IV. ENVIRONMENTAL IMPACT ANALYSIS
I. HYDROLOGY AND WATER QUALITY

INTRODUCTION

This chapter describes the environmental setting for the proposed project, including a description of the watershed and groundwater basin, surface runoff and drainage, flooding, and water quality, based on available information provided as part of the project application and published reports. The environmental setting also describes the project regulatory framework. Following the setting, impacts that could result from implementation of the proposed project are evaluated.

ENVIRONMENTAL SETTING

This subsection describes the existing hydrological setting at and near the proposed project. For the purposes of this analysis, the study area for hydrology and water quality includes the project site and the adjacent areas within the groundwater basin and watershed.

Stormwater Runoff and Drainage

The project site is located within the Butte Creek Watershed, which receives approximately 20 to 50 inches of rain annually.[1] The project site is generally undeveloped grassland and, therefore, most rainfall on the project site infiltrates to the subsurface, unless rainfall rates exceed the infiltration capacity of the soils. Streams on the project site follow the general topography that gradually slopes down to the southwest from an elevation of about 270 feet to 225 feet (NAVD 88).[2] However, a 5- to 12-foot tall levee constructed for the Butte Creek Diversion Channel traverses from north to south across the middle of the project site and creates a divide in the site drainage (Figure 1). The levee for the Butte Creek Diversion Channel was built in 1957 to limit and divert excess floods flows from Little Chico Creek, located north of the project site, to Butte Creek, located south of the project site.[3]

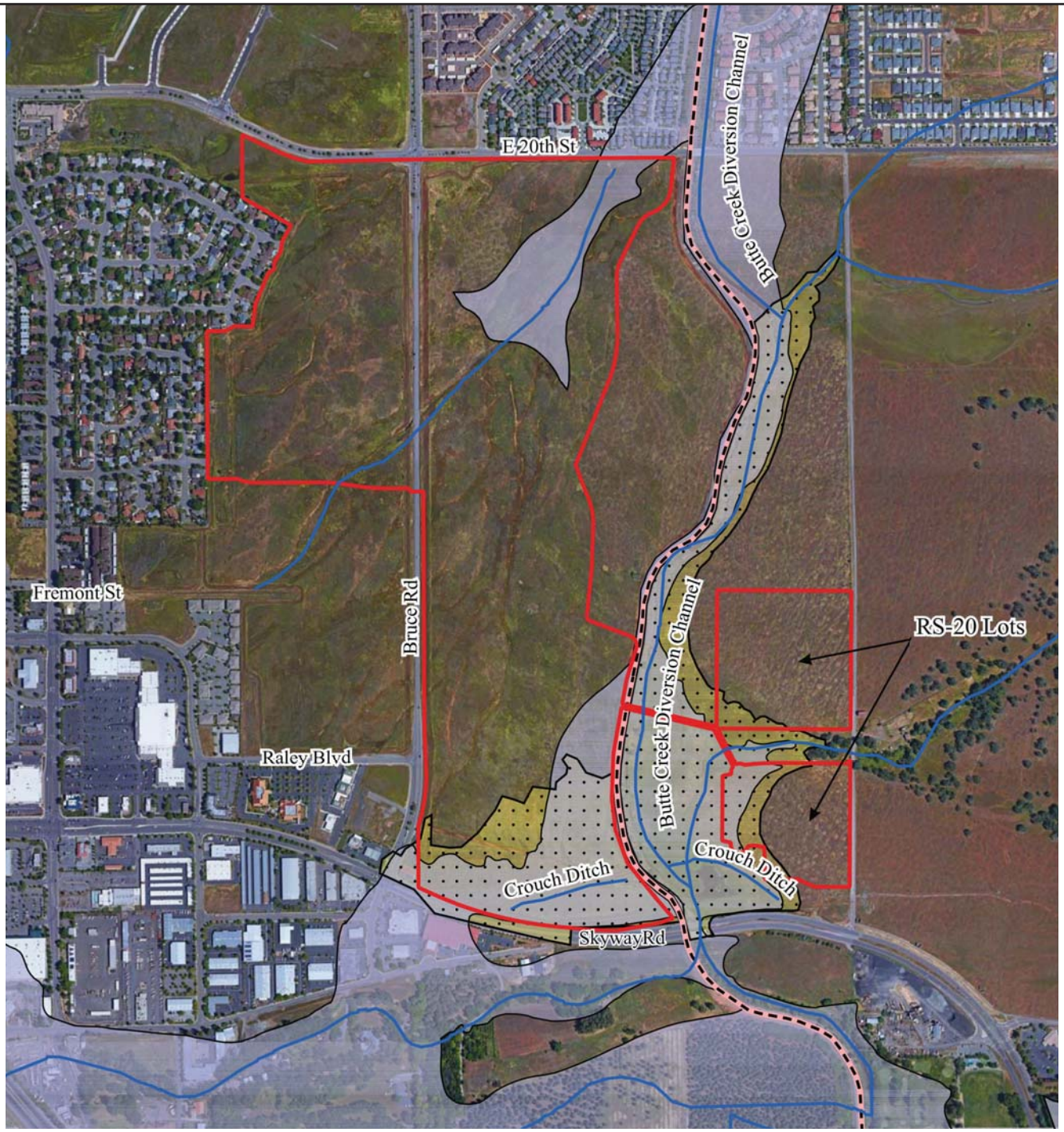
The Butte Creek Diversion Channel collects surface water from several intermittent streams that enter the east side of the project site from the Sierra Foothills and flows south-southeast for about 1.0 mile before connecting to Butte Creek. One of the intermittent streams is a remnant of the Crouch Ditch along the southern boundary of the project site, which was historically used as

---

1 *Sacramento River Watershed Program, 2010. The Sacramento River Basin; A Roadmap to Watershed Management. Butte Creek Watershed, Pages 125-130. October.*

2 *USGS, 2015. Chico Quadrangle, California-Butte Ca., 7.5-Minute Series,*

3 *California Department of Water Resources, 2014. Mid and Upper Sacramento Regional Flood Management Plan. November 10.*



Legend

- Project Footprint
- Federal Levee Centerline
- Stream or Channel
- FEMA 100-Year Flood Zone
- DWR 200-Year Flood Zone

Sources: Federal Levee Centerline (DWR, 2017); Streams and Channels (USGS National Hydrography Dataset); FEMA 100-Year Flood Zones (FEMA, 2011); DWR 200-year Flood Zones (DWR, 2013).

Note: The extent of the 200-year flood zones only shown in the immediate project vicinity. The extent of the Crouch Ditch and an unnamed stream on the northwest side of the project site was reduced based on field observations from September 26, 2017. Evidence of a braided network of streams was observed on the west and northwest side of project site (not marked on figure, but visible from aerial photograph).

0 900 Feet N

Figure IV.I-1 Hydologic Features

wra ENVIRONMENTAL CONSULTANTS

Stonegate Vesting Tenative Subdivision
Map and GPA/Rezone
City of Chico, California

Date: 3/28/18
Source: Baseline

an irrigation canal for agriculture. Some water from the Crouch Ditch drains into the Butte Creek Diversion Channel, and the remainder appears to pool onsite (Figure 1).

There are vernal pools and a series of braided streams on the west and northwest side of the project site that intermittently flow to the southwest through several culverts under Bruce Road and into a surface ditch located on the neighboring Chico Unified School District property that drains southwest into a City culvert near Fremont Street (Figure 1). From there, the City's existing storm drain system conveys water to Comanche Creek located about 1.0 mile southwest of the project site. Butte Creek flows into the Sacramento River about 45 miles south-southeast of the project site.

Surface Water Quality

As discussed above, stormwater runoff from the project site either drains into the Butte Creek Diversion Channel or into the City storm drain system at Freemont Street. According to the Central Valley Regional Water Quality Control Board's (Regional Water Board's) Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins, the beneficial uses of Butte Creek include municipal and domestic supply, irrigation, stock watering, power, water contact, warm and cold freshwater habitat, cold migration, warm and cold spawning, and wildlife habitat.

Pursuant to Section 303(d) of the Clean Water Act, the State Water Resources Control Board (State Water Board) has listed Butte Creek as an impaired water body for mercury and pH. Impaired water bodies refer to those that do not meet one or more of the water quality standards established by the state. Total Maximum Daily Loads (TMDLs) will be established for Butte Creek in 2021 to describe the maximum amount of a pollutant that the water bodies can receive while still meeting water quality standards. Once a TMDL is developed, it will be implemented by allocating wasteloads via the National Pollutant Discharge Elimination System (NPDES) permit program. The regulatory framework for designating impaired water bodies, establishing TMDLs, and NPDES permits is discussed under the Regulatory Framework section below.

Groundwater Quality

The West Butte subbasin of the Sacramento Valley Groundwater Basin underlies the project site and is listed in the Basin Plan as having the potential to support the beneficial uses of municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply. Based on groundwater level measurements collected near the project site, groundwater is approximately 40 feet below ground surface in the project vicinity.[4] As discussed in Section IV.H (Hazards and Hazardous Materials) there is no documented groundwater contamination beneath the project site.

[4] *Broadbent & Associates, Inc., 2017. First Quarter 2017 Groundwater Monitoring Report; Flyers Energy (former Nella Oil Company) Station No. 50, 2501 Notre Dame Boulevard, Chico, Butte County, California. April.*

Storm-related Flooding

The water levels in the Butte Creek Diversion Channel rise rapidly during a storm event and generally flow high for a limited duration. However, a prolonged storm event could potentially exceed the capacity of the levee structure and channel.[5] Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, portions of the project site along the Butte Creek Diversion Channel are mapped within a 100-year flood zone. Portions of the project site along the Crouch Ditch and unnamed streams on the northwest and southeast side of the project site are also mapped within a 100-year flood zone (Figure 1).[6]

In accordance with Senate Bill 1278, the California Department of Water Resources (DWR) has developed floodplain maps for 200-year flood events within the Sacramento-San Joaquin Valley watersheds. Based on available DWR mapping, portions of the project site along the Butte Creek Diversion Channel and Crouch Ditch are mapped within a 200-year flood zone (Figure 1).[7]

Dams Inundation

Dams that could inundate significant portions of watersheds in the Chico area include the Shasta Dam, Oroville Dam, Whiskeytown Dam, and Black Butte Dam. The project site is not located within the potential inundation area for any of these dams.[8]

Mudflow

Prolonged and intense rainfall on steep hillslopes can cause mud flows (also known as debris flows). These catastrophic flows are capable of destroying homes, washing out roads and bridges, sweeping away cars, knocking down trees, and obstructing streams and roadways with thick deposits of mud and rocks. Since there are no steep hills located in the project vicinity, the project site would not be at risk of inundation from mudflows.

---

5 *California Department of Water Resources, 2014. Mid and Upper Sacramento Regional Flood Management Plan. November 10.*

6 *Federal Emergency Management Agency (FEMA), 2011. Flood Insurance Rate Map, Butte County, California and Incorporated Areas, 06007C0506E and 06007C0510E. Revised January 6.*

7 *California Department of Water Resources (DWR), 2013. FloodSAFE California; Senate Bill 1278/Assembly Bill 1965 Urban Level of Flood Protection Informational Map with Water Surface Elevation Contours. Sacramento River Basin Chico Study Area Chico USGS Quadrangle. Page 6. June 24.*

8 *City of Chico, 2011. Chico 2030 General Plan, Safety. April.*

Seiches

A seiche is the oscillation of a body of water at its natural period. Seiches occur most frequently in enclosed or semi-enclosed basins such as lakes, bays, or harbors and may be triggered by strong winds, changes in atmospheric pressure, earthquakes, tsunami, or tides. The project site is not located near any large bodies of water. Therefore, the project would not be at risk of flooding from seiches.

Sea Level Rise and Tsunamis

The project site is located far inland from any coastline. Therefore, the project would not be at risk of flooding from sea level rise or tsunamis.

REGULATORY SETTING

Federal Regulations

Clean Water Act of 1972

The federal Clean Water Act (CWA) amendments establish the basic structure for the U.S. Environmental Protection Agency (USEPA) to regulate discharges of pollutants into the waters of the United States. Under the CWA, the USEPA sets water quality standards for contaminants in surface waters and implements the pollutant control programs, as discussed below.

Impaired Waters and TMDL Program

In accordance with Section 303(d) of the CWA, states must evaluate all available water quality-related data and information to present the USEPA with a list of water bodies that do not meet established water quality standards (i.e., impaired waters). States must then develop a TMDL for every pollutant on the impaired waters list. An essential component of a TMDL is the calculation of the maximum amount of a pollutant that a waterbody can receive while still meeting water quality standards. Based on the TMDL, the state allocates a loading capacity among the various point and non-point sources that discharge into the impaired waterbody. Permits for point sources are issued through the USEPA's NPDES program, as discussed below.

NPDES Permit Program

Under Section 402 of the CWA, the discharge of pollutants through a point source into waters of the United States is prohibited unless the discharge is in compliance with an NPDES permit. The NPDES program regulates the discharge of pollutants from municipal and industrial wastewater treatment plants and sewer collection systems, as well as stormwater discharges from industrial facilities, municipalities, and construction sites. In California, implementation and enforcement of the NPDES program is conducted through the State Water Board and the nine Regional Water Quality Control Boards. The Regional Water Quality Control Boards set standard conditions for each permittee in their region, which includes effluent limitations and monitoring programs. The proposed project would be subject to NPDES permits as described under the State regulatory framework, below.

Federal Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The NFIP makes federally-backed flood insurance available for communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. FEMA manages the NFIP and creates Flood Insurance Rate Maps that designate 100-year floodplain zones and delineate other flood hazard areas. A FEMA 100-year flood hazard zone is an area that has a 1-in-100 (1 percent) chance of being flooded in any year based on historical data.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides for the protection of the quality of all waters of the State of California for use and enjoyment by the people of California. The act also establishes provisions for a statewide program for the control of water quality, recognizing that waters of the state are increasingly influenced by interbasin water development projects and other statewide considerations, and that factors such as precipitation, topography, population, recreation, agriculture, industry, and economic development vary regionally within the state. The statewide program for water quality control is therefore administered on a local level with statewide oversight. Within this framework, the act authorizes the State Water Board and the nine Regional Water Quality Control Boards to oversee the coordination and control of water quality within California. The Porter-Cologne Act also provides for the development and tri-annual review of Water Quality Control Plans (Basin Plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters.

NPDES Construction General Permit

Construction in California that disturbs one or more acres of land surface are required to comply with the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ (as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit). The Construction General Permit is issued by the State Water Board and is overseen by the Regional Water Board in the proposed project area.

To obtain coverage under the Construction General Permit, the discharger must provide via electronic submittal, a Notice of Intent, a Storm Water Pollution Prevention Plan (SWPPP), and other documents required in Attachment B of the Construction General Permit. The construction activities subject to this permit include clearing, grading, and disturbances to the ground such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The permit also covers linear underground and overhead projects such as pipeline installations.

The Construction General Permit uses a risk-based permitting approach and mandates certain requirements based on the established risk level (Risk Level 1, 2, or 3) of the project. The project risk level is based on the risk of sediment discharge and the receiving water risk. The sediment discharge risk depends on the project location and timing (e.g., wet season versus dry season activities). The receiving water risk depends on whether the project would discharge to a sediment-sensitive receiving water. The discharger would determine the project risk level when filing the Notice of Intent.

A Qualified SWPPP Developer must prepare a SWPPP that meets the certification requirements in the Construction General Permit. The purpose of the SWPPP is to (1) help identify the sources of sediment and other pollutants that could affect the quality of stormwater

discharges; and (2) describe and ensure the implementation of Best Management Practices (BMPs) to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges resulting from construction activity. Common BMPs on construction sites include project phasing and the placement of vegetation, straw, fiber, stabilizing emulsion, protective blankets, or other materials on areas of disturbed soils to reduce erosion. A Qualified SWPPP Practitioner must oversee the operation of BMPs that meet the requirements outlined in the permit.

The SWPPP also requires a construction site monitoring program. The monitoring program may include, depending on the project's risk level, visual observations of site discharges, water quality monitoring of site discharges (pH, turbidity, and non-visible pollutants, if applicable), and receiving water monitoring (pH, turbidity, suspended sediment concentration, and bioassessment).

The Construction General Permit allows non-stormwater discharge of dewatering effluent if the water is not contaminated and is properly filtered or treated, using appropriate technologies such as clarifier tanks and/or sand filters. If the dewatering activity is deemed by the local Regional Water Board to not be covered by the Construction General Permit, then the discharger would be required to prepare a Report of Waste Discharge, and if approved by the local Regional Water Board, be issued site-specific waste discharge requirements (WDRs) under NPDES regulations. Site-specific WDRs contain rigorous monitoring requirements and performance standards that, when implemented, ensure that receiving water quality is not substantially degraded. The discharge of dewatering effluent is authorized under the Construction General Permit if the following conditions are met:

- The discharge does not cause or contribute to a violation of any water quality standard;
- The discharge does not violate any other provision of the Construction General Permit;
- The discharge is not prohibited by the applicable Basin Plan;
- The discharger has included and implemented specific BMPs required by the Construction General Permit to prevent or reduce the contact of the non-stormwater discharge with construction materials or equipment;
- The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;
- The discharge is monitored and meets the applicable numeric action levels; and
- The discharger reports the sampling information in the annual report.

If any of the above conditions are not satisfied, the discharge of dewatering effluent is not authorized by the Construction General Permit. The discharger must notify the local Regional Water Board of any anticipated non-stormwater discharges not already authorized by the Construction General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

NPDES Small MS4 General Permit

Municipal stormwater discharges in the City of Chico are regulated under the statewide NPDES General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems, Order No. 2013-0001-DWQ (Small MS4 General Permit). Under the Small MS4 General Permit, projects that create or replace 5,000 square feet or more of impervious surface are required to incorporate standard permanent and/or operation source control measures as applicable and Low Impact Development (LID) standards. LID design standards apply techniques to infiltrate, filter, store, evaporate, and/or detain stormwater runoff close to its source to maintain pre-development runoff rates and volumes. Common practices used to adhere to the LID principles include, but are not limited to, the use of permeable pavement and bioretention areas. Furthermore, projects in the Great Valley geomorphic province (such as the proposed project) that create and/or replace one acre or more of impervious surface are required to develop and implement hydromodification management procedures to limit post-project runoff to pre-project flow rates for the 2-year, 24-hour storm event.

Local Regulations

Basin Plan

The Regional Water Board implements the Basin Plan,[9] which is a master policy document for managing water quality issues in the Central Valley region. The Basin Plan establishes beneficial water uses for waterways and water bodies within the region. The Regional Water Board also evaluates the water quality within water bodies to determine if they are impacted by pollutants such that it would impair its use. Impaired waters are rivers, lakes, or streams that do not meet one or more water quality standards and are considered too polluted for the intended beneficial uses. Specific narrative and numerical water quality objectives (e.g., color and concentration limits, respectively) have been developed in the Basin Plan to protect beneficial use designations through the adoption of WDRs, cleanup abatement orders, and TMDLs.

Central Valley Flood Protection Plan

The Central Valley Flood Protection Act of 2008 directed the DWR to prepare the Central Valley Flood Protection Plan and submit to the Central Valley Flood Protection Board (CVFPB) for adoption. The Central Valley Flood Protection Act of 2008 establishes that urban areas require protection from flooding that has a 1-in-200 chance of occurring in any given year (200-year flood). The DWR's most recent update to the Central Valley Flood Protection Plan, which was adopted by the CVFPB in August 2017, includes Urban Level of Flood Protection Criteria to help cities determine if proposed land-use development would provide an adequate urban level of

[9] *Central Valley Regional Water Quality Control Board, 2016. Op. cit.*

flood protection.[10] Land-use developments that meet all of the following Urban Level of Flood Protection Criteria[11] may be subject to urban level of flood protection requirements:

- Located within an urban area that is a developed area with 10,000 residents or more, or an area outside a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years;
- Located within a flood hazard zone that is mapped as either a special hazard area or an area of moderate hazard on FEMA's official Flood Insurance Rate Map for the NFIP;
- Located within the Sacramento-San Joaquin Valley;
- Located within an area with a potential flood depth above 3.0 feet, from sources of flooding other than localized conditions;
- Located within a watershed with a contributing area of more than 10 square miles.

Central Valley Flood Protection Board Encroachment Permits

The CVFPB regulates the alteration and construction of levees and floodways in the Central Valley that are defined as part of the Sacramento Valley and San Joaquin Valley flood-control projects. The purpose and mission of the CVFPB, with authority granted under the California Water Code and Title 23 of the California Code of Regulations, is threefold:

- Control flooding along the Sacramento and San Joaquin rivers and their tributaries in cooperation with the U.S. Army Corp of Engineers;
- Cooperate with various agencies of the federal, state, and local governments in establishing, planning, constructing, operating, and maintaining flood-control works; and
- Maintain the integrity of the existing flood-control system and designated floodways through the board's regulatory authority by issuing permits for encroachments.

CVFPB requires an encroachment permit application to be filed for any work conducted in designated floodway, on a state or federally owned levee, and/or near a regulated stream (e.g., Butte Creek Diversion Channel). The CVFPB exercises jurisdiction over the waterward area between project levees, a minimum 10-foot-wide strip adjacent to the landward levee toe, and within 30 feet of the top of the banks of un-leveed project channels. Activities outside of these limits which could adversely affect the flood control project are also under the CVFPB's jurisdiction. Encroachment activities may include, but are not limited to, the placement, construction, reconstruction, removal, or abandonment of any landscaping, culvert, bridge, conduit, fence, fill, embankment, building, or structure.

---

[10] *California Department of Water Resources, 2017. Central Valley Flood Protection Plan; 2017 Update. August.*

[11] *California Department of Water Resources, 2013. Urban Level of Flood Protection Criteria. November*

The CVFPB may approve structures constructed within an adopted plan of flood control, such as the Central Valley Flood Protection Plan, if they conform to the following standards from Title 23 of the California Code of Regulations:

- Structures may not be constructed on a levee section or within ten feet of a levee toe;
- Structures must be securely anchored and flood proofed to at least two feet above the 100-year flood elevation or two feet above the design flood plain, whichever is higher;
- Flood proofing must be consistent with the potential uses of the structure;
- Structures must be located and oriented to have minimal impact on flood flows; and
- The number of structures permitted is limited to the minimum reasonably necessary to accomplish an appropriate land use activity.

City of Chico Municipal Code

Chico Municipal Code Chapter 15.50 governs stormwater management and discharge controls. The chapter prescribes regulations that prohibit non-stormwater discharges to the City's storm drain system, reduce pollutants in stormwater discharges, and minimize degradation of water quality from construction-related activities. The provisions also require applicants for development projects disturbing over one acre to file a SWPPP with the State to gain coverage of the activity under the Construction General Permit. In addition, development that would create or replace 5,000 square feet or more of impervious surface are considered "regulated projects" subject to post-construction stormwater management requirements, including source control measures and LID design standards. Consistent with the Small MS4 General Permit, regulated projects that create and/or replace one acre or more of impervious surface are also required to develop and implement hydromodification management procedures to limit post-project runoff to pre-project flow rates for the 2-year, 24-hour storm event. Project compliance with these stormwater regulations is assessed by City staff prior to issuance of building permits.

Chico Municipal Code Chapter 16R.37 describes the City's floodplain management standards, which apply to all development occurring within a FEMA 100-year flood hazard zone. The floodplain management standards require future developments to be properly anchored, elevated, and constructed to resist or minimize flood damage. The City also prohibits obstructions which would cause or contribute to an increase in flood heights and velocities.

City of Chico General Plan

The following goals and policies are relevant to hydrology and water quality:

Goal PPFS-6: Provide a comprehensive and functional storm water management system that protects people, property, water quality, and natural aquifers.

Policy PPFS-6.2 (Storm Water Drainage) – Continue to implement a storm water drainage system that results in no net increase in runoff.

Action PPFS-6.2.1 (Storm Water Drainage Standards) – Regularly update storm water drainage standards to include all current best management practices and ensure water quality and quantity standards governing the discharge of storm water drainage to downstream receiving waters conform with State and Federal regulations.

Policy PPFS-6.3 (Storm Water Drainage BMPs) – To protect and improve water quality, require the use of Best Management Practices for storm water drainage infrastructure suited to the location and development circumstances.

Action PPFS-6.3.1 (Alternative Storm Water Infrastructure) – Continue to develop engineering standards and guidelines for the use of alternative storm water infrastructure in order to minimize impervious area, runoff and pollution, and to maximize natural storm water infiltration wherever feasible.

Policy PPFS-6.4 (Water Runoff) – Protect the quality and quantity of water runoff that enters surface waters and recharges the aquifer.

Action PPFS-6.4.1 (Storm Water Management Program) – Continue to implement the City's Storm Water Management Program (SWMP) and enforce storm water provisions in the City's Municipal Code.

Policy PPFS-6.5 (Flood Control) – Manage the operation of the City's flood control and storm drainage facilities and consult with local and state agencies that have facilities providing flood protection for the City.

Action PPFS-6.5.2 (Natural Watercourses) – Utilize natural watercourses and existing developed flood control channels as the City's primary flood control channels when and where feasible.

Action PPFS-6.5.3 (Flood Impacts) - Require that new development not increase flood impacts on adjacent properties in either the upstream or downstream direction.

Action PPFS-6.5.4 (Flood Zones) – Require new development to fully comply with State and Federal regulations regarding development in flood zones.

Goal S-2: Minimize the threat to life and property from flooding and inundation.

Policy S-2.1 (Potential Flood Hazards) – When considering areas for development, analyze and consider potential impacts of flooding.

Action S-2.1.1 (Flood Hazard Analysis) - As part of project review, analyze potential impacts from flooding and require compliance with appropriate building standards and codes for structures subject to 200-year flood hazards.

Action S-2.1.2 (Flood Hazard Management) - Continue efforts to work with the Federal Emergency Management Agency and state and local agencies to evaluate the potential for flooding, identify areas susceptible to flooding, accredit the flood control levees in the City, and require appropriate measures to mitigate flood related hazards.

Goal OS-3: Conserve water resources and improve water quality.

Policy OS-3.1 (Surface Water Resources) – Protect and improve the quality of surface water.

Action OS-3.1.1 (Comply with State Standards) - Comply with the California Regional Water Quality Control Board's regulations and standards to maintain, protect, and improve water quality and quantity.

Action OS-3.1.2 (Runoff from New Development) - Require the use of pollution management practices and National Pollutant Discharge Elimination System permits to control, treat, and prevent discharge of polluted runoff from development.

ENVIRONMENTAL IMPACTS

Thresholds of Significance

Criteria for determining the significance of impacts to hydrology and water quality have been developed based on Appendix G of the CEQA Guidelines and relevant agency thresholds. Based on the Appendix G, Environmental Checklist Form, of the State *CEQA Guidelines*, the proposed project would have a significant impact on the environment related to hydrology and water quality if it would:

a. Violate any water quality standards or waste discharge requirements;

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

f. Otherwise substantially degrade water quality;

g. Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

h. Place within a 100-year flood hazard area structures that would impede or redirect flood flows;

i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or

j. Expose people or structures to inundation by seiche, tsunami or mudflow.

Hydrology and Water Quality Issues not Further Analyzed

The following issue was addressed in the Initial Study (see Appendix A) and was determined to result in no impact or a less-than-significant impact and do not warrant further analysis:

- Inundation by seiche, tsunami or mudflow – The project site is located inland, far from any coastline and the surrounding terrain is relatively flat. Therefore, there would be no impacts associated with inundation by seiche, tsunami or mudflow.

Impact HYDRO-1: Violation of any water quality standards or waste discharge requirements

During construction of the project, exposed soils and any chemicals spilled or leaked onto the ground may be entrained in stormwater runoff into the Butte Creek Diversion Channel or an unnamed stream located on the project site. During operation of the project, urban pollutants such as landscaping chemicals and spilled or leaked maintenance chemicals can also be entrained in stormwater runoff. Project construction activities would involve site preparation, grading, and excavation of soil, which could result in temporary erosion and movement of sediments into nearby surface waterways, particularly during precipitation events. The potential for chemical releases is present at most construction sites due to the use of paints, solvents, fuels, lubricants, and other hazardous materials associated with heavy construction equipment. Once released, these hazardous materials could be transported to nearby surface waterways in stormwater runoff, wash water, and dust control water. The release of sediments and other pollutants during construction could adversely affect water quality in receiving waters.

During construction, the proposed project would be required to comply with the Construction General Permit, because construction activities would disturb more than one acre of land. In accordance with the General Construction Permit, the project would be required to prepare and implement a SWPPP that includes BMPs to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges resulting from construction activity.

During operation, the proposed project would be required to comply with the Small MS4 General Permit, because the proposed project would create more than 5,000 square feet of impervious surface. In accordance with the Small MS4 General Permit, the project would be required to implement post-construction stormwater management measures, such as LID design standards to capture and treat runoff from impervious surfaces.

Because compliance with the Construction General Permit and the Small MS4 General Permit is mandatory, impacts related to the violation of any water quality standards or waste discharge requirements would be less-than-significant.

Impact HYDRO-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge

Water supply services for the proposed project would be provided by the California Water Service's (Cal Water's) Chico-Hamilton District. Groundwater is expected to be the sole source of supply for the Chico-Hamilton District through 2040. Using available historical information and projections of future water uses, regulatory and legal constraints, and hydrological and environmental conditions, including climate change, Cal Water has performed a Water Supply Assessment to evaluate the reliability of the Chico-Hamilton District's water supply. Based on the assessment, Cal Water has concluded that for the next 20 years the Chico-Hamilton District will be able to provide adequate water supplies to meet existing and projected customer demands, which includes full development of the proposed project for normal, single dry year, and multiple dry year conditions.[12] In addition, because the project would create 5,000 square feet or more of impervious surface, it is subject to the post-construction stormwater management requirements under the NDPES Small MS4 General Permit, such as LID design standards that encourage infiltration of rainwater to maintain the site's pre-development stormwater runoff rates and volumes. Therefore, the project would have a less-than-significant impact related to the depletion of groundwater supplies and interference with groundwater recharge.

Impact HYDRO-3: Substantial Erosion or Siltation through Alteration of Drainage Patterns

Development of subdivisions on APNs 021-190-041, 018-510-009, and 018-510-008 would remove the braided network of intermittent streams observed on the west and northwest side of the project site. Stormwater runoff would be piped through these subdivisions and discharged to existing storm drains along Fremont Street, Bruce Road, and Skyway Road. The City's existing storm drain system conveys runoff to Comanche Creek, about 1.0 mile southwest of the project site.

Stormwater runoff from development of the proposed RS-20 lots on APN 018-510-007 would be piped through the associated streets and discharged to the Butte Creek Diversion Channel. As a result, project operations could potentially increase the rate, volume, and/or duration of stormwater discharges into the Butte Creek Diversion Channel, which could contribute to stream channel hydromodification downstream of the project site in Butte Creek. However, the proposed project would be required to comply with the Construction General Permit and Small MS4 General Permit. The Construction General Permit requires preparation and implementation of a SWPPP, including BMPs to reduce and eliminate sediment during construction activities. The Small MS4 General Permit requires implementation of post-construction stormwater management measures, such as LID design standards to capture and treat runoff from impervious surfaces. Compliance with the Construction General Permit and Small MS4 General

[12] *California Water Service (Cal Water), 2017. Draft SB 610 Water Supply Assessment For Stonegate Vesting Tentative Subdivision Map and General Plan Amendment. September 15.*

Permit would ensure that the rate, volume, and/or duration of stormwater discharges from the project would not substantially increase during construction and operations.

Portions of the project site along the Butte Creek Diversion Channel, Crouch Ditch, and unnamed streams on the northwest and southeast sides of the project site are mapped within the FEMA 100-year flood zone and/or DWR 200-year flood zone (Figure 1). As discussed under Impact HYDRO-4, development of the proposed RS-20 lots would substantially change the existing topography and place fill and structures within the existing FEMA 100-year and DWR 200-year flood zones. As a result, this could affect channel flow during a 100-year or 200-year flood event and cause a substantial increase in erosion and downstream siltation. As discussed under Impact HYDRO-4, development of the other lots for the proposed project are not expected to substantially alter the velocity of flood flows. Implementation of *Mitigation Measures HYDRO-1* and *HYDRO-2* would reduce potentially significant impacts related to erosion and siltation from altered drainage patterns to a less-than-significant level.

Mitigation Measure HYDRO-1:

Prior to development of the RS-20 lots, the project applicant shall prepare a detailed hydraulic evaluation to determine the potential for improvements within the existing Federal Emergency Management Agency (FEMA) 100-year flood zones and California Department of Water Resources (DWR) 200-year flood zones to result in changes to the extent, depth, and velocity of flood flows. The modeling shall be performed and certified by a professional engineer using the U.S. Army Corp of Engineer's Hydrologic Engineering Center's River Analysis System (HEC-RAS) or similar surface water flow modeling software. The modeling shall include an evaluation of both the on-site and off-site flooding impacts under existing flooding conditions and future flood conditions as a result of developing the RS-20 lots.

Based on the surface water flow modeling, areas of development that could reduce the overflow storage capacity of floodwater near the channel shall be identified. For any of the RS-20 lots improvements that could reduce overflow storage capacity, the project design shall be modified to ensure there is no net decrease in the floodwater storage capacity. This could include balancing the amount of cut and fill materials within the flood zones.

Based on the surface water flow modeling, areas of development that could affect the velocity of floodwater along the Butte Creek Diversion Channel shall be identified. For any improvements that would substantially alter the channel flow velocity, the project design for the RS-20 lots shall be modified to reduce potential erosion, siltation, and associated flooding impacts. Modifications to the project design may include, but are not limited to, the following measures.

- Alter the location and design of structures and/or fill materials within the FEMA 100-year flood zones or DWR 200-year flood zones.
- Install erosion controls systems such as rock protection or erosion resistant vegetation.
- Increase the size of proposed culverts.
- Install cross-flow culverts for improvements through flood zones.

- Improve existing off-site stormwater drainage systems that would receive runoff from the project site.

The detailed hydraulic evaluation and, if necessary, proposed changes to the RS-20 lots design, shall be submitted to the City of Chico and any other regulatory agencies that have jurisdiction over the improvements.

Mitigation Measure HYDRO-2:

The project applicant shall coordinate levee modification activities (if any) with the California Department of Water Resources and obtain an encroachment permit from the Central Valley Flood Protection Board (CVFPB) prior to commencing project construction activities. As required by the encroachment permit, project construction shall comply with the CVFPB's flood control standards described under Title 23 of the California Code of Regulations and (if applicable) the U.S. Army Corps of Engineers construction standards to ensure that the integrity of the existing flood-control system is properly maintained.

Impact HYDRO-4: Increased Flooding through Alteration of Drainage Patterns or Substantial Increases in the Rate or Amount of Surface Runoff

As discussed above, compliance with the Construction General Permit and Small MS4 General Permit would ensure that the rate, volume, and/or duration of stormwater discharges during project construction and operation activities would be similar to existing conditions. However, the proposed project would encroach on the Butte Creek Diversion Channel and levee and place fill material and structures within the FEMA 100-year flood zones and DWR 200-year flood zones. The potential effect of project developments on the extent, depth, and velocity of flood flows relative to existing conditions is discussed below.

The Butte Creek Diversion Channel and levee on the project site are under the CVFPB's jurisdiction and provide flood protection for the City of Chico. According to the DWR's Central Valley Flood Protection Plan, future developments on the project site may be subject to the Urban Level of Flood Protection Criteria. Based on a detailed cross-sectional analysis of existing flooding zones on the project site,[13] none of the proposed structures would exceed the Urban Level of Criterion of being placed more than 3 feet below the DWR's 200-year base flood elevation. As a result, the proposed project would not adversely affect the urban level of flood protection provided by the existing flood control system.

Existing FEMA mapping shows flooding occurring on the northwest portion of the project site due to overflow from the Butte Creek Diversion Channel north of East 20th Street (Figure 1). However, the overflow area to the north was recently developed for residential purposes, and the terrain was elevated at least 1 foot above the FEMA 100-year base flood elevation. Therefore, the pathway for flooding on the northwest portion of the project site no longer exists and development within this area would have no effect on existing flood conditions.

[13] *Rolls Anderson & Rolls Civil Engineers, 2018. Stonegate Floodplain Cross-Sections. February 27.*

Existing FEMA 100-year and DWR 200-year flood mapping shows flooding occurring on the southwest portion of the project site, to the west of the levee. Based on a detailed cross-sectional analysis of existing flood zones on the project site, the terrain west of the levee is at a higher elevation than the terrain east of the levee, and generally slopes away from the channel.[14] As a result, any development within the flood zones to the west of the levee could potentially affect the overflow storage capacity of floodwater, but would not be expected to affect the velocity of floodwater along the Butte Creek Diversion Channel. The project design includes a balance of cut and fill materials within the flood zones to ensure that there is no net decrease in the floodwater storage capacity; therefore, development west of the levee would not result in an increase in flooding.

Existing FEMA 100-year and DWR 200-year flood mapping shows flooding occurring on the southeast portion of the project site, to the east of the levee. Based on a detailed cross-sectional analysis of existing flood zones on the project site, the terrain east of the levee is at a lower elevation than the terrain west of the levee, and could potentially influence the velocity of flow along the channel.[15] Therefore, any development within the flood zones to the east of the levee could potentially affect both the overflow storage capacity of floodwater and the velocity of floodwater along the Butte Creek Diversion Channel. While the project design includes a balance of cut and fill materials within the flood zones to ensure that there is no net decrease in the floodwater storage capacity, changes to the drainage patterns east of the levee could affect the channel flow velocity and increase flooding conditions.

As a result, development of the RS-20 lots could result in a potentially significant impact related to on- or off-site flooding. Implementation of *Mitigation Measures HYDRO-1* and *HYRDO-2* would reduce potentially significant impacts related to flooding on- and off-site site from altered drainage patterns to a less-than-significant level.

Impact HYDRO-5: Create or Contribute Runoff Water that Exceeds the Capacity of the Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff

Stormwater runoff from subdivisions on APNs 021-190-041, 018-510-009, and 018-510-008 would be discharged to the existing storm drains along Fremont Street, Bruce Road, and Skyway Road. As discussed above, compliance with the Construction General Permit and Small MS4 General Permit would ensure that the rate, volume, and/or duration of stormwater discharges during project construction and operation activities would be similar to existing conditions. Therefore, the proposed project would have a less-than-significant impact related to an exceedance of the City of Chico's existing stormwater drainage system.

[14] *Ibid 13*
[15] *Ibid 13.*

Impact HYDRO-6: Substantial Degradation of Water Quality

As discussed above, compliance with the Construction General Permit and the Small MS4 General Permit would prevent substantial degradation of water quality. Therefore, impacts associated with substantial degradation of water quality would be less-than-significant.

Impact HYDRO-7: Placing Housing within a 100-year Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map

As discussed under Impact HYDRO-4, portions of the project site are located within the FEMA100-year and DWR 200-year flood zones (Figure 1). According to the project design, all housing would be placed at least 1 foot above the FEMA 100-year base flood elevation and no more than 3 feet below the DWR 200-year base flood elevation. Furthermore, the City of Chico's floodplain management standards set forth in Chapter 16R.37 of the Municipal Code require that housing within a mapped FEMA 100-year flood zone be properly anchored, elevated, and constructed to minimize flood damage. As a result, impacts associated with placing housing within a FEMA 100-year flood zone or DWR 200-year flood zone would be less-than-significant.

Impact HYDRO-7: Placing Structures within a 100-year Flood Hazard Area which would Impede or Redirect Flood Flows

As discussed under Impact HYDRO-4, portions of the project site are located within the FEMA-100 year flood zones (Figure 1). Based on the terrain, the placement of structures west of the levee would not be expected to impede or redirect the flow of channel floodwater. However, the placement of structures east of the levee associated with the RS-20 lots could potentially influence channel flow and cause a redirection and/or impediment of flood flows. Implementation of *Mitigation Measures HYDRO-1* and *HYRDO-2* would reduce potentially significant impacts related to the impediment or redirection of flood flows from the placement of structures in the FEMA 100-year flood zones to a less-than-significant level.

Impact HYDRO-8: Inundation as a Result of the Failure of a Levee or Dam

The project site is not located within a dam inundation area. However, the levee along the Butte Creek Diversion Channel provides flood protection for the City of Chico. Project improvements that encroach upon the levee (e.g., stormwater discharge pipelines) could potentially weaken the structural integrity of the levee. Failure of the levee due to proposed project improvements could result in a potentially significant impact related to flooding. Implementation of *Mitigation Measures HYDRO-1* and *HYRDO-2* would reduce potentially significant impacts related to flooding from levee failure to a less-than-significant level.

LEVEL OF SIGNIFICANCE AFTER MITIGATION

All project impacts related to hydrology and water quality are ***less-than-significant*** after implementation of *Mitigation Measures HYDRO-1* and *HYDRO-2*.