

3.8 HYDROLOGY AND WATER QUALITY

The purpose of this section is to evaluate the hydrology and water quality impacts of the proposed project under long-term buildout conditions. The evaluation is based upon an analysis of the site and its surroundings; storm water runoff calculations of the project site (Draft Hydrology Report for the “Lucas Ranch” Project, Tract 6569, Humann Company, Inc., 2005); and reference information from the City of Lafayette *General Plan (General Plan)*.

3.8.1 Environmental Setting

3.8.1.1 Climate and Topography

The project site is located in the northern portion of the Diablo Range, east of the East Bay Hills. The region’s climate is characterized by hot summers and cool winters. The region’s rainy season extends from November to March with an average annual precipitation of 24 inches per year. Average temperatures range from a low of 39 degrees (Fahrenheit) in the winter to 86 degrees in the summer (Western Regional Climate Center, 2005).

The development area of the project site is located on the west-facing slope of a northwest trending ridge to the east of Lucas Drive. The adjacent ridge top within the project site reaches an elevation of approximately 800 feet, and is moderately to steeply sloped. Numerous small ravines and ephemeral drainage channels exist on the side slopes of the ridge.

3.8.1.2 Geology and Site Soils

The project site is located in the Coast Ranges Geomorphic Province in the East Bay Hills region of the San Francisco Bay Area. The Coast Range Province is generally composed of northwest trending ridges made up primarily of steeply dipping sedimentary rocks. These ridges are comprised of shale, siltstone, sandstone, clay stone, and conglomerate that are folded and faulted with steep side slopes. Erosion and weathering of these various rock types generally produces a heterogeneous soil layer. The geology of the project parcel is described further in Section 3.7 Geology and Soils.

The Soil Survey of Contra Costa County (U.S. Department of Agriculture [USDA], 1997) identified two predominant soil types on the project site, Lodo clay loam and Los Osos clay loam. The permeability and texture of on-site soils influence drainage patterns. Soil permeability is the rate at which water is absorbed under saturated conditions and is related to the hydraulic conductivity of the soil. A list of on-site soil types and their relevant hydrologic characteristics are shown in Table 3.8-1 (Hydrologic Characteristics of Site Soils). Soils on the project site are generally characterized as having slow to moderately slow permeability and high to moderately high runoff potential (USDA, 1977).

Table 3.8-1. Hydrologic Characteristics of Site Soils

Name	Symbol	Permeability	Runoff Potential
Lodo clay loam	LcG	Moderately Slow	High
Los Osos clay loam	LhF	Slow	Moderately High

Source: Soil Survey of Contra Costa County, USDA (1977).

3.8.1.3 Site Hydrology

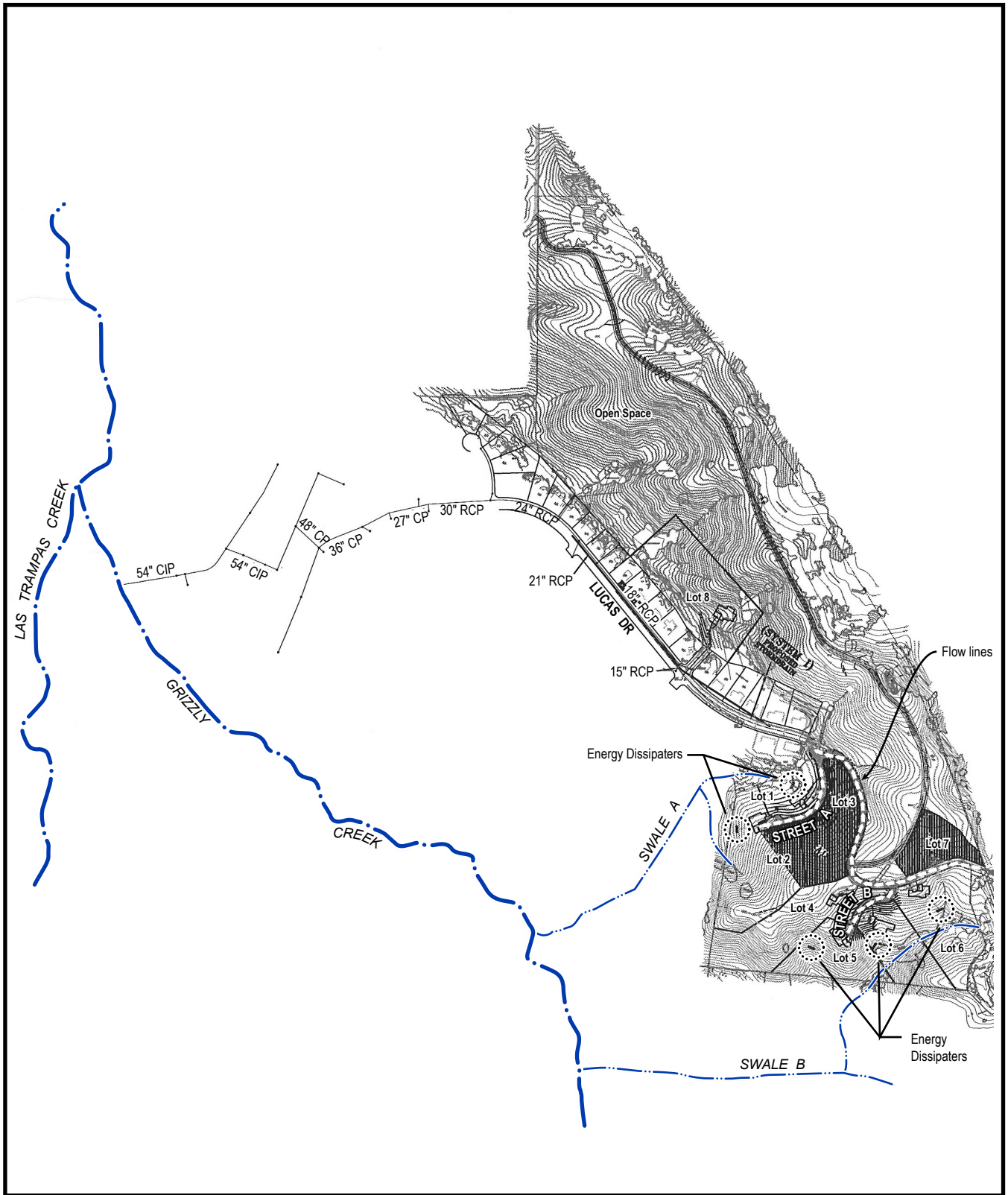
Located in the Grizzly Creek Watershed, the nearest stream or creek to the project site is Grizzly Creek, which is approximately 1,100 feet west of the development area at its closest reach. Grizzly Creek collects runoff from the surrounding foothills and City's storm drain system, and flows northwest to its confluence with Las Trampas Creek. Refer to Figure 3.8-1 (Drainage Map). As the project site is undeveloped, except for two paved access roads, runoff currently occurs as predominantly overland sheet flow and concentrated shallow flow via existing ravines, ephemeral drainage channels and/or swales. The southern portion of the project site, where a majority of the proposed development would occur, drains into two natural swales (named Swale A and B for this discussion) that direct runoff to Grizzly Creek. The remaining portion of the site mainly drains from the ridgeline towards Lucas Drive to the west. Runoff from this area follows a number of smaller natural drainages and collects in a series of catch basins connected to the City's storm drain system. Subsequently, flows are conveyed beneath Lucas Drive within a reinforced concrete pipeline that ultimately discharge to Grizzly Creek, just south of its confluence with Las Trampas Creek.

3.8.1.4 Groundwater

Subsurface investigations of the project site were performed in 1985 by Hallenbeck and Associates as part of the geotechnical investigation for a previously proposed project at the site. Of the seven exploratory borings taken as part of this investigation, six did not encounter groundwater. The test boring that encountered groundwater was at a depth of approximately seven feet and was located in the northern portion of the project site. Hallenbeck indicated that the boring might be located in a small area of naturally high groundwater or near a spring. In addition, it should be noted that fluctuations in groundwater levels could occur due to variations in rainfall, temperature, pumping from wells, and other factors. Nevertheless, due to the low permeability of on-site soils, the project site does not contribute significantly to local groundwater recharge.

3.8.1.5 Flooding

Flood insurance rate maps produced by the Federal Emergency Management Agency (FEMA) for the project site and surrounding area indicate the proposed development is located outside of 100-year and 500-year flood hazard zones (FEMA, 1996).



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3.8.2 Regulatory Setting

3.8.2.1 Federal

The Clean Water Act (CWA) has regulated the discharge of pollutants to waters of the United States from any point source since enacted in 1972. In 1987, amendments to the CWA added discharges under the National Pollutant Discharge Elimination System (NPDES). The NPDES storm water program is described below.

3.8.2.2 State

NPDES General Construction Activities Storm Water Permit Requirements

The General Construction Activities Storm Water Permit requirements are reviewed here, as these requirements would apply to the project development. In California, the NPDES Storm Water Program is administered by the California Regional Water Quality Control Board. Pursuant to the Phase I NPDES Storm Water Program, discharges of storm water associated with construction activities that result in the disturbance of equal to or greater than five acres of land must apply for coverage under the statewide General Construction Activities Storm Water Permit (General Permit). Pursuant to the NPDES Storm Water Phase II Final Rule, dated December 8, 1999, discharges of storm water associated with construction activities that result in the disturbance of equal to or greater than one acre of land must also apply for coverage under the General Permit. Construction activities include, but is not limited to: clearing, grading, demolition, excavation, construction of new structures, and reconstruction of existing facilities involving removal and replacement that results in soil disturbance. It is the responsibility of the owner of the land where the construction activity is to occur to obtain a permit prior to site construction. The owner can obtain coverage under the General Permit by filing a Notice of Intent (NOI) with the State Water Resources Control Board's Division of Water Quality Storm Water Permit Unit. Generally, the site is considered to be covered by the General Permit upon filing the NOI and submitting the appropriate annual fee. The NOI must be submitted, and the permit obtained, before construction starts.

In addition to submitting the NOI, the discharger must develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and develop and implement a monitoring and reporting plan. The SWPPP should be developed to meet the following objectives:

- Identify pollutant sources that may affect the quality of discharges of storm water associated with construction activity from the construction site;
- Identify, construct, implement and maintain best management practices (BMPs) to reduce or eliminate pollutants in storm water discharges from the construction site during construction; and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).

3.8.2.3 Local

Contra Costa Clean Water Program

To comply with the Clean Water Act, Contra Costa County, 19 of its incorporated cities, and the Contra Costa County Flood Control and Water Conservation District together formed the Contra Costa Clean Water Program. The Contra Costa Clean Water Program initially obtained a Joint Municipal NPDES Permit from the San Francisco Bay and Central Valley Regional Water Quality Control Boards

(RWQCBs) in September 1993 and January 1994, respectively. These permits, valid only for a five-year period, were reissued in 1999 (San Francisco Bay RWQCB Permit) and 2000 (Central Valley RWQCB Permit), and have been extended through 2005 while a single Bay Area wide permit is currently being drafted. The permits include a comprehensive plan to reduce the discharge of pollutants to the “maximum extent practicable.”

The Contra Costa Clean Water Program acts on behalf and under the direction of the Program’s Management Committee. The program coordinates, administers, and implements activities its municipal members decide to conduct as a group. In particular, the Program provides guidance and training on the following:

- Adopting legal ordinances;
- Conducting public education programs such as stenciling informational signs like “No Dumping Drains to Bay” on storm drain covers;
- Instituting or enhancing programs such as street sweeping, storm drain maintenance;
- Performing erosion control practices; and
- Identifying illicit pollutant discharges to the storm drain system, and requiring new development and industrial discharge controls. Typical storm water protection measures are described below:
 - **Best Management Practices (BMPs).** Contributors to non-point source pollution may establish BMPs to minimize the potential for pollution. A BMPs program document may be prepared. Typical elements of such a program may include addressing the possibility of substituting less toxic compounds in various manufacturing or other operations, proper handling of those toxic compounds used, and proper storage of toxic compounds.
 - **Source Control.** The industrial and commercial land uses may be required to demonstrate that the application and use of various pollutants on their sites cannot be easily mobilized and carried off by storm water runoff. This involves confining some operations to roofed/covered areas and preventing on-site runoff from flowing through these areas. Hazardous material storage in uncovered areas requires the capability for full containment of the material during periods of rain. Uncovered parking areas are required to conduct street sweeping periodically to remove pollutants, oils and greases before they are mobilized.

City of Lafayette General Plan

The City of Lafayette *General Plan* Open Space and Conservation Chapter contains several policies that apply to the proposed project.

3.8.3 Environmental Analysis

3.8.3.1 Thresholds of Significance

The proposed project would result in a significant impact if it would:

- Violate any water quality standards or waste discharge requirements;
- 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

(e.g., the production rate of preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);

- 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;
- 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 that would result in flooding on- or off-site;
- Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- 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;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- 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
- Result in inundation by seiche, tsunami, or mudflow.

3.8.3.2 Potential Impacts and Mitigation Measures

Potential Impact 3.8-1: Would the proposed project violate any water quality standards or waste discharge requirements? (Less Than Significant Impact With Mitigation)

Construction

Construction-related erosion problems could result from alterations in drainage patterns and grading activities and could increase sedimentation in receiving waters. Sedimentation can lead to a reduction of water quality because sediment can carry nitrogen, phosphorus and trace metals. Sediment can also accumulate at the entrance of downstream storm drain system inlets and reduce capacity.

Earthwork and grading activities would occur over a limited portion of the site (68 percent of the site would be left as open space). Vegetative cover, which acts to stabilize the soil, would be removed from areas where earthwork and grading activities would occur. Due to the fact that some grading would occur on moderate to steep slopes, the proposed project would present a threat of soil erosion from soil disturbance by subjecting unpaved and unvegetated areas to the erosional forces of runoff.

Since the project would result in a disturbance of over one acre of land, the project sponsor must obtain coverage under the General Permit by filing an NOI with the SWRCB Division of Water Quality. The filing would describe erosion control and storm water treatment measures to be implemented during and following construction and provide a schedule for monitoring performance. These BMPs would serve to control point and non-point source pollutants in storm water and constitute the project's SWPPP for construction activities. While the SWPPP would include several of the same components as the erosion control plan (ECP) required by the City, the SWPPP would also include BMPs for preventing the discharge of other non-point source pollutants besides sediment (such as paint, concrete, etc) to downstream waters.

Implementation of Mitigation Measures 3.8-1a through 3.8-1d would reduce construction-related water quality impacts to less than significant levels.

Post-Construction

Sedimentation should not be a significant issue during post-construction and operation of the proposed project. The proposed project includes installation of new storm drainage pipelines and catch basins that would direct surface flow generated along the proposed roads, driveways and building sites away from natural water drainages to the existing storm drain system at Lucas Drive and Lucas Circle. In addition, storm water runoff from the proposed development area that is not intercepted and/or directed to the City's storm drain system would be diverted to energy dissipaters before continuing off-site. Landscaping would also serve to reduce exposed soil surfaces that could erode and result in sedimentation of local waterways.

After construction, and during the life of the project, non-point source pollutants would be the primary contributors to potential water quality degradation. Non-point source pollutants would be washed by rainwater from rooftops and landscape areas into the on-site drainage system and local drainage network. Potential non-point source pollutants include landscape materials and products (pesticides, herbicides and fertilizers), oil, grease and heavy metals from automobiles, and petroleum hydrocarbons from fuels. However, due to the nature and scale of the proposed project, only a small quantity of these pollutants would likely flow to the on-site drainage system and local drainage network. Thus, no significant impacts are anticipated in this regard and no further mitigation is required for post-construction conditions.

Mitigation Measure 3.8-1a: Prior to Improvement Plan approval or issuance of a grading permit, whichever occurs first, the project sponsor shall prepare and submit a detailed erosion control plan (ECP) and narrative to the Engineering Services Manager for review and approval. The purpose of the ECP shall be to mitigate erosion and sedimentation impacts during construction. At a minimum, the ECP and written narrative shall include the following:

- a. A proposed schedule of grading activities, monitoring, and infrastructure milestones in chronological format;
- b. Identification of critical areas of high erodibility potential and/or unstable slopes;
- c. Contour and spot elevations indicating runoff patterns before and after grading;
- d. Identification of erosion control measures on slopes, lots and streets. Measures shall be based on recommendations contained in the "Erosion and Sediment Control Field Manual" published by the San Francisco Regional Water Quality Control Board (RWQCB);
- e. Soil stabilization techniques such as short-term biodegradable erosion control blankets and hydroseeding should be utilized; and
- f. Post-construction inspection of all drainage facilities for accumulated sediment, and the cleaning of these drainage structures of debris and sediment.
- g. Post-construction inspection of all drainage facilities for accumulated sediment, and the cleaning of these drainage structures of debris and sediment.

Mitigation Measure 3.8-1b: Hydroseeding for erosion control shall utilize the following performance standards:

- a. Hydroseeding on the regraded slopes shall include only native species;

- b. Hydroseeding shall take place in a time period that will ensure germination, or as directed by the Engineering Services Manager; and
- c. As dictated by weather and field conditions at the time of hydroseeding, the Engineering Services Manager may require the installation of erosion control blankets or matting to secure the hydroseed.

Mitigation Measure 3.8-1c: Prior to issuance of grading or building permits, whichever occurs first, the project sponsor shall comply with NPDES General Construction Activities Storm Water Permit Requirements established by the CWA including preparation of a SWPPP. The SWPPP shall identify specific types and sources of storm water pollutants, determine the location and nature of potential impacts, and specify appropriate control measures to eliminate any potentially significant impacts to receiving water quality from storm water runoff. In addition to complying with the standards established by the CWA for preparation of a SWPPP, the SWPPP shall also comply with the directions for preparing a SWPPP contained in the latest edition of the Guidelines for Construction Projects published by the California Regional Water Quality Board San Francisco Region.

Mitigation Measure 3.8-1d: Prior to issuance of grading or building permits, whichever occurs first, the project sponsor shall submit to the Engineering Services Manager a copy of the Notice of Intent (NOI) and SWPPP sent to the State Water Resources Control Board.

Potential Impact 3.8-2: Would the proposed project 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? (Less Than Significant Impact)

The proposed project would not involve extraction of groundwater. Project construction would result in a net increase of impervious surface area of less than two acres, which would result in a small decrease in groundwater recharge. However, due to the low permeability of on-site soils, the project site does not contribute significantly to local groundwater recharge. Furthermore, there is little dependence on groundwater in the area, partially due to poor groundwater quality. Water is supplied by the East Bay Municipal Utility District (EBMUD) from surface flows of the Mokelumne River in the Sierra Nevada. The proposed project's impact on groundwater would be less than significant. No mitigation is required.

Potential Impact 3.8-3: Would the proposed project 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? (Less Than Significant Impact)

Project implementation would not alter the course of Grizzly Creek or Las Trampas Creek. In addition, most of the project site would not be altered. Within the development area of the project site, a portion of the natural course of the existing overland sheet flow and concentrated shallow flow would be intercepted by the proposed roads, driveways and building sites. A majority of this water would then travel west by northwest via a pipeline to the existing catch basin on Lucas Drive, where it would join the City's storm drain system. Runoff originating from the new impervious surfaces of the proposed development area that is not intercepted would be diverted to energy dissipaters before being allowed to flow downhill along the existing natural topography. It should be noted that discharge of runoff would not occur onto landslide deposits or potentially unstable colluvium, which are present in a few lots on-site (refer to Figure 3.7-1, Landslide Features Map). Thus, the proposed project would not substantially alter the existing drainage pattern in a manner that would result in substantial erosion or siltation and impacts would be less than significant. No mitigation is required.

Potential Impact 3.8-4: Would the proposed project 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 that would result in flooding on- or off-site? (Less Than Significant Impact With Mitigation)

The flood insurance rate maps produced by the FEMA indicate that the project site and adjoining areas are not located within either the 100-year or 500-year flood hazard zone. As discussed above, however, the hydrology of the project site would undergo slight modifications with project implementation. For instance, runoff from the area where Lots 1-3 are proposed, currently drain to Swale A; however, under the proposed project, runoff would be intercepted and conveyed through Street A to the City's storm drain system in Lucas Drive. While partially counterbalanced by the increase in runoff from additional impervious surfaces associated with the proposed development, the overall runoff to Swale A during a 10-year storm event would decrease by approximately 2.9 cubic feet per second (cfs).

Similarly, much of the area that drains to Swale B would be intercepted and conveyed to the existing storm drain system in Lucas Drive. This decrease in runoff to Swale B would be partially counterbalanced by the additional runoff due to the proposed impervious areas created by development of Lots 4-7 and Street B. In total, the runoff to Swale B during a 10-year storm event is anticipated to be reduced by approximately 0.5 cfs.

As such, to accommodate storm water runoff from much of the development area, the existing storm drain system in Lucas Drive would be extended into the project site. This drainage improvement would convey flows intercepted from Swales A and B and created from additional impervious surfaces. Overall, the net increase of runoff to the City's existing storm drain system is projected to be approximately 3.8 cfs during a 10-year storm event. While this is not anticipated to exceed the storm drain capacity, analysis of the storm drain system has not been performed to date. Therefore, it cannot be definitively stated whether or not the proposed project would increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site. To mitigate this potential impact to a less than significant level, the following mitigation measure is required.

Mitigation Measure 3.8-4: Prior to Final Map and Improvement Plan approval or issuance of a grading permit, whichever occurs first, the project sponsor shall prepare and submit a hydrology and hydraulic analysis of the existing storm drain system (System I) and the downstream connecting pipes to Grizzly Creek to the Engineering Services Manager for review and approval. Any impacts or deficiencies shall be mitigated as part of the subdivision improvements.

Potential Impact 3.8-5: Would the proposed project create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff? (No Impact)

Drainage System Capacity

As discussed above, while the proposed project is not anticipated to result in a significant increase of runoff to the City's storm drain system, analysis of the system has not been performed to date. Therefore, it cannot be definitively stated whether or not the increase in runoff at downstream drainage facilities could accommodate runoff from a 10-year storm event and would not result a significant impact. Implementation of Mitigation Measure 3.8-4 would reduce impacts to a less than significant level.

Polluted Runoff

The proposed project would introduce non-point source pollutants typical of urban settings associated with automobiles (rubber residue from tires, oil, grease, gasoline, and other automotive fuels), herbicides, pesticides and fertilizers. The implementation of BMPs would reduce the impact from the addition of polluted runoff from automotive and landscaping sources to a less than significant level. No further mitigation is required.

Potential Impact 3.8-6: Would the proposed project otherwise substantially degrade water quality? (No Impact)

The project would not otherwise substantially degrade water quality beyond the impacts discussed in Potential Impact 3.8-1. Therefore, no impact would result with project implementation. No mitigation is required.

Potential Impact 3.8-7: Would the proposed project 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? (No Impact)

The project site is located outside of the 100-year and 500-year flood hazard zones. Therefore, no impact would result with project implementation. No mitigation is required.

Potential Impact 3.8-8: Would the proposed project place within a 100-year flood hazard area structures that would impede or redirect flood flows? (No Impact)

The project site is located outside of the 100-year and 500-year flood hazard zones. Therefore, no impact would result with project implementation. No mitigation is required.

Potential Impact 3.8-9: Would the proposed project 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? (No Impact)

The project site is not within the 100-year or 500-year flood hazard zone. In addition, due to intervening topography, the development area is not within an area susceptible to flooding should the dam at the Lafayette Reservoir fail. The project would not expose people or structures to a significant risk of loss, injury or death involving flooding on-site. Furthermore, as required by Mitigation Measure 3.9-4, the project sponsor would be required to prepare a hydrology and hydraulic analysis of the existing storm drain system downstream of the project site for review and approval by the City. If any impacts or deficiencies are identified, mitigation would be required as part of the subdivision improvements. Therefore, no impacts are anticipated and no further mitigation is required.

Potential Impact 3.8-10: Would the proposed project result in inundation by seiche, tsunami, or mudflow? (Less Than Significant Impact)

The absence of any oceans, seas or large lakes in the vicinity of the project site precludes the possibility of inundation by seiche or tsunami. In addition, the project would not result in inundation by mudflow. Refer to the discussion on the potential risk of landslides in Section 3.7, Geology and Soils. Therefore, impacts would be less than significant impacts and no mitigation is required.