

Draft Environmental Assessment

Alamo Creek Detention Basin

City of Vacaville

FEMA-1628-DR-CA & FEMA-1646-DR-CA, HMGP 1628-31-14

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Acronyms and Abbreviations

ACDB	Alamo Creek Detention Basin
APE	area of potential effect
BA	Biological Assessment
BMP	Best Management Practice
BO	Biological Opinion
Cal EMA	California Emergency Management Agency
CCV steelhead	California Central Valley steelhead
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
City	City of Vacaville
CNDDDB	California Natural Diversity Database
CO	Carbon monoxide
CRLF	California red-legged frog
CWA	Clean Water Act of 1977
DPS	distinct population segment
DSOD	California Department of Water Resources, Division of Safety of Dams
EA	Environmental Assessment
EIR	Environmental Impact Report
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FDB	Florence Detention Basin
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
GCR	General Conformity Rule
HMGP	Hazard Mitigation Grant Program
MOA	Memorandum of Agreement
MSFCMA	Magnuson-Stevens Fisheries Conservation Management Act
NAAQS	National Ambient Air Quality Standards
NAHC	(California) Native American Heritage Commission

NEPA	National Environmental Policy Act of 1969
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NO _x	Nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O ₃	ozone
PM _{2.5}	Particulate matter less than 2.5 micrometers in diameter
PM ₁₀	Particulate matter less than 10 micrometers in diameter
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SO ₂	Sulfur dioxide
SVAB	Sacramento Valley Air Basin
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
Treatment Plan	<i>Cultural Resources Treatment Plan for the Proposed Alamo Creek Detention Basin, Vacaville, Solano County, California</i>
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USFWS	U.S. Fish and Wildlife Service
VELB	valley elderberry longhorn beetle
VOC	volatile organic compounds
WOUS	waters of the United States
YDWN	Yocha Dehe Wintun Nation
YSAQMD	Yolo-Solano County Air Quality Management District

SECTION ONE INTRODUCTION

The City of Vacaville (City) in Solano County, California, has applied through the California Emergency Management Agency (Cal EMA) to the Department of Homeland Security's Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) for Federal financial assistance (Federal action) to implement the Alamo Creek Detention Basin (ACDB) project (proposed action). The detention basin, which would be constructed on approximately 77 acres of City-owned property, would reduce the potential for damage from flooding on Alamo Creek. FEMA proposes to provide Federal financial assistance pursuant to Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (42 U.S.C. § 5170c) and its implementing regulations (44 CFR Part 206).

FEMA has prepared this Environmental Assessment (EA) to evaluate the impacts of the City's proposal. The EA has been prepared according to the requirements of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. §§ 4321–5327), the Council on Environmental Quality's (CEQ's) regulations implementing NEPA (40 CFR Parts 1500–1508), and FEMA's implementing regulations (44 CFR Part 10).

The EA process provides steps and necessary procedures for evaluating the potential environmental, social, and economic impacts of the proposed action and alternatives. Potential impacts are measured by context and intensity, as defined in CEQ regulations. The EA process includes a 15-day comment period during which the public and local, State, and Federal agencies can submit comments on the proposed action. The comment period follows the issuance of the Draft EA and publication of the Notice of Availability.

SECTION TWO PURPOSE OF AND NEED FOR ACTION

The City has a long history of flooding and is at high risk for future flooding, which poses a threat to public health and safety and to property. The purpose of the Federal action is to provide HMGP Federal financial assistance to the City, through Cal EMA, to protect people and property from recurring flood damage. The HMGP provides grants to local, territorial, tribal, and State governments to implement long-term hazard mitigation measures after a major disaster declaration.

The City has been developed in the uplands adjacent to and surrounding Alamo Creek, which drains approximately 10 square miles in and around the City. Because of the existing development and the small capacity of the creek channel to contain flood flows, Alamo Creek has repetitively flooded and damaged public and private property in the City. On most reaches of the creek, creek flows overtop the banks and flood surrounding areas from storms, causing flows in the creek that are lower than the 10-year flood. In some areas, flooding occurs from flows lower than the 5-year flood.

The two major drainage channels that flow through the City are Alamo Creek and Ulati Creek. After heavy rainfall, both creeks overtop their banks, resulting in flooding of adjacent lands. The City has experienced 12 flood-related disaster events since 1963. Damage in the City from the 10-year flood on Alamo Creek in December 2002 totaled approximately \$3.4 million. Damage in the City from the 28-year flood on Alamo Creek in December 2005 totaled approximately \$26.5 million.

The City has concluded that there is a need to reduce the extent of flooding on Alamo Creek to reduce the flood-related damage within the City. Therefore, the purpose of the Federal action is to reduce flooding hazards from Alamo Creek within the City boundary and to help protect health and safety and public and private property within the City.

SECTION THREE ALTERNATIVE ANALYSIS

Alternatives that were considered but eliminated from further review are discussed in Section 3.1. The No Action Alternative was considered, as required by NEPA, and is discussed in Section 3.2. One action alternative (proposed action) was evaluated in detail and is discussed in Section 3.3.

3.1 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER REVIEW

The following alternatives were considered but eliminated from further review: expanding the width and depth of the Alamo Creek channel, constructing a large detention basin on the main channel of Alamo Creek, and modifying drop structures along Alamo Creek (Solano County Water Agency 2007).

3.1.1 Expanding the Width and Depth of the Alamo Creek Channel

Expanding the width and depth of the Alamo Creek channel would allow stormwater to pass through the City in limited capacity, increasing conveyance capacity, but would require downstream channel improvements outside the City. This alternative would require acquisition and demolition of residential and business properties adjacent to the creek to provide the right-of-way for the new wider channels. Depending on the scale of the channel improvements, between 11 and more than 150 residences and business properties would need to be acquired, between approximately 8 and 14 bridges would need to be modified or replaced, and levees or flood easements would need to be constructed or purchased, resulting in substantial costs. Additionally, this alternative would be anticipated to have substantial environmental impacts because large areas of riparian and aquatic habitat would be adversely affected. For these reasons, this alternative was eliminated from further consideration (Solano County Water Agency 2007).

3.1.2 Constructing a Detention Basin on the Main Channel of Alamo Creek

Constructing a large detention basin on the main channel of Alamo Creek was also considered. The new basin would provide detention storage upstream of the City and would reduce peak flows during a 100-year flood event below the minimum channel conveyance capacity along critical reaches of Alamo Creek. This alternative would require constructing a detention basin with more than three times the capacity of the basin being proposed by the City (proposed action) and directing nearly all of the flow of a 100-year flood into the basin. Costs would be substantial for property acquisition; construction, especially offhauling excavated soil material; and maintenance. For these reasons, this alternative was eliminated from further consideration (Solano County Water Agency 2007).

3.1.3 Modifying Drop Structures Along Alamo Creek

Modifying existing drop structures along Alamo Creek to lower upstream water surface elevations was also considered. This alternative would reduce localized flooding upstream of the

drop structures. Removal of these structures would likely reduce the extent of localized flooding in the immediate area of the structure but would not reduce the extent of flooding in other areas adjacent to Alamo Creek. Because this alternative would only minimally reduce localized flooding, it was eliminated from further consideration (Solano County Water Agency 2007).

3.2 ALTERNATIVE 1: NO ACTION

A No Action Alternative is required to be included in the environmental analysis and documentation pursuant to CEQ regulations implementing NEPA. The No Action Alternative is defined as maintaining the status quo with no FEMA financial assistance. The No Action Alternative is used to evaluate the effects of not providing assistance for the proposal and provides a benchmark against which other alternatives may be evaluated. For the purpose of this EA, under the No Action Alternative, it is assumed that the City would be unable to reduce the risk from recurring floods to the community and property because of the lack of Federal financial assistance. Therefore, in the No Action Alternative, no improvements would be made, and the City would continue to experience recurring flood damage and health and safety threats to people from flooding.

3.3 ALTERNATIVE 2: CITY'S PROPOSAL (PROPOSED ACTION)

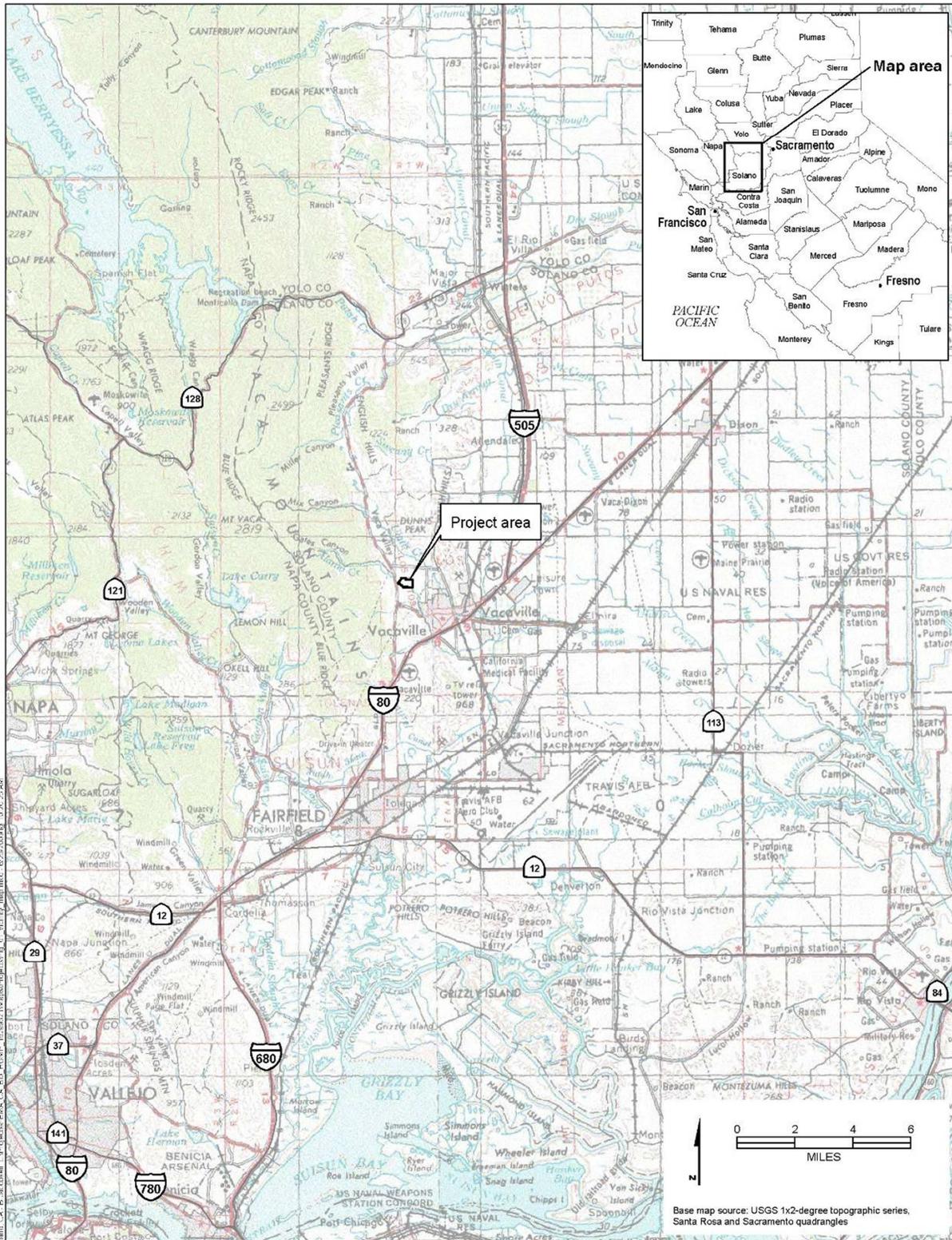
The proposed action would involve construction, operation, and maintenance of the ACDB, as described below.

3.3.1 Project Area

The project area for the proposed action is northwest of Vacaville, California, approximately 54 miles northeast of San Francisco and 34 miles southwest of Sacramento (Figure 1). The project area is northwest of the City (Figure 2) between Pleasants Valley Road (west), Rogers Lane (east), and Vaca Valley Road (north). The southern boundary of the project area is along the northern bank of Alamo Creek. The project area consists of approximately 77 acres, which are owned by the City.

3.3.2 Construction of Alamo Creek Detention Basin

The proposed ACDB would reduce the existing flood hazard from Alamo Creek within the City boundaries during flood events. The inlet structure would be designed to passively allow flowing water in Alamo Creek to flow into the ACDB when water in the creek is less than the 10-year flood elevation. The ACDB would store up to approximately 575 acre-feet of water; the exact capacity may vary slightly based on the final design of the basin. At this approximate capacity,



FEMA-1628-DR-CA & FEMA-1646-DR-CA, HMGP #1628-31-14 City of Vacaville, Alamo Creek Detention Basin **Figure 1** Project vicinity

the ACDB would provide storage for up to a 25-year storm event. The ACDB would be designed to retain water for a period of up to 72 hours. Retained water would be passively released back into Alamo Creek through an outfall structure. The outfall structure would limit, but not stop, the gravity flow of floodwater back into Alamo Creek. Water in the ACDB would flow over an engineered spillway in the southern berm during flood events that exceed the capacity of the basin.

The ACDB would have an earthen bottom, engineered earthen berms, emergency spillway, 300-foot-wide articulated concrete block inlet structure, 42-inch-diameter reinforced-concrete pipe outlet, and maintenance road. An excavation disposal area, two parking areas, an access road, perimeter fencing, and access gates would also be constructed adjacent to the ACDB as permanent features of the facility (Figure 3).

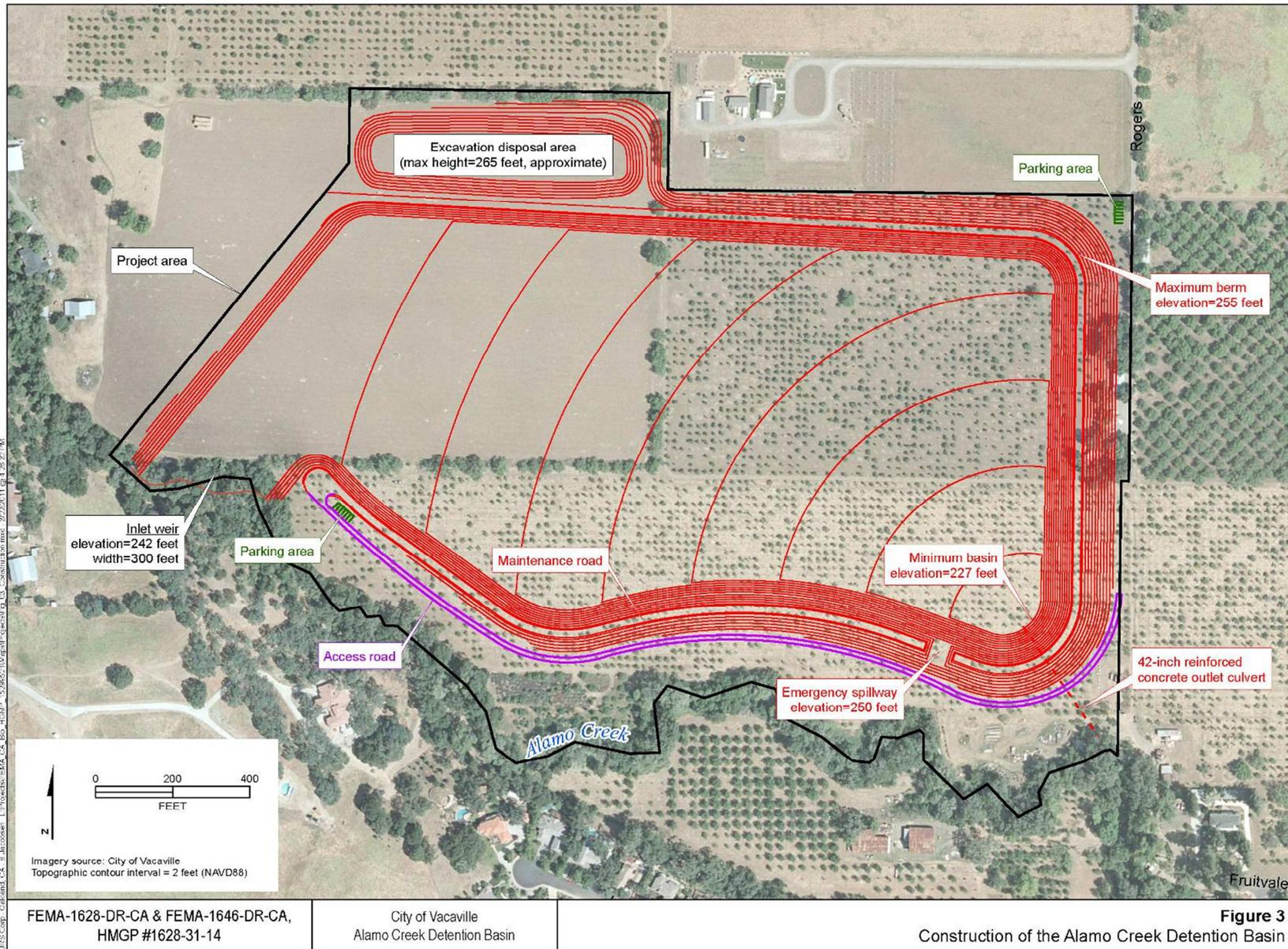
Construction would be initiated by grading the project area, removing some trees and vegetation, and demolishing several vacant structures along the eastern side of the project area. Vegetation near the intake and outfall structures would be permanently removed, but trees and other vegetation in the riparian zone along Alamo Creek would be avoided.

The basin, intake, and outfall footprints, and foundation area for the berms would be excavated. The maximum depth of excavation would be approximately 17 feet below ground surface. The basin bottom would consist of native soil.

The berm closest to Alamo Creek would be constructed outside the 100-year floodplain. The berms would have a maximum crest elevation of 11 feet above the existing grade and an approximate crest width of 20 feet. An approximately 12-foot-wide maintenance road would be constructed atop the crest. An emergency spillway would be constructed across the crest on the eastern side of the southern berm. The emergency spillway would have a reinforced-concrete bottom and would be 20 feet wide at its bottom, with an invert elevation of approximately 6 feet above the existing grade. The berms would be constructed on an engineered fill foundation that would be built on undisturbed native soil. Soil excavated for the basin, intake structure, and outlet structure would be used to construct the berms.

The intake structure would consist of an inlet weir lined with articulated concrete block placed on undisturbed native soil. The block would be designed based on the flow characteristics of the inlet and the block manufacturer's recommendations. Riprap could be placed at the junction between the intake structure and Alamo Creek to prevent scour. Because the intake structure would function passively, it would not extend into the natural Alamo Creek stream channel. The inlet weir would be approximately 2 feet below the existing grade and have a bottom width of 300 feet.

The outfall structure would consist of a 42-inch-diameter reinforced-concrete culvert constructed on a reinforced-concrete bed. This structure would be designed to meter the detained water into Alamo Creek. Water would be conveyed through the outfall structure by gravity. The outfall structure would be constructed using open channel trenching methods. The creek bank would be



lined with half-ton rock riprap at the terminus of the outfall structure to prevent scour, and the terminus of the culvert could include a flap gate.

To minimize off-site disposal and truck trips, some excess excavated soil would be stored at an onsite disposal area. This disposal site would have a height of approximately 21 feet above the existing grade and would be constructed on undisturbed native soil. Any additional excess soil from excavation would be trucked to other locations in accordance with local, State, and Federal requirements.

The project area would be finish-graded after the grading has been completed and the berms, disposal site, intake structure, and outfall structure have been constructed. Finish-grading would include completing the maintenance road on top of the berms, the permanent parking areas, and the access road. Disturbed soils within the project area would be hydroseeded, a fence would be installed in upland areas around the perimeter of the property boundary, and access gates would be installed.

As stated above, with the exception of areas where the outfall and intake structures would be installed, the riparian zone would not be disturbed. All equipment would be staged in the project area outside the riparian and stream zones.

Rogers Lane would be used to access the project area. The proposed action would not include improvements to Rogers Lane.

The City would implement all standard and necessary Best Management Practices (BMPs) to protect water quality, wetlands, waters of the United States (WOUS), and the Alamo Creek streambed through its compliance process with Sections 401, 402, and 404 of the Clean Water Act of 1977 (33 U.S.C. §§ 1341, 1342, and 1344) and Section 1600 et seq. of the California Fish and Game Code. Any construction-related BMPs required under local regulations or by local regulatory agencies (e.g., BMPs to reduce construction-related air quality effects, noise effects, or traffic control) would be implemented, as applicable.

3.3.3 Operation and Maintenance of ACDB

City operation and maintenance activities at the ACDB would be minimal. The intake and outfall structures would operate passively and would therefore not require personnel to operate mechanical devices to allow water to enter or exit the ACDB. The basin has a 10 percent chance of operation in any given year.

The bottom of the ACDB could be used for agriculture. Debris removal and cleanup would occur after the winter and spring rainy season and would consist of removing accumulated silt using a backhoe or excavator. Some debris removal could occur during the winter but would be infrequent and occur only as needed. Weeds would be abated by mowing and/or an herbicide (Aquamaster) two or three times in the summer to restrict the accumulation of fire fuel and maintain water flow in the ACDB. If the ACDB bottom were used for agriculture, weed abatement could occur less often.

SECTION FOUR AFFECTED ENVIRONMENT, IMPACTS, AND MITIGATION

This section focuses on the resources the alternatives have the potential to affect: land use and agriculture, geology and soils, seismicity, water resources, biological resources, historic properties, air quality, noise, transportation, visual resources, recreation, and environmental justice. No other resources have been identified as having the potential to be affected by the alternatives that would require further evaluation pursuant to NEPA.

4.1 LAND USE AND AGRICULTURE

The project area consists of approximately 77 acres of City-owned property in unincorporated Solano County northwest and outside the Vacaville city limits. The project area and adjacent properties are outside the City's Urban Growth Boundary and designated agriculture on the City land use map (City of Vacaville 2008). The *City of Vacaville General Plan*, Land Use Element, includes Guiding Policy 2.10-G 1, which states that development would be focused within the Urban Growth Boundary and that land outside the Urban Growth Boundary would not be redesignated for other uses besides agriculture, open space, public facility, and utility uses (City of Vacaville 2008).

The *Solano County General Plan* (Solano County 2008b) indicates that portions of the project area have been designated prime farmland by the California Department of Conservation, Division of Land Resource Protection, which administers the Farmland Mapping and Monitoring Program (FMMP). According to the FMMP, prime farmland is defined as "farmland with the best combination of physical and chemical features able to sustain long term agricultural production" (California Department of Conservation 2010).

Existing land use within the majority of the project area is agricultural, including an abandoned cherry orchard and an active agricultural field planted in wild oats in the northwestern corner. The project area also includes some developed areas—a homestead at the northeastern edge, a junk pile, an undeveloped cleared area, and several farm roads that bisect the project area.

Adjacent properties are also designated for agricultural use. Surrounding areas to the north and west consist of agricultural and grazing land, while surrounding areas to the east and south are in the City and developed with low-density residential neighborhoods.

The Farmland Protection Policy Act of 1981 (7 U.S.C. §§ 4201 et seq.) and the U.S. Department of Agriculture's implementing procedures require Federal agencies to evaluate the effects (direct and indirect) of their activities before taking any action that could result in converting designated important farmland to nonagricultural purposes. If an action would adversely affect the use of an area as farmland, alternative actions that could avoid or decrease the adverse effects must be considered. Federal agencies must also ensure that their programs, to the extent practicable, are compatible with State, local, and private programs to protect farmlands. Farmland in the project area is designated as prime.

4.1.1 Alternative 1: No Action

Under the No Action Alternative, no improvements or construction by the City would occur and right-of-way, easements, displacements, or relocations would therefore not be required. No change would occur to existing land use or development patterns. Because the existing land uses are expected to continue, land use in the project area would continue to be compatible with adjacent land use. Although the No Action Alternative would not preclude future development, existing drainage problems (i.e., flooding) would continue on infrastructure and on land in and near Vacaville. Flooding could be an impediment to future development. However, the City's Department of Planning and Building would be responsible for approving development plans, and the City's permitting process would address localized drainage issues. Therefore, minor long-term indirect impacts could occur under the No Action Alternative.

The No Action Alternative would have no direct impacts on land use but could result in minor long-term indirect impacts.

4.1.2 Alternative 2: Proposed Action

Agricultural land uses could continue after construction of the proposed action. The project area is on land that is designated for agricultural use, and it is unlikely that the area would be developed with urban uses in the reasonably foreseeable future. The basin has a 10 percent chance of operation in any given year. The bottom of the ACDB would be native soil and could be used for agriculture when the basin is not retaining stormwater. Operation and maintenance of the ACDB would include debris removal and cleanup after the winter and spring rainy seasons and weed abatement throughout the summer. If the ACDB bottom is used for agriculture, weed abatement could be required less often. Given that the ACDB has a 10 percent chance of operation in any given year, and the basin floor may be used for agriculture, the proposed action would be compatible with surrounding agricultural uses.

Construction of the ACDB would affect the approximately 63 acres of farmland in the project area designated as prime. FEMA completed an AD-1006 Farmland Conversion Impact Rating form for the proposed action and submitted it to the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Office in Solano County for an evaluation of the effects of the proposed action on prime farmland. The NRCS determined the relative value of the farmland to be converted and documented the value on the Farmland Conversion Impact Rating form. The form is provided as Appendix A. Based on FEMA's assessment and the relative value of the farmland to be converted, the total score for the site of the proposed action, including the 63 acres of farmland to be converted, is 152. As described in 7 CFR § 658.4, sites with a total score of less than 160 do not need further consideration for protection, and no additional sites need to be evaluated.

Because Solano County has 358,225 acres of available farmland, the proposed action would not have a disproportionately adverse effect on farmland or agriculture in the region. Furthermore,

although the proposed action would affect land designated prime farmland, the impacts would be reduced if the basin floor were used for agriculture.

Therefore, the proposed action would result in moderate short-term direct impacts and moderate long-term indirect impacts to land use and agriculture.

4.2 GEOLOGY AND SOILS

The project area is in the Great Valley physiographic province, a broad, trough-shaped, alluvial plain in central California (California Geological Survey 2002). Sediments have collected in the province since the Jurassic period (about 160 million years ago). The project area is near the Sacramento Valley in the northern part of the Great Valley province. Elevations in the project area are between 220 and 258 feet above mean sea level.

The project area is underlain by Quaternary (late Pleistocene to Holocene) alluvium composed of unconsolidated flood-plain deposits consisting of irregularly interstratified sand, silt, clay, and gravel (Sims et al. 1973; Wiegers et al. 2006, 2007). Underlying bedrock along Alamo Creek has been mapped as unnamed Paleocene rocks consisting largely of medium and fine-grained sandstone and late Cretaceous sandstone and shale associated with the upper part of the Great Valley province.

As a part of the proposed action design process, the City conducted geotechnical investigations of the project area. The results of the investigations indicated that the soils in the project area consist of low to moderate plasticity native fine sandy clays and clays with occasional layers of sandy silt, clayey sand, and clayey gravel and are underlain by claystone, siltstone, and sandstone bedrock. The depth to bedrock ranges from approximately 20 to 90 feet below grade (Paragon Geotechnical 2009).

4.2.1 Alternative 1: No Action

No ground-disturbing activities would occur as a result of the No Action Alternative. Therefore, this alternative would have no direct impact on geology or soils. However, the flood hazard in the project area would not be mitigated, and soil erosion would continue as a result of flooding. Because soils in the project area are relatively shallow, this impact is expected to result in minor long-term indirect impacts to soil.

4.2.2 Alternative 2: Proposed Action

During construction of the proposed action, activities such as grading, vegetation removal, and use and transport of heavy equipment could disturb and expose soils, resulting in an increased susceptibility to water and wind erosion. Approximately 77 acres of soil would be disturbed by construction of the proposed action. Areas that would be disturbed by construction activities would be stabilized with erosion-control measures such as silt fences, or cleared soil would be mulched to avoid or reduce soil erosion during construction. The City would be responsible for covering spoil piles or watering existing soils, as necessary, to minimize soil loss from surface

runoff and wind erosion. To minimize offsite disposal and truck trips, some excess excavated soil would be stored at an onsite disposal area. Any additional excess soil from excavation of the ACDB would be trucked to other locations in accordance with local, State, and Federal requirements.

After construction, the City would implement permanent erosion-control measures, such as revegetation with native plant seed mix, to stabilize soils and minimize the potential for long-term erosion. With the implementation of these measures, impacts to soils and geology as a direct result of construction would be minimized and temporary.

To prevent scour during operation, riprap would be placed between the intake structure and Alamo Creek and would line the bank at the terminus of the outfall structure. Other maintenance activities would include bi-annual removal of accumulated silt after the rainy season with a backhoe or excavator and weed abatement during the summer. These maintenance activities would be similar to existing agricultural and maintenance activities in the project area and would not result in an adverse impact on geology and soils.

Implementation of the proposed action would reduce the risk of flooding in the project area. The reduced risk of flooding would indirectly result in a lower potential for uncontrolled soil erosion or deposition as a result of unmanaged water flows.

Therefore, the proposed action would result in moderate short-term direct impacts and minor long-term indirect impacts to geology and soils.

4.3 SEISMICITY

The City is approximately 54 miles northeast of the San Francisco Bay Area, which is a seismically active area. Two faults have been mapped near the project area: the Lagoon Valley fault, which is west of the project area and roughly parallel to Pleasants Valley Road on a north-south trend; and the Vaca fault, which is just south of the project area and runs in a northwesterly direction, as shown on the *Fault Activity Map of California* (Jennings 1994). The geotechnical study for the proposed action included a review of several years of aerial photographs of the project area, and no indications of the fault traces were detected.

Executive Order (EO) 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, requires newly constructed buildings to meet standards for seismic safety set by the National Earthquake Hazard Reduction Program. However, EO 12699 applies only to construction of new buildings that are to be used or intended for sheltering persons or property and thus is not applicable to the proposed action.

4.3.1 Alternative 1: No Action

The No Action Alternative would not have any impact on seismicity.

4.3.2 Alternative 2: Proposed Action

Under the proposed action, the potential for earthquakes would remain unchanged. The detention basin would be constructed consistent with seismic standards from the California Department of Water Resources, Division of Safety of Dams (DSOD). Failure of a berm in a seismic event is unlikely. However, if a berm failed when the basin was full, areas adjacent to the berm and downstream could be inundated. Inundation flows would generally follow topography and drain toward Alamo Creek. The inundation could be commensurate with what is currently experienced during major storm events. Any associated structural damage to the proposed features of the basin is not anticipated to pose a major risk to the people and facilities in the vicinity. However, because the basin would meet DSOD standards, structural damage is not likely.

4.4 WATER RESOURCES

Water resources in the project area are influenced heavily by rainfall and regional geology. Average annual precipitation in the project area is 24.6 inches, which occurs mostly during November through March (Western Region Climate Center 2009). Surface water in the project area is conveyed by Alamo Creek. Alamo Creek is an intermittent drainage that flows west to east through the southern portion of the project area. Alamo Creek drains an area of approximately 10 square miles in the vicinity of the City. The creek flows from the Vaca Mountains, approximately 1.5 miles northwest of the project area, into Ulatis Creek, approximately 11 miles southeast of the project area. Ulatis Creek drains into Cache Slough of the Sacramento-San Joaquin Delta. Laguna Creek and Encinosa Creek confluence with the main tributary of Alamo Creek downstream of the project area within the City boundary.

4.4.1 Water Quality and Hydrology

The Clean Water Act of 1977 (CWA) (33 U.S.C. §§ 1251 et seq.) established quality standards for surface water and a mechanism for regulating discharges of pollutants into waters of the United States (WOUS). Under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403) and Section 404 of the CWA (33 U.S.C. § 1344), a permit must be obtained from the U.S. Army Corps of Engineers (USACE) prior to discharging dredged or fill materials into WOUS unless the activity is exempt.

Section 401 of the CWA (33 U.S.C. § 1341) requires certification that any activity authorized under Section 404 of the CWA is in compliance with State water quality standards, effluent limits, and other applicable State laws. In California, Section 401 certification is administered by the State Water Resources Control Board (SWRCB), the Regional Water Quality Control Boards (RWQCBs), or certain tribal governments, depending on the location and type of permitted activity.

Section 402 of the CWA (33 U.S.C. § 1342) established the National Pollutant Discharge Elimination System (NPDES) Permit Program, which permits the discharge of pollutants into surface water. On non-tribal lands in California, the permit program is administered by the SWRCB or the RWQCBs.

In 2009, the USACE completed a jurisdictional determination of the project area and determined that WOUS under the jurisdiction of the USACE are present in Alamo Creek. The USACE also determined that the WOUS are not wetlands and that no wetlands are present in the project area.

The hydrology of Alamo Creek in the project area varies in width, depth, composition, and flow rate. The creek has a mostly sandy substrate and some areas of silt and gravel. The wetted width of the stream varies from 2 to 15 feet, and the normal-flow stream depth varies from 2 to 6 feet. Intermittent pools, scattered logs, and woody debris are located along the creek adjacent to the project area. Emergent and overhanging vegetation are present in the creek. Vegetation along the creek bank is characterized as riparian woodland dominated by valley oak (*Quercus lobata*) and red willow (*Salix laevigata*). The majority of the creek bank is incised. The creek bed in the project area becomes dry or contains shallow intermittent pools during the dry season. A small portion of the upstream end of the creek channel in the project area is wet year-round.

Surface water in the upland portion of the project area comes in the form of rainfall. This water either drains into Alamo Creek or is absorbed into the soil.

Most peak flows in Alamo Creek in the project area are contained within the creek channel. Downstream of the project area within the City boundary, the Alamo Creek channel capacity is typically smaller and the creek banks overtop from flood events. Capacity water flows in Alamo Creek have inhibited the City storm drain system from discharging into the creek, resulting in flooding in the City (Solano County Water Agency 2007).

Water quality in and immediately downstream of the project area is influenced by flow levels in Alamo Creek. During large storm events, water quality is affected by erosion and sedimentation. Additionally, some of City storm drains discharge directly into Alamo Creek and can convey contaminants into the creek, affecting the creek's water quality. High flood flows in Alamo Creek that result in flooding of built-out areas convey urban-based contaminants back into Alamo Creek and degrade the water quality. The SWRCB has determined that water quality is impaired in Alamo Creek by high concentrations of diazinon and chlorpyrifos, which are pesticides from urban and agricultural uses (City of Vacaville 2010).

The uses of Alamo Creek include municipal and domestic water supply, agricultural supply, industrial process and service supply, contract and non-contract water recreation, warm and cold freshwater habitat, and wildlife habitat.

The Vacaville area has two primary groundwater aquifers that are used for agricultural water, local domestic supplies, and the City's municipal supply. Groundwater in the project area has been determined to be 16 to 20 feet below ground surface and is known to change on an annual cycle. The changes are often associated with seasonal changes in localized groundwater use longer term fluctuations, which are partially related to groundwater recharge rates and droughts. Because the project area does not contain impervious surfaces, groundwater is recharged in the project area into the underlying aquifers. Four groundwater wells are believed to be present in

the project vicinity, and the groundwater is expected to be usable for both domestic and agricultural purposes (City of Vacaville 2010).

4.4.1.1 Alternative 1: No Action

The No Action Alternative would result in no change to existing surface water quality or hydrology. Water quality would continue to be degraded by erosion, sedimentation, and contamination from pollutants. The extent of flooding in the City from overflows of Alamo Creek would not change. The No Action Alternative would result in no change to existing groundwater water quality and would therefore have no impact on this resource.

4.4.1.2 Alternative 2: Proposed Action

Temporary impacts to water quality could occur from the operation of heavy equipment, disturbance of soils, placement of rock and construction materials in Alamo Creek, and groundwater dewatering. Construction activities would include excavation of soils and earthmoving, including along the northern bank of Alamo Creek at the locations of the intake and outlet structures, and the use of heavy construction equipment. Because construction activities would take place over several years, the project area would be subjected to winter rains and wind erosion, which could result in erosion at the project site and deposition of sediment into Alamo Creek. Additionally, onsite stormwater runoff could result in discharges of suspended solids and other pollutants, such as construction-related chemicals into Alamo Creek. These temporary impacts would be minimized with the implementation of appropriate BMPs.

Because of the shallow groundwater and the proposed depth of excavation, dewatering activities could be necessary during construction. Dewatering discharges could contain suspended sediment and other construction-related contaminants. These discharges could become a part of the stormwater runoff from the project area if the dewatering discharges are used at the site for activities such as dust control. During construction of the basin, groundwater may be encountered, which would be minimally affected with the implementation of appropriate BMPs.

The potential release of construction-related chemicals and pollutants onto the exposed ground of the project area could result in seepage of these pollutants into the groundwater; however, these impacts would be minimized with implementation of the appropriate BMPs.

Temporary degradations to water quality as a result of construction activities would result in both direct and indirect effects to the surface water of Alamo Creek but would be temporary, lasting only until construction was complete.

Potential adverse effects to water quality would be minimized through the implementation of BMPs that would be required as a part of the City's compliance with the CWA. The City would be responsible for obtaining the appropriate permits and certifications from the USACE and the RWQCB. An NPDES permit and an associated Storm Water Pollution Prevention Plan (SWPPP) would be required for the construction of the proposed action. The SWPPP would incorporate temporary erosion-control measures during construction, permanent erosion-control measures

post-construction, and BMPs for the control and prevention of release of water pollutants. The City would obtain the necessary permits in compliance with Section 402 of the CWA, which would address any pollutants that could be discharged into the water system during construction.

Once the ACDB is constructed, flood flows would enter the basin through the intake structure when the flood elevation in Alamo Creek exceeds the 10-year flood elevation. The basin would be designed to meter water back into the creek through the outflow structure when creek capacity permits, which is estimated to be between 24 and 72 hours after peak flood flow.

Operation of the basin would result in beneficial effects to water quality and hydrology in Alamo Creek. Under flood conditions (i.e. when the basin is filling and in use), sediment that is carried into the basin would settle and remain in the basin, thus reducing sedimentation downstream. The intake and outlet structures would be protected with articulated concrete block or riprap, respectively, which would reduce the potential of scour and downstream sedimentation. During flood events when the basin is filling, the extent of downstream flooding would be reduced. This reduction of downstream flooding would correspondingly reduce the potential amount of contamination from urban-based pollutants captured in floodwaters. Because most of the project area would remain covered by pervious soils, the proposed action would have negligible long-term changes to groundwater quality in the project area. Therefore, operation of the basin would result in direct and indirect, long-term beneficial impacts to water quality and hydrology.

Maintenance activities would involve the periodic use of heavy equipment and herbicides, which could result in accidental release of small quantities of hazardous materials that could adversely affect water quality. The adverse effects would be minimized through the City's compliance and implementation of the appropriate NPDES permit and SWPPP. Herbicides such as Aquamaster would be used in a manner following manufacturer's recommended methods and would follow all requirements of the appropriate NPDES permit and SWPPP. Maintenance of the basin would have periodic minor direct and indirect adverse effects to water.

The use of agricultural equipment could result in accidental release of small quantities of hazardous materials, which could adversely affect water quality. The use of agricultural chemicals, such as herbicides, fertilizers, and pesticides, could affect water quality in Alamo Creek. The use of agricultural equipment in the basin would likely fall under the purview of the appropriate NPDES permit and SWPPP, which the City would need to obtain and adequately implement. Thus, these effects would be minimized. The City has determined that the use of herbicides and fertilizers in the basin is not regulated by the RWQCB and has thus proposed to prohibit the use of agricultural chemicals in the basin. This action by the City would remove this potential impact to water quality (City of Vacaville 2011).

Therefore, the proposed action is anticipated to result in minor short-term impacts and minor and beneficial long-term direct and indirect impacts to water quality and hydrology.

4.4.2 Executive Order 11988: Floodplain Management

EO 11988 requires Federal agencies to take action to minimize occupancy and modification of floodplains. Furthermore, EO 11988 requires that Federal agencies proposing a project in the 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. FEMA's regulations implementing EO 11988 are codified at 44 CFR Part 9.

The City participates in FEMA's National Flood Insurance Program (NFIP). Thus the City has promulgated and enforces a floodplain ordinance at least as stringent as the NFIP and its implementing regulations (44 CFR Parts 59 through 77). Panel Number 257 of 730 of the Flood Insurance Rate Map for Solano County, California and Incorporated Areas (Map Number 06095C0257E), effective date May 4, 2009, indicates that the project area is in Zone AE and shaded and unshaded Zone X. Zone AE is defined by FEMA as an area inundated by 100-year flooding for which base flood elevations have been determined. The project area is therefore in the floodplain, and the City's proposal has the potential to affect the floodplain.

4.4.2.1 Alternative 1: No Action

The No Action Alternative would not alter the existing conditions and would therefore have no impact on the floodplain.

4.4.2.2 Alternative 2: Proposed Action

In compliance with EO 11988, FEMA considered the proposed action's impacts on the floodplain. FEMA applies the Eight-Step Decision-Making Process to ensure that it provides Federal financial assistance for projects consistent with EO 11988. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, the Eight-Step Decision-Making Process has been integrated into the NEPA process.

The proposed action would modify the extent of the floodplain in order to provide a flood-control benefit to the City. The City would construct the intake and outlet structures of the ACDB in the floodplain, and the floodplain at the project location would widen and extend into the project area. The proposed action would remove downstream portions of Vacaville from the floodplain by reducing peak flows downstream in Alamo Creek. FEMA published a cumulative, Initial Public Notice at the declaration of FEMA-1628-DR-CA, which included information about FEMA's intention to carry out actions within or affecting the floodplain. To FEMA's knowledge, no comments were received on the Initial Public Notice.

The nature of the proposed action (i.e., flood control) requires that it occur in the floodplain. Therefore, no practicable action alternatives are available to locating the proposed action in the floodplain. Section 3.1 discusses the other alternatives that were considered to address the flood hazard in the City. The proposed action would result in flood-control benefits and would not result in adverse effects to the floodplain. FEMA would ensure publication of a Final Public Notice in compliance with EO 11988 before implementation of the proposed action.

Therefore, the proposed action would result in moderate long-term impacts to the floodplain, and the proposed action would be in compliance with EO 11988.

4.5 BIOLOGICAL RESOURCES

The project area is in Vaca Valley, which is bounded by the Vaca Mountains to the west and the English Hills to the east. The English Hills represent the transition from the inner North Coast range habitats into the Sacramento Valley habitats.

In 2008, numerous surveys of the project area and vicinity were conducted by FEMA's consultant, URS Group, Inc. (URS) (FEMA 2009). During the surveys, black-tailed deer (*Odocoileus hemionus*), jackrabbits (*Lepus californicus*), red-winged blackbirds (*Agelaius phoeniceus*), turkey vultures (*Cathartes aura*), and pheasants (*Phasianus colchicus*) were observed multiple times in the orchard and/or the wild oat agriculture field habitats. Pacific tree frogs (*Pseudacris regilla*), bullfrogs (*Lithobates catesbeiana*, formerly *Rana catesbeiana*), Louisiana red crayfish (*Procambarus clarkii*), a mallard duck (*Anas platyrhynchos*), skunk (*Mephitis mephitis*), three-spine stickleback (*Gasterosteus aculeatus*), mosquitofish (*Gambusia affinis*), California roach (*Hesperoleucus symmetricus*), and beaver dams were observed in the creek or bank of Alamo Creek. Red-tailed hawks (*Buteo jamaicensis*) and a barn owl (*Tyto alba*) were also seen in the riparian habitat area.

4.5.1 Endangered Species Act

Section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. § 1536(a)(2)) requires Federal agencies to determine whether projects they propose to carry out or fund have any potential to affect species listed or proposed for listing as threatened or endangered or designated critical habitat.

FEMA obtained a list of species that are listed as endangered, threatened, or proposed for listing as endangered or threatened under the ESA that may occur in the vicinity of the project area. The sources of the information are the U.S. Fish and Wildlife Service (USFWS) (2009) and California Department of Fish and Game (CDFG) (2009).

Wildlife and plant species were identified as having potential to occur in the vicinity of the project area that are under the jurisdiction of either USFWS and National Marine Fisheries Service (NMFS) under the ESA. A literature review was conducted to identify habitat requirements and distribution of these species.

FEMA prepared a Biological Assessment (BA) for the proposed action to evaluate the potential effects on species that are listed or proposed for listing under the ESA and that are under the jurisdiction of the USFWS (FEMA 2009). As a result of the field and background review for the BA, FEMA made the initial determination that the project area may provide habitats suitable to support two federally listed wildlife species and three plant species regulated by USFWS under the ESA. Following focused surveys for these species, FEMA made the final determinations of the potential of these species to be present in the project area, as described below.

- **California red-legged frog** (*Rana draytonii*, formerly *Rana aurora draytonii*) (Threatened) (CRLF): Although the project area contains habitats suitable to support the breeding cycle of the CRLF, USFWS protocol-level surveys for this species in the project area and a 1-mile radius surrounding the project area did not find this species to be present in the areas surveyed (FEMA 2009). No designated or proposed critical habitat for the CRLF is located in the project area.
- **Valley elderberry longhorn beetle** (*Desmocerus californicus dimorphus*) (Threatened) (VELB): The project area and a surrounding 100-foot buffer area were surveyed for elderberry shrubs (*Sambucus* sp.), the sole host plant for the beetle, and 91 shrubs with stems of at least 1.0 inch in diameter at ground level were identified. In addition, exit holes on elderberry shrub stems were identified within the project area (FEMA 2009). Therefore, the VELB likely occurs within the project area. However, no designated or proposed critical habitat for the VELB is located in the project area.
- **Tiburon paintbrush** (*Castilleja affinis* ssp. *neglecta*) (Endangered), **Contra Costa goldfields** (*Lasthenia conjugens*) (Endangered), and **showy Indian clover** (*Trifolium amoenum*) (Endangered): Although the project area contains habitats suitable to support Tiburon paintbrush, Contra Costa goldfield, and showy Indian clover, focused surveys for these species during their appropriate blooming periods in the project area did not find these species present in the project area (FEMA 2009). The project area does not overlap proposed or designated critical habitat for these plant species.

In addition, FEMA prepared a BA to evaluate the potential effects of the proposed action on species that are listed or proposed for listing under the ESA and that are under the jurisdiction of the NMFS (FEMA 2010). As a result of the field and background review, FEMA determined that the project area provides habitats suitable to support one species regulated by NMFS under the ESA:

- **California Central Valley steelhead** (CCV steelhead) (*Oncorhynchus mykiss*), distinct population segment (DPS) (Threatened): Alamo Creek within the project area does not provide the physical or biological characteristics required for steelhead spawning but could be used by juvenile CCV steelhead DPS for juvenile rearing and dispersal and by adult CCV steelhead DPS for migration. The project area does not overlap designated critical habitat for the CCV steelhead DPS.

4.5.1.1 **Alternative 1: No Action**

Under the No Action Alternative, no activities would occur and therefore no effects would occur to federally listed or species proposed for Federal listing under the ESA.

4.5.1.2 **Alternative 2: Proposed Action**

FEMA determined that the proposed action is likely to adversely affect the VELB and would have no effect on the CRLF or federally listed plants. Of the 91 elderberry shrubs identified, the proposed action would directly affect one elderberry shrub with two stems measuring at least

1.0 inch in diameter at ground level. The shrub is within the Alamo Creek riparian corridor and would be removed to allow for construction of the inlet structure to the detention basin.

On October 13, 2009, FEMA initiated Section 7 consultation with the USFWS regarding the proposed action, which included submittal of a BA (FEMA 2009). USFWS issued a Biological Opinion (BO) on August 17, 2010, stating that the project is likely to adversely affect the VELB (USFWS 2010; Appendix B). The USFWS BO states that the project is not likely to jeopardize the continued existence of the VELB, and designated critical habitat for the VELB would not be affected by the proposed action.

In accordance with the USFWS's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Guidelines) (USFWS 1999), the City had initially proposed to transplant an affected elderberry shrub and to purchase beetle credits from a USFWS-approved conservation bank before groundbreaking work occurred. Because of construction timing restraints, the City requested a variance to these measures by letter on October 28, 2010, to instead pay double the amount of monetary compensation requested in the BO by USFWS in lieu of shrub transplantation. USFWS concurred with this variance in a letter dated April 5, 2011 (Appendix B).

As stated above, one elderberry shrub would be removed. Approximately 23 other elderberry shrubs occur within the project area and 100-foot buffer, and work may occur within 100 feet of these shrubs. The shrubs are primarily within the riparian vegetation on the northern edge of Alamo Creek, and no project work is anticipated within 20 feet of the dripline of these shrubs. If project work encroaches within 20 feet of the dripline of these shrubs, the City would cease work and notify FEMA of the need to reinitiate consultation with the USFWS.

Indirect effects to the VELB could occur from operation and construction activities, including sedimentation, erosion, and dust. Also, elderberry shrubs used by the VELB could be destroyed or injured from accidental grading in areas designated as avoidance areas or other careless handling of heavy equipment during construction. These effects would be minimized by the proposed conservation measures listed in the USFWS BA, USFWS BO, and letter from the USFWS dated April 5, 2011, which would be implemented by the City (see Appendix B).

Therefore, the proposed action would result in moderate short-term direct impacts and minimal long-term direct and indirect impacts to the VELB. The proposed conservation measures would minimize these effects.

On January 22, 2010, FEMA initiated Section 7 consultation with NMFS regarding the proposed action's potential effects on CCV steelhead DPS and their designated critical habitat. In a letter dated August 18, 2010, NMFS determined that with implementation of mitigation measures, the proposed action may affect, but is not likely to adversely affect, CCV steelhead or its designated critical habitat. The project area is not in designated critical habitat for salmonid species and is not considered essential fish habitat for salmonid species. The project area is also not bound by

any additional restrictions related to essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.).

In addition, proposed action activities could result in disturbance to CCV steelhead DPS and its habitat. Although the reach of Alamo Creek within the project area does not appear to provide the physical or biological characteristics required for steelhead spawning, it could be used by juvenile CCV steelhead DPS for juvenile rearing and dispersal and by adult CCV steelhead DPS for migration.

NMFS determined that the project is not likely to adversely affect CCV steelhead based on the fact that the City of Vacaville would implement the measures listed in NMFS's August 18, 2010, letter; Section 5 of the NMFS BA (FEMA 2010); the City of Vacaville's October 11, 2010, and October 20, 2010, letters requesting a time restriction modification; and a supplemental time restriction modification from NMFS received by FEMA on December 10, 2010 (Appendix B). Per NMFS's August 18, 2010, letter, NMFS has not authorized incidental take of CCV steelhead DPS for the proposed action.

Based on the implementation of the conservation measures for CCV steelhead DPS and the "not likely to adversely affect" determination made by NMFS for the species, the proposed action would have negligible short-term and long-term direct and indirect impacts to CCV steelhead DPS.

4.5.2 Wildlife and Vegetation

4.5.2.1 *Alternative 1: No Action*

Under the No Action Alternative, no ground-disturbing activities would occur, and this alternative would therefore have no effect on wildlife or vegetation.

4.5.2.2 *Alternative 2: Proposed Action*

The proposed action would disturb wildlife in the vicinity of the project. Construction would include removing trees and other vegetation in the project area.

Small mammals, reptiles, amphibians, and insects may suffer injury or mortality during construction, operation, and maintenance. Ground disturbance during construction, operation, and maintenance would also result in associated disturbance to vegetation, which may be suitable habitat for these species. During construction, operation, and maintenance, animal species in the vicinity would experience short-term loss of habitat. During construction and maintenance, animals would also experience harassment from noise and dust from equipment movement. Impacts to these species during operation and maintenance are anticipated to be infrequent. The basin is anticipated to operate less than once every 10 years, and maintenance activities would occur bi-annually. Impacts to animal species would be limited to construction and during periodic operation and maintenance activities.

The City would be responsible for complying with the Migratory Bird Treaty Act of 1918 (16 U.S.C §§ 703–712) for all construction-related disturbance and all applicable local and State wildlife and vegetation requirements (e.g., California Endangered Species Act).

Therefore, the proposed action would result in direct moderate short-term impacts to wildlife and vegetation. No indirect or long-term impacts are anticipated.

4.5.3 Executive Order 13112: Invasive Species

EO 13112, Invasive Species, requires Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species cause. EO 13112 requires that Federal agencies not authorize, fund, or implement actions that are likely to introduce or spread invasive species unless the agency has determined that the benefits outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize harm have been implemented.

4.5.3.1 Alternative 1: No Action

Under the No Action Alternative, no ground-disturbing activities would occur, and therefore this alternative would have no effect on invasive species.

4.5.3.2 Alternative 2: Proposed Action

The proposed action has limited potential to contribute to the spread of invasive species in the project area. The majority of the proposed improvements occur in or adjacent to land that has been used for agriculture. With the exception of areas where the outfall and intake structures would be installed, the riparian zone would not be disturbed. All equipment would be staged in the project area outside the riparian and stream zones. Disturbed areas would be reseeded with a native seed mix. The City would take measures to prevent the introduction of invasive weeds at the construction site, including cleaning all equipment before accessing the site and using only certified, weed-free erosion control and re-vegetation materials.

Periodic routine maintenance could result in the spread of invasive species seed from equipment and vehicles traveling to the basin. As with construction, the City would take measures to prevent the introduction of invasive weeds at the construction site, including cleaning all equipment before accessing the site and using only certified, weed-free erosion control and re-vegetation materials. Stormwater flows would have the potential to carry invasive species seeds during storm events. During ordinary flows, water—and any incidental vegetation or debris—would generally follow current drainage patterns.

The potential for the proposed action to contribute to the spread of invasive species is minimal, and this alternative would comply with EO 13112. Therefore, the proposed action is anticipated to result in negligible short-term direct and indirect impacts to invasive species.

4.5.4 Magnuson-Stevens Fisheries Conservation Management Act

The Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA), also known as the Sustainable Fisheries Act (16 U.S.C. §§ 1801 et seq.), requires all Federal agencies to consult with the Secretary of Commerce on activities or proposed activities that are authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat (EFH) of commercially managed marine and anadromous fish species. The EFH provisions of the Sustainable Fisheries Act are designed to protect fisheries habitat from being lost because of disturbance and degradation. The act requires implementation of measures to conserve and enhance EFH. Guidelines from the MSFCMA direct NMFS to use a coordinated process to evaluate projects that may affect EFH under Section 305(b) of the MSFCMA (16 U.S.C. § 1855[b]), with required Section 7 consultation under the ESA (16 U.S.C. § 1536).

Steelhead are not covered by the MSFCMA. Therefore, neither the No Action Alternative or the proposed action would affect EFH.

4.6 HISTORIC PROPERTIES

Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470f) requires Federal agencies to consider the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings prior to the approval of the expenditure of Federal funds.

FEMA identified an area of potential effect (APE) that included the area of the proposed action. The City completed an archaeological pedestrian survey and report entitled *Archaeological Survey and Geoarchaeological Testing Report for the Alamo Creek Detention Basin, Solano County, California* (Far Western, 2009). Based on this report, FEMA identified two archaeological sites (CA-SOL-468 and CA-SOL-469). FEMA determined that the sites are eligible for listing in the National Register of Historic Places under Criterion D for their ability to yield information important in prehistory and therefore qualify as “historic properties” as defined in 36 CFR Part 800.16(l)(1).

4.6.1 Alternative 1: No Action

Under the No Action Alternative, no impacts would occur to historic properties because no construction or other activities would occur that could potentially disturb historic properties.

4.6.2 Alternative 2: Proposed Action

FEMA has determined that the implementation of the proposed action would result in an adverse effect to the two historic properties identified in the APE.

In accordance with 36 CFR Part 800.4(a)(4), FEMA sent an informational letter to the California Native American Heritage Commission (NAHC) on February 5, 2008, to request a review of its Sacred Lands File and a list of the individuals and groups that the NAHC believed should be contacted regarding information or concerns related to the project area. The NAHC responded on

February 15, 2008. The NAHC had not identified any Native American archaeological sites. On March 20, 2008, FEMA transmitted an informational letter to the nine potentially interested parties identified by the NAHC. Marshall McKay, Chairman of the Rumsey Indian Rancheria of Wintun, responded on April 8, 2008, stating that he was not aware of any historic properties on the site and requested that he be kept apprised of the project's progress. To date, FEMA has not received any other responses.

Letters were sent to potentially interested parties notifying them of FEMA's determination and intention to resolve adverse effects through the execution of a Memorandum of Agreement (MOA) (Appendix C). The parties that FEMA contacted are listed below; their responses are also included:

- State Historic Preservation Office: Concurred with FEMA's APE, determination of adverse effect, and decision to prepare an MOA; and elected to participate in the MOA process
- Advisory Council on Historic Preservation: Declined to participate in the MOA process
- Cortina Band of Wintun: Declined to participate in the MOA process, stating that for National Historic Preservation Act compliance, they would defer to the Yocha Dehe Wintun Nation (YDWN)
- USACE: Elected to participate in the MOA process and agreed that FEMA be designated as lead Federal agency
- YDWN (formerly known as Rumsey Indian Rancheria of Wintun): Elected to participate in the MOA process and requested government-to-government consultation with FEMA.

FEMA, USACE, and YDWN held a government-to-government meeting on June 16, 2010. At the meeting, roles and responsibilities for the MOA process were established, and it was determined that the YDWN would participate in the MOA process as a signatory party.

FEMA prepared an MOA that stipulates that the *Cultural Resources Treatment Plan for the Proposed Alamo Creek Detention Basin, Vacaville, Solano County, California* (Treatment Plan) (Far Western 2010), prepared by the City of Vacaville, be implemented to resolve adverse effects to historic properties CA-SOL-468 and -469. The MOA and Treatment Plan are included as Appendix D. The MOA was executed on June 24, 2011.

The City would abide by the terms and stipulations of the MOA, including the complete implementation of the Treatment Plan. Prior to construction of the detention basin, the City of Vacaville would recover archaeological data in accordance with the Treatment Plan. The Treatment Plan includes a research design and proposed field and laboratory methods using a phased approach to carry out data recovery. Backhoe trenching and hand excavation will be used to obtain a sufficient sample of site deposits to mitigate the destruction of the site and to recover any human remains that may be present. Following excavation, site destruction using heavy

equipment would be systematic to avoid affecting additional significant cultural features or additional human remains.

Following an archaeological field investigation, archaeological monitors representing the City and YDWN would monitor all ground-disturbing activities in Holocene soils in the APE for FEMA's undertaking. The Treatment Plan provides for the treatment and disposition of human remains, associated funerary goods, and specific classes of artifacts, if encountered during data recovery, in accordance with the terms negotiated between the City and the YDWN. The detention basin would not be constructed until FEMA, in consultation with USACE, has issued written authorization to the City to proceed with construction.

With the implementation of the Treatment Plan and adherence to the terms and conditions of the MOA, FEMA is in compliance with Section 106 of the National Historic Preservation Act.

4.7 AIR QUALITY

The Federal Clean Air Act of 1970 (42 U.S.C. §§ 7401–7661) was enacted to regulate air emissions from area, stationary, and mobile sources. The act authorized the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQSs) to protect public health and the environment. The six criteria pollutants regulated by this act are carbon monoxide (CO), lead, nitrogen oxides (NO_x), ozone (O₃), particulate matter (less than 10 micrometers [PM₁₀] and less than 2.5 micrometers [PM_{2.5}]), and sulfur dioxide (SO₂).

Under the 1977 amendments to the Clean Air Act, states with air quality that does not achieve the NAAQSs are required to develop and maintain State Implementation Plans. These plans constitute a federally enforceable definition of the State's approach (or plan) and schedule for the attainment of the NAAQSs. Air quality management areas are designated as "attainment," "nonattainment," or "unclassified" for each individual criteria pollutant depending on whether concentrations exceed an applicable NAAQS. Areas that have been redesignated from nonattainment to attainment are called maintenance areas.

The General Conformity Rule (GCR) (40 CFR § 51.853) states that a "a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates" (40 CFR 51.853b) specified in the GCR. Therefore, a comparison must be made to demonstrate that the proposed action's emissions would be below the applicable emission threshold rates listed in the GCR. The applicable GCR emission threshold rates for the Yolo-Solano County Air Quality Management District (YSAQMD) are listed in Table 1.

Table 1. Applicable GCR Emission Threshold Rates for the YSAQMD

Pollutant	Nonattainment (tons/year)
NO _x	50
PM ₁₀	100
PM _{2.5}	100
VOCs	50

The project area is in Solano County, which is in EPA Region 9 and at the southwestern end of the Sacramento Valley Air Basin (SVAB). The SVAB has relatively flat topography that is bounded by the Coast Mountains to the west, the Cascade Range to the north, and the Sierra Nevada Range to the east. The climate of the SVAB consists of wet and cool winters and hot and dry summers. The surrounding mountains can act as a barrier to airflow and may trap air pollutants in the basin depending on meteorological conditions, such as wind and surface temperatures. The primary source of air pollution in the SVAB is on-road motor vehicles. The population of the SVAB has increased by 51 percent over the past 20 years, a rate that is higher than the State's average. The number of vehicle miles driven has also increased by 95 percent during the past 20 years.

The YSAQMD is responsible for managing air quality in the project vicinity. Air quality in the project area is designated as non-attainment for the O₃ NAAQS and as partial non-attainment for the 24-hour PM_{2.5} NAAQS. Air quality is in attainment or unclassified for all other Federal criteria pollutants (YSAQMD 2010).

The National Emissions Standards for Hazardous Air Pollutants (NESHAP) are set by the EPA for air pollutants not covered by NAAQS that may adversely affect human health (e.g., asbestos). Existing concrete features such as culverts, headwalls, and roadway features may contain asbestos-containing materials.

4.7.1 Alternative 1: No Action

The No Action Alternative would have no impacts to air quality because no construction or other activities resulting in air emissions or affecting attainment status would occur.

4.7.2 Alternative 2: Proposed Action

Construction associated with the proposed action would result in localized short-term deterioration of air quality. Construction of the ACDB would include grading, vegetation removal, and the demolition of several structures. The basin footprint, intake footprint, outfall footprint, and foundation area for the berms would be excavated. To minimize offsite disposal and truck trips, some excess excavated soil would be stored at an onsite disposal area.

Temporarily disturbed soils within the project area would be hydroseeded, which would reduce emissions of fugitive dust (PM₁₀ and PM_{2.5}).

Construction of the proposed action would take approximately 450 working days. An estimate of the maximum number of equipment pieces that could be used at the project area at any one time is provided below.

- Water trucks, rubber tired: 3
- Excavators, tracked: 3
- Backhoes, rubber tired: 2
- Bulldozers, tracked: 4
- Scrapers, rubber tired: 5
- Compactors, sheep's foot: 4
- Bottom dump trucks, rubber tired: 10
- Pickup trucks, rubber tired: 10

The construction-related effects of the proposed action would consist of temporary increases of fugitive dust (PM₁₀ and PM_{2.5}) and combustion emissions (CO, NO_x, PM₁₀, PM_{2.5}, SO₂, and the precursors to O₃, which are reactive organic gases [ROG] that include volatile organic compounds [VOCs]). Fugitive dust emissions would be generated by vehicle movement over paved and unpaved roads, dirt tracked onto paved surfaces from unpaved areas at access points, and particulate matter that is suspended during construction activities. Combustion emissions would be generated from the operation of construction equipment during the construction process. No NAAQS exists for ROG or VOCs, but ROG and VOCs are precursors to O₃, which has a NAAQS. The formation of O₃ occurs in the troposphere as precursor pollutants react in the presence of sunlight. Therefore, the only way to regulate/reduce O₃ is through the control of its reactive precursors.

The City prepared a *Final Environmental Impact Report* (EIR) for the proposed action (City of Vacaville 2011). Estimated emissions associated with the proposed action were calculated using information from the City and emissions factors from the EPA and OFFROAD2007 (version 9.2.4) computer program. The majority of emissions would occur during the first year of construction when excavation and grading would take place. Based on the EIR calculations, the unmitigated emissions listed in Table 2 are expected for the first year of construction of the proposed action.

**Table 2. Estimated Proposed Action
Emission Rates During Construction Year 1**

Pollutant	Emission Rate^(a) (ton/yr)
NO _x	16.49
PM ₁₀	14.97
PM _{2.5}	3.73
ROG ^(b)	1.67

(a) Emissions include contributions from construction equipment and employee vehicle contributions

(b) ROG include VOCs

The project emission estimates for NO_x, PM₁₀, PM_{2.5}, and ROG are below the applicable GCR threshold emission rates. Therefore, no further analysis is required to establish conformity with the State Implementation Plan, and air quality impacts as a result of implementation of this action would be temporary and negligible. Implementation of the avoidance and minimization measures described below would reduce temporary impacts to sensitive populations.

Construction activities would also include the demolition of an existing concrete slab under a farm shed on Rogers Lane. The City would complete all required NESHAP notifications and comply with all local, county, State, and Federal regulations regarding the demolition and disposal of materials.

Periodic maintenance would result in temporary localized deterioration of air quality. Maintenance in the detention basin would occur twice a year and would include removing accumulated silt after the winter and spring rainy season using a backhoe or excavator and weed abatement. If the ACDB bottom is used for agriculture, weed abatement could occur less often. Some debris removal may occur during the winter, but this activity would be infrequent and occur only as needed. During these activities, maintenance vehicles would travel along unpaved roads, which would result in increased emissions of fugitive dust and particulate matter. Air quality impacts associated with these maintenance activities would be similar to those that would occur during construction but would be of shorter duration and limited to the periods discussed above.

Therefore, the proposed action would result in moderate short-term and negligible long-term impacts to air quality.

4.8 NOISE

Noise-sensitive receptors are located in areas with land uses that are associated with indoor and outdoor activities and that may be subject to substantial interference from noise. These land uses

include residential dwellings, hotels, hospitals, nursing homes, educational facilities, and libraries. Noise sensitive land uses in or near the project area are rural residences in surrounding agricultural properties and the residential developments within the City limits to the east and south. The nearest residential dwellings are approximately 175 feet to the north, 400 feet to the southeast and south, and approximately 200 feet to the west of the project area (City of Vacaville 2011). The dominant noise sources in the vicinity are vehicle traffic on roadways, including Vaca Valley Road to the north, Rogers Lane bordering the project area to the east, and Pleasants Valley Road to the west.

4.8.1 Alternative 1: No Action

Under the No Action Alternative, there would be no activities that would result in an increase in noise levels; therefore, there would be no impacts to noise.

4.8.2 Alternative 2: Proposed Action

Construction activities and traffic using local roadways would result in temporary increases in noise levels that may exceed local noise ordinances. These temporary and localized noise impacts would discontinue when construction is complete.

To reduce the temporary impacts from construction-related noise, the City would be responsible for implementing the following measures to the extent practicable:

- The City would post public notices to notify the public of the scheduled construction.
- All mobile or fixed noise-producing construction equipment that is regulated for noise output by a local, State, or Federal agency would comply with such regulation.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, would be for safety warning purposes only.
- Construction would be limited to weekdays between 7 a.m. and 7 p.m. and between 10 a.m. and 5 p.m. on weekends. Noise-generating construction operations would be limited to the weekdays between 7 a.m. and 6 p.m. unless an expanded time frame is granted in writing by the City of Vacaville Director of Public Works as necessary to address special construction circumstances or to maintain the construction schedule.

Noise levels would generally return to pre-construction levels after construction is complete. The basin floor may be used for agriculture, but noise from potential agricultural activities would be commensurate with current activities on the property. Noise generated from maintenance are expected to be commensurate with previous noise levels on the property and would occur only approximately twice per year.

Therefore, the proposed action would result in moderate short-term direct impacts and minor long-term direct impacts to noise levels.

4.9 TRANSPORTATION

Rogers Lane borders the project area to the east. Other roads in the surrounding area are Pleasants Valley Road to the west and Vaca Valley Road to the north, which provide access to adjacent and surrounding agricultural areas. Several farm roads bisect the project area.

4.9.1 Alternative 1: No Action

No activities would occur as part of the No Action Alternative, and this alternative would therefore not directly affect transportation. Under this alternative, the periodic flooding of roadways adjacent to the creek and within City limits would continue to occur during major storm events. Flooding of these roads would continue to require periodic closures, detours, and potentially hazardous driving conditions. However, these closures would occur only temporarily (during major storm events).

Therefore, the No Action Alternative would have minor long-term indirect impacts to transportation.

4.9.2 Alternative 2: Proposed Action

The proposed action would result in temporary increases in local traffic from construction-related traffic. Haul routes and construction access would use local roads in unincorporated portions of Solano County. The mobilization and demobilization of construction vehicles and equipment could slow traffic along nearby roadways that provide access to adjacent and surrounding agricultural and residential properties. To minimize offsite disposal and truck trips, some excess excavated soil would be stored at an onsite disposal area. In addition, the majority of temporary, construction-related traffic impacts would occur along Pleasants Valley Road, and these impacts are anticipated to be commensurate with agricultural vehicles that currently use this road.

Two parking lots and an access road would be constructed adjacent to the ACDB as permanent features of the facility (Figure 3). These new transportation features would be for maintenance access and are not anticipated to provide any public utility. The ACDB would include an associated maintenance road. Periodic ingress and egress of maintenance vehicles and equipment may occur within roadways in the project limits, which could result in temporary, localized traffic slowing. This impact is anticipated to be commensurate with ingress/egress of agricultural vehicles that currently use the transportation system in the project area and therefore would be negligible.

Implementation of the proposed action would address drainage and flooding issues in the project vicinity. After construction, the potential for uncontrolled flows from major storm events to overtop transportation features in the project vicinity would be diminished. The proposed action would not preclude the development of planned roads in the project vicinity.

Therefore, the proposed action would result in moderate short- and long-term direct and indirect impacts to transportation.

4.10 VISUAL RESOURCES

Views in the project area include foreground views of tan and green vacant land dominated by grasses and punctuated with uniformly planted, green vegetation. The majority of the project area is an abandoned orchard with rows of plum trees and scattered apricot trees. Grafted walnut trees line the northern border, and an active agricultural field planted with wild oats is in the northwestern corner. The riparian corridor along Alamo Creek that runs along the southern boundary of the project area provides views of valley oak and red willow trees. Views in the project area also include linear features such as utility lines and nearby farm roads. The northeastern portion of the project area features previous residential use, with vacant structures, a junk pile, and ornamental vegetation visible.

Middle ground views include the generally tan and green undulating terrain, uniform rows of vegetation, and scattered development similar to that in the foreground. The lack of prominent topographic or tall, constructed features in the project vicinity allows some unobstructed views of the relatively flat landscape, distant views of the surrounding hillsides covered with oak trees, and the Vaca Mountains farther to the west.

Observation points in the project area are primarily from Rogers Lane and Pleasants Valley Road, rural residences on adjacent agricultural properties, and single-family residences along the western end of Fruitvale Avenue to the southeast of the project area.

4.10.1 Alternative 1: No Action

The No Action Alternative would result in no changes to the viewshed, and therefore no impacts to visual resources would occur.

4.10.2 Alternative 2: Proposed Action

The proposed action would result in the construction of new features and modify existing features in the viewshed. During and immediately after construction, portions of the work area would be noticeable to motorists and nearby residents—particularly those portions of the area immediately adjacent to Rogers Lane to the east, near the neighborhood development to the east of Rogers Lane, and near Pleasants Valley Road to the west. Views of the project area from the south would be screened by the riparian corridor surrounding Alamo Creek, and views from the north would be screened by a mature walnut orchard.

The proposed action would replace orchard trees and non-native annual grasses with a detention basin that would have a maximum depth of excavation of approximately 17 feet below ground surface. The new basin and drainage improvements would be constructed primarily through modification of the existing landscape. As such, in the long term, the forms, colors, and textures would be similar to those currently present, and the new basin would generally blend with the

surrounding area. During and immediately after large storm events, the retained water in the detention basin would provide an area of visual interest because the water would contrast with the surrounding landscape. However, these impacts would be temporary because they would occur only with a large storm event, and the basin is anticipated to operate less than once every 10 years. Ongoing maintenance would result in some dust and ground disturbance that may be visible from observation points. However, this maintenance would be commensurate with expected levels of ongoing use, maintenance, and repair on adjacent agricultural properties, and would be temporary.

The berm along the eastern boundary of the project area would reach a maximum height of 11 feet above existing grade. This increase in scale would alter views of the project area for residences along Rogers Lane and the western end of Fruitvale Avenue. However, the berm would have similar colors and textures to the existing landscape because it would be constructed with soil excavated for the basin and associated structures and would be revegetated and managed as annual grassland.

The excavation disposal area in the northwestern corner of the project area would be constructed to a height of approximately 23 feet above existing grade. This disposal area would therefore alter long-term views of the project area from Pleasants Valley Road and residences to the west and north. Views from the north would be partially screened by existing vegetation to the north. In addition, the excavation disposal area and temporarily disturbed soils in the project area would be hydroseeded and managed as annual grassland and would therefore be consistent in color and texture with the surrounding agricultural landscape.

Therefore, the proposed action would result in moderate short-term and long-term direct impacts and minor long-term indirect impacts to visual resources.

4.11 RECREATION

The project area is primarily an abandoned orchard and does not include existing recreational uses. In addition, the project area is outside City limits and is not proposed for future recreational uses in the *City of Vacaville General Plan* (City of Vacaville 2007).

4.11.1 Alternative 1: No Action

The No Action Alternative would not require modifications to the existing conditions. The project area is not currently used for recreation. Therefore, the No Action Alternative would result in no impact on recreation.

4.11.2 Alternative 2: Proposed Action

Because there are no existing or planned recreational uses in the project area, the proposed action would not require construction in recreational areas. Therefore, the proposed alternative would result in no impact on recreation.

4.12 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND PUBLIC SAFETY

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

FEMA reviewed data available from the 2000 U.S. census to determine the presence of low-income or minority residential populations that could be affected by the proposed action. FEMA reviewed data for the census tract that encompasses the project limits and adjacent residential areas (Census Tract 2532.01) and compared that data to information from the City as whole and from Solano County.

According to the 2000 census, the percent of the population in Census Tract 2532.01 that self-reported as Hispanic or Latino; Black or African American; American Indian and Alaskan Native; Asian; Native Hawaiian and Other Pacific Islander; Two or More Races; or Other was less than 9 percent in any given category, and less than the percentages of the comparative geographies.

The percent of the population within Census Tract 2532.01 with reported income below the Federal poverty level was 2.1 percent, which is less than the percentages for the City and County as a whole. The percent of the tract's population that reported as disabled (10.4 percent) is also less than the comparative geographies. However, the percentage of the tract's population that reported as elderly (in the age group of 67 years or older) was 10.1 percent, which is higher than that of the City and County as a whole (7.3 percent and 8.3 percent, respectively).

The project area receives law enforcement and fire protection services from the Solano County Sheriff's Department and the Vacaville Fire Protection District, respectively. Existing emergency access routes in the project area include Vaca Valley Road to the north, Rogers Lane to the west, and Pleasants Valley Road to the east.

Potential public safety hazards include hazardous materials that may be present as a result of historical agricultural activities. A former farm house was burned for fire training exercises, and elevated levels of lead were identified in the burn area (City of Vacaville 2011). Former agricultural wells and septic systems may also occur in the project area.

4.12.1 Alternative 1: No Action

Under the No Action Alternative, no construction activities or changes to the existing conditions would occur and, therefore, there would be no impact to minority or low-income populations and no changes to the social or economic character of the community, or to the level of public services or public safety hazards that currently exist.

4.12.2 Alternative 2: Proposed Action

During construction, temporary adverse impacts, such as increases in dust and noise levels, road closures and traffic slowing, and changes to the viewshed would be predominately temporary and mitigated as discussed earlier. These impacts would be experienced equally by all nearby residents and motorists. After implementation, the proposed action would not directly result in changes to the socioeconomic character of the community. Maintenance activities, including silt removal and weed abatement, would be commensurate with existing agricultural activities. The proposed action would not increase the number of residents in the project vicinity and would not generate additional demand for housing or jobs.

The project area would be fenced to prevent casual trespass to the detention basin and to neighboring properties. Proposed maintenance and access roads along the top of the detention berms would improve emergency vehicle access to the project area and vicinity.

Small quantities of hazardous materials, such as gasoline and diesel fuel, would be used to power equipment during construction and maintenance activities. However, potential spills would be localized and cleaned up if they occurred. If the basin floor is used for agriculture, the City would prohibit the use of chemicals within the basins (City of Vacaville 2011). To protect public health and eliminate safety hazards during construction, the City would comply with recommendations in the Phase I and II Environmental Site Assessments (Dunn Environmental 2010) for the project area, including proper abandonment or destruction of agricultural wells encountered during construction, removal of soil associated with burn piles that may contain elevated lead, and removal of septic tanks associated with former farm buildings (City of Vacaville 2011). If standing water causes mosquitoes to breed at the detention basin, the City would implement vector elimination procedures in coordination with the mosquito vector control district (City of Vacaville 2010).

The proposed action would decrease the risk of damage from flooding associated with major storm events. The increased management of stormwater flows would reduce flooding of adjacent properties—including surrounding residential neighborhoods and transportation routes in the City limits. The decreased risk of damage from flooding would enhance public safety in the community. Furthermore, increasing the availability of transportation routes during and immediately after major storm events could be especially beneficial to the elderly or other vulnerable populations in the community because it would increase access for emergency vehicles and to evacuation routes.

Thus, the proposed action would result in beneficial changes to public safety or to the socioeconomic character of the community and would not have disproportionately high and adverse effects on minority or low-income populations. As a result, the proposed action would comply with EO 12898 and would have minor short-term direct and long-term indirect socioeconomic and public safety impacts.

4.13 CUMULATIVE IMPACTS

CEQ defines a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions...” (40 CFR Part 1508.7). Past, present, and reasonably foreseeable actions were identified based on information obtained from the City, Solano County, and FEMA.

Past actions in the area include agricultural operations in the immediate project vicinity and residential development in surrounding areas to the east and south of the project area. These past actions are assumed to create the existing affected environment.

The City has constructed three small detention basins in the project vicinity. Two of the basins are on Encinosa Creek, a tributary of Alamo Creek and were designed to reduce downstream peak flows and associated flooding on Encinosa Creek and Alamo Creek downstream of the confluence of the two creeks. The third detention basin is between Encinosa Creek and the main branch of Alamo Creek (project area). This basin was designed to capture and detain sheetflows in adjacent agricultural fields from entering and flooding a nearby neighborhood.

Ongoing and current projects are the use and maintenance of agricultural properties and residences in the project vicinity.

Screening criteria were developed to determine which actions would be considered speculative versus “reasonably foreseeable.” The criteria included projects for which NEPA compliance is complete or underway (based on a published Notices of Intent, other published scoping documents, Findings of No Significant Impact, or decision records), projects listed in short-range adopted land use or management plans, and projects identified by a land or resource managing agency as “reasonably foreseeable.”

The City has notified FEMA that it is investigating the feasibility of constructing the Florence Detention Basin (FDB) approximately 0.25 mile northeast of the project area at the end of Florence Drive. The FDB would capture and detain sheetflow from adjacent agricultural fields and prevent flooding in the adjacent neighborhood. The proposed footprint of the FDB would not overlap any portion of the project area, but water entering the FDB would eventually flow into Alamo Creek by way of the City’s storm drainage system.

The City is also proposing construction of two additional detention basins at Ulatis and Laguna Creeks. The upstream detention reservoir proposed on Ulatis Creek is approximately 0.75 mile north of the project area on a 50-acre parcel. The proposed detention basin on Laguna Creek would be approximately 2 miles south of the project area. The Ulatis Creek and Laguna Creek Detention Basins would reduce peak flow and the associated downstream flooding in the City along Ulatis Creek and Laguna Creek. The City has applied for funding from FEMA for both of these projects, and FEMA is currently reviewing the two project applications. Because all of these proposed detention basins capture flows from different waterways or sheetflows along different agricultural fields, they are independent of each other in function and in providing flood protection to the City.

The potential cumulative impacts of each alternative to the resource areas are discussed below. If an alternative would have no or negligible direct or indirect impacts to a resource, that alternative is assumed to not contribute to any cumulative impact on that resource and is not discussed further in this section. Therefore, because both the No Action Alternative and the proposed action would have no impact on seismicity, wetlands, and recreation, neither alternative would contribute to any cumulative impact on these resources.

4.13.1 Alternative 1: No Action

Under the No Action Alternative, no construction, ground disturbance, or modification to the existing conditions would occur for the proposed action, but the other five past, present, and reasonably foreseeable detention basin projects would occur. As described in Sections 4.1 to 4.12, the implementation of this alternative would result in no direct or indirect impacts to land use, water quality/hydrology, floodplain, general wildlife and vegetation, invasive species, air quality, noise levels, visual resources, or recreation. Therefore, the No Action Alternative would not contribute to cumulative impacts to these resources.

The No Action Alternative would not address the existing drainage issues within the project area. As such, the flood hazard in the project area would not be mitigated, and soil erosion as a result of flooding would continue. Also, periodic flooding of roadways in the project area would continue to require temporary, periodic closures and detours, and result in potentially hazardous driving conditions. Therefore, when considered along with past, present, and reasonably foreseeable future actions, the No Action Alternative would have minor cumulative impacts to soils and transportation.

4.13.2 Alternative 2: Proposed Action

Resources areas that could incur cumulative impacts when considering the proposed action and any past, present, or reasonably foreseeable future actions are described below.

4.13.2.1 *Geology and Soils, Air Quality, Noise, and Transportation*

The proposed action would contribute to cumulative impacts to geology and soils, air quality, noise, and transportation resulting from overlapping or consecutive construction/implementation periods. However, when considered with past, present, and reasonably foreseeable future actions in the area, and the temporary nature of these impacts, the proposed action's contribution is not expected to be cumulatively substantial.

4.13.2.2 *Land Use*

The proposed action would continue the pattern of developing vacant undeveloped land or land previously used for agriculture. As discussed in Section 4.1, ample vacant land is available in the project vicinity, and the proposed action would conform to current land uses. Furthermore, the project area is outside the City's Urban Growth Boundary and is unlikely to be developed with urban land uses in the reasonably foreseeable future. Therefore, when considered with past,

present and reasonably foreseeable future actions in the area, the project's contribution to land use impacts is not expected to be cumulatively substantial.

The proposed action would contribute to cumulative impacts to agriculture. Prime farmland in the county has decreased by 7.2 percent in the past 8 years (from 150,356 acres in 1998 to 139,536 acres in 2006) (California Department of Conservation 2010). Future urban development as proposed in the *Solano County General Plan* would reduce prime farmland in the county by another 2.4 percent (3,417 acres) compared to 2006 (Solano County 2008b). Compared to the county as a whole, the proposed action's contribution to the cumulative loss of prime farmland from 2006 would be minimal (0.05 percent of the county as a whole) or negligible if the basin floor is used for agriculture. Therefore, when considered with past, present, and reasonably foreseeable future actions in the area, the project's contribution to agricultural impacts is not expected to be cumulatively substantial.

4.13.2.3 Water Resources

The proposed action would contribute to cumulative impacts related to water resources. The proposed action would provide further drainage improvements to address stormwater flows associated with major storm events. Therefore, when considered together with past, present, and reasonably foreseeable future actions, the proposed action would result in substantial beneficial cumulative contributions to flood protection in the area.

4.13.2.4 Biological Resources

The proposed action would contribute to cumulative impacts related to biological resources, including species listed or proposed for listing as threatened or endangered or designated critical habitat. In addition, the proposed action is likely to adversely affect the federally listed as threatened VELB, as discussed in Section 4.5.1.2. At its closest point, the proposed FDB project area is approximately 1,200 feet north of Alamo Creek. Due to the distance from Alamo Creek, it is unlikely that riparian habitat occurs at this site. Thus, suitable habitat for elderberry shrubs and VELB is not likely to occur in the FDB project area. Without an assessment of the habitat in other project areas, it cannot be ruled out that habitat for VELB is present. FEMA would perform Section 7 consultation with USFWS if the future detention basins resulted in effects to the VELB. Therefore, the proposed action could result in direct cumulative impacts to the VELB.

Without an assessment of the habitat in the other project areas, it cannot be ruled out that habitat that could support federally listed species is not present. Thus, if valley and foothill grassland is present in the FDB project area, this habitat could support federally listed species. However, because the proposed action would have no effect on any other federally listed species under USFWS jurisdiction, it would not contribute to any cumulative impacts.

In addition, water entering the FDB would eventually flow into Alamo Creek via the City's storm drainage system. The City has stated that the proposed FDB would provide flood mitigation by impounding the sheetflows from adjacent orchards that occur during heavy rain events. Currently, sheetflows flow into the adjacent neighborhood and overwhelm the existing

storm drain system. FDB would be an “offline” detention facility because it would not impound stormwater flows directly from a creek. The sheetflows impounded by this facility would be metered into the City’s storm drainage system, which eventually flows into Alamo Creek. Given that the FDB would capture only sheetflows that would have been captured by the existing storm drain system in another nearby location without the presence of the FDB, the addition of the basin is not expected to increase the amount of water entering the drainage system and Alamo Creek or decrease water quality in Alamo Creek. Therefore, the construction, operation, and maintenance of the proposed FDB in conjunction with the proposed action are not expected to result in cumulative effects to federally listed species under NMFS jurisdiction.

The proposed action, ongoing activities, and reasonably foreseeable future projects would all likely require some disturbance to vegetation and wildlife and may have the potential to spread invasive species. However, for the proposed action, disturbance to vegetation and wildlife would be temporary during the construction period, and the potential to spread invasive species would be minimized with the mitigation measures described in Section 4.5.3. In addition, after construction of the proposed action, disturbed soil would be reseeded with native plant mix and managed as annual grassland. Therefore, when considered with past, present and reasonably foreseeable future actions in the area, and the temporary nature of the impacts, the project’s contribution is not expected to be cumulatively considerable.

4.13.2.5 Historic Properties

The proposed action, ongoing activities, and reasonably foreseeable future projects have the potential to include cumulative impacts to historic properties. Historic property investigation has not yet been conducted at other proposed detention basin sites but would be conducted prior to construction. If cultural resources were present, treatment would be required to mitigate potential adverse effects. Thus, the proposed action could result in cumulative long-term impacts to historic properties.

4.13.2.6 Visual Resources

The proposed action would contribute to cumulative impacts related to visual resources. The *Solano County General Plan Environmental Impact Report* (Solano County 2008a) states that with the implementation of the general plan, agricultural lands and open space as a valuable aesthetic resource would continue to diminish within the County. However, the proposed action would convert existing agricultural land into a detention basin that would generally blend in with the colors and textures of the surrounding landscape, as discussed in Section 4.10. During construction, visual impacts would occur, but these are not expected to be cumulatively substantial due to the temporary nature of these impacts. Furthermore, after construction, disturbed soil would be hydro-seeded and maintained as grassland, and the basin floor may be used for agricultural purposes or would appear as a wetland when used to retain stormwater. Maintenance activities in the project area would be commensurate with expected levels of ongoing maintenance and repair on adjacent agricultural properties. Limited vegetation removal would occur along the riparian corridor for construction of the basin inlet and outlet structure;

however, the majority of the trees and vegetation would be protected in place. Therefore, when considered with past, present and reasonably foreseeable future actions in the area, the project's contribution to cumulative impacts on visual resources would be minimal.

4.13.2.7 Summary

Implementation of the proposed action would address drainage and flooding issues in the project area, thus reducing the potential for uncontrolled flows from major storm events and damage from flooding on Alamo Creek. In addition, implementation of other proposed detention basins would also further reduce the potential for uncontrolled flows from major storm events and damage to City streets, businesses, public property, and private property. When considered together with past, present, and reasonably foreseeable future actions, the proposed action would result in beneficial cumulative contributions to flood protection in the area.

Therefore, the project would result in minor, long-term cumulative impacts on geology and soils, air quality, noise, transportation, visual resources, land use and agriculture, water resources, biological resources, invasive species, and historic properties.

4.14 MITIGATION MEASURES

Mitigation measures are actions that are intended to avoid or minimize the impacts of the alternatives on social, cultural, and natural environmental resources when appropriate. The environmental consequences of the alternatives, as described earlier, are projected with the assumption that the applicable mitigation measures are implemented. The City may also be required to implement additional mitigation measures based on required compliance with local, State, or other laws, regulations, and permits. The City would be required to agree to implement the following measures as a condition of receiving Federal financial assistance from FEMA.

4.14.1 Alternative 1: No Action

No mitigation measures would be required for the implementation of this alternative.

4.14.2 Alternative 2: Proposed Action

If the proposed action is implemented by the City, the following mitigation measures will be required:

1. Areas that will be disturbed by construction activities will be stabilized with erosion-control measures such as installing silt fences or mulching cleared soil to eliminate or reduce soil erosion during construction. The City will be responsible for covering spoil piles or watering existing soils, as necessary, to minimize soil loss from surface runoff and wind erosion.
2. After construction, the City will implement permanent erosion-control measures, such as revegetation with native plant seed mix, to stabilize soils and minimize the potential for long-term erosion.

3. The City will be responsible for obtaining the appropriate permits and certifications (e.g., 33 U.S.C. §§ 1344/1341) from the USACE and the RWQCB. An NPDES permit and an associated SWPPP would likely be required for the construction of the proposed action. The SWPPP would incorporate temporary erosion-control measures during construction, permanent erosion-control measures when the project is completed, and BMPs for the control and prevention of release of water pollutants. The City will obtain the necessary permits in compliance with Section 402 of the CWA, which will address any pollutants that could be discharged into the water system during construction.
4. Surface water runoff will be treated through the measures stipulated and approved by the RWQCB under its regulatory authority before being discharged.
5. The City will abide by the avoidance and minimization measures listed in the USFWS BA, USFWS BO, and the letter from USFWS dated April 5, 2011, outlining variances to avoidance and minimization measures.
6. The City will abide by the avoidance and minimization measures listed in the NMFS BA, the August 18, 2010, NMFS not likely to adversely affect concurrence letter, and the December 10, 2010, letter from NMFS outlining variances to avoidance and minimization measure.
7. The City will abide by the terms and stipulations of the MOA, including the complete implementation of the Treatment Plan.
8. The City will complete all required NESHAP notifications and comply with all local, county, State, and Federal regulations regarding the demolition and disposal of materials.
9. To reduce the temporary impacts from construction-related noise, the City will be responsible for implementing the following measures to the extent practicable:
 - The City will post public notices that would provide notification of construction.
 - All mobile or fixed noise-producing construction equipment that is regulated for noise output by a local, State, or Federal agency will comply with such regulation.
 - The use of noise-producing signals, including horns, whistles, alarms, and bells will be for safety warning purposes only.
 - Construction will be limited to weekdays between 7 a.m. and 7 p.m. and between 10 a.m. and 5 p.m. on weekends. Noise-generating construction activities will be limited to the weekdays between 7 a.m. and 6 p.m. unless an expanded time frame is granted in writing by the City of Vacaville Director of Public Works as necessary to address special construction circumstances or to maintain the construction schedule.
10. The City will comply with recommendations in the Phase I and II Environmental Site Assessments (Dunn Environmental 2010) completed for the project area.

4.15 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES AND SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

4.15.1 Irreversible or Irretrievable Commitment of Resources

For the purposes of this document, irreversible commitment of resources is interpreted to mean that once resources are committed, the production or use of those resources would be lost for other purposes throughout the life of the alternative being implemented. An irretrievable commitment of resources defines the resources that are used, consumed, destroyed, or degraded during the life of the alternative that could not be retrieved or replaced during or after the life of the alternative.

The No Action Alternative would not directly require the commitment of human or fiscal resources. However, ongoing flooding of, and repair of damage to, facilities within the City would continue, and the risk of loss of social, natural, and cultural resources as a result of flooding would continue.

The proposed action would require the commitment of human and fiscal resources. The additional expenditure of labor required for this alternative would occur predominately during construction. However, ongoing maintenance and associated repairs would continue throughout the life of the alternative. Funding for the proposed action would not be available for other uses and would therefore be irretrievable.

Implementation of the proposed action would also require the commitment of natural resources, such as land, water, and vegetation. Construction of the basins and drainage features would result in the incorporation of a larger amount of land than what is currently developed in the project area. However, use of the land is consistent with the existing and planned land uses. If the features constructed as part of the proposed action were removed, the land could be reclaimed and converted back to its pre-construction state. The proposed action would also require a commitment of water resources for construction purposes and periodic maintenance activities. If implemented, this alternative would permanently modify the existing drainage patterns in the project area. However, if the proposed improvements were later demolished, hydrologic patterns could revert to the current condition. Vegetation committed for construction and periodic maintenance of the proposed improvements would be restored after construction/maintenance activities.

Non-renewable and irretrievable fossil fuels and construction materials (e.g., cement, gunite, steel, water, petroleum, energy) would be required. Labor and materials are also irretrievably committed during the fabrication, preparation, and distribution of construction materials and equipment. However, the proposed action would require only a small amount of these materials, the materials are abundant, and use would not result in a measurable impact to the availability of these resources.

Although the implementation of the proposed action would result in the commitment of resources as described above, the alternative would result in a decreased risk of loss to critical and non-critical facilities in the City.

4.15.2 Short-term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

Implementation of the proposed action would result in short-term uses of and short- and long-term impacts on the environment, as documented in Sections 4.1 through 4.12. However, these uses of the environment would be balanced by the long-term improvements to drainage patterns and the long-term reduction in the risk of damage to critical features as a result of flooding that the proposed action would avoid. The new facilities would enhance the long-term productivity of resources by appropriately addressing stormwater flow from major storm events. Furthermore, implementation of any of the alternatives would not preclude or alter the range of potential uses of the resources in the area.

SECTION FIVE PUBLIC PARTICIPATION AND AGENCY COORDINATION

FEMA is the lead Federal agency for conducting the NEPA compliance process for this proposed action. The lead Federal agency is responsible for expediting the preparation and review of NEPA documents in a way that is responsive to the needs of City residents while meeting the spirit and intent of NEPA and complying with all NEPA provisions.

The City will circulate the EA for a 15-day public comment period and will ensure that the document is made available at City offices and other local repositories. The public will be notified of the availability of the EA through the FEMA website, direct mailings to interested parties, and publication of a public notice in *The Reporter*. During the public comment period, FEMA will accept written comments on the EA addressed to FEMA Region IX Environmental and Historic Preservation Office, 1111 Broadway, Suite 1200, Oakland, California 94607, or to fema-rix-ehp-documents@dhs.gov.

At the end of the comment period, FEMA will review the comments and consider them in its determination of a finding (either a Finding of No Significant Impact or a finding that an Environmental Impact Statement must be prepared). FEMA will publish the finding.

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