5.8 HYDROLOGY AND WATER QUALITY

INTRODUCTION

Hydrological information for this section is provided in the *Hydrology Report*[1] and *Water Quality Report*[2] prepared for the Project (see **Appendix H** of this Draft Environmental Impact Report (EIR)).

Scoping Issues Addressed

Public comments related to hydrology and water quality were received during the public scoping period for this Draft EIR. The comments were from individuals and presented concerns over the potential for the Project to change the hydrology of the Project site and surrounding area, resulting in flooding or indirect changes to habitat for protected species. As presented in the analysis below, the Project design includes cross culverts to preserve the existing hydrology of the Project site and includes stormwater detention facilities to avoid flooding. A discussion of hydrology and its connection to biological resources on the Project site is provided in **Section 5.3, Biological Resources**.

REGULATORY SETTING

Federal

Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (US) from any point source unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit.[3] Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of stormwater from municipal, industrial, and construction point sources to comply with the NPDES permit program. Important CWA sections relevant to hydrology and water quality include the following[4]:

- Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.
- Section 402 establishes the NPDES, a permitting system for the discharge of any pollutant into waters of the US, except for dredge or fills material. Regional Water Quality Control Boards (RWQCBs) administer this permitting program in California. Section 402(p) requires permits for discharges of stormwater from industrial uses, construction, and municipal separate storm sewer systems (MS4s).

[1] BKF, 2018a. Hydrology Report - Dublin Boulevard-North Canyons Parkway Extension Project.
[2] BKF, 2018b. Water Quality Report - Dublin Boulevard-North Canyons Parkway Extension Project.
[3] A point source of pollution is any discrete conveyance such as a pipe or a man-made ditch.
[4] Refer to **Section 5.3, Biological Resources**, for a discussion of CWA Sections 401 and 404.

Municipal Separate Storm Sewer Systems

Section 402(p) of the CWA requires the issuance of NPDES permits for MS4 discharge.[5] The Project site is within the San Francisco Bay RWQCB jurisdiction and is under an existing MS4. The Project site is also subject to the *California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit* (MRP).[6] This permit includes provisions for permanent post-construction stormwater treatments for development and roadway projects outside the Caltrans right-of-way. The MRP in Alameda County is administered by the Alameda Countywide Clean Water Program (ACCWP), and requires post-construction stormwater treatment and hydromodification management for all new impervious components of roadway projects.[7] Hydromodification is changes in the timing and volume of runoff from a site. The ACCWP developed the *C.3 Stormwater Technical Guidance* manual to assist designers and reviewers in complying with post-construction stormwater treatment requirements.[8]

Construction General Permit

By law, all stormwater discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least 1 acre must comply with the provisions of the General Construction Permit.[9] Operators of regulated construction sites are required to develop stormwater pollution prevention plans (SWPPPs) outlining sediment, erosion, and pollution prevention control measures.

State

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. Under the Porter-Cologne Water Quality Control Act, the State Water Resources Control Board (SWRCB) has the ultimate authority over state water rights and water quality policy. This act requires a "Report of Waste Discharge" for any discharge of waste to land or surface waters that may impair beneficial uses for surface or groundwater of the state. Discharges under the Porter-Cologne Act are allowed when in compliance with Waste Discharge Requirements (WDRs), which may be required even when the discharge is already permitted or exempt under the CWA.

[5] The US Environmental Protection Agency defines an MS4 as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over stormwater, that is designed or used for collecting or conveying stormwater."
[6] NPDES Permit No. CAS612008, SWRCB Order R2-2015-0049
[7] ACCWP, 2017. About the Clean Water Program. Available: https://www.cleanwaterprogram.org/index.php/about-us.html. Accessed: November 13, 2018.
[8] ACCWP, 2018. C.3 Stormwater Technical Guidance. Available: https://www.cleanwaterprogram.org/images/uploads/C3_Technical_Guidance_v6_Oct_2017_FINAL_Errata_updated_04.20.18.pdf. Accessed: November 13, 2018.
[9] NPDES Permit No. CAS000002, SWRCB Order No. 2009- 0009-DWQ

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB and RWQCB establish water quality standards and regulate discharges to ensure compliance with water quality standards. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect those uses. As a result, water quality standards are developed for specific water body segments based on the designated beneficial use of that water body segment. The RWQCB is also responsible for implementation of Section 402 of CWA, as discussed above.

In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines waters are impaired with one or more constituents and the water quality standards cannot be met through point source or non-point source controls (NPDES permits or WDRs), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

Local

City of Dublin

City of Dublin General Plan

The City of Dublin General Plan, Chapter 12, Environmental Resources Management: Water Resources Management contains information and polices related to the conservation and management of water resources, riparian corridors, and watershed lands within Dublin.[10] This element includes Dublin's goals pertaining to water quality, flood protection, and stormwater management, including the following guiding policies:

- Protect the quality and quantity of surface water and groundwater resources that serve the community
- Protect water quality by minimizing stormwater runoff and providing adequate stormwater facilities
- Minimize flooding in existing and future development, and design stormwater facilities to handle design-year flows based on buildout of the General Plan

City of Dublin Municipal Code

Chapter 7.74 (Stormwater Management and Discharge) of the Dublin Municipal Code controls discharges to municipal storm sewers from spills, dumping, or disposal; and reduces pollutants in stormwater discharges.[11] The purpose of this chapter is to ensure public health, safety, and general welfare by:

[10] City of Dublin, 2017. City of Dublin General Plan, Ch. 12 Environmental Resources Management: Water Resources Element. Available: https://www.dublin.ca.gov/DocumentCenter/View/10560/Chapter-12. Accessed: June 5, 2018.
[11] City of Dublin, 2017. Dublin Municipal Code, Ch. 7.74 Stormwater Management and Discharge Control. Available: https://www.dublin.ca.gov/DocumentCenter/View/570/Muni-Code-Section-774-Stormwater. Accessed: June 5, 2018.

- Eliminating non-stormwater discharges to the municipal separate storm sewer
- Controlling the discharge to municipal separate storm sewers from spills, dumping or disposal of materials other than stormwater
- Reducing pollutants in stormwater discharges to the maximum extent practicable

Alameda County

Alameda County Flood Control and Water Conservation District, Zone 7

The development or encroachment of built structures within floodplains and floodways is subject to FEMA requirements for maintenance of flood flow conveyance and floodplain storage. Zone 7 manages stormwater conveyances and flood channels within the region and requires that activities within these channels, including discharges of stormwater, obtain an encroachment permit.

Alameda County Watercourse Protection Ordinance

For unincorporated areas within Alameda County (County), the Watercourse Protection Ordinance restricts the discharge of pollutants to watercourses and the encroachment of new development into watercourses without first obtaining a permit from the County.[12] Implementation of this ordinance serves to protect surface water and groundwater recharge areas from erosion, sedimentation, and sources of pollution.

City of Livermore

City of Livermore General Plan

The Livermore General Plan, Chapter 8, Open Space and Conservation Element ensures the comprehensive and long-range preservation and management of open space land for the protection of natural resources, economic uses, outdoor recreation, and as a scenic resource. The Open Space and Conservation Element contains goals and policies regarding watersheds, wetlands, creeks, surface water, and groundwater quality and preservation.[13]

City of Livermore Municipal Code

The Livermore Municipal Code, Chapter 16.12, Flood Control Regulations minimizes public and private losses due to flood conditions through:[14]

- Restricting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Controlling the alteration of natural floodplains, stream channels and natural protective barriers which help accommodate or channel floodwaters

[12] Alameda County, 2018. *Alameda County, California - Municipal Code, Ch 13.12 Water Course Protection.* Available: https://library.municode.com/ca/alameda_county/codes/code_of_ordinances?nodeId=TIT13PUSE_CH13.12WAPR. Accessed: June 6, 2018.
[13] City of Livermore. 2004. City of Livermore General Plan 2003-2025. Amended December 2014.
[14] City of Livermore, 2018. Livermore Municipal Code. Ch. 16.12 Flood Control Regulations. Available: http://www.codepublishing.com/CA/Livermore/Municipal/Livermore16/Livermore1612.html. Accessed: June 5, 2018.

- Controlling the filling, grading, dredging and other development which may increase erosion or flood damage; prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas

EXISTING CONDITIONS

The hydrologic and water quality study area includes the Project site and areas in its immediate vicinity that could be affected by the Project. This includes areas north of the Project site that drain across the Project site, as well as areas to the south where stormwater flows into drainage systems that run along and cross Interstate 580 (I-580).

Climate and Topography

The climate in eastern Alameda County is characterized by warm, dry summers and mild, wet winters. The mean annual precipitation in the study area is approximately 14 inches, with precipitation occurring mostly in the months of October through April. Soils in the Project site exhibit a slow infiltration rate and high runoff potential, resulting in overland sheet flow throughout the study area.[15]

The topography of the study area ranges from gently rolling hills (10-20 percent grades) to the north, to relatively flat (5 percent grades) at the southern portion near I-580. From west to east, elevations throughout the Project site vary from approximately 370 feet above mean sea level (AMSL) near Fallon Road, to an approximately 420-foot AMSL high point in the middle of study area, to approximately 415 feet AMSL near Doolan Road. Existing slope conditions throughout the eastern portion of the study area cause much of the stormwater to drain directly into Cottonwood Creek. Runoff from other sections of the Project site flows both southerly and southwesterly (downslope) towards flatter terrain near I-580.

Surface Hydrology

Regionally, the Project site is within the San Francisco Bay RWQCB jurisdiction, within the South Bay Hydrologic Unit.[16,17] Locally, the Project site is within the Arroyo Mocho watershed and Lower Arroyo Mocho sub-watershed. No man-made drainage improvements exist within the undeveloped Project site, although there are several planned or existing systems at the Dublin Boulevard/Fallon Road and North Canyons Parkway/Doolan Road intersections. Local drainage from the study area flows north-to-south as sheet flow or concentrated flow through intermittent or ephemeral drainage areas following the natural topography before entering one of the three drainage systems that cross I-580:

- An east-west culvert within the Caltrans I-580 right-of-way that enters a stormwater collection system beneath Fallon Road before crossing under I-580 to the west

[15] Overland sheet flow refers to stormwater runoff that flows within a thin, shallow layer over the ground surface.
[16] Alameda Creek hydrologic area, hydrologic sub-area 204.30
[17] United States Geological Survey, 2018. Hydrologic Unit Maps. Available: https://water.usgs.gov/GIS/huc.html. Accessed: June 26, 2018.

- A north-south culvert crossing under Collier Canyon Road that extends to the south under I-580
- Cottonwood Creek, which flows into Arroyo Las Positas south of I-580 before entering Arroyo Mocho

After crossing I-580, all runoff from the Project site discharges into Arroyo Mocho, then flows into Alameda Creek and ultimately empties into the San Francisco Bay.

Cottonwood Creek

Aside from minor tributaries, Cottonwood Creek is the only surface water resource within the Project site, located west of Doolan Road. Cottonwood Creek is a natural, perennial stream[18] that traverses active grazing land. This feature flows generally north-to-southwest through Doolan Canyon, crosses under I-580, and enters Arroyo las Positas near the Las Positas Golf Course. The stream channel is approximately 6 to 10 feet wide at the toe of slope near I-580. The bottom substrate in Cottonwood Creek consists of gravel and native soil.[19]

Floodplains

There is one existing floodplain within the Project site along Cottonwood Creek.[20] This area has a 0.2 percent annual chance flood discharge contained in channel, indicating that Cottonwood Creek could be subject to a 500-year storm event, but the creek channel would adequately convey floodwaters. A deep incision in the floodplain contains the ordinary high water mark (OHWM).[21] The remainder of the Project site does not overlie flood hazard zones.

Groundwater

The Project site is within the boundaries of the Livermore Valley groundwater basin, which extends from the Pleasanton Ridge east to the Altamont Hills and from the Livermore Upland north to the Orinda Upland.[22] Surface drainage features include Arroyo Valle, Arroyo Mocho, and Arroyo las Positas as principal streams, with Alamo Creek, South San Ramon Creek, and Tassajara Creek as minor streams.

The Livermore Valley groundwater basin provides municipal, domestic, industrial and agricultural water supply. Alameda County Flood Control and Water Conservation District, Zone 7 maintains an annual hydrologic supply and demand inventory. The groundwater budget is essentially in balance under average hydrologic conditions, which means that annual groundwater usage is completely

[18] Perennial streams generally convey water year-round, under average conditions.
[19] Bay Area Rapid Transit Agency, 2017. BART to Livermore Extension Project EIR, Chapter G: Geology, Soils, Seismicity, Mineral, and Paleontological Resources. Available: http://www.bart.gov/sites/default/files/docs/BLVX%20DEIR_Vol%201_0_Cover-TOC.pdf. Accessed: November 13, 2018.
[20] BKF, 2018a.
[21] The OHWM is a jurisdictional benchmark for administering the US Army Corps of Engineers regulatory program in navigable waterways.
[22] California Department of Water Resources, 2006. California's Groundwater Bulletin 118 - Livermore Valley Groundwater Basin. Available: https://water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/2-10.pdf. Accessed: November 28, 2018.

replenished with recharge and groundwater is not being depleted. Historical geotechnical testing in the study area encountered groundwater approximately 10-39 feet below grade, but shallower groundwater levels may be present throughout the Project site, particularly at the Cottonwood Creek crossing.[23]

Water Quality

Beneficial Uses

The San Francisco Bay RWQCB identifies beneficial uses for water bodies within its jurisdiction. **Table 5.8-1** lists the identified beneficial uses for the two surface waterbodies that receive runoff discharged from the study area: Cottonwood Creek and Arroyo Mocho.

Table 5.8-1 Beneficial Uses – Cottonwood Creek and Arroyo Mocho

Water Body	Beneficial Uses								
	Groundwater Recharge	Commercial and Sport Fishing	Fish Migration	Preservation of Rare and Endangered Species	Fish Spawning	Warm Freshwater Habitat	Wildlife Habitat	Contact Water Recreation	Noncontact Water Recreation
Cottonwood Creek	-	-	-	X	-	X	X	X	X
Arroyo Mocho	X	X	X	-	X	X	X	X	X

Source: BKF, 2018b

303(d) Impaired Waters

Cottonwood Creek is not listed as a 303(d) impaired waterbody. Arroyo Mocho is a 303(d) Category 5 waterbody, which means this watercourse does not meet SWRCB water quality standards and a TMDL is required, but not yet completed, for at least one of the pollutants listed for this segment. Listed pollutants in Arroyo Mocho include; diazinon[24] related to urban stormwater runoff and temperature related to channelization, habitat modification, and removal of riparian vegetation.

IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following significance criteria for hydrology and water quality were derived from the Environmental Checklist in the California Environmental Quality Act (CEQA) Guidelines Appendix G. These significance criteria have been amended or supplemented, as appropriate, to address lead agency requirements and the full range of potential impacts related to this Project.

[23] BKF, 2018c. Geotechnical Feasibility Summary - Dublin Boulevard-North Canyons Parkway Extension Project.
[24] Diazinon is an insecticide used in agriculture to control insects on fruit, vegetable, nut, and field crops.

An impact of the Project would be considered significant and would require mitigation if it would meet one of the following criteria:

A. Result in or be subject to damage from inundation by mudflow

B. Violate any water quality standards or waste discharge requirements, create any substantial new sources of polluted runoff, or otherwise degrade surface water or groundwater quality

C. Place within a watercourse or flood hazard area structures which would impede or redirect flood flows, or otherwise substantially alter the existing drainage pattern of an area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion, siltation, or flood-related damage on- or offsite

D. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite

E. Substantially deplete groundwater supplies or interfere with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)

Methodology

This analysis cites two Project-specific reports outlining hydrology and water resources in the study area: *Water Quality Report* and *Hydrology Report*. The purpose of the *Water Quality Repor*t is to fulfill the requirements of CEQA and to provide information for NPDES permitting. The document includes a discussion of the following:

- General environmental setting of the study area
- Regulatory framework with respect to water quality
- Data on surface water within the study area
- Water quality impairments and beneficial uses
- Identifies potential water quality impacts/benefits associated with the Project
- Avoidance and/or minimization measures for potentially adverse impacts

The purpose of the *Hydrology Report* is to document existing stormwater flows and summarize improvements necessary to address the drainage needs of the Project.

Impact Analysis

No Impact Summary

A. Result in or be subject to damage from inundation by mudflow.

There is not a significant potential for mudflow due to the overall flatness of the Project site (see **Section 5.6, Geology and Soils**). No impact would occur.

Impacts of the Project

B. Violate any water quality standards or waste discharge requirements, create any substantial new sources of polluted runoff, or otherwise degrade surface water or groundwater quality.

Construction

Construction of the Project would involve ground disturbing activities such as excavation, trenching, grading, demolition, and vegetation removal, which could result in runoff that contains sediment and other pollutants that could degrade water quality if not properly controlled. Fueling or maintenance of construction vehicles would occur within the construction footprint during construction, which poses a risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of these materials could pose a threat to water quality if contaminants enter storm drains, open channels, or surface water receiving bodies (i.e., Cottonwood Creek). Construction activities that intrude into the groundwater table or require dewatering could also introduce loose soils and pollutants, resulting in increased sedimentation and a temporary impact to groundwater quality.

The Project would be subject to a NPDES General Construction Permit, issued by the RWQCB, which would stipulate water quality control requirements. These requirements include the implementation of a SWPPP to identify potential pollutant sources and prescribe best management practices (BMPs) to avoid impacts to surface water or groundwater quality during construction. Such BMPs could include the following:

- Provide for waste management
- Establish proper building material staging areas
- Designate paint and concrete washout areas
- Establish proper equipment/vehicle fueling and maintenance practices
- Control equipment/vehicle washing and allowable non-stormwater discharges
- Develop a spill prevention and response plan

With implementation of required permit conditions, this impact would be **less than significant**.

Operation

During Project operation, stormwater that encounters the roadway may be exposed to common pollutants such as motor oil and dust that collect on impervious surfaces. Other than stormwater exposure to low levels of pollutants that accumulate on the roadway, Project operation would not create any other source of polluted runoff.

The NPDES MRP includes provisions for permanent post-construction stormwater treatment requirements related to roadway projects. The ACCWP administers Alameda County's MRP, and developed the *C.3 Stormwater Technical Guidance* manual to assist compliance with post-construction stormwater treatment requirements. The ACCWP *C.3 Stormwater Technical Guidance* manual outlines BMPs to reduce water pollution, including on-site source control measures and

Low Impact Development (LID) features.[25] These required C.3 post-construction protocols would ensure stormwater conveyance and treatment systems proposed as a part of the Project adequately treat runoff prior to discharge offsite.

The Project would include facilities to collect and treat surface runoff from impervious surfaces prior to discharge into the stormwater system which would be installed beneath the roadway surface within the operational area of the Project. Stormwater treatment facilities would include biofiltration swales proposed in the median and parkway strips, and if needed, detention basins at the base of embankments. Biofiltration is a pollution control technique using living material (vegetation) and sub-surface media such as sand and gravel to capture sediment and pollutants from stormwater runoff. Biofiltration swales are vegetated ditches with a layer of biofiltration media/soil underneath and a layer of permeable material with an underdrain (perforated plastic pipe) further below.

The Project would include stormwater inlets and stormdrain laterals to collect stormwater from biofiltration areas and direct it to a storm drain main located beneath the new roadway. This storm drain main would route stormwater generated on impervious surfaces to two locations:

- Stormwater generated west of the roadway's highest elevation point (located approximately in the middle of the Project site) would route towards a stormwater transmission system located under Fallon Road
- Stormwater generated east of the roadway's highest elevation point would discharge to Cottonwood Creek

These facilities would ensure stormwater collection and treatment would not compromise surface water quality or result in increased, uncontrolled stormwater flows to existing stormwater drainage facilities or receiving water bodies. Once operational, these facilities would also minimize the potential for groundwater quality degradation. As discussed, polluted stormwater generated within the roadway would be treated prior to discharge into pervious areas or drainages that provide a connection to groundwater. As a result of Project biofiltration components and the proposed storm drain, stormwater would continue to ultimately discharge to the same water bodies as it does under existing conditions. Given the above, this impact would be **less than significant**.

C. Place within a watercourse or flood hazard area structures which would impede or redirect flood flows, or otherwise substantially alter the existing drainage pattern of an area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion, siltation, or flood-related damage on- or offsite

And

[25] LID refers to systems and practices that can reduce runoff and pollutant loadings by managing runoff as close to its source(s) as possible. LID includes overall site design approaches and individual small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and the harvesting and use of rainwater.

D. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite

Construction

Grading and earthmoving during construction would alter upland topography across the Project site, which directly influences the direction and timing of stormwater and flood flows. Construction-induced erosion could also temporarily increase sedimentation in receiving water bodies throughout the construction period. However, construction activities would be subject to SWPPP erosion-control requirements, and temporary disturbance areas used for equipment access and staging would be restored to pre-Project topography upon the completion of construction activities. Construction of the Cottonwood Creek bridge would not take place within the watercourse, or have direct impacts on the Creek itself. Therefore, construction activities would not permanently alter existing drainage patterns resulting in substantial erosion, siltation, or flood-related damage. This impact would be **less than significant**.

Operation

Cottonwood Creek Floodzone

According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, the western portion of Project site is located within an area of minimal flood hazard, which is an area outside the 100-year and 500-year flood zones.[26] The Cottonwood Creek channel is a floodplain within the 500-year floodzone, but is large enough to contain the discharge of 100-year and 500-year storm events.

The Project would include a new bridge spanning Cottonwood Creek perpendicular to the channel. At this crossing, the top width of flood waters during a base flood event would be approximately 167 feet. Three rows of 2-foot diameter piers would be installed in the floodway to support the bridge. The piers would remove 6 feet of flow area from the 167-foot wide floodway (approximately 3.5 percent of the flow area), but would be outside of the Ordinary High Water Mark.

The *Hydrology Report* prepared for the Project included a hydraulic study of Cottonwood Creek to measure floodwaters flows during a 100-year storm event with and without the bridge pier obstruction. This hydraulic study confirmed a slight raise in water surface elevation (from a depth of 3.68 feet to 3.85 feet) immediately south of the bridge pier locations. However, this raise in water surface elevation would not occur further downstream or further upstream of the proposed Cottonwood Creek bridge. Furthermore, hydraulic modeling results demonstrate approximately 5.8 feet of freeboard between the 100-year flood event water surface and the bottom of bridge, which exceeds the minimum 1-foot of freeboard requirement established by the Alameda County Flood Control and Water Conservation District. Therefore, the Project would not substantially impede or redirect flood flows in the Cottonwood Creek channel that would result in substantial erosion, siltation, or flood-related damage. This impact would be **less than significant**.

[26] BKF 2018a

Dam Inundation

A 'dam inundation zone' is the area downslope of a dam structure that would flood in the event of a failure (breach) or uncontrolled release of water from the dam. The southwest portion of the study area is within the northern limit of the dam failure inundation hazard area for the Del Valle Dam.[27] Del Valle Dam is located approximately 5 miles southeast of the Project site and stores an average of 44,000 acre-feet of water in its reservoir. Del Valle Dam is under the jurisdiction of the California Department of Water Resources, Division of Safety of Dams. Existing dams under Department of Water resources jurisdiction are periodically inspected to ensure adequate maintenance and to direct the owner to correct any deficiencies found.[28] Regular inspections and required maintenance of the dams substantially reduce the potential for catastrophic failure. There are no state or local restrictions for development within dam failure inundation areas; however, the Emergency Services Act (Government Code Section 8589.5) requires that dam inundation maps be prepared to identify flood risk and that local jurisdictions prepare evacuation procedures in the event of a catastrophic dam failure. This impact would be **less than significant**.

As a linear roadway Project, the Project would not substantially increase exposure of persons or habitable structures to flooding from dam inundation. Additionally, based on the location of the Project site – which is partially within the northern limit of the inundation zone, described as an "upland area" in the County's General Plan – in the event of dam failure the study area would be inundated by 0 to a few feet of water. This would not pose a significant flooding hazard, and this impact would be **less than significant**.

Stormwater Runoff

Overall, the new roadway would create a barrier for sheet runoff flowing north to south following the Project site's natural topography. In order to account for this runoff barrier, the Project would include cross-culverts installed perpendicularly to the roadway to convey stormwater across the proposed roadway alignment. Swales[29] would be built along the north side of the Project to direct runoff to the culvert systems. Stormwater discharged from the cross-culverts would follow the existing downslope pattern south towards I-580, thereby preserving the prevailing stormwater drainage pattern on the Project site.

Pavement and other hardscape associated with the Project would increase the total impervious surface within the Arroyo Mocho watershed area by approximately 19 acres. An increase in impervious surfaces could increase stormwater runoff timing and volume. When a site is developed, much of the rainwater can no longer infiltrate into the soils, so it flows offsite at a faster rate and in greater volume. As a result, erosion may occur in creeks and channels downstream of the Project.

[27] Alameda County, 2012. Alameda County General Plan 2012.
[28] City of Livermore. 2004. City of Livermore General Plan 2003-2025. Amended December 2014.
[29] Swales are engineered landscape features which collect and treat stormwater before conveying it to the stormwater system. In this case, swales would direct stormwater from north of the Project site to cross culverts under the roadway.

In the County, certain projects must incorporate hydromodification techniques focused on retaining, detaining, or infiltrating runoff to ensure that post-project stormwater flows match pre-project stormwater flow patterns. The Project is subject to hydromodification requirements because it meets the following applicability criteria:

- The Project would include creation or replacement of 1 acre or more of impervious surface,
- The Project improvements would increase impervious surface over pre-Project conditions, AND
- The Project is located in a susceptible area for stormwater-related erosion, as shown on the default susceptibility map.

The ACCWP *C.3 Stormwater Technical Guidance* manual outlines hydromodification controls to reduce post-construction stormwater flow, including source control measures, LID features, and on-site structural hydromodification facilities. The proposed stormwater treatment system (biofiltration swales discussed above) would also operate as hydromodification controls to capture and slow stormwater runoff. In the event that during final design it is determined that biofiltration areas would not sufficiently reduce stormwater flows off-site, there are two additional components which could be implemented to handle stormwater flows: detention basins and an oversized underground storm drain.

Detention basins temporarily hold stormwater, letting sediment in the stormwater settle to the bottom of the basin, before discharging the water through an outlet. These facilities would provide stormwater storage and would regulate the discharge to the collecting water bodies. The precise number, location, and design of detention basins have not yet been determined, and would be developed, if needed, during final design. Therefore, the preliminary concept design for detention basins was utilized for the purposes of this study: detention basins would be installed within the operational footprint, most likely at the base of roadway embankments. Based on preliminary design, detention basins would be constructed up to 50 feet from the edge of pavement. In addition to biofiltration areas, detention basins would provide ample space in which to accommodate and treat stormwater. Alternatively, stormwater could be accommodated through oversized underground storm drain lines or underground storage vaults.[30]

These proposed facilities would be vetted against the ACCWP hydromodification requirements to ensure that new stormwater drainage systems have the capacity to receive new stormwater flow generated by the Project, eliminating the possibility of flooding. This impact would be **less than significant**.

[30] To ensure the totality of Project impacts are captured in this Draft EIR, this Draft EIR includes supplemental storage areas along the roadway and an oversized underground storm drain as a part of the project site.

E. Substantially deplete groundwater supplies or interfere with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

As discussed above, the Project would include cross-culverts to allow stormwater from the north to travel across the Project site and discharge south of the proposed roadway alignment, as it does under existing conditions. This routing would allow most stormwater runoff in the study area to percolate through pervious soils and recharge the groundwater aquifer or discharge into existing drainage systems outside of the Project site, as it does under existing conditions.

The Project would include 19 acres of new impervious surface, slightly reducing available pervious areas that allow stormwater runoff to infiltrate into the soils and recharge the groundwater aquifer. However, the new impervious surface that would be created as a part of the Project – 19 acres – represents less than 0.1 percent of the 69,600-acre Livermore Valley groundwater basin. Further, Project design and implementation of LID features would contribute to groundwater recharge at the Project site. As such, impervious surfaces introduced as a component of the Project would not substantially interfere with groundwater recharge such that substantial depletion of groundwater supply would occur. Furthermore, Project operation would not increase water demand that would contribute to lowering of the groundwater table, as Project operation would not require the regular use of water. This impact would be **less than significant**.

CUMULATIVE IMPACTS

Construction and operation of the Project, in combination with past, present, and foreseeable future cumulative development, could encounter surface water and groundwater resources within the regional watersheds and groundwater basins. Other projects in the area include past and planned residential, commercial, and infrastructure development projects in Dublin, Livermore, and elsewhere around the study area (see **Chapter 4.0, Introduction to Environmental Analysis**).

In general, construction of past, present, and foreseeable future projects could alter surface water drainage patterns, modify watercourse capacity and water flow height, increase erosion and sedimentation, degrade surface water or groundwater quality, and increase flood risks by altering flood hazard areas. Potential long-term effects associated with past, present, and foreseeable future projects operation could increase stormwater runoff speed and rates, permanently alter watercourse hydraulic capacity, degrade surface water or groundwater quality, increase flood heights, or decrease groundwater recharge. However, all development in the vicinity of the Project site and within the watershed would be subject to federal, state, and local regulations designed to control stormwater runoff, require construction-period pollution controls, prevent floodplain development, ensure adequate groundwater recharge, and otherwise protect hydrologic resources and water quality. The Project would alter the hydrology along the 1.5 mile roadway alignment, resulting in stormwater from the Project being directed to the west (to Fallon Road drainage system) or east (to Cottonwood Creek). However, the Project has been designed to ensure the greater hydrology of the study area, in which stormwater moves generally from north to south, would be preserved through culverts. Future development would be independently responsible for

evaluating hydrology and water quality impacts, and would be subject to mitigation from prior EIRs such as the Dublin General Plan EIR, EDSP EIR, and the Fallon Village SEIR. These EIRs evaluated future development in the study area holistically, including cumulative analysis. Due to existing regulatory and permitting requirements, the Project design, and mitigation requirements from prior EIRs, the Project would not result in a cumulatively considerable contribution to any significant cumulative impacts associated with hydrology or water quality. No cumulative impact would occur.

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