



**US Army Corps  
Of Engineers®**  
Los Angeles District

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# **Los Angeles River Ecosystem Restoration Feasibility Study**

## **APPENDIX M**

### **Draft Clean Water Act Section 404(b)(1) Evaluation**

**September 2015**

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## Appendix M Draft Clean Water Act Section 404(b)(1) Evaluation

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## **1.0 Clean Water Act Section 404(b)(1) Regulatory Background**

Section 404 of the Clean Water Act (CWA) governs the discharge of dredged or fill material into waters of the U.S. Although the Corps does not process and issue permits for its own activities, the Corps authorizes its own discharges of dredged or fill material by applying all applicable substantive legal requirements, including application of the Section 404(b)(1) Guidelines, 33 C.F.R. 336.1(a).

Under the Section 404(b)(1) Guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge is prohibited. The Section 404(b)(1) Guidelines prohibit discharges of dredged or fill material into waters of the U.S. if a practicable alternative to the proposed discharge exists that would have less adverse impacts on the aquatic ecosystem, including wetlands, as long as the alternative does not have other significant adverse environmental impacts (40 C.F.R. 230.10(a)). An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of overall project purpose (40 C.F.R. 230.10(a)(2)). The Section 404(b)(1) Guidelines follow a sequential approach to project planning that considers mitigation measures only after the project proponent shows no practicable alternatives are available to achieve the overall project purpose with less environmental impacts. Once it is determined that no practicable alternatives are available, the guidelines then require that appropriate and practicable steps be taken to minimize potential adverse effects on the aquatic ecosystem (40 C.F.R. 230.10(d)). Such steps may include actions controlling discharge location, material to be discharged, the fate of material after discharge or method of dispersion, and actions related to technology, plant and animal populations, or human use (40 C.F.R. 230.70-230.77).

Beyond the requirement for demonstrating that no practicable alternatives to the proposed discharge exist, the Section 404(b)(1) Guidelines also require the Corps to compile findings related to the environmental impacts of discharge of dredged or fill material. The Corps must make findings concerning the anticipated changes caused by the discharge to the physical and chemical substrate and to the biological and human use characteristics of the discharge site.

These guidelines also indicate that the level of effort associated with the preparation of the alternatives analysis be commensurate with the significance of the impact and/or discharge activity (40 C.F.R. 230.6(b)).

## **2.0 Basic and Overall Project Purpose**

### **2.1 Basic Project Purpose**

The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the Corps to determine whether a project is water dependent. The Section 404(b)(1) Guidelines state that if an activity associated with the discharge proposed for a special aquatic site does not require access or proximity to, or siting within, the special aquatic site in question to fulfill its basic purpose, the activity is not water-dependent.

The basic project purpose is aquatic ecosystem restoration. The activity is water dependent. See Section 5.5 of the Integrated Feasibility Report (IFR) for in-water construction required for all action alternatives.

### **2.2 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 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 preferred alternative, thereby unreasonably limiting the consideration of alternatives. Conversely, it should not be so broadly defined as to render the evaluation unreasonable and meaningless.

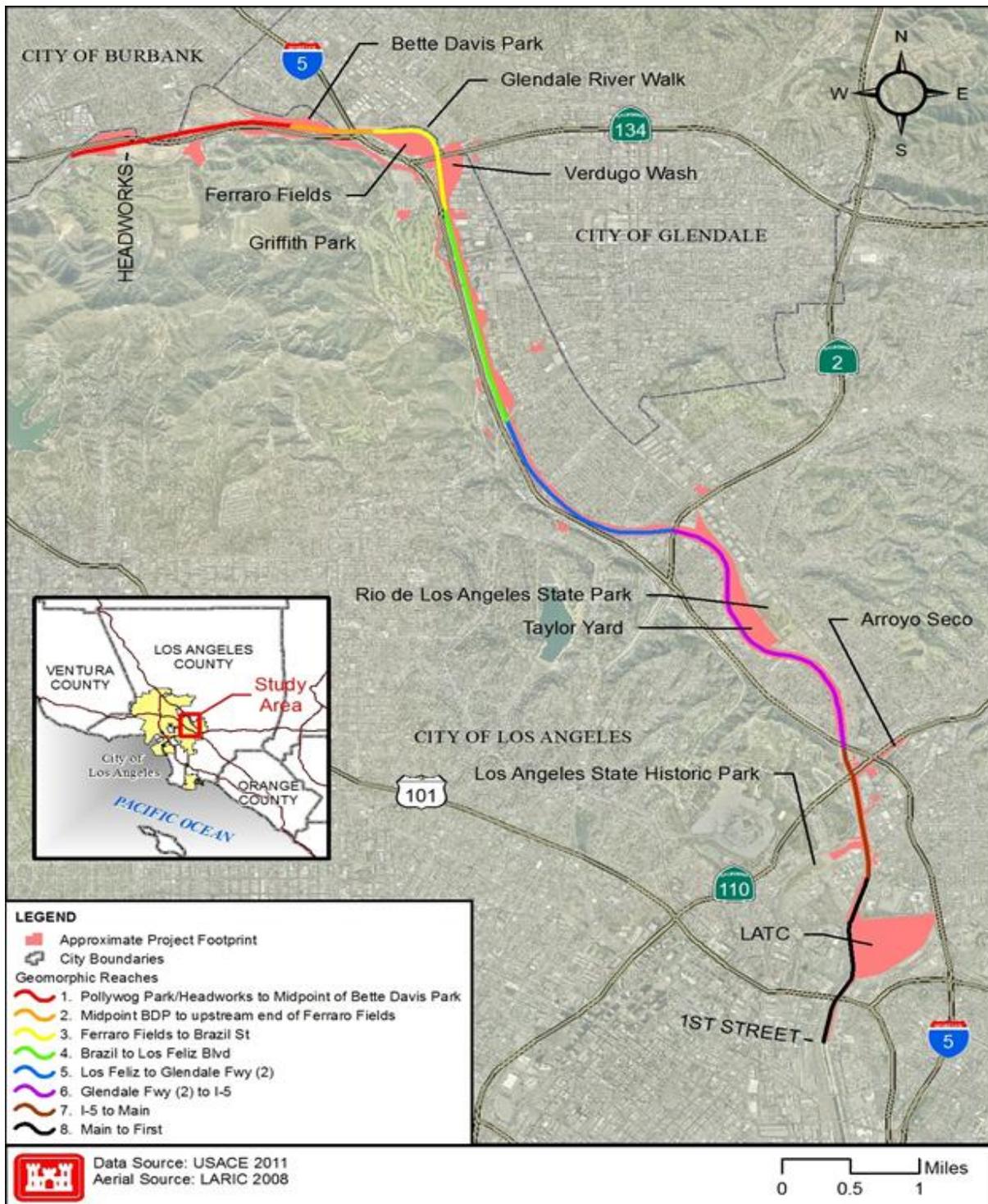
As indicated in Section 1.1.1 of the IFR, the overall project purpose is to restore approximately 11 miles of the Los Angeles River (River) from Griffith Park to downtown Los Angeles by reestablishing riparian strand, freshwater marsh, and aquatic habitat communities and reconnecting the River to major tributaries, its historic floodplain, and the regional habitat zones of the Santa Monica, San Gabriel, and Verdugo mountain ranges while maintaining existing levels of flood risk management.

There is a secondary objective of the project to provide passive recreational opportunities consistent with the restored ecosystem, which is considered incidental to the overall project purpose and therefore not part of the overall project purpose under the CWA. There are no impacts to waters of the U.S. associated with recreation features corresponding to the restoration alternatives.

### **2.3 Study Area Description**

There are eight geomorphically different reaches within the study area as shown in Figure 1 (see Section 2.2 of the IFR for additional information). They were defined based on the physical characteristics of channel morphology, bank characteristics, soil exposure, existing habitat, and surrounding land uses. Specific geomorphic criteria include: (1) channel bed type (either soft bed with groundwater/surface water exchange, or concrete), (2) side slope type (vertical or trapezoidal), and (3) adjacent land uses or open space. The reaches are described as follows:

- **Reach 1:** Reach 1 is the upstream segment of the study area and is approximately 1.5 river miles in length. In this reach the River's channel has a rectangular concrete-lined configuration with subdrains and no low flow channel.
- **Reach 2:** Reach 2 is approximately 0.75 mile in length. The bed transitions from concrete-lined to a cobblestone bed, and then transitions back to concrete. The channel has a trapezoidal configuration with grouted derrick stone banks. The banks are toed-down (secured by extending the bank wall below the River bed) with sheet pile and quarry run stone.
- **Reach 3:** This reach is approximately 1 mile in length. From upstream to downstream, the bed transitions from cobbles to concrete and back to cobbles. The channel in this area has a rectangular concrete configuration.
- **Reach 4:** This reach is approximately 1.75 miles long. The bed transitions from a concrete-lined rectangular channel to a trapezoidal channel with a cobble bed and grouted derrick stone banks. Banks are toed-down with sheet pile and quarry run stone. Sediment deposited in the channel has formed sand bars/islands, which are stabilized by the root systems of the many trees and other vegetation.
- **Reach 5:** This reach is approximately 1.55 miles long. The bed transitions from concrete under each of the large bridges to a trapezoidal channel with a cobblestone bed and grouted derrick stone banks between the bridges. Banks are toed-down with sheet pile and quarry run stone. Sediment deposited in the channel has formed sand bars/islands, which have stabilized as the root systems of the many trees and other vegetation have trapped sediment.
- **Reach 6:** This reach is approximately 2.34 miles long. From upstream to downstream, the bed transitions from cobblestone to concrete-lined. Here, the channel is in a trapezoidal configuration with a cobble bed and grouted derrick stone banks. The banks are toed-down with sheet pile and quarry run stone. Sediment deposited in the channel has formed sand bars/islands, which have become stabilized as the root systems of the many trees and other vegetation have trapped sediment.
- **Reach 7:** This reach is approximately 1-mile-long. The channel in this area transitions out of the rectangular concrete channel at the Arroyo Seco confluence, and becomes a trapezoidal concrete channel that is approximately 30 feet deep.
- **Reach 8:** This approximately 1-mile-long reach is a trapezoidal concrete channel approximately 30 feet deep.



**Figure 1: Study Area Reaches**

## 2.4 Jurisdictional Determination of Waters of the U.S.

The study area encompasses 11 miles of the River and approximately 1,500 feet of the lower reaches of Verdugo Wash, Arroyo Seco Channel, and Burbank Western Channel.

### Los Angeles River

In the 2010 Special Case Evaluation Regarding Status of the River, the U.S. Environmental Protection Agency documented the historical and current navigability of the River and deemed the River to be a Traditional Navigable Water (TNW), a water of the U.S. pursuant to 33 C.F.R. 328.3(a)(1).

In the absence of adjacent wetlands, jurisdictional limits in non-tidal waters of the U.S. extend to the ordinary high water mark (OHWM). When adjacent wetlands are present, jurisdiction extends beyond the OHWM to the limit of the adjacent wetlands. No adjacent wetlands were identified in the River study area. Wetlands within the non-concrete bottom portions of the River are located on sand banks and are variable, prone to changes in size and location depending on the severity of storm flows.

OHWM within the River was established by examining debris lines deposited on the trapezoidal embankments during and after storm flows. Based on a conservative interpretation of physical evidence, the OHWM is halfway up the embankment.

### Arroyo Seco, Verdugo Wash, Burbank Western Channel

Per the 2008 joint U.S. Environmental Protection Agency-Department of the Army guidance implementing the Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* which address the jurisdiction over waters of the U.S. under the CWA, the agencies will assert jurisdiction over relatively permanent non-navigable tributaries of TNWs. A non-navigable tributary of a TNW is a non-navigable water body whose waters flow into a TNW either directly or indirectly by means of other tributaries. Non-navigable tributaries of TNWs are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months). Relatively permanent waters do not include ephemeral tributaries which flow only in response to precipitation and intermittent streams which do not typically flow year-round or have continuous flow at least seasonally.

The Arroyo Seco Channel is a direct tributary to the River. Due to a high ground water table in unlined reaches as well as nuisance flows and runoff from golf courses, daily base flow ranges from 0.25-1 cubic feet per second (cfs). As such, flows are perennial. Arroyo Seco Channel is therefore a relatively permanent non-navigable tributary of a TNW, and a jurisdictional water of the U.S. pursuant to 33 C.F.R. 328.3(a)(5). No adjacent wetlands were identified. OHWM was established by examining the extent of concrete stains on the vertical wall. Based on the physical evidence, the OHWM is halfway up the vertical walls.

Verdugo Wash is a relatively permanent non-navigable tributary of a TNW. The wash is a direct tributary to the River, draining an urbanized area within the City of Glendale as well as the Verdugo Hills. Due to nuisance flows and runoff from golf courses, daily base flow ranges from 1-3 cfs. As such, flows are perennial. Verdugo Wash is therefore a relatively permanent non-navigable tributary of a TNW, and a jurisdictional water of the U.S. pursuant to 33 C.F.R.

328.3(a)(5). No adjacent wetlands were identified. Examination of available photographs does not indicate presence of concrete stains or other physical evidence of OHWM. Thus, based on the available evidence at Arroyo Seco, the OHWM is assumed to be halfway up the vertical walls.

The Burbank Western Channel is a relatively permanent non-navigable tributary of a TNW. The channel is a direct tributary to the River, draining an urbanized area within the City of Burbank as well as the Verdugo Hills. Daily base flow averages at approximately 10 cfs. As such, flows are perennial. Burbank Western Channel is therefore a relatively permanent non-navigable tributary of a TNW, and a jurisdictional water of the U.S. pursuant to 33 C.F.R. 328.3(a)(5). No adjacent wetlands were identified. Examination of available photographs does not indicate presence of concrete stains or other physical evidence of OHWM. Based on the available evidence at Arroyo Seco, the OHWM is assumed to be halfway up the vertical walls.

## 3.0 Alternatives Considered

### 3.1 Management Measures and Associated Discharges of Fill

Alternatives were formulated from a combination of management measures. See Chapter 4 of the IFR for additional information. This section describes the management measures and qualitatively characterizes the anticipated discharges of fill material associated with each management measure.

#### Daylight Streams

This management measure entails excavation of currently enclosed drainages in the historic floodplain of the River. Once excavated, the drainages would be naturalized in areas within the vicinity of their respective confluences with the River. Many of the enclosed drainages convey storm flows from the uplands into the River through existing storm water outfalls. Materials to be excavated/removed from the drainages include, but are not limited to, corrugated metal pipes and reinforced concrete boxes. Once excavated, the drainages would be graded, contoured, and planted with native riparian vegetation. In some cases, storm drains that are not being daylighted (naturalized) may need to be reconfigured or new outfalls constructed, due to other restoration work occurring in the vicinity. These activities may also result in discharges of fill material. Discharges of fill material into existing waters of the U.S. for all storm drain modification activities would entail placement of concrete for new outfalls, and would entail like-for-like replacement of existing outfalls. Temporary discharges of fill material would include potential placement of dewatering structures within the invert in the area of the outfalls.

#### Widen River and Tributaries

This management measure entails excavation of uplands behind the existing embankment, construction of a new embankment in the uplands, and removal of the existing embankment of the River, Verdugo Wash, or Arroyo Seco. The activity would require discharge of native substrate associated with grading in the vicinity of the existing embankment as well as temporary discharges of fill material for dewatering structures, such as k-rails, to divert water around the work area during construction; establishment of access ramps; and establishment of staging areas.

#### Creation of Side Channels

This management measure entails the excavation of new drainages in the uplands parallel to the River. Once excavated, the drainages would be graded, contoured, and planted with native riparian vegetation. The principal sources of hydrology could be storm water or existing flows from the River. Discharges of fill material into existing waters of the U.S. would be limited to discharges of fill material associated with the construction or reconstruction of concrete outfalls or construction of intake structures in the River. In many cases, the discharges would entail like-for-like replacements.

#### Vegetated Channel Walls

This management measure supplements the existing riparian vegetation in the River by attaching turf reinforcement mat, a pre-seeded turf matrix, to the existing sloped embankments of the River. The portion of the turf laid upon the sloped embankments would be anchored with

fasteners. The portion of the turf within the invert would be anchored with engineered rock keys. The work would also require the temporary discharges of fill material for dewatering structures, such as k-rails, to divert water around the work area during construction; establishment of access ramps; and establishment of staging areas.

#### Modify Channel Banks

This management measure would remove a portion of the upper sloped embankments of the River to create a two-tiered sloped embankment profile. It would include excavation to create basins or terraces that tie into the channel and adjacent topography. These modifications would have slopes at a 3 to 1 transition ratio or more gradual and be interspersed with freshwater marsh (retention basins) and riparian vegetation. In other cases, the trapezoidal embankments of the River would be replaced with a vertical wall to widen the channel. The work would also require the temporary discharge of dewatering structures, such as k-rails, to divert water around the work area during construction.

### **3.2 Alternatives and Impacts to Waters of the U.S.**

The IFR evaluated an array of alternatives in Chapter 4. A number of alternatives were deemed impracticable due to costs while one would not have met the overall project purpose. Due to the need to maintain existing flood risk levels, several alternatives incorporated tunnels to divert flood flows around the study area. These alternatives were determined to be impracticable due to the approximately \$1.5 billion cost of tunneling (see Section 4.10 of the IFR). Another alternative that would have widened the channel width by 3 to 5 times to accommodate a natural riparian river system was determined to be impracticable due to the approximately \$7.6 billion real estate acquisition cost (see Section 4.10.1 of the IFR). One alternative limiting the ecosystem restoration to the Los Angeles County Drainage Area (LACDA) right-of-way (i.e., channel and bicycle paths) would not meet the overall project purpose (see Section 4.10.1 of the IFR). Chapter 4 of the IFR provides complete descriptions of these alternatives as well as discussions of alternatives considered but not carried forward for further analysis.

Subsequent to the application of measures to screen alternatives, four action alternatives (Alternatives 10, 13, 16, and 20) as well as the No Federal Action Alternative were further evaluated in the IFR, constituting a reasonable range of alternatives. Furthermore, after additional economic analysis, a more cost effective variation was identified for one alternative; this variation alternative, known as Alternative 13v, is identical to Alternative 13 except in Reach 7, where it includes restoration measures in Reach 7 identical to those proposed under Alternative 20. Specifically, the Reach 7 plan in Alternative 20 includes the three daylighted streams in the Reach 7 plan from Alternative 10, the Arroyo Seco softening and backwater wetland creation from Alternative 13, and adds restoration of wetland habitat at the Los Angeles State Historic Park (LASHP) along with terracing of the right bank of the channel adjacent to the LASHP.

#### No Federal Action

Under the No Federal Action alternative, none of the proposed management measures would be implemented. The Corps would continue to maintain the channel for flood risk management purposes, but would not seek to restore habitat values. There would be no impacts to wetlands or

other waters of the U.S. from restoration activities as none would occur. Channel maintenance activities would continue to include vegetation and sediment removal as funding allows.

#### Alternative 10

Alternative 10 is called the ART (for ARBOR Riparian Transitions) as it provides some restoration in all reaches and provides transitions or connections between existing riparian corridors and concrete lined river reaches. In Reach 1, it establishes riparian corridors along the overbanks of both sides of the River channel, improving potential wildlife connections from the river to the Headworks study site and the Santa Monica Mountains. It also restores riparian habitat at the Pollywog Park Area of Griffith Park and along the left overbank of the Burbank Western Channel. In Reach 2, the plan continues the establishment of the riparian corridor along the overbank on both sides of the River, with habitat connections to the Santa Monica Mountains. In Reach 3, it continues the riparian corridor on the right side of the River along Zoo Drive and daylights and restores riparian and freshwater marsh habitat at three streams currently encased in culverts, two on the east side of the River and one on the west side. In Reach 4, it establishes a riparian corridor on the left overbank, creates a side channel at the edge of Griffith Park Golf Course with inlet and outlet to the River under I-5 on the right bank, lowers a portion of the Los Feliz Golf Course on the left bank of the River to allow seasonal flooding through existing culverts, and daylights eight streams. In Reach 5, this alternative continues the riparian corridor on the left overbank and includes a daylighted stream at the downstream end. In Reach 6, it widens the channel approximately 80 feet along Taylor Yard, restores riparian habitat in the widened area and overbank, and creates a small terraced area in the Bowtie parcel. Restoration is continued in Reach 7 with three daylighted streams. In Reach 8, at the LATC site, it restores a historic wash and riparian habitat. This restoration would allow flows from the ephemeral wash to enter the River through existing culverts under the railroad lines. In addition to the specific features outlined above, this alternative removes invasive vegetation throughout the restoration features and within the River and tributary channel bottom throughout the project footprint. Table 3-1 below details measures that either fill waters of the U.S. or create new waters of the U.S. In total, Alternative 10 would discharge fill material into approximately 4.63 acres of waters of the U.S. Permanent fill material would be discharged into 4.52 acres. Dewatering structures would temporarily discharge fill material into 0.11 acre. Alternative 10 would establish approximately 56 acres of new waters of the U.S.

Maintenance of ecosystem restoration features would be conducted under this alternative by the City of Los Angeles, the non-Federal sponsor. Maintenance in general would include removal of invasive species throughout the project footprint, including the River and tributary channel bottom; repair and replacement of irrigation pipes and sprinklers; maintenance of constructed trails, terraces, and viewing areas; trimming of native vegetation; removal of trash and accumulated sediment; graffiti abatement; vector management; and like-for-like structural repair. Project areas subject to invasive removal include the channel bottom of the River, Verdugo Wash-River confluence, Burbank-Western Channel-confluence and short distance upstream, and the Arroyo Seco-River confluence as well as constructed restoration features. The Corps would continue to be responsible for maintaining all other aspects of the portion of the LACDA project that overlaps with the restoration project footprint.

Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintaining design grades, elevations,

contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment such as bulldozers within newly established waters of the U.S. Impacts would be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill material would not decrease the amount of newly established waters of U.S. Invasive species in the River and tributary channel bottom within the study area would typically be removed by hand tools. Thus, the activity would not result in discharges of fill material in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, impacts would be temporary and there would be no loss of waters of the U.S.

**Table 3-1 Alternative 10 – Summary of Fill Material in Existing Waters of the U.S. and Establishment of New Waters of the U.S.**

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
3. Ferraro Fields area of Griffith Park	Daylight Streams	5	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA
4. Griffith Park	Daylight Streams	9	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	1	None: Removal of materials at inlet and outlet connections	NA	(200 CY)	0
			Backfill as needed to create stable inlet and outlet	Perm.	100 CY	.02
			Install k-rails or sandbags	Temp.	220 linear feet (LF)	0.01
5. Riverside Drive	Daylight Streams	1	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA
6. Taylor Yard	Modify Channel Banks/Widen Channel	12	None: Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(145,381 CY)	0
			Backfill with clean topsoil	Perm.	8,066 CY	4.5
			Install k-rails or sandbags	Temp.	4,224 LF	0.10
7. Arroyo Seco	Daylight Streams	3	None: activity is occurring in overbank area outside of existing waters of the	NA	NA	NA

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
			U.S.			
8. LATC	Restore historic wash	25	None: activity is occurring in overbank area outside of existing waters of the U.S.	Perm.	NA	NA

### Alternative 13

Alternative 13 is named ACE (for ARBOR Corridor Extension). Alternative 13 has the same restoration features as Alternative 10 in Reaches 1, 2, 4, 5, and 8 and provides additional restoration in Reaches 3, 6, and 7. In Reach 3, in addition to the measures identified in Alternative 10, this alternative would create a side channel entering upstream from the River behind Ferraro Fields and re-entering the River at the downstream end of the reach. In Reach 6, this alternative widens the river channel by over 300 feet into Taylor Yard with restoration of the floodplain and freshwater marsh in the widened channel. It also creates a backwater wetland at the Bowtie parcel, and it restructures the left bank upstream of the backwater wetland and downstream of Taylor Yard, as well as the entirety of the right bank, in this reach with implanted vegetation. In Reach 7, this alternative restores a portion of the Arroyo Seco tributary and makes nodal connections on the left side of the River to the Arroyo Seco watershed. This is accomplished through softening of the bed and banks with development of a riparian corridor in the tributary confluence and for one half mile upstream. The Arroyo Seco restoration supports connections through the River from the Santa Monica Mountains to the San Gabriel Mountains. Instead of the daylighted streams included in this reach in Alternative 10, this alternative lines the banks of the River downstream from the Arroyo Seco with overhanging vines and implanted vegetation. In addition to the specific features outlined above, this alternative removes invasive vegetation throughout the restoration features and within the River and tributary channel bottom throughout the project footprint. Table 3-2 below summarizes the measures that either fill waters of the U.S. or create new waters of the U.S. In total, Alternative 13 would discharge fill material into approximately 27.51 acres waters of the U.S. Permanent fill material would be discharged into 26.84 acres. Dewatering structures would temporarily discharge fill material into 0.67 acre. Alternative 13 would establish approximately 86 acres of new waters of the U.S.

Maintenance of ecosystem restoration features would be conducted under this alternative by the City of Los Angeles. Maintenance in general would include removal of invasive species throughout the project footprint, including the River and tributary channel bottom; repair and replacement of irrigation pipes and sprinklers; maintenance of constructed trails, terraces, and viewing areas; trimming of native vegetation; removal of trash and accumulated sediment; graffiti abatement; vector management; and like-for-like structural repair. Project areas subject to invasive removal include the channel bottom of the River, Verdugo Wash-River confluence, Burbank-Western Channel-confluence and short distance upstream, and the Arroyo Seco-River confluence as well as constructed restoration features. The Corps would continue to be

responsible for maintaining all other aspects of the portion of the LACDA project that overlaps with the restoration project footprint..

Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts would be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill material would not decrease the amount of newly established waters of U.S. Invasive species in the River and tributary channel bottom within the project area are typically removed by hand tools. Thus, the activity would not result in discharges of fill material in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, impacts would be temporary and there would be no loss of waters of the U.S.

**Table 3-2 Alternative 13 – Summary of Fill Material in Existing Waters of the U.S. and Establishment of New Waters of the U.S.**

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
3. Ferraro Fields area of Griffith Park	Daylight Streams	5	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	6	Removal of materials at inlet and outlet connections, above existing waters of the U.S.	Perm.	(200 CY)	0
			Backfill to create stable inlet and outlet	Perm.	100 CY	.02
			Install k-rails or sandbags	Temp.	220 LF	.01
4. Griffith Park	Daylight Streams	9	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	1	Removal of materials at inlet and outlet connections, above existing waters of the U.S.	Perm.	(200 CY)	0
			Backfill as needed to create stable inlet and outlet, above existing waters of the U.S.	Perm.	100 CY	.02
			Install k-rails or sandbags	Temp.	220 LF	0.01

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
5. Riverside Drive	Daylight Streams	1	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
6. Taylor Yard	Vegetated Channel Walls (Right Bank)	NA	Install vegetation anchor materials	Perm.	67,819 Square Yards (SY)	14
			Rock at vegetation anchor tie-in	Perm.	2,833 CY	
			Install k-rails or sandbags	Temp.	7,392 LF	0.2
	Vegetated Channel Walls (Left Bank)	NA	Install vegetation anchor materials	Perm.	16,855 SY	3.3
			Rock at vegetation anchor tie-in	Perm.	778 CY	
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
	Modify Channel Banks/Widen Channel	12	None: Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(145,381 CY)	0
			Backfill with clean topsoil	Perm.	8,066 CY	4.5
			Install k-rails or sandbags	Temp.	4,224 LF	0.10
	Create New Wetlands Behind Bank	13	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
7. Arroyo Seco/Los Angeles River State Park	Modify Channel Banks	14	None: Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(79,723 CY)	0
			Backfill with clean topsoil	Perm.	3,000 CY	5
			Install k-rails or sandbags	Temp.	4,200 LF	0.10
8. LATC	Restore Historic Wash	25	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA

### Alternative 16

Alternative 16 is called AND (for ARBOR Narrows to Downtown). This alternative includes the same features as Alternative 13 in Reaches 1-4 and 6-8 and includes greater restoration in Reaches 5 and 8. In Reach 5, this alternative widens the River channel by modifying the right

bank from a trapezoidal bank to a vertical wall and modifies the left bank from trapezoidal to a terraced vegetated bank. At the downstream end of this reach, the River channel will also be widened by modifying the left bank. The daylighted stream in Alternatives 10 and 13 is also included in this reach. In Reach 8, the alternative includes additional restoration by terracing upstream of LATC on the right bank of the River, terracing downstream on the left bank, and removing the left bank and the concrete bed adjacent to LATC. The channel bed will be naturalized to support freshwater marsh in the River. This alternative widens the River into the LATC site by 500 feet on a low terrace and another 1000 feet on a second terrace. The restoration features at the LATC site would also include the restoration of the historic wash, along with wetland habitat. In addition to the specific features outlined above, this alternative removes invasive vegetation throughout the project footprint, including the River and tributary channel bottom. Table 3-3 below summarizes the measures that either fill waters of the U.S. or create new waters of the U.S. In total, Alternative 16 would permanently discharge fill material into approximately 50.25 acres waters of the U.S. Permanent fill would be discharged into 49.21 acres. Dewatering structures would temporarily discharge fill material into 1.04 acres. Alternative 16 would establish approximately 145.6 acres of new waters of the U.S.

Maintenance of ecosystem restoration features would be conducted under this alternative by the City of Los Angeles. Maintenance in general would include removal of invasive species throughout the project footprint; repair and replacement of irrigation pipes and sprinklers; maintenance of constructed trails, terraces, and viewing areas; trimming of native vegetation; removal of trash and accumulated sediment; graffiti abatement; vector management; and like-for-like structural repair. Project areas subject to invasive removal include the channel bottom of the River, Verdugo Wash-River confluence, Burbank-Western Channel-confluence and short distance upstream, and the Arroyo Seco-River confluence as well as constructed restoration features. The Corps would continue to be responsible for maintaining all other aspects of the portion of the LACDA project that overlaps with the restoration project footprint.

Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts would be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill material would not decrease the amount of newly established waters of U.S. Invasive species in the river and tributary channel bottom within the project area are typically removed by hand tools. Thus, the activity would not result in discharges of fill material in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, impacts would be temporary and there would be no loss of waters of the U.S.

**Table 3-3 Alternative 16 – Summary of Fill Material in Existing Waters of the U.S. and Establishment of New Waters of the U.S.**

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
3. Ferraro Fields area of Griffith Park	Daylight Streams	5	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	6	Removal of materials at inlet and outlet connections	Perm.	(200 CY)	0
			Backfill to create stable inlet and outlet	Perm.	100 CY	.02
			Install k-rails or sandbags	Temp.	220 LF	.01
4. Griffith Park	Daylight Streams	9	None: activity is occurring in overbank area, outside of existing waters of the U.S,	NA	NA	NA
	Side Channel	1	Removal of materials at inlet and outlet connections	Perm.	(200 CY)	0
			Backfill as needed to create stable inlet and outlet	Perm.	100 CY	.02
			Install k-rails or sandbags	Temp.	220 LF	0.01
5. Riverside Drive	Daylight Streams	1	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Terrace/Vegetated Channel Walls	NA	Install vegetation anchor materials	Perm.	14,520 SY	3
			Rock at vegetation anchor tie-in	Perm.	778 CY	0.02
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
	Modify Trapezoidal Channel to Vertical Banks	20.6	Demolition and materials removal	Perm.	(140,763 CY)	0
			Backfill for stabilization	Perm.	113,991 CY	6.2
			Install k-rails or sandbags	Temp.	8,448 LF	0.02
6. Taylor Yard	Vegetated Channel Walls (Right Bank)	NA	Install vegetation anchor materials	Perm.	67,819 CY	14
			Rock at vegetation anchor tie-in	Perm.	2,833 CY	0.2

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.				
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled	
	Vegetated Channel Walls (Left Bank)	NA	Install k-rails or sandbags	Temp.	7,392 LF	0.2	
			Install vegetation anchor materials	Perm.	16,855 SY	3.3	
			Rock at vegetation anchor tie-in	Perm.	778 CY	.05	
	Modify Channel Bed and Banks	12	Install k-rails or sandbags	Temp.	11,960 LF	0.25	
			Excavate embankment to channel bed within waters of the U.S.	Perm.	(145,381 CY)	0	
			Backfill with clean topsoil	Perm.	8,066 CY	4.5	
	Create New Wetlands Behind Bank	13	Install k-rails or sandbags	Temp.	4,224 LF	0.10	
			None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA	
	7. Arroyo Seco/Los Angeles River State Park	Modify Channel Banks	14	Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(79,723 CY)	0
				Backfill with clean topsoil	Perm.	3,000 CY	5
Install k-rails or sandbags				Temp.	4,200 LF	0.10	
8. LATC	Create Side Channel	13	Demolition and materials removal	NA	(46,826 CY)	0	
			Backfill for stabilization	Perm.	42,476 CY	0.2	
			Install k-rails or sandbags	Temp.	220 LF	0.01	
	Modify Channel Bed and Banks	26	Excavate embankment and channel bed to within the waters of the U.S.	Perm.	(397,871 CY)	0	
			Backfill with clean topsoil	Perm.	18,996 CY	11.3	
			Install k-rails or sandbags	Temp.	3,168 LF	0.08	
	Restore Historic Wash	25	Demolition and materials removal within waters of the U.S.	Perm.	(48,340 CY)	0	
			Backfill for stabilization	Perm.	2,193 CY	1.4	
			Install k-rails or sandbags	Temp.	3,168 LF	0.01	

### Alternative 20

Alternative 20 is called RIVER (for Riparian Integration via Varied Ecological Reintroduction) as it includes the same features as Alternative 16 in Reaches 1, 4, 5, 6, and 8 and includes greater restoration in Reaches 2, 3 and 7. In Reach 2, this alternative widens the the River channel by modifying the right bank from a trapezoidal bank to a vertical wall. In Reach 3, the alternative restores the confluence with Verdugo Wash by softening the bed of the stream and significantly widening the mouth of the wash, thus providing riparian habitat and an additional connection to the San Gabriel Mountains through the Verdugo Hills. In Reach 7, this alternative includes the same Arroyo Seco restoration as Alternative 13, and in addition, reintroduces the daylighted streams included in Alternative 10 in lieu of the channel bank vegetation features that were in Alternatives 13 and 16. Also in Reach 7, this alternative restores freshwater marsh at the Los Angeles State Historic Park and creates a terraced bank connection to the River. In addition to the specific features outlined above, this alternative removes invasive vegetation throughout the project footprint, including within the River and tributary channel bottom. Table 3-4 below summarizes the measures that either fill waters of the U.S. or create new waters of the U.S. In total, Alternative 20 would permanently discharge fill material into approximately 67.29 acres waters of the U.S. Permanent fill would be discharged into 65.61 acres. Dewatering structures would temporarily discharge fill material into 1.68 acres. Alternative 20 would establish approximately 168.6 acres of new waters of the U.S.

Maintenance of ecosystem restoration features would be conducted under this alternative by the City of Los Angeles. Maintenance in general would include removal of invasive species throughout the project footprint; repair and replacement of irrigation pipes and sprinklers; maintenance of constructed trails, terraces, and viewing areas; trimming of native vegetation; removal of trash and accumulated sediment; graffiti abatement; vector management; and like-for-like structural repair. Project areas subject to invasive removal include the channel bottom of the River, Verdugo Wash-River confluence, Burbank-Western Channel-confluence and short distance upstream, and the Arroyo Seco-River confluence as well as constructed restoration features. The Corps would continue to be responsible for maintaining all other aspects of the portion of the LACDA project that overlaps with the restoration project footprint. Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts would be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill material would not decrease the amount of newly established waters of U.S. Invasive species in the River and tributary channel bottom within the study area would typically be removed by hand tools. Thus, the activity would not result in discharges of fill material in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, impacts would be temporary and there would be no loss of waters of the U.S.

**Table 3-4 Alternative 20 – Summary of Fill Material in Existing Waters of the U.S. and Establishment of New Waters of the U.S.**

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
2. Bette Davis Park area of Griffith Park	Vegetated Channel Walls	NA	Install vegetation anchor materials	Perm.	8,206 SY	1.7
			Rock at vegetation anchor tie-in	Perm.	424 CY	0.02
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
	Modify Trapezoidal Channel to Vertical Banks	5.5	Demolition and removal of materials	Perm.	(7,020 CY)	0
			Backfill for stabilization	Perm.	41,625 CY	1.75
			Install k-rails or sandbags	Temp.	8,448 LF	0.2
3. Ferraro Fields/Verdugo Wash area of Griffith Park	Daylight Streams	2	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	6	Removal of materials at inlet and outlet connections, above OHWM	Perm.	(200 CY)	0
			Backfill to create stable inlet and outlet	Perm.	100 CY	0.02
			Install k-rails or sandbags	Temp.	220 LF	0.01
	Widen Tributaries	8	Demolition and removal of materials	Perm.	(509,058 CY)	0
			Backfill for stabilization and add vegetation anchoring materials	Perm.	24,115 CY	6.5
Install k-rails or sandbags			Temp.	2,000 LF	0.02	
4. Griffith Park	Daylight Streams	9	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	1	Removal of materials at inlet and outlet connections, above OHWM	Perm.	(200 CY)	0
			Backfill as needed to create stable inlet and outlet	Perm.	100 CY	0.02
			Install k-rails or sandbags	Temp.	220 LF	0.01
5. Riverside Drive	Daylight Streams	1	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Vegetated Channel Walls (Both Banks)	NA	Install vegetation anchor materials	Perm.	14,520 CY	9
			Rock at vegetation anchor tie-in	Perm.	2,333 CY	0.05
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
Modify Trapezoidal	20.6	Demolition and materials removal	Perm.	(140,763 CY)	0	

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
	Channel to Vertical Banks		Backfill for stabilization	Perm.	113,991 CY	6.2
			Install k-rails or sandbags	Temp.	8,448 LF	0.02
6. Taylor Yard	Vegetated Channel Walls (Right bank)	NA	Install vegetation anchor materials	Perm.	67,819 SY	14
			Rock at vegetation anchor tie-in	Perm.	2,833 CY	0.2
			Install k-rails or sandbags	Temp.	7,392 LF	0.2
	Vegetated Channel Walls (Left bank)	NA	Install vegetation anchor materials	Perm.	16,855 SY	3.3
			Rock at vegetation anchor tie-in	Perm.	778 CY	0.05
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
	Modify Channel Banks	12	Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(145,381 CY)	0
			Backfill with clean topsoil	Perm.	8,066 CY	4.5
			Install k-rails or sandbags	Temp.	4,224 LF	0.1
	Create New Wetlands Behind Bank	13	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
7. Arroyo Seco and Los Angeles State Historic Park	Daylight Streams	3	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA.	NA	NA
	Create Wetland	9	Install vegetation stabilization features, concrete, riprap, and topsoil	Perm.	NA	NA
	Modify channel Banks	14	Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(79,723 CY)	0
			Backfill with clean topsoil	Perm.	3,000 CY	5
			Install k-rails or sandbags	Temp.	4,200 LF	0.1
	Terrace banks	0.5	Demolition and removal of materials to within waters of the U.S.	Perm	(3,771 CY)	0
			Backfill for stabilization and add vegetation anchoring materials	Perm	3,052 SF	0.5
	0	Install k rails or sandbags	Temp	595 LF	0.5	
8. LATC	Create Side Channel	13	Demolition and materials removal	Perm.	(46,826 CY)	0
			Backfill for stabilization	Perm.	42,476 CY	0.1
			Install k-rails or sandbags	Temp.	220 LF	0.01
	Modify Channel Bed	26	Excavate embankment and channel bed within waters of the U.S.	Perm.	(397,871 CY)	0

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
	and Banks	25	Backfill with clean topsoil	Perm.	18,996 CY	11.3
			Install k-rails or sandbags	Temp.	3,168 LF	0.08
	Excavate embankment to channel bed within waters of the U.S.		Perm.	(48,340 CY)	0	
	Backfill with clean topsoil		Perm.	2,193 CY	1.4	
	Install k-rails or sandbags		Temp.	3,168 LF	0.01	

Alternative 13v

Alternative 13v would include all measures and impacts of Alternative 13. Moreover, Alternative 13v would add restoration measures in Reach 7 identical to those proposed under Alternative 20. Within Reach 7, streams would be daylighted; freshwater marsh would be created; embankments would be terraced; and channel banks would be modified. Like the other alternatives, this alternative includes invasive vegetation removal throughout project footprint, including the River and tributary channel bottom. This Alternative has been identified as the National Ecosystem Restoration plan. Table 3-5 below summarizes the measures that either fill waters of the U.S. or create new waters of the U.S. In total, Alternative 13v would permanently discharge fill material into approximately 27.51 acres waters of the U.S. Permanent fill would be discharged into 26.84 acres. Dewatering structures would temporarily discharge fill material into 0.67 acre. Alternative 13v would establish approximately 98.5 acres of new waters of the U.S.

Maintenance of ecosystem restoration features would be conducted under this alternative by the City of Los Angeles. Maintenance in general would include removal of invasive species throughout the the project footprint; repair and replacement of irrigation pipes and sprinklers; maintenance of constructed trails, terraces, and viewing areas; trimming of native vegetation; removal of trash and accumulated sediment; graffiti abatement; vector management; and like-for-like structural repair. Project areas subject to invasive removal include the channel bottom of the River, Verdugo Wash-River confluence, Burbank-Western Channel-confluence and short distance upstream, and the Arroyo Seco-River confluence as well as constructed restoration features. The Corps would continue to be responsible for maintaining all other aspects of the portion of the LACDA project that overlaps with the restoration project footprint.

Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts would be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or

permanent discharges of fill material would not decrease the amount of newly established waters of U.S. Invasive species in the River and tributary channel bottom within the project area would typically be removed by hand tools. Thus, the activity would not result in discharges of fill material in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, impacts would be temporary and there would be no loss of waters of the U.S.

**Table 3-5 Alternative 13v – Summary of Fill Material in Existing Waters of the U.S. and Establishment of New Waters of the U.S.**

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
3. Ferraro Fields area of Griffith Park	Daylight Streams	5	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	6	None: Removal of materials at inlet and outlet connections, above existing waters of the U.S.	Perm.	(200 CY)	0
			Backfill to create stable inlet and outlet	Perm.	100 CY	0.02
			Install k-rails or sandbags	Temp.	220 LF	0.01
4. Griffith Park	Daylight Streams	9	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Side Channel	1	None: Removal of materials at inlet and outlet connections, above existing waters of the U.S.	Perm.	(200 CY)	0
			Backfill as needed to create stable inlet and outlet, above existing waters of the U.S.	Perm.	100 CY	0.02
			Install k-rails or sandbags	Temp.	220 LF	0.01
5. Riverside Drive	Daylight Streams	1	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
6. Taylor Yard	Vegetated Channel Walls (Right Bank)	NA	Install vegetation anchor materials	Perm.	67,819 (SY)	14
			Rock at vegetation anchor tie-in	Perm.	2,833 CY	
			Install k-rails or sandbags	Temp.	7,392 LF	0.2
	Vegetated Channel Walls (Left Bank)	NA	Install vegetation anchor materials	Perm.	16,855 SY	3.3
			Rock at vegetation anchor tie-in	Perm.	778 CY	
			Install k-rails or sandbags	Temp.	11,960 LF	0.25
	Modify	12	None: Excavate embankment to channel bed to	Perm.	(145,381)	0

Reach	Management Measures	Acres of New Waters of the U.S.	Fill Material in Existing Waters of the U.S.			
			Discharge Material and Activity	Impacts (Perm./Temp.)	Quantity	Acres Filled
	Channel Banks/Widen Channel		within the waters of the U.S.		CY)	
			Backfill with clean topsoil	Perm.	8,066 CY	4.5
			Install k-rails or sandbags	Temp.	4,224 LF	0.1
	Create New Wetlands Behind Bank	13	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
7. Arroyo Seco and Cornfields	Daylight Streams	3	None: activity is occurring in overbank area, outside of existing waters of the U.S.	NA	NA	NA
	Create Wetland	9	Install vegetation stabilization features, concrete, riprap, and topsoil	NA	NA	NA
	Terrace banks	0.5	None: Demolition and removal of materials to within waters of the U.S.	Perm	(3,771 CY)	0
	Modify Channel Banks	14	None: Excavate embankment to channel bed to within the waters of the U.S.	Perm.	(79,723 CY)	0
			Backfill with clean topsoil	Perm.	3,000 CY	5
			Install k-rails or sandbags	Temp.	4,200 LF	0.1
8. LATC	Restore Historic Wash	25	None: activity is occurring in overbank area outside of existing waters of the U.S.	NA	NA	NA

### 3.3 Impacts to Waters of the U.S.

All action alternatives would entail both temporary and permanent discharges of fill material into waters of the U.S. None of the alternatives would entail permanent loss of waters of the U.S.

There are incremental increases in permanent and temporary discharges of fill material from Alternative 10 through Alternative 20. Likewise, there are incremental increases in the scope of restoration activities from Alternative 10 through Alternative 20.

The types of fill material include restoration fill and stabilization fill.

- **Restoration fill** includes fill that would enhance aquatic functions and services.
  - **Seeded Turf Mat:** The management measure to vegetate channel walls (See Section 3.1.4) with seeded turf would entail discharge of a seeded mat on top of the existing concrete embankments. The discharge of the seeded mat would not change the channel configuration, or reduce groundwater recharge area. Alternatives 13, 13v, 16, and 20 would include the discharge of this fill material. The turf reinforcement mat is a pre-seeded mat that would be put in place to facilitate the process of formation of riparian and wetland plant communities.
  - **Clean Backfill:** Another management measure entails removal of concrete from waters of the U.S. and discharge of backfill into the excavated areas to support riparian vegetation. The discharge of clean backfill would not change the channel configuration, but would increase the area of riparian vegetation and surface area for groundwater recharge. In both cases, the discharge of permanent fill material would not lead to the permanent loss of existing waters of the U.S. All action alternatives include the discharge of clean backfill. Clean fill material would be placed to allow formation of wetland and riparian habitat where concrete is excavated from the channel.
- **Stabilization fill** is fill material required to stabilize the substrate of newly created waters of the U.S. Alternatives 13, 13v, 16 and 20 would entail measures that would set back the existing levees which in turn would widen channel invert. Fill material such as rocks or concrete would be discharged as appropriate within the widened channel invert to stabilize the substrate. The discharge of this material would not result in the permanent loss of existing waters of the U.S. All action alternatives include the discharge of concrete or rock backfill. This type of fill material would be installed in areas where trapezoidal channel walls were set back to increase the invert width, thereby exposing erodible soils; where the channel banks were notched to allow for creation of inlets and outlets for new side channels; and where existing concrete banks were terraced to allow for plantings.

**Table 3-6 Classes of Permanent Fill Material for Restoration Activities**

Alternative	Permanent Fill Within Existing Waters of the U.S. (Acres)	Classes of Permanent Fill		
		Seeded Turf (Acres)	Soil Backfill Within Excavated Concrete (Acres)	Fill to Stabilize Expanded Waters of the U.S.
10	4.52	0	4.5	0.02
13	26.84	17.3	9.5	0.04
13v	26.84	17.3	9.5	0.04
16	49.21	20.57	20.8	7.84
20	65.61	28.32	22.20	15.09

**3.4 Permanent Losses of Existing Waters of the U.S.**

The discharge of permanent fill material would not result in the permanent loss of waters of the U.S. Typical examples of changes that constitute permanent loss of waters of the U.S. include permanent decrease in surface area available for water recharge or permanent loss of riparian habitat.

- Ground Water Recharge:** All action alternatives would discharge permanent fill material into existing waters of the U.S. However, the fill material would not result in an increase of impermeable surfaces. Seeded reinforced mats would be placed on top of existing embankments. Excavated concrete would be replaced with either soil backfill or rocks. Furthermore, all action alternatives would create new, soft bottom waters of the U.S., resulting in an increase of permeable surface areas to enhance groundwater recharge functions.
- Riparian Habitat:** There would be no permanent loss of aquatic habitat associated with discharges of fill under any of the action alternatives. The discharges of fill material would entail placement of reinforced vegetated mats or rocks and clean soil for the establishment of vegetation in open water area and soft river bottom area, and at side channels and tributaries.

**Table 3-7 Fill and Loss of Existing Waters of the U.S. and New Waters of the U.S. Established**

Alternative	Fill Within Existing Waters of the U.S. (Acres)		Permanent Loss of Existing Waters of the U.S. (Acres)	New Waters of the U.S. Established (Acres)
	Permanent	Temporary		
10	4.52	0.11	0	56
13	26.84	0.67	0	86
13v	26.84	0.67	0	98.5
16	49.21	1.04	0	145.6
20	65.61	1.68	0	168.6

## **4.0 Alternatives Analysis**

### **4.1 Restrictions on Discharge**

The 404(b)(1) Guidelines prohibit the discharge of dredged or fill material into waters of the U.S. if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem<sup>1</sup>, so long as the alternative does not have other significant adverse environmental consequences. 40 C.F.R. 230.10(a). To be “practicable,” an alternative must be “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” 40 C.F.R. 230.10(a)(2).

### **4.2 Overall Project Purpose**

With the exception of the No Federal Action Alternative all alternatives meet the overall project purpose. The No Federal Action Alternative has been dropped from consideration in the 404(b)(1) evaluation since it does not meet the overall project purpose.

### **4.3 Practicability (Technology)**

All action alternatives can be constructed with existing technology. All action alternatives would utilize conventional construction techniques and conventional construction equipment.

### **4.4 Practicability (Logistics)**

As detailed in Appendix J of the IFR, all action alternatives would require acquisition of approximately 145 acres of privately-owned lands and relocation of private businesses and industrial operations which include two railway yards: 93 acres at LATC (existing yard) and 43 acres at Taylor Yard (former yard, no existing business/operations). Acquisition of up to 8 acres of private land with business operations would occur at the confluence of Verdugo Wash under Alternative 20. Implementation of any action alternative would require the acquisition of land, changes in zoning, and relocation of the rail facilities and operations. The City of Los Angeles is responsible for acquisition of lands, easements and rights-of-way and performing relocations (Appendix J, Section 11). Furthermore, City of Los Angeles is fully capable of fulfilling its responsibility (Appendix J, Section 13). Based on the above, all action alternatives are practicable with respect to logistics.

### **4.5 Practicability (Cost)**

Per Engineer Regulation (ER) 1105-2-100 the economic analysis associated with the IFR is required to identify the alternative that reasonably maximizes benefits, the NER. Under ER 1105-2-100, the NER plan is the recommended plan unless a waiver is granted to consider an alternative plan as the Locally Preferred Plan. Though not bound to do so, the U.S. Congress

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<sup>1</sup>In this instance, the terms *aquatic environment* and *aquatic ecosystem* mean waters of the U.S., including wetlands that serve as habitat for interrelated and interacting communities and populations of plants and animals. 40 C.F.R. 230.3.

may select the recommended plan for authorization and appropriation. Alternatively, the U.S. Congress may select another plan from the final array of alternatives for authorization and appropriation. All alternatives are considered practicable in terms of cost.

The cost comparison discussion is a summary of a detailed cost analysis prepared for the action alternatives in Chapters 4 and 6 of the IFR. As summarized in Tables 6-2 and 6-3 of the IFR, all action alternatives from Alternative 10 through Alternative 20 would incrementally increase the scope of ecosystem restoration activities. Likewise, there is an incremental increase in total construction costs from Alternative 10 through Alternative 20. See Table 6-6 of the IFR and Table 7, below. Alternative 10 would entail the smallest scope of restoration activities and would cost the least. In contrast, Alternative 20 would entail the largest scope of restoration activities and would cost the most. However, as summarized in Table 4-10 of the IFR, the incremental-increase pattern is not evident in more refined measurements. With respect to incremental construction cost Alternative 13v would result in the smallest incremental construction cost. In contrast, Alternative 16 would result in the largest incremental construction cost. With respect to habitat output, Alternative 13v would result in the largest incremental output while Alternative 20 would result in the smallest incremental output. In sum, Alternative 13v maximizes incremental habitat output and minimizes total construction costs. Therefore, Alternative 13v is identified as the plan that maximizes NER benefits (See Section 6.6 of the IFR).

However, the City of Los Angeles has requested the Corps recommend Alternative 20 as a Locally Preferred Plan. The Assistant Secretary of the Army (Civil Works) has permitted the Corps to consider Alternative 20 as a Locally Preferred Plan for recommendation to Congress.

**Table 4-1 Comparison of Costs<sup>2</sup> and Habitat Output (October 2014 Price Levels)**

	<b>Alternative 10</b>	<b>Alternative 13</b>	<b>Alternative 13v*</b>	<b>Alternative 16</b>	<b>Alternative 20</b>
<b>First Cost</b>	\$591,371,000	\$707,800,000	\$703,062,000	\$1,050,057,000	\$1,309,332,000
<b>Average Annual Costs (AAC)</b>	\$26,722,000	\$32,089,000	\$31,851,377	\$49,271,000	\$60,656,000
<b>Annual Average Habitat Output (AAHU)</b>	5,321	5,902	5,989	6,509	6,782
<b>Cost/Habitat Output (AAC/AAHU)</b>	\$5,022	\$5,437	\$5,318	\$7,570	\$8,944

\* The IFR identifies Alternative 13v as the plan that maximizes NER benefits.

<sup>2</sup> Costs in Table 4-1 are based upon estimates in December 2014. MCACES estimates have only been prepared for Alternatives 13v and 20 and therefore these will differ from more refined estimates found elsewhere in the IFR.

**Table 4-2 Comparison of 404(b)(1) Evaluation Criteria**

Alternatives	Practicability Test			Significant Environmental Impacts to Non-Aquatic Resources?	Permanent Fill Within WoUS (acres)	Permanent Loss of WoUS (acres)	Meets Overall Project Purpose?
	Cost (Amount)	Logistics	Technology				
Alternative 10	Yes (\$591M)	Yes	Yes	Yes	4.52	0	Yes
Alternative 13	Yes (\$708M)	Yes	Yes	Yes	26.84	0	Yes
Alternative 13v	Yes (\$703M)	Yes	Yes	Yes	26.84	0	Yes
Alternative 16	Yes (\$1,050M)	Yes	Yes	Yes	49.21	0	Yes
Alternative 20	Yes (\$1,309M)	Yes	Yes	Yes	65.61	0	Yes
No Federal Action Alternative	N/A	N/A	N/A	No	0	0	No

## 5.0 Environmental Effects

### 5.1 Effects on Aquatic Resources

The potential impacts of the construction associated with all action alternatives have been analyzed in the IFR.

The purpose of the Section 404(b)(1) Guidelines is to restore and maintain the chemical, physical, and biological integrity of the waters of the U.S. through the control of discharges of dredged or fill material. Except as provided under CWA Section 404(b)(2), no discharge of dredged or fill material will be authorized if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. In accordance with the Section 404(b)(1) Guidelines, the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment must be determined.

All action alternatives would entail the discharge of fill material into waters of the U.S. The following discussion evaluates impacts of all action alternatives on environmental resources identified in Subpart C through Subpart F of the Section 404(b)(1) Guidelines.

### 5.2 Effects on Non-Aquatic Resources

All action alternatives would result in significant impacts to:

- **Land Use:** Restoration of the LATC site and other properties in Reach 8 would result in a conflict with the existing industrial land use designation, constituting a significant impact to land use. See Section 5.3 of the IFR. Alternative 20 would also convert lands designated industrial to restored habitat in Reach 3, constituting a significant impact to land use.

### 5.3 Potential Direct and Secondary Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

#### Substrate

**Construction:** All alternatives would entail excavation or disturbance of substrate during the construction process. In some cases, excavated materials would be replaced with materials such as natural substrate and vegetation that would support the proposed habitat restoration measures. In other cases, fill material such as concrete would be discharged to create grade stabilizers or similar features at key transition points to ensure that flood damage reduction is not impaired. Native substrates that are supportive of riparian or wetland vegetation will be left in place to the degree possible.

Alternative 10 would have minimal disturbance on existing substrates at or below the OHWM, and would require minimal permanent fill. Excavation of the channel wall and some soil removal would occur to allow upstream and downstream River connections to a proposed side channel at Griffith Park. Approximately 100 cy of concrete and topsoil would be removed at each of the connections for a total of 200 cy of excavated substrate. Each connection would be backfilled with approximately 50 cy of clean topsoil and riprap and/or concrete for a total of approximately 100 cy of permanent fill. These and all other construction areas would be temporarily isolated from the River during construction by installation of k-rails or sandbags, resulting in up to 4,440 linear feet of temporary fill. It is estimated that these materials would be used in the River channel for no more than one month at any given location, after which this temporary fill would be removed.

Under Alternative 10, up to 12 acres of new waters of the U.S. would be created at Taylor Yard by excavating and permanently removing approximately 145,381 cy of mostly earthen substrate to lower the channel banks, reconnecting the River with a portion of the historic floodplain. Revegetating this area would require backfilling with up to 8,066 cy of clean topsoil, meaning that on balance the prism of waters of the U.S. would increase by up to 137,315 cy at this location. Backfilling would not entail discharge into waters of the U.S. since the temporary isolation of the construction area would prohibit establishment of the OHWM. Both the excavation and backfill would occur in order to allow wetland and riparian conditions to develop.

Alternative 13 would include the measures described under Alternative 10, and would include additional measures that would increase the amount of permanent substrate removal, permanent backfill, and temporary fill. Additional excavation of 79,723 cy of concrete and soil would occur by lowering the channel banks at Arroyo Seco, and additional backfilling with 3,000 cy of clean topsoil would then occur at this location. Toe of the bank on both sides would be moved outward to create a vertical wall and widen the Riverbed in Reach 5. Twelve storm drains would

be daylighted. An additional side channel would be created, which would double both the permanent and temporary fill and excavation amounts relative to Alternative 10, but which would also double the amount of waters of the U.S. in the newly created side channels. In newly created waters of the U.S., engineered substrates such as concrete, asphalt, or corrugated metal pipe as well as compacted earthen substrates would be replaced with earthen vegetated substrate similar to those found in natural riparian systems. Within existing waters of the U.S., concrete would be discharged for the construction or modification of existing outfalls. Therefore, in many instances the change in substrate would be like-for-like.

Vegetating the channel walls would require permanent fill in the form of pre-seeded turf reinforcements matting, which is a thin geotextile mesh that is installed to allow for retention of soil and vegetation in relatively steep areas. This mesh would cover approximately 84,650 square yards (sy) of waters of the U.S. and would be anchored by approximately 3,600 cy of rock. Both the pre-seeded turf reinforcements matting and rock would constitute permanent fill, but would allow wetland vegetation to occur in areas that are now covered by concrete.

Alternative 16 would include the same measures as Alternative 13, and additional measures that would increase the amount of both permanent substrate removal, permanent backfill, and temporary fill. The toe of the bank would be moved outward to create a vertical wall and widen the Riverbed in Reach 5. Twelve storm drains would be daylighted. Addition of a side channel relative to Alternative 13 would increase the amount of permanently removed concrete and topsoil by excavating an additional inlet and outlet, and would increase the amount backfill with stabilizing rock and/or concrete in these locations. Temporary fill would also increase in the form of sandbags or k-rails to allow for dewatering at construction areas. An additional 14,520 sy of pre-seeded turf reinforcements matting would be installed in Reach 5, and would be anchored by 778 cy of rock, constituting permanent fill to allow for retention of soil and vegetation. K-rails or sandbags would be installed at 11 locations to allow for dewatering, and would constitute temporary fill. Backfilling with clean topsoil to allow for wetland and riparian vegetation establishment would occur at 3 locations, all of which would be newly created waters of the U.S. that were isolated from the River by dewatering devices.

Terracing banks would allow for increased wetland and riparian vegetation in Reach 5 and at LATC. This measure would entail both excavation of existing materials, primarily concrete, and backfill with both concrete and clean topsoil. Temporary fill in the form of sandbags or k-rails would also occur at these locations. Additional waters of the U.S. would be created by modifying the trapezoidal channel. The toe of the bank would be moved outward to create a vertical wall and widen the Riverbed in Reach 5. Backfill would occur at this location to stabilize the bank, but would occur in newly created waters of the U.S. which would be isolated from the River by dewatering structures, such as k-rails or sandbags. Dewatering structures at this location would add approximately 8,450 lf of temporary fill.

In these existing and newly created waters of the U.S., engineered substrates such as concrete, asphalt, or corrugated metal pipe as well as compacted earthen substrates would be replaced with earthen vegetated substrate similar to those found in natural riparian systems. Within existing waters of the U.S., concrete would be discharged for the construction or modification of existing outfalls. Therefore, in many instances the change in substrate would be like-for-like.

Alternative 20 would entail all measures specified above, and increase the amount of waters of the U.S. over Alternative 16, including by widening the trapezoidal channel in Reach 2 and excavating upland areas to create wetland and riparian habitat at the Verdugo Wash confluence in Reach 3. Thirteen storm drains would be daylighted. Within Reach 7, streams would be daylighted and wetlands be created and channel banks modified at the Arroyo Seco confluence and the LASHP. Permanent and temporary fill would be most extensive under this alternative, as would creation of new waters of the U.S.

In these existing and newly created waters of the U.S., engineered substrates such as concrete, asphalt, or corrugated metal pipe as well as compacted earthen substrates would be replaced with earthen vegetated substrate similar to those found in natural riparian systems. Within existing waters of the U.S., concrete would be discharged for the construction or modification of existing outfalls. Therefore, in many instances the change in substrate would be like-for-like.

Alternative 13v would include all measures and impacts of Alternative 13. Moreover, Alternative 13v would add restoration measures in Reach 7 identical to those proposed under Alternative 20. Within Reach 7, streams would be daylighted; wetlands would be created; embankments would be terraced; and channel banks would be modified.

In these existing and newly created waters of the U.S., engineered substrates such as concrete, asphalt, or corrugated metal pipe as well as compacted earthen substrates would be replaced with earthen vegetated substrate similar to those found in natural riparian systems. Within existing waters of the U.S., concrete would be discharged for the construction or modification of existing outfalls. Therefore, in many instances the change in substrate would be like-for-like.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom. Invasive species in channel within the project area would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances and the existing substrate would be left intact. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate.

Secondary effects of the fill would be de minimis for all alternatives. Concrete, rocks, and soils discharged in waters of the U.S. would not be substantially different from the existing concrete, rocks, and soils at the site.

**Operation:** Maintenance activities within waters of the U.S. for all action alternatives may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material

into waters of the U.S. However, temporary or permanent discharges of fill would not decrease the amount of existing or newly established waters of U.S.

Secondary effects of the fill would be de minimis for all maintenance activities. Concrete, rocks, and soils discharged in waters of the U.S. would not be substantially different from the existing concrete, rocks, and soils at the site.

### **Suspended particulates and turbidity**

**Construction:** Alternative 10 would require construction activities within waters of the U.S. Work areas within the channel invert would be isolated from flows with k-rails or sandbags during construction. In total, Alternative 10 would result in the temporary discharge of approximately 4,444 lf of the k-rails. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, work within River would result in minimal or no increases in turbidity.

Alternative 13 would require construction activities within waters of the U.S. Work areas within the channel invert would be isolated from flows with k-rails or sandbags during construction. In total, Alternative 13 would result in the temporary discharge of approximately 24,544 lf of the k-rails. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, work within River would result in minimal or no increases in turbidity.

Alternative 16 would require construction activities within waters of the U.S. Work areas within the channel invert would be isolated from flows with k-rails or sandbags during construction. In total, Alternative 16 would result in the temporary discharge of approximately 61,276 lf of the k-rails. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, work within River would result in minimal or no increases in turbidity.

Alternative 20 would require construction activities within waters of the U.S. Work areas within the channel invert would be isolated from flows with k-rails or sandbags during construction. In total, Alternative 20 would result in the temporary discharge of approximately 118,639 lf of the k-rails. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, work within River would result in minimal or no increases in turbidity.

Alternative 13v would include all measures and impacts of Alternative 13 in Reaches 1-6 and 8. Moreover, Alternative 13v would include restoration measures in Reach 7 identical to those proposed under Alternative 20. Within Reach 7, streams would be daylighted; wetlands would be created; embankments would be terraced; and channel banks would be modified. When fully isolated from surrounding flows, work within River would result in minimal or no increases in turbidity.

Secondary effects of the fill would mostly be identical for all alternatives. Concrete and rocks discharged into waters of U.S. would not increase turbidity. The increase in soft bottom waters of the U.S. would likely increase the potential for turbidity beyond existing baseline levels. The potential increase would be commensurate with increased project footprints. However, most of the soft bottom areas would be vegetated. The vegetation would attenuate turbidity levels. Secondary impacts over the long-term would be minimal.

The amount of in-channel work would increase from Alternative 10 through Alternative 20. However, active construction areas would be dewatered and isolated from active flows to minimize water quality impacts. Furthermore, adherence to the storm water pollution prevention plan (SWPPP) and permitting requirements, and implementation of best management practices (BMPs) described in Section 5.6 of the IFR, would further reduce water quality impacts. Furthermore, because most of the surfaces in the River channel are hardened, channel modifications are not expected to result in water quality impacts due to excessive erosion, scour, and head cuts. Thus, long term impacts to water quality across all alternatives are expected to be approximately the same.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances and there would be no temporary increases in turbidity. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, any increase in turbidity would be temporary.

Secondary effects of the fill would mostly be identical for all alternatives. Concrete and rocks discharged into waters of U.S. would not increase turbidity. The increase in soft bottom waters of the U.S. would likely increase the potential for turbidity beyond existing baseline levels. The potential increase would be commensurate with increased project footprints. However, most of the soft bottom areas would be vegetated. The vegetation would attenuate turbidity levels. Furthermore, much of the permanent fill would also be chemically inert, and would consist of materials such as concrete, rock from a certified source, or pre-seeded turf reinforcement matting, none of which would leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source, and would be free of most weed seeds and free of hazardous toxic, and radioactive wastes (HTRW) or other contaminants. Thus, potential for long-term leaching of contaminants into the water column would be minimal.

**Operation:** Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharge of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material. However,

temporary or permanent discharges of fill material would not decrease the amount of existing or newly established waters of U.S.

Maintenance may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Maintenance activities requiring in-water work would likely require the use of water diversion structures, such as k-rails or sandbags. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, maintenance work within aquatic areas would result in minimal or no increases in turbidity.

Secondary effects of the fill associated with maintenance activities would be minimal. Discharge of concrete or rocks within waters of the U.S. would be associated with like-for-like repairs. Thus, impacts would be small in scope. Furthermore, concrete and rocks discharged into waters of U.S. would not increase turbidity. Vegetation within restoration elements would attenuate turbidity from soils. Discharge of soils would also be limited in scope. Furthermore, much of the permanent fill would also be chemically inert, and would consist of materials such as concrete, rock from a certified source, or pre-seeded turf reinforcement matting, none of which would leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source, and would be free of most weed seeds, and free of HTRW, or other contaminants. Thus, potential for long-term leaching of contaminants into the water column would be minimal.

## Contaminants

**Construction:** All temporary fill would be chemically inert and would consist of either concrete k-rails or sandbags comprised of clean sand obtained from a source that is certified in providing contaminant-free materials. Much of the permanent fill would also be chemically inert, and would consist of materials such as concrete, rock from a certified source, or pre-seeded turf reinforcement matting, none of which would leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source, and would be free of most weed seeds, HTRW, or other contaminants.

All alternatives would entail excavation at or below the OHWM, potentially allowing for release or suspension of contaminants at or below the ground surface into the water column. All HTRW impacted soil within the project footprint must be remediated to the requirements of the local environmental regulatory agencies and be compatible with the future land uses for and needs of the restoration project prior to the City of Los Angeles providing those lands to the restoration project. At this time, those areas with HTRW impacted soil to be addressed by the City of Los Angeles are anticipated to be the Taylor Yard G1 and G2 sites and the LATC. In addition, groundwater contamination is known to be present due to the San Fernando Valley Superfund Site (SFVSS), and other localized groundwater contamination may also be present. With respect to groundwater contamination that cannot be remediated prior to construction, the City of Los Angeles will design, implement, coordinate and fully fund all treatment and disposal of contaminated groundwater during construction, with regulator concurrence and any necessary permits. These temporary operations should also be consistent with current management of contaminated groundwater at SFVSS and Pollock Well Field. Furthermore, all work areas would be isolated from the River during construction, and storm water runoff at construction locations would be contained according to SWPPP conditions.

Use of construction vehicles increases the potential for accidental release of fuels, solvents, or other petroleum-based contaminants. Although releases of such substances in any part of the construction footprint could drain to the River and thereby affect aquatic resources, releases in the overbank area are most removed from the River and most likely to be contained and removed before reaching the River, compared to releases occurring below the top of the bank. Also, under any alternative, BMPs designed to minimize the potential for release of toxic substances will be implemented. These BMPs are listed in Section 5.11.4 of the IFR.

Under Alternative 10, most of the ground-disturbing work and work involving heavy machinery will occur in the overbank area, outside of the River channel. As with all alternatives, some use of machinery in the channel is anticipated to assist in removing invasive species and to install dewatering equipment. Additional ground-disturbing work and use of construction equipment in the River channel would occur in Reach 4 to create an inlet and outlet for a side channel, and in Reach 6 to lower the channel banks.

Alternative 13 would require ground-disturbing work and use of construction equipment at up to 6 locations within the River channel, not including invasive species removal areas. Measures under this alternative that could increase the potential for releases of contaminants from ground sources into waters of the U.S. include the same measures as under Alternative 10, as well as creation of additional side channels and additional lowering of channel banks.

Alternative 16 would require ground-disturbing work and use of construction equipment at up to 12 locations within the River channel, not including invasive species removal areas. Measures under this alternative that could increase the potential for releases of contaminants from ground sources into waters of the U.S. include the same measures as under Alternative 13, as well as creation of additional side channels, additional lowering of channel banks, terracing banks, and modifying the trapezoidal channel to vertical banks.

Alternative 20 would require ground-disturbing work and use of construction equipment at up to 15 locations within the River channel, not including invasive species removal areas. Measures under this alternative that could increase the potential for releases of contaminants from ground sources into waters of the U.S. include the same measures as under Alternative 16, and would excavate upland area at the mouth of Verdugo Wash in Reach 3 to create additional wetland and riparian habitat.

Alternative 13v would include all measures and impacts of Alternative 13 in Reaches 1-6 and 8. Moreover, Alternative 13v would include restoration measures in Reach 7 identical to those proposed under Alternative 20. Within Reach 7, streams would be daylighted; wetlands would be created; embankments would be terraced; and channel banks would be modified. Ground-disturbing work will be undertaken at Arroyo Seco-River confluence and LASHP.

The potential for accidental release of contaminants from construction equipment into the water column increases as the amount of in-channel work increases. However, impacts would be short term and would be minimized with the implementation of BMPs, such as use of water diversion structures or regulatory requirements such as SWPPPs. Per requirements of ER 1165-2-132 discussed above, long term release of HTRW into the water column under all alternatives would be unlikely.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate.

Secondary effects of the fill would mostly be identical for all alternatives. Much of the permanent fill would also be chemically inert, and would consist of materials such as concrete, rock from a certified source, or pre-seeded turf reinforcement matting, none of which would leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source, and would be free of most weed seeds; HTRW, or other contaminants. Thus, potential for long-term leaching of contaminants into the water column would be minimal.

**Operation:** Maintenance activities within waters of the U.S. may require use of excavators, backhoes, or grapple trucks for removal of trash, debris, and sediment. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases, there may be discharges of fill material associated with the use of earthmoving equipment, such as bulldozers, within newly established waters of the U.S. Though minimal, there is potential for accidental release of petroleum based products from construction equipment into the water column during maintenance activities. However, impacts would be short term and would be minimized with the implementation of BMPs such as use of water diversion structures or regulatory requirements, such as SWPPPs.

Secondary effects of the fill associated with maintenance activities would be minimal. Discharge of concrete, rocks, or soils within waters of the U.S. would be associated with associated with like-for-like repairs. Thus, impacts would be small in scope. Much of the permanent fill would also be chemically inert, and would consist of materials such as concrete, rock from a certified source, or pre-seeded turf reinforcement matting, none of which would leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source, and would be free of most weed seeds and free of HTRW or other contaminants. Thus, potential for long-term leaching of contaminants into the water column would be minimal.

## **Water Flow**

**Construction:** For all alternatives, restoration measures would be designed to not impair flood risk management functions in any portion of the study area or areas downstream. It is assumed that in-channel construction and modification of the project reaches would be conducted outside of the winter storm season (April 15 - October 15) to avoid wet weather storm flows, or that work areas would be adequately protected and not affect flood conveyance. In areas where in-channel construction would occur, diversions would be implemented to bypass dry weather flows downstream. Base flows may be temporarily affected in the immediate construction zone, but would not be affected upstream or downstream of the study area.

Under all alternatives, modifications to the channel will not increase the maximum water surface elevation. Under all alternatives, modifications to the channel are not expected to result in substantial changes to water velocity and circulation. While initial assessment identified that an increase in water surface elevation could occur at transition areas (areas where the channel has geometric changes (transitioning from trapezoidal to rectangular or from a widened section to a narrow section) or changes in construction material (transitioning between soft-bottom and concrete)) if no design refinements were made, the detailed design will ensure the maximum water surface elevations will not increase when compared to the existing conditions. Any change in water surface in the transition areas will be avoided through design refinements to the project modifications to channel geometry and/or avoidance of introduction of vegetation and enforcing O&M requirements limiting vegetation growth in those areas. Additional hydraulic analysis will be conducted and design modifications will be implemented during the design phase to provide more detail on the channel hydraulics with the recommended plan in place. Under all the alternatives, with implementation of such design refinements, there will be no increase in flood damages through the project area as compared to existing conditions.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. Removal of invasive vegetation from in-channel areas would facilitate conveyance of flows and would not increase flood risks.

**Operation:** Maintenance activities within waters of the U.S. required to maintaining design flow velocity and water surface elevations would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. An operation and maintenance would be developed as part of the project. Full implementation of the maintenance regimen would ensure that maintenance activities do not impact flow velocity, circulation, and water surface elevation.

Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases there may be discharge of fill associated with the use of earthmoving equipment such as bulldozers or temporary stockpiling within newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill would not change the design elevations or contours. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate. Removal of invasive vegetation from the project footprint would facilitate conveyance of flows and would not increase flood risks. Thus, changes in velocity and circulation are not expected.

## **Cumulative Impacts**

Due to the reduced flood risks subsequent to the channelization of the River, development increased within the vicinity of the study area, with residential, commercial, and industrial uses

abutting the channel. As development increased, the channel was further modified for bridge crossings, utility crossings, and construction of storm drain outfalls. In addition, maintenance activities were conducted. These modifications and maintenance activities resulted in the discharge of concrete structural fill below the OHWM. Since the River was channelized, concrete-on-concrete discharges would not have resulted in significant impacts to substrate.

Previous construction likely resulted in temporary impacts to water quality during construction. However, increased development in the uplands has resulted in long-term water quality impairments from nuisance flows. The River is consistently listed on the CWA Section 303(d) List from 1998-2010 for water quality impairments. The 2010 Integrated Report CWA Section 303(d) List indicates that the water quality of the River traversing the study area is impaired due to presence of ammonia, copper, lead, algae, and trash.

All action alternatives would entail direct impacts on the physical and chemical characteristics of the aquatic ecosystem due to the discharge of temporary and permanent fill. Furthermore, the potential for impacts to water quality, circulation, and water surface elevations from construction and maintenance would increase from Alternative 10 to Alternative 20 as the amount of in-channel work and required maintenance incrementally increases. However, with implementation of design refinements increase in water surface elevations across all alternatives would be attenuated to a sufficiently acceptable level that would not compromise the flood risk management functions of the River. Furthermore, with implementation of BMPs to fully isolate work areas from surrounding flows, and implementation of SWPPPs, short-term impacts to water quality would be minimal and remain the same across all action alternatives.

Under all action alternatives, there would be incidental benefits to functions of the aquatic environment through increase adsorption and absorption of contaminants. Furthermore, there would be increased structural and functional heterogeneity as concrete structures are modified into vegetative connections, side channels, and in some cases restoration of restoration of full floodplain connectivity within particular reaches. See Section 5.4 of the IFR for further information.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances and there would be no temporary increases in turbidity. In cases where limited earthmoving may be required, there would be discharges of earthen fill. Impacts to turbidity would be minimal. There would be no impacts to substrate, contaminants or flow characteristics.

In addition to project construction, constructed ecosystem features would be maintained and invasives management conducted throughout the project footprint under all alternatives. Furthermore, the Corps would continue to conduct maintenance for flood risk management operation of the LACDA project in the channel areas outside the restoration features except for invasives removal throughout the in-channel areas. Maintenance would continue to include native vegetation management. Under both maintenance programs there may be discharge of fill associated with the use of earthmoving equipment such as bulldozers or temporary stockpiling within existing or newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges

of fill material into waters of the U.S. However, temporary or permanent discharges of fill would not change the design elevations or contours. Thus, changes in velocity and circulation are not expected.

Removal of invasive vegetation from the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, this activity is not expected to result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. Such fill would be identical to the existing native substrate. Impacts to turbidity would be minimal. There would be no impacts to substrate, contaminants or flow characteristics.

The channel is currently surrounded by a developed urban landscape consisting of commercial, public, and residential uses in adjacent areas. As a result, present and future projects in the uplands within the study area would likely entail redevelopment or conversion of existing land uses. Minor modifications to the River channel associated with construction, modifications, and maintenance of existing and future infrastructure such as bridges and utilities are anticipated. Changes to circulation, velocity, and water surface elevations would be mitigated as appropriate for actions requiring Rivers and Harbors Act Section 408, 33 U.S.C. 408, approvals and reviews. Impacts to water quality would be temporary and would be attenuated through CWA Section 401 and Section 404 permitting requirements.

With a renewed public interest in the revitalized River, additional projects within the study area are likely. Future projects include the Atwater Pedestrian-Equestrian Bridge and the Los Angeles Waterwheel. Construction would temporarily affect water quality. However, land uses are expected to remain urban. Thus, the existing water quality impairments are unlikely to change substantially. Therefore, construction of the ecosystem restoration project would not result in cumulative significant impacts to the physical and chemical characteristics of the aquatic ecosystem. See Chapter 5 of the IFR for additional discussion on cumulative impacts.

#### **5.4 Potential Direct and Indirect Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)**

##### **Threatened and Endangered Wildlife**

**Construction:** The only listed species with a potential to occur in the study area is the least Bell's vireo, a federally listed bird species associated with the riparian areas. The study area does not include any designated critical habitat for vireo. Due to the linear and confined nature of existing habitat and the lack of breeding pairs in the most recent survey conducted in 2009, presence of the vireo is unlikely. Pre-construction surveys would be performed with all the action alternatives. If nesting vireos are found, construction in those areas would be halted until the Corps completes consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act. Construction in areas not occupied with vireo would continue as scheduled. At this time, however, the Corps has determined that no effects to listed species will occur under any of the action alternatives. Please refer to Section 5.5.3 of the IFR for additional discussion. No other special status species are expected to occur due to the degraded conditions within the study area and lack of suitable habitat.

During construction, noise and presence of visual forms associated with an active construction site may discourage establishment of nests or foraging within the vicinity of the construction footprint. Under all action alternatives, invasive species would be removed from the project footprint, including the River and tributary channel bottoms, during construction.

However, construction would not occur simultaneously within the entire project area. The construction footprint would migrate from one location to another over a number of years through the project area. As a result, avian and wildlife species within the active construction zone should be able to relocate to and utilize unaffected areas. Upon completion of construction, presence of native vegetation within the restoration project footprint would indirectly benefit wildlife by restoring regional connectivity to the Santa Monica Mountains, San Gabriel Mountains, and the Verdugo Mountains.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases there may be discharges of fill material associated with the use of earthmoving equipment such as bulldozers or temporary stockpiling within existing or newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in permanent discharges of fill material into waters of the U.S. However, temporary or permanent discharges of fill material would not change the design elevations or contours.

The only listed species with a potential to occur in the study area is the least Bell's vireo, a federally listed bird species associated with the riparian areas.

The Corps has determined that there will be no effect to least Bell's vireo from operations of the proposed project. Removal of non-native vegetation and trimming of in-channel vegetation to maintain flood conveyance would occur outside the breeding season. Overall, operations will support the establishment and expansion of native riparian vegetation in the restored areas, which has the potential to support future populations of vireo, and may support foraging and stop over habitat for southwestern willow flycatcher and coastal California gnatcatcher. Presence/absence surveys for these species will be performed during operation of the proposed project as part of the Monitoring and Adaptive Management Plan. The Corps and non-Federal sponsor will continue to coordinate with the U.S. Fish and Wildlife Service and the California Department of Wildlife during operations of the proposed project.

Vegetation management activities, including removal of invasive vegetation from the project footprint, including the River channel and tributary bottom, would be scheduled outside of migratory bird nesting season to the extent practicable. However, vegetation management or other types of maintenance may be required during the nesting season in order to maintain design flow velocities; water surface elevations; and conveyance capacity. In such cases, pre-construction surveys for the vireo would be performed prior to maintenance activities. If nesting vireos are found, maintenance activities would be coordinated with a qualified biologist to avoid take, or consultation with the USFWS would first be required.

No other special status species are expected to occur due to the degraded conditions within the study area and lack of suitable habitat. Impacts to threatened and endangered species are not expected to occur.

During maintenance activities, noise and presence of visual forms associated with an active construction site may discourage establishment of nests or foraging within the vicinity of the work area. However, the duration of maintenance activities would be approximately 30 days. Furthermore, the work area would be small and would migrate from one location to another as needed. Other vegetated areas within the ecosystem restoration project and the flood risk minimization project will continue to be available for nesting and foraging. As a result, there would be no indirect impacts to the vireo or other avian species within the project area. Maintenance of the ecosystem restoration elements would indirectly benefit wildlife by maintaining established regional connectivity to the Santa Monica Mountains, San Gabriel Mountains, and the Verdugo Mountains.

### **Other Wildlife**

**Construction:** Wildlife species that utilize the open aquatic areas, wetlands, and riparian areas along the River channel may be temporarily impacted by construction in those areas, and will experience long-term beneficial impacts from restoration in those areas. In general, species present in the study area are those that are opportunistic and/or habituated to human presence. These species are able to move to alternative locations if they are disturbed by construction activities and, therefore, are not anticipated to be impacted adversely. Alternative 10 would result in the least overall temporary impacts to wildlife, while each subsequent alternative would result in incremental increases in temporary impacts and benefits to wildlife. BMPs would be implemented under all action alternatives to avoid or minimize impacts to wildlife during construction, including but not limited to:

- Vegetation clearing activities would be avoided to the maximum extent practicable in any areas identified as breeding or nesting habitat for any bird species during the breeding season, which generally runs from March 1-August 31.
- If vegetation removal must occur during the breeding season, a qualified biologist would perform nesting bird surveys following established protocol prior to construction. If nests are detected during these surveys, a 300-foot no construction buffer would be delineated around the nest (500 feet for raptors).
- Construction in breeding areas would be monitored by a qualified biologist.
- Construction would be phased to minimize impacts to wildlife species, so that the entire study area would not be under construction all at once to minimize human intrusion.

Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel have typically been removed by hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. All BMPs listed above would be implemented during invasive vegetation removal operations.

There would be no permanent loss of native habitat or impacts to wildlife under any action alternatives. Thus, no significant adverse impacts will result. All action alternatives will result

in beneficial impacts to the aquatic ecosystem through the expansion of open water area, soft river bottom area, riparian zones, wetlands, and connection to side channels and tributaries. Beneficial impacts would be commensurate with the footprint of restoration. Thus, long-term beneficial impacts will increase with Alternatives 13, 13v, and 16, with the greatest amount of beneficial impact occurring under Alternative 20.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate.

Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases there may be discharges of fill associated with the use of earthmoving equipment such as bulldozers or temporary stockpiling within existing or newly established waters of the U.S. Impacts will be temporary in nature. In other cases, like-for-like structural repair below the OHWM could result in discharges of permanent fill. However, temporary or permanent discharges of fill material would not change the design elevations or contours.

Wildlife species that utilize the open aquatic areas, wetlands, and riparian areas along the River channel may be temporarily impacted by noise and temporary changes in the acreage of invasive vegetation as well as height and density of all vegetation. In general, species present in the study area are those that are opportunistic and/or habituated to human presence. These species are able to move to alternative locations if they are disturbed by construction activities and, therefore, are not anticipated to be impacted adversely. Maintenance of Alternative 10 would result in the least overall temporary impacts to wildlife, while maintenance of each subsequent alternative would result in incremental increases in temporary impacts to wildlife. BMPs would be implemented under all action alternatives to avoid or minimize impacts to wildlife during construction. There would be no permanent loss of habitat or impacts to wildlife under any action alternatives. Thus, no significant adverse impacts will result.

## **Aquatic Organisms**

**Construction:** As indicated in Section 3.5.3 of the IFR, the study area supports nonnative fish species such as mosquito fish, catfish, and green sunfish, and carp throughout the study reach. Native fish species are not present. In-channel activities during construction will require dewatering. However, dewatering would only occur with phased construction designed to impact isolated areas for short periods of time. As with impacts to wildlife, temporary adverse impacts will be least in Alternative 10, increasing with each alternative, but overall would be temporary and not significant. There would be no permanent adverse impacts to aquatic organisms under any build alternative. Instead, with each increasing footprint in each alternative, a greater area of aquatic habitat will be created or enhanced, resulting in improved conditions for aquatic organisms. This indirectly benefits the rest of the fish and wildlife assemblage in the area through creating more abundant food sources.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species throughout the project footprint, including the River channel and tributary bottom. Invasive species within the project footprint would typically be removed by hand tools. Thus, in most instances there would be no impacts to aquatic organisms.

Maintaining design grades, elevations, contours, and conveyance may require in-water work on a periodic basis. In-water work would likely require the use of water diversion structures, such as k-rails or sandbags. Movement of vehicles across earthen substrate during the placement and removal of dewatering structures would temporarily elevate turbidity in the water column. When fully isolated from surrounding flows, maintenance work within aquatic areas would result in minimal or no increases in turbidity. As indicated in Section 3.5.3 of the IFR, the study area supports nonnative fish species such as mosquito fish, catfish, and green sunfish, and carp throughout the study reach. Native fish species are not present. As a result, impacts would result in de minimis impacts to fish population.

## Vegetation

**Construction:** Within each alternative, a number of measures are designed to create additional riparian and wetland habitats, which are closely associated with water and may be indirectly affected by changes to water during construction or operation. During construction, in-water work may temporarily affect riparian vegetation. Impacts would be temporary. Due to the existing seed bank and perennial flow, affected vegetation is expected to recover soon after completion of construction. Under all action alternatives, invasive species would be removed throughout the project area, including the River channel and tributary bottom, during construction. Invasive species in the channel would typically be removed by hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. Invasive species removal would result in a more natural and functional plant community. There would be no permanent loss or impact to existing native vegetation under any action alternative. After construction is complete, under each alternative, new acres of riparian and wetland habitat would be present within the study area. Day lighting uplands culverts will create riparian corridors which will provide additional filtration of storm water entering the system. Riparian and wetland vegetation, along with vegetated embankments, will combine to increase shading of the River, which may reduce microclimate temperatures. Alternative 10 provides the least total area of new vegetation, with increasing areas in each subsequent Alternative, meaning that beneficial impacts increase with each alternative. Alternative 20 provides the greatest area of beneficial impacts.

**Operation:** Maintenance activities within waters of the U.S. for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Invasive species removal throughout the project footprint, including the River channel and tributary channel bottom, would typically be performed with hand tools. Thus, the activity would not result in discharges of fill in most instances. In cases where limited earthmoving may be required, there would be discharges of earthen fill. However, the fill would be identical to the existing native substrate.

Vegetation maintenance would result in temporary changes in the acreage of invasive vegetation as well as the height and density of all vegetation. Maintaining design grades, elevations, contours, and conveyance may require in-water work on a periodic basis. Impacts to during construction would be temporary. Due to the existing seed bank and perennial flow, affected vegetation is expected to recover soon after completion of construction. Impacts would be temporary and less than significant.

## **Cumulative Impacts**

The study area for biological resources includes the River watershed. The River was once a 51-mile-long backbone of a vast system of riparian foothill, riverine, and freshwater marsh habitat that carried seasonal rains and subterranean flows to the coastal plain and the Pacific Ocean. Over time, the River has been degraded by a cycle of increasing urban development, flooding, and channelization, culminating in the mid-20<sup>th</sup> Century with the LACDA system. The LACDA project encased the River in concrete banks and a mostly concrete bed, and straightened the river's course, thereby significantly diminishing its plant and wildlife diversity and quality, and disconnecting it from its floodplain and significant ecological zones. The entire River corridor is degraded due to historic activities.

During construction activities, noise and presence of visual forms associated with an active construction site may discourage establishment of nests or foraging within the vicinity of the work area. However, construction would not occur simultaneously within the entire project area. The construction footprint would migrate from one location to another over a number of years through the project area. As a result, avian and wildlife species within the active construction zone should be able to relocate to and utilize unaffected areas. Upon completion of construction, presence of vegetation within ecosystem restoration elements would indirectly benefit wildlife by restoring regional connectivity to the Santa Monica Mountains, San Gabriel Mountains, and the Verdugo Mountains. No other special status species are expected to occur due to the degraded conditions within the study area and lack of suitable habitat in the immediate future. Impacts to threatened and endangered species are not expected to occur.

In addition to project construction, constructed ecosystem features would be maintained under all alternatives. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species from the project footprint, including the River channel and tributary bottom areas. The Corps would continue to be responsible for maintaining all other aspects of the portions of the LACDA project that overlap with the restoration project footprint.

Under both maintenance programs vegetation within LACDA project and the ecosystem restoration project would be managed in accordance with the respective operating manuals. Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. During maintenance activities noise and presence of visual forms associated with an active construction site may discourage establishment of nests or foraging within the vicinity of the work area. However, the duration of maintenance activities for both projects would be approximately 30 days. Furthermore, the work area would be small and would migrate from one location to another as needed. Other vegetated areas within the ecosystem restoration project and the flood risk management project will continue to be available for nesting and foraging. As a result, avian and wildlife species within the active construction zone should be able to relocate to and utilize unaffected areas.

The restoration measures in Alternatives 10, 13, 13v, 16, and 20 would contribute to beneficial cumulative impacts to biological resources. These impacts would increase the amount of fish and wildlife habitat; provide greater ecological/biological benefits; aid in linking isolated habitats; help increase the amount of open space; help expand species diversity; and reduce the amount of impermeable surface area in the study area. These impacts would be beneficial from a regional perspective since they would benefit fish and wildlife species that may migrate outside of the study area. These benefits would also accrue to past, present, and reasonably foreseeable projects including the Albion Dairy Park, Griffith Park on the East Bank, Sennett Creek Park, and the Rio de Los Angeles State Parks that are located along or in the vicinity of the River. Cumulative impacts have been assessed in Chapter 5 of the IFR.

## 5.5 Potential Direct and Indirect Impacts on Special Aquatic Sites (Subpart E)

### Sanctuaries and refuges

**Construction:** There are no sanctuaries or refuges designated under state or federal laws within the footprint of any of the action alternatives. Therefore, no alternative would directly or indirectly impact sanctuaries or refuges.

**Operation:** There are no sanctuaries or refuges designated under state or federal laws within the footprint of any of the action alternatives. Operations and maintenance would not directly or indirectly impact sanctuaries or refuges.

### Wetlands

**Construction:** Wetlands are known to occur in the soft bottom areas in Reach 2 and in the Glendale Narrows (Reaches 4-6) and at the River-Verdugo Wash confluence. When there is low-energy, sediment-laden flow within these reaches, the sediments will occasionally form sandbars, and remain intact as flow diminishes. Wetland vegetation will establish temporarily on these sandbars until high flows wash them away. Wetland vegetation establishment will vary from year to year due to flows and ongoing LACDA maintenance activities. Because wetland vegetation in the channel does not expand jurisdictional waters and is highly variable, prior to each phase of construction, the project area would be surveyed for the current location of jurisdictional wetlands.

Aside from invasive species removal efforts, the only actions that would occur in the River channel under Alternative 10 would be creation of an inlet and outlet for a side channel in Reach 4 and lowering the channel banks to widen the River in Reach 6. Primary construction for these measures would occur relatively high on the River channel banks, away from any wetlands, which would be found at the bottom of the channel. Construction at the toe of the slope in Reach 6 could occur close to wetlands and may necessitate working in wetland areas, resulting in temporary adverse impacts to this resource. Construction would avoid or minimize impacts to wetlands to the maximum extent practicable.

Unavoidable impacts to wetlands during construction would be temporary. Due to the existing seed bank and perennial flow, affected wetland vegetation is expected to recover soon after completion of construction. Subsequent to construction, Alternative 10 would result in a net gain in wetlands in the study area. Because Alternative 10 has the least amount of construction in the River channel in Reaches 2, 4, 5, and 6, it also has the least potential for adverse impacts to wetlands of any action alternative. New riparian areas would be created in the overbank areas where streams would be daylighted and a side channel constructed, and additional wetlands may form where channel banks are lowered in Reach 6. With presence of sufficient hydrology either seasonally or on a relatively permanent basis, the riparian areas could develop hydric soils, one indicator of jurisdictional wetlands.

Potential for impacts to wetlands under Alternative 13 would be similar to Alternative 10, since the amount of in-channel construction remains similar. Construction would avoid or minimize impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands during construction would be temporary. Due to the existing seed bank and perennial flow, affected

wetland vegetation is expected to recover soon after completion of construction. New riparian areas would be created in Reaches 3 and 4 where streams would be daylighted and side channels constructed in the overbank areas; in Reaches 6 and 7 where channel banks would be lowered; and in Reach 8 where a historic wash would be restored. With presence of sufficient hydrology either seasonally or on a relatively permanent basis, the riparian areas could develop into wetlands.

Potential for impacts to wetlands under Alternative 16 would increase relative to Alternative 13 due to the increased amount of in channel construction associated with terracing the banks and modifying the trapezoidal channel in Reach 5. Construction would avoid or minimize impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands during construction would be temporary. Due to the existing seed bank and perennial flow, affected wetland vegetation is expected to recover soon after completion of construction. New riparian areas would be created in Reaches 3 and 4 where streams would be daylighted and side channels constructed in the overbank areas; in Reach 5 where streams would be daylighted and a concrete-lined, trapezoidal channel would be converted into a soft bottom rectangular channel; in Reaches 6 and 7 where channel banks would be lowered and additional riparian areas would be treated behind the banks; and in Reach 8 where a historic wash would be restored and channel banks would be modified. With presence of sufficient hydrology either seasonally or on a relatively permanent basis, the riparian areas could develop into wetlands.

Potential for impacts to wetlands under Alternative 20 would be similar to Alternative 16. Construction would avoid or minimize impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands during construction would be temporary. Due to the existing seed bank and perennial flow, affected wetland vegetation is expected to recover soon after completion of construction. Furthermore, modifying the trapezoidal channel in Reach 2 to increase the amount of soft bottomed surface area under Alternative 20 could yield additional wetlands.

Under all action alternatives, invasive species would be removed from the project footprint, including the River and tributary channel bottom, during construction. Invasive species within the project footprint would typically be removed by hand tools. Thus, in most instances there would be no impacts to wetlands.

In general, long-term direct or indirect impacts to wetlands are not anticipated. Subsequent to the completion of construction and sufficient growth of plants and vegetation, the ecosystem restoration elements would provide increased wetland functions and services such as increasing foraging and nesting habitat for wildlife especially avian species. Though not designed as treatment wetlands, wetlands within newly created waters of the U.S. would provide some level of filtration commensurate with the duration of water residence times within these areas. There would be an increase in turbidity minimization functions.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species throughout the project footprint. Invasive species within the project footprint

would typically be removed by hand tools. Thus, in most instances there would be no impacts to wetlands.

Maintaining design grades, elevations, contours, and conveyance may require in-water work on a periodic basis. Impacts to during construction would be temporary. Due to the existing seed bank and perennial flow, affected vegetation is expected to recover soon after completion of construction. Impacts would be temporary and less than significant.

Long-term direct or indirect impacts to wetlands are not anticipated for maintenance activities within ecosystem restoration elements. Maintenance and adaptive management of habitat elements (such as non-native removal) would ensure that benefits continue to be realized for the life of the project.

### **Mudflats**

**Construction:** Mudflats are generally found in intertidal, estuarine or near-shore habitats, in deltas, or at river mouths. None of these conditions occur in the study area. Sediment deposits may occur on occasion in some parts of the River, but they do not function as mudflats, which are generally rich biologically and support benthic organisms that are supportive of fish and avian species. The action alternatives would not directly or indirectly affect mudflats.

**Operation:** As no mudflats are present or will result from construction of restoration features, operations and maintenance activities would not directly or indirectly affect mudflats.

### **Vegetated shallows**

**Construction:** Vegetated shallows are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as sea grasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems. Vegetated shallows are not present in the study area. The action alternatives would not directly or indirectly affect vegetated shallows.

**Operation:** As no vegetated shallows are present or will result from construction of restoration features, operations and maintenance activities would not directly or indirectly affect vegetated shallows.

### **Coral reefs**

**Construction:** Coral reefs consist of skeletal deposits, usually of calcareous or siliceous materials, and occur in marine environments, which does not exist in the study area. Therefore, there would be no direct or indirect effects to coral reefs.

**Operation:** As no coral reefs are present or will result from construction of restoration features, operations and maintenance activities would not directly or indirectly affect coral reefs.

### **Riffle and pool**

Steep gradient sections of streams are sometimes characterized by riffle and pool complexes. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high

dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Although this habitat type is generally associated with higher-gradient streams, some form of riffle and pool complex may occur where boulders and gravel have accumulated to the extent that they can back up flows to cause pools and allow for increased water velocity or formation of eddies on the downstream side.

Occasional riffle and pool complexes may be found in the soft bottom reaches of the study area and are subject to variation based on flows and maintenance activities (Reaches 2, 4, 5 and 6). Prior to initiation of construction, the study area would be surveyed for the current location of riffle and pool complexes. Per recommendations of the Fish and Wildlife Coordination Act Report, feasibility of constructing riffle and pool complexes in the soft bottom reaches would be further evaluated during the design phase. During construction, the potential for impacts would increase from Alternative 10 through Alternative 20, commensurate with the amount of in-channel work. Construction would avoid or minimize impacts to these features to the maximum extent practicable. Furthermore, the project would create conditions that would allow for the natural formation of riffle and pool complexes.

Under all action alternatives, invasive species would be removed from the project footprint, including the River and tributary channel bottom, during construction. Invasive species within the project footprint would typically be removed by hand tools. Thus, in most instances there would be no impacts to riffle and pool complexes.

Long-term impacts to aeration and downstream scour would be de minimis since the River downstream of the project area would remain channelized. Furthermore, as indicated in Section 3.5.3 of the IFR, the study area supports nonnative fish species such as mosquito fish, catfish, and green sunfish, and carp throughout the study reach. Native fish species are not present. As a result, impacts would result in de minimis impacts to fish population. Under all action alternatives, direct and indirect impacts to functions and services associated with riffle and pool complexes would be temporary.

Implementation of any action alternative may result in indirect long term benefits to aquatic species. Per recommendations of the Fish and Wildlife Coordination Act Report, feasibility of implementing design refinements and placement of measures to support native fish habitat in the study area would be examined during the design phase. The measures in the soft bottom reaches include but are not limited to water shaded by riparian vegetation, riffle and pool complexes, refugia, in-channel woody debris, and gravel and cobble substrates. In concrete reaches the measures may include installation of boulder clusters to provide some refugia for native fish between widened areas depending on results of design analysis.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species throughout the project footprint. Invasive species within the project footprint would typically be removed by hand tools.

Maintaining design grades, elevations, contours, and conveyance may require in-water work on a periodic basis. Maintenance activities would avoid or minimize impacts to riffle and pool

complexes to the maximum extent practicable. If disturbed during maintenance activities, riffle and pool complexes would be restored to match pre-construction configurations to the maximum extent practicable. Furthermore, the project would create conditions that would allow for formation of additional riffle and pool complexes.

Long-term impacts to aeration and downstream scour would be de minimis since the River downstream of the project area would remain channelized. Furthermore, as indicated in Section 3.5.3 of the IFR, the study area supports nonnative fish species such as mosquito fish, catfish, and green sunfish, and carp throughout the study reach. Native fish species are not present. As a result, impacts would result in de minimis impacts to fish population. For all maintenance activities, direct and indirect impacts to functions and services associated with riffle and pool complexes would be de minimis.

### **Cumulative impacts**

The River was once a 51-mile-long backbone of a vast system of riparian foothill, riverine, and freshwater marsh habitat that carried seasonal rains and subterranean flows to the coastal plain and the Pacific Ocean. Coral reefs and mudflats have not been present historically within the study area. However, wetlands as well as riffle pool and complexes were likely present. Over time, the River has been degraded by a cycle of increasing urban development, flooding, and channelization, culminating in the mid-20th Century with the LACDA system. The LACDA project encased the river in concrete banks and a mostly concrete bed, and straightened the river's course, thereby significantly diminishing the range and size of special aquatic sites.

In addition to project construction, constructed ecosystem features and invasives removal throughout the project footprint would be maintained under all alternatives. The Corps would continue to be responsible for maintaining all other aspects of the portions of the LACDA project that overlap with the restoration project footprint. Removal of invasive vegetation would benefit recruitment of riparian vegetation and establishment of wetlands.

In-channel work under both maintenance programs may require work within wetland areas. Impacts to wetlands during construction would be temporary. Due to the existing seed bank and perennial flow, affected wetland vegetation is expected to recover soon after completion of construction. Naturally formed or engineered riffle and pool complexes within the ecosystem restoration project would be maintained.

## **5.6 Potential Direct and Indirect Effects on Human Use Characteristics (Subpart F)**

### **Municipal and private water supplies**

**Construction:** The River is not a source for municipal or private water supplies. It conveys storm flows and discharge from wastewater treatment plants, which are not suitable for potable use. Furthermore, the proposed action alternatives would not alter flows through the system. Therefore, there would be no direct or indirect effects on municipal or private water supplies under any alternative.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in

areas where ecosystem restoration features transition to flood risk management elements of LACDA. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species throughout the project footprint. Invasive species within the project footprint would typically be removed by hand tools.

Maintaining design grades, elevations, contours, and conveyance may require limited earthmoving activities on a periodic basis. In such cases there may be discharge of fill associated with the use of earthmoving equipment such as bulldozers or temporary stockpiling within newly established waters of the U.S. Impacts will be temporary in nature. In other cases like-for-like structural repair below the OHWM could result in discharge of permanent fill. However, temporary or permanent discharges of fill would not change the design elevations or contours. Because the River is not a source for municipal or private water supplies, in-channel work would not directly or indirectly affect municipal or private water supplies.

### **Recreational and commercial fisheries**

**Construction:** Recreational fishing at the Elysian Valley area (Reaches 4-6) is authorized during the summer months from Memorial Day through Labor Day by the Mountains Recreation and Conservation Authority and City of Los Angeles in cooperation with the Corps and County of Los Angeles. Though access is generally discouraged or unauthorized during other times of the year, recreational fishing still occurs. Fish within the Glendale Narrows reach are nonnative, primarily mosquito fish, catfish, and green sunfish, and carp. There is no commercial fishery associated with the River.

Short-term adverse impacts may occur to the recreational fishery if pools where fish may occur are made inaccessible during construction. Due to construction phasing, the amount of area made inaccessible at any given time would be a minor amount of the available area, so adverse impacts would likewise be minor and short-term. This type of effect would be least under Alternative 10 since it has the smallest amount of in channel construction, and greatest under Alternative 20 since it has the greatest amount of in channel construction. Under all action alternatives, impacts would be temporary.

Implementation of any build alternative may result in indirect long term benefits to aquatic species and recreational fishing. Per recommendations of the Fish and Wildlife Coordination Act Report, feasibility of implementing design considerations and placement of measures to support native fish habitat in the study area would be examined during the design phase. The measures in the soft bottom reaches include but are not limited to water shaded by riparian vegetation, riffle and pool complexes, refugia, in channel woody debris, gravel and cobble substrates. In concrete reaches the measures may include installation of bolder clusters to provide some refugia for native fish between widened areas.

### **Water-related recreation**

**Construction:** Kayaking and fishing are permitted in the Elysian Valley area (Reaches 4-6) from Memorial Day to Labor Day each year through the Mountains Recreation and Conservation Authority and City of Los Angeles in cooperation with the Corps and County of Los Angeles. Under all alternatives, access may be limited during construction if parts of these reaches need to be restricted for dewatering. Impacts would be temporary.

Alternative 10 proposes the least construction in Reaches 4-6, and would therefore have the least temporary effect on water-related recreation.

Alternative 13 proposes additional restoration measures. These measures may require construction access in the River channel. Thus, a larger portion part of the channel maybe restricted during construction than under Alternative 10.

Alternatives 16 and 20 propose the same measures in Reaches 4 and 6 as Alternative 13, and add the measure of modifying the banks to a vertical wall on one side and primarily terracing the bank on the other in Reach 5. This additional measure may require construction access in the River channel, meaning that a larger portion of the channel may be restricted during construction than under Alternative 13.

Alternative 13v would include all measures and impacts of Alternative 13 in Reaches 1-6 and 8. Moreover, Alternative 13v would include restoration measures in Reach 7 identical to those proposed under Alternative 20. Within Reach 7, streams would be daylighted; wetlands would be created; embankments would be terraced; and channel banks would be modified. This additional measure may require construction access in the River channel. However, since water related recreation is not supported in Reach 7, impacts to water-related recreation would be identical to Alternative 13.

There would be long-term, indirect benefits to water-related recreation upon completion of the ecosystem restoration project. As noted above, the study area already supports water-related recreation through the Mountains Recreation and Conservation Authority. With increasing public interest in a revitalized River, the ecosystem restoration project would likely catalyze implementation of future water-related recreational programs.

**Operation:** Maintenance activities within waters of the U.S. required for maintaining habitat restoration or recreational features primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA as well as invasive management throughout the project footprint, including the River and tributary channel bottom. Maintaining design grades, elevations, contours, and conveyance may require in-water work on a periodic basis. In-water work during from Memorial Day to Labor Day may temporarily disrupt kayaking, fishing, or other authorized recreation programs. However, since work would likely be localized, impacts would be de minimis and temporary.

Indirect benefits to water-related recreation from maintenance activities would be limited. In general, maintenance activities would ensure that the ecosystem research elements are maintained to design specifications and would not interfere with flood risk minimization functions of the LACDA project.

## **Aesthetics**

**Construction:** As noted in the IFR, minor, short-term adverse impacts to aesthetic resources are likely to occur under all action alternatives during construction. The proposed restoration measures under all alternatives require large equipment to be present to conduct extensive earthwork and in-channel construction. The extent and duration of temporary impacts is commensurate with the scope of the construction footprint, increasing from Alternative 10 to Alternative 20.

The fewest temporary adverse impacts would occur under Alternative 10, since it entails the smallest construction footprint and would occur over the shortest timeframe (9 years). There would be no significant adverse impacts from this alternative.

Alternative 13 and 13v would have more adverse and beneficial impacts than Alternative 10 due to the larger footprint of construction, and would occur over a longer time period (10 years). There would be no significant adverse impacts from this alternative.

Alternative 16 and 20 would have more adverse and beneficial impacts than Alternative 13 and 13v due to the larger footprint of construction, and would occur over a longer time period (15 year). There would be no significant adverse impacts from this alternative.

Long-term beneficial impacts would occur under all action alternatives. The benefits are commensurate with the scope of the construction footprint, increasing from Alternative 10 to Alternative 20. Management measures common to all alternative would benefit aesthetics. Riparian plantings would occur under all action alternatives as would non-native plant removal, trash removal, installation of linear strips for biofiltration, greening of River channel walls, and creation of buffer zones and planted swales. These common elements require little to no machinery, can be implemented quickly, and would have less than significant impacts on aesthetic resources.

There would be long-term, indirect benefits to aesthetics upon completion of the ecosystem restoration project. Currently, views from waters of U.S. are composed of trapezoidal concrete or rectangular channels, urban development at the top of banks, perennial water, debris, graffiti, and intermittent vegetation. With the project, existing views of the River composed of linear lines, sharp angles and other geometric forms as well as industrial colors and textures associated with an engineered channel would be attenuated by non-linear forms, heterogeneous textures and a natural color palette associated with a vegetated River. Furthermore, future projects within waters of the U.S., such as the Atwater Pedestrian-Equestrian Bridge or the Los Angeles Waterwheel, would juxtapose unique architectural elements against the enhanced natural views. With increasing public interest in a revitalized River, the ecosystem restoration project may catalyze implementation of future projects that would further accentuate the aesthetic elements described above.

**Operation:** Maintenance activities within waters of the U.S. for maintaining habitat restoration or recreational features would primarily entail vegetation maintenance especially in areas where ecosystem restoration features transition to flood risk management elements of LACDA. Furthermore, the City of Los Angeles would also be responsible for removal of invasive species throughout the project footprint. Invasive species within the project footprint would typically be removed by hand tools. Removal of invasive vegetation would benefit recruitment of riparian vegetation and establishment of wetlands.

Vegetation maintenance would result in temporary changes in the height and density of vegetation, affecting aesthetics. Impacts to during construction would be temporary. Due to the existing seed bank and perennial flow, affected vegetation is expected to recover soon after completion of construction. Furthermore, since work would likely be localized, impacts would be de minimis and temporary.

Indirect impacts to aesthetics from maintenance activities would be limited.

### **Parks, national and historical monuments, national seashores, wilderness areas, and research sites**

Two state parks and several city parks are located in the study area, and would be affected by construction. There are no national parks, national or historical monuments or seashores, wilderness areas, or research sites in the study area.

Temporary partial closure of Harding Park Golf Course, and temporary full closure of Los Feliz Golf Course, would occur under all alternatives. This is considered a less than significant adverse impacts because closures would be phased and golfers would have options to golf elsewhere during construction. Conversion of a small portion of the LASHP to wetland habitat is proposed under Alternative 20, but this is not expected to result in a significant impact as the new use is consistent with the parks' general plan.

**Operation:** Maintenance activities within waters of the U.S. within the River would not affect parks. However, maintenance of restored historic channels in the uplands could be located in parks and result in temporary closure of the immediate area surrounding the restoration feature. Impacts would be de minimis and temporary.

### **Cumulative impacts**

The study area encompasses a built out urban environment with residential, commercial, industrial, and recreational land uses. As a result, present and future projects within the study area would likely entail redevelopment or conversion of existing land uses. Thus, the existing urban viewshed is unlikely to change substantially. The views from waters of U.S. are composed of trapezoidal concrete or rectangular channels, urban development at the top of banks, perennial water, debris, graffiti, and intermittent vegetation. The project would substantially alter the views from waters of the U.S. Existing views of the River composed of distinctive form, line, color, and texture associated with an engineered channel would be attenuated by non-linear forms, textures and color palette associated with a vegetated channel. Furthermore, future projects within waters of the U.S., such as the Atwater Pedestrian-Equestrian Bridge or the Los Angeles Waterwheel, would add unique architectural elements to views from waters of the U.S. Cumulative impacts to aesthetics would be beneficial and significant.

Existing recreational uses within the vicinity of the study area includes a number of parks. Immediately adjacent to the study area is Griffith Park, a large regional recreational area that supports many recreational activities. Recreational opportunities along the study reach include year-round jogging and biking trails. In addition, annual kayaking and fishing in the River during summer months is offered through the Mountains Recreation and Conservation Authority. The project would indirectly increase recreational opportunities within the study area. Demand for recreation is expected to increase proportionally to population growth in the study area. Furthermore, due to the increasing public interest in revitalizing the River, implementation of additional recreational programs or construction of recreational amenities within the vicinity of the study reach in the future is likely. Cumulative impacts to recreation would be beneficial and significant.

The River is not a source for municipal or private water supplies. It conveys storm flows and discharge from wastewater treatment plants, which are not suitable for potable use. In consideration of the on-going drought in the Los Angeles area and an increasing emphasis on water conservation to augment water supplies, future implementation of programs and infrastructure to utilize existing flows remains a possibility. Due to real estate requirements and technical challenges for establishment of large groundwater recharge basins within the vicinity of the study area, future projects would likely entail small-scale demonstration or pilot programs. Impacts to water supplies would be less than significant.

Please refer to Section 5 of the IFR for the scope of analysis and discussion of past, present, and reasonably foreseeable future projects.

### **5.7 Evaluation and Testing (Subpart G)**

All action alternatives would entail discharges of fill materials within waters of the U.S. Temporary discharges of fill would entail dewatering structures such as k-rails and sand bags. Dewatering structures would be removed upon completion of each phase of construction. Permanent discharges of fill would entail discharges of rock, concrete, reinforced vegetated matting, and top soil.

Both temporary and permanent fills would be chemically inert and would not leach contaminants into the water column. Topsoil would be acquired from a certified contaminant-free source to ensure that fill material is most likely to be free from chemical, biological, or other pollutants. Thus, topsoil would be suitable for discharge into the aquatic environment. Per 40 C.F.R. 230.60(a), additional chemical, biological, and physical evaluation testing would not be required.

### **6.0 Measures to Minimize Adverse Impacts (Subpart H)**

Under any alternative, the following measures will be taken prior to and during construction to monitor the degree of impacts related to wetland and riparian construction, and to ensure that materials used in construction or operations are appropriate for use in an aquatic restoration project.

- Sources of seeds used for revegetation and soils used for backfilling will be required to show that they are weed free to the degree possible.
- Soils and all materials used for backfilling or stabilization must be certified to be free of contaminants.
- All sites with known and suspected HTRW soil contamination will be investigated and remediated prior to project construction. All groundwater contamination that cannot be remediated prior to project construction will be subject to appropriate handling, treatment and disposal ensured by the non-Federal sponsor. All work shall be consistent with ER 1165-2-132.

Construction plans will identify optimum phasing and timing and specify the guidelines for minimum standards necessary to protect soils, biological resources, and water and prevent generation of fugitive dust. Specific guidelines may include;

- Limiting certain aspects of in-channel construction outside of the winter storm season (April 15 - October 15) to minimize soil erosion.
- Installing silt fences around construction areas to prevent silt and sediment from entering the River channel.
- Designing and implementing a dewatering plan to avoid operating equipment in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area.
- Complying with an established Spill Prevention and Response Plan, which would define requirements for storage, handling, and containment of hazardous materials.
- Developing and implementing a storm water pollution prevention plan.
- Vegetation clearing activities would be avoided to the maximum extent practicable in any areas identified as breeding or nesting habitat for any bird species during the breeding season, which generally runs from March 1-August 31.
- If vegetation removal must occur during the breeding season, a qualified biologist would perform nesting bird surveys following established protocol prior to construction. If nests are detected during these surveys, a 300-foot no construction buffer would be delineated around the nest (500 feet for raptors).
- Construction in breeding areas would be monitored by a qualified biologist.
- Construction would be phased to minimize impacts to wildlife species, so that the entire study area would not be under construction all at once to minimize human intrusion.
- Stabilizing and reseeded disturbed areas with native grasses, shrubs, and trees after construction is complete.
- Conducting operation and maintenance during times of the year when wildlife is not likely to be breeding or nesting.
- Avoiding sensitive habitat types to the degree possible when performing maintenance,
- Prior to initiation of construction of each project phase, the relevant portion of the project area would be surveyed for wetlands. Construction would avoid or minimize impacts to wetlands to the maximum extent practicable.
- Prior to initiation of construction of each project phase, the relevant portion of the project area would be surveyed for riffle and pool complexes. Construction would avoid or minimize impacts to these features to the maximum extent practicable.

## 7.0 Summary of Effects to the Aquatic Environment

In general, potential for temporary impacts during construction would increase from Alternative 10 through Alternative 20, commensurate with the increasing scope for a number of aquatic resources. However, with implementation of measures to minimize adverse impacts, there would be no permanent loss or reduction of aquatic functions and services for any build alternative.

## 8.0 Conclusion

Alternatives 10, 13, 13v, 16, and 20 meet the overall project purpose and are practicable with respect to cost, technology, and logistics (See Section 4.3, 4.4, and 4.5). All action alternatives would entail significant impacts to non-aquatic resources (See Section 4.7). *The long term benefits to aquatic services and functions would be commensurate with the scale of construction and associated impacts.* The acreage of permanent fill within existing waters of the U.S. would increase from Alternative 10 (4.52 acres) through Alternative 20 (65.61 acres). The acreage of temporary fill would also increase correspondingly. However, all temporary fill would be removed upon completion of construction. Likewise, the acreage of new waters of the U.S. created will increase from Alternative 10 (56 acres) through Alternative 20 (156.9 acres).

All action alternatives would entail discharges of permanent fill into waters of the U.S. The discharge of fill material is required for the restoration of aquatic functions and services within waters of the U.S, and stabilization of new waters of the U.S. The discharge of permanent fill material would not result in the permanent loss of existing waters of the U.S.

All action alternatives would require implementation of environmental commitments to further avoid and minimize effects to the aquatic environment. No significant adverse impacts to aquatic resources have been identified in the IFR. No take of protected or sensitive aquatic species would occur under any build alternative.

**Based on the preliminary analysis above, the project is in compliance with the Section 404(b)(1) Guidelines. The final 404(b)(1) evaluation and Findings of Compliance will be included with the Record of Decision for this project.**