10.0 HYDROLOGY AND WATER RESOURCES

This section addresses potential impacts to hydrology and water resources resulting from implementation of the proposed project. Documents reviewed and incorporated as part of this analysis include the *Santa Barbara Cottage Hospital Hydrology & Water Quality Assessment* (Fuscoe Engineering, Inc. [Fuscoe] 2004), which is provided in Appendix G. Additional information and data was obtained from the *Flood Report* (Penfield & Smith, July 2004).

10.1 HYDROLOGY/WATER - IMPACT SIGNIFICANCE GUIDELINES

In accordance with the City of Santa Barbara environmental review guidelines for the preparation of an EIR, significant hydrology and water resources impacts may potentially result from:

- Substantially changing the amount of surface water in any water body or the quantity of groundwater recharge.
- Substantially changing the drainage pattern or creating a substantially increased amount or rate of surface water runoff that would exceed the capacity of existing or planned drainage and storm water systems.
- Locating development within 100-year flood hazard areas; substantially altering the course or flow of flood waters or otherwise exposing people and property to substantial flood hazard.
- Substantial discharge of sediment or pollutants into surface waters or groundwater, or otherwise degrading water quality, including temperature, dissolved oxygen, or turbidity.

10.2 HYDROLOGY/WATER - METHODOLOGY

This EIR section analyzes the difference between the existing condition and the project build condition, with respect to hydrology, floodplain, and water quality impacts. The analysis takes into consideration:

- changes in drainage patterns (potential for flooding on site or off site),
- changes to floodplains (potential for flooding on site or off site),
- pollutant loads (change in land use),
- impervious area and relation to amount of runoff or water available for groundwater recharge (increase or decrease),
- application of BMPs (number of BMPs, new technologies, effectiveness),
- discharges into impaired waters (listed pursuant to Section 303[d] of the CWA).

The methods used to conduct the environmental analysis of hydrology and water quality are as follows:

- Evaluation of public comments received on the Initial Study/Notice of Preparation (IS/NOP). Comments raised in response to the IS/NOP with respect to hydrology and water quality included:
  - Oak Park area streets are subject to significant flooding, and the EIR must provide for a thorough and complete analysis if this impact.
  - Given the nine-year phased development of the site, the change in drainage and flooding must also be considered both at completion of the project and during construction.
  - Additional water quality BMPs must be identified in the EIR to address storm water quality such as a restoration plan for Mission Creek, cleaning the parking garages, installation of storm drain filters on catch basins, uses of permeable paving, etc.
- Preparation of a *Hydrology and Water Quality Assessment* (Appendix G) by Fuscoe Engineering, Inc. This report evaluated potential impacts to hydrology, floodplains, and water quality with implementation of the proposed project. The report evaluated the proposed project features and included mitigation necessary to reduce impacts.
- Peer review and evaluation of the *Flood Report* prepared by Penfield & Smith (July 2004). This peer review was prepared by Fuscoe Engineering, Inc. and is included in Appendix G.

10.3 HYDROLOGY/WATER - REGULATORY FRAMEWORK

➢ City of Santa Barbara General Plan

The City of Santa Barbara General Plan Conservation Element contains a number of goals, policies, and implementation strategies pertaining to water resources. Flood control work is to be conducted in a manner that would maintain the natural qualities of a creek's open space. The implementation strategies for drainage, flood control, and water resources are listed below:

- The City shall participate in the Federal Flood Insurance Program so that property owners may receive disaster assistance.
- Floodplain management programs shall be implemented through the Building Officer of the Division of Land Use Controls and the Flood Control Division.
- Enact a flood control and creek ordinance that would include provisions to restrict channelization in natural creek bottoms and structural developments within the 100-year floodplain in natural creek areas.
- Hazard reduction programs shall be implemented in urban sections of the City already built in hazardous flood-prone areas.
- Goals and policies of this Element are interrelated with those of the Safety and Open Space Element and shall be considered together in land use planning decisions.
- Provide for a continued supply of water to the City that meets all regional, State, and federal health standards.
- Develop plans for implementation of water conservation regulations.
- Implement monitoring program of groundwater resources in the Santa Barbara basin.

The goal of the Open Space Element of the City's General Plan is to conserve and provide significant open and natural landforms through and around the community. Included as categories of open space are the ocean and creeks. The implementation strategies for the ocean and creeks are listed below:

Ocean

- Establish and enforce a high water quality standard.

Creeks

- Design and adopt standards for creek development. Work with those agencies involved with the creek areas to assure that all creek developments would comply with the adopted standards.
- Adopt zoning regulations and other development controls necessary to protect the Creek Open Spaces from development encroachment and to protect adjacent development from flood hazards.

➢ Municipal Code

The project is subject to the following chapters of the City of Santa Barbara Municipal Code with regard to hydrology and water quality:

Chapter 14.23.009 Regulation of New or Rehabilitated Landscapes. This chapter states that all new and rehabilitated landscaping for public and private development projects subject to review of the Architectural Board of Review or the Landmarks Committee is required to comply with the City's Water Conservation Landscape Design Standards as adopted by resolution of the City Council.

Chapter 14.56.020 Watercourses—Obstructions, Etc., by Matter Unlawful. This chapter prohibits dumping of any debris, garbage, rubbish, trash, brush, timber, waste products, or any combustible or incombustible material or commodity whatsoever which obstructs, prevents, diverts, or tends to obstruct, prevent, or divert the normal, natural, or ordinary flow of water in a watercourse or storm drain system.

Chapter 14.56.030 Allowing Rubbish, Garbage, Debris, Etc. to Obstruct. This chapter prohibits a property owner from maintaining any debris, garbage, rubbish, trash, brush, timber, waste products, or any combustible or incombustible material or commodities whatsoever which obstructs, prevents, diverts, or tends to obstruct, prevent, or divert the normal, natural, or ordinary flow of water in a watercourse.

Chapter 14.56.040 Fill Material. This chapter prohibits the placement of any fill material in any natural watercourse without provision for drainage conduit of adequate size and strength to replace the existing natural watercourse capacity.

Chapter 14.56.050 Obstruction, Etc., by Buildings, Etc. This chapter prohibits any structure in a watercourse which obstructs, prevents, or diverts, or tends to obstruct, prevent, or divert the normal, natural, or ordinary flow of water in such watercourse, or which endangers or tends to endanger public property, including bridges, roads, buildings, structures, or facilities, or the land crops, buildings, or structures of other persons.

Chapter 14.56.070 Connecting with City Drain System—Permit Required. This chapter requires a permit from the Public Works Director to connect any drainage pipe to the City storm drain system.

Chapter 14.56.130 Installation Permit—Plan, Etc., Required. This chapter requires that for any structure to be installed in a watercourse or the City's storm drain system a plan must be submitted to the Public Works Department that indicates the size, type, length, and location of the proposed installation, amount of fill, the relationship of the proposed structures to existing structures, and any necessary data or calculations based upon the drainage area contributing to storm water flow in the subject watercourse at the location of the proposed installation. The plan must be prepared by a licensed civil engineer.

Chapter 16.15.100 Discharge of Hazardous Substances Prohibited. This chapter prohibits the discharge of any quantity of hazardous substance as included or defined in California Health and Safety Code §25316 without a permit or agreement into the waters of the State or into any drain, drop inlet, conduit, or natural or artificial watercourse that flows into any storm drain, creek, lagoon, or other waters of the State.

Chapter 16.15.010 Water Pollution Prohibited. This chapter prohibits the discharge of any waste, infectious waste, contamination, or pollution or other substance which impairs water quality into the waters of the State or into any drain, drop inlet, conduit, or natural or artificial watercourse that flows into any storm drain, creek, lagoon, or other waters of the State.

Chapter 22.24.110 Establishment of Development Permit. This chapter requires a development permit for construction or development within any area of special flood hazard. Permit requirements may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, and drainage facilities; and the location of the foregoing.

Chapter 22.24.160 General Standards for Flood Hazard Reduction. This chapter lists flooding prevention design standards for special flood hazard areas, including elevation and floodproofing requirements for structures in Zone AO or VO.

Chapter 22.24.180 Floodways. This chapter lists the limitations on encroachment into floodways to prevent increases in base flood levels.

Chapter 22.80.020 Water Conservation Landscape Design Standards. This chapter states that each development subject to the review of the Architectural Board of Review or the Historic Landmarks Commission is required to comply with the City's Water Conservation Landscape Design Standards as adopted by resolution of the City Council.

➢ Floodplains

Executive Order 11988, Floodplain Management, was issued with the President's Environmental message on May 2, 1977. The major requirements of this Executive Order are to avoid support of floodplain development; to prevent uneconomic, hazardous, or incompatible use of floodplains; to restore and preserve the natural and beneficial floodplain values; and to be consistent with the standards and criteria of the National Flood Insurance Program.

Founded in 1979, the Federal Emergency Management Agency's (FEMA) mission is to lead America to prepare for, prevent, respond to, and recover from disaster. FEMA is responsible for

coordinating the Federal response to floods, earthquakes, hurricanes, and other natural or man-made disasters, and providing disaster assistance to States, communities and individuals.

The Federal Insurance and Mitigation Administration (FIMA) within FEMA is responsible for administering the National Flood Insurance Program (NFIP) and administering programs that provide assistance for mitigating future damages from natural hazards.

A floodway is the channel of a stream, including any adjacent areas, that must be kept free of encroachment so that a 100-year flood can be carried without substantial increase in flood heights. According to FEMA, an area that is designated as Zone A is a 100-year flood area. A 100-year flood is defined as a flood with a magnitude that is expected to be equaled or exceeded once on the average during any 100-year period, or a flood that has a one percent chance of occurring in any given year. The 100-year flood was adopted as the national standard by FIMA for floodplain management, and for insurance purposes. Zone A is an area identified as having a one percent annual chance of flooding, for which no Base Flood Elevations have been determined.

The NFIP requires the following for all new and substantially improved buildings in A Zones:

- All new construction and substantial improvements of residential buildings must have the lowest floor (including basement) elevated to or above the Base Flood Elevation (BFE).
- All new construction and substantial improvements of nonresidential buildings must either have the lowest floor (including basement) elevated to or above the BFE or dry-floodproofed to the BFE. Dry floodproofing means that the building must be designed and constructed to be watertight, substantially impermeable to floodwaters.
- Buildings can be elevated to or above the BFE using fill, or they can be elevated on extended foundation walls or other enclosure walls, on piles, or on columns.
- Because extended foundation or other enclosure walls will be exposed to flood forces, they must be designed and constructed to withstand hydrostatic pressure; otherwise, the walls can fail and the building can be damaged. The NFIP regulations require that foundation and enclosure walls that are subject to the 100-year flood be constructed with flood-resistant materials and contain openings that will permit the automatic entry and exit of floodwaters. These openings allow floodwaters to reach equal levels on both sides of the walls and thereby lessen the potential for damage. Any enclosed area below the BFE can only be used for the parking of vehicles, building access, or storage.[1]

Portions of the Santa Barbara Cottage Hospital properties are located in Flood Zone AH.[2]

➢ Water Quality Control Plan, Central Coast Region Basin (Basin Plan)

The Central Coast Regional Water Quality Control Board (RWQCB) has adopted a Basin Plan for its region of responsibility, which includes the City of Santa Barbara. The agency has delineated water resource area boundaries based on hydrological features. For purposes of achieving and maintaining water quality protection, specific beneficial uses have been identified for each of the hydrologic areas described in the Basin Plan. The Basin Plan also establishes implementation programs to achieve water quality objectives to protect beneficial

[1] FEMA. National Flood Insurance Program, Program Description. August 1, 2002.
[2] Flood Insurance Rate Map, City of Santa Barbara, California, Panel 4 of 11, Revised December 3, 1991.

uses and requires monitoring to evaluate the effectiveness of the programs. These objectives must comply with the State antidegradation policy (State Board Resolution No. 68-16), which is designed to maintain high-quality waters while allowing some flexibility as long as beneficial uses are not unreasonably affected.

The RWQCB has designated narrative or numerical water quality objectives for its surface waters and groundwaters. If these objectives are exceeded, RWQCB can use its regulatory authority to require municipalities to reduce pollutant loads to the affected receiving waters. The Board utilizes water quality criteria in the form of "scientific information developed by the USEPA regarding the effect a constituent concentration has on human health, aquatic life, or other uses of water," to develop its water quality objectives (RWQCB 1994).

Beneficial uses of water are defined in the Basin Plan as those necessary for the survival or well-being of humans, plants, and wildlife. Examples of beneficial uses include drinking water supplies, swimming, industrial and agricultural water supply, and the support of freshwater and marine habitats and their organisms.

The identified beneficial uses for Mission Creek designated by the RWQCB are listed below:

- Municipal and Domestic Supply (MUN)
- Commercial and Sportfishing (COMM): Includes uses of water for commercial or recreational collection of fish, shellfish, or other organisms including but not limited to uses involving organisms intended for human consumption or bait purposes.
- Warm Fresh Water Habitat (WARM)
- Migration of Aquatic Organisms (MIGR)
- Groundwater Recharge (GWR)
- Spawning, Reproduction, and Development (SPWN): Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
- Contact Water Recreation (REC-1): Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, waterskiing, skin diving, scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
- Noncontact Water Recreation (REC-2): Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
- Freshwater Replenishment (FRSH)
- Rare, Threatened, or Endangered Species (RARE): Includes preservation of rare, threatened, or endangered species
- Estuarine Habitat (EST)
- Cold Freshwater Habitat (COLD)

- Wildlife Habitat (WILD): Includes uses of water that support terrestrial ecosystems, including but not limited to the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife, water, and food sources.

Water quality objectives for inland surface waters such as Mission Creek are listed in Table 10.A.

All groundwaters in the Central Coast Basin must comply with the following objectives: (1) tastes and odors—groundwaters shall not contain taste or odor-producing substances in concentrations that adversely affect beneficial uses, and (2) radioactivity—radionuclides shall not be present in concentrations that are harmful to human, plant, or aquatic life, and accumulation of radionuclides in the food web may not be present to an extent that presents a hazard to human, plant, animal, or aquatic life.

Numerical objectives for the South Coast Groundwater Subbasin are listed in Table 10.B below.

➢ Bacterial Standards

Bacterial standards for beaches (includes REC-1 and REC-2 beneficial uses) have been identified in State Assembly Bill 411 (1999) and in the State Water Resources Control Board's (SWRCB) Ocean Plan. These are promulgated in the California Health and Safety Code, Section 115880, and the California Code of Regulations Title 17, respectively, and are listed below.

Single Point Standards (Grab samples)

Total coliforms	10,000 organisms/100 milliliters of sample
Fecal coliforms (*E. coli*)	400 organisms/100 milliliters of sample
Enterococci	104 organisms/100 milliliters of sample
Fecal coliform to Total coliform ratio	>1,000 total coliforms if ratio exceeds 0.1

30-day geometric log mean standards of 5 weekly samples

Total coliforms	1,000 organisms/100 milliliters of sample
Fecal coliforms (*E. coli*)	200 organisms/100 milliliters of sample
Enterococci	35 organisms/100 milliliters of sample

Although these standards do not apply to freshwater creeks, they are often used as benchmarks to determine water quality of inland waters when few sampling events or sufficient monitoring data are available.

➢ Clean Water Act, Section 402, National Pollutant Discharge Elimination System (NPDES)

Direct discharges of pollutants into waters of the United States are not allowed, except in accordance with the National Pollutant Discharge Elimination System (NPDES) program established in Section 402 of the Clean Water Act. Waters of the United States are defined in 33 CFR 328.3:

TABLE 10.A: SURFACE WATER QUALITY OBJECTIVES FOR INLAND WATERS

Constituent	Concentration
Color	Shall not cause nuisance or adversely affect beneficial uses.
Tastes and Odors	Shall not cause nuisance or adversely affect beneficial uses or cause undesirable tastes or odors to edible organisms.
Floating Material	Shall not cause nuisance or adversely affect beneficial uses.
Suspended Material	Shall not cause nuisance or adversely affect beneficial uses.
Settleable Material	Shall not cause nuisance or adversely affect beneficial uses.
Oil and Grease	Shall not cause nuisance or adversely affect beneficial uses or visible film on water surface.
Sediment	Shall not cause nuisance or adversely affect beneficial uses.
Turbidity	Where natural turbidity is between 0 and 50 Jackson Turbidity Units (JTU), increases shall not exceed 20 percent. Where natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 percent. Where natural turbidity is greater than 100 JTU, increases shall not exceed 10 percent.
Toxicity	Shall be free of toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in life forms.
Pesticides	Shall not reach concentrations that adversely affect beneficial uses. Shall not increase concentrations in bottom sediments or aquatic life.
pH	Shall not be depressed below 6.5 nor raised above 8.3.
Radioactivity	Shall not be present in concentrations that are deleterious to life forms.
	Not to be exceeded levels
Methylene Blue Activated Substances	0.2 mg/l
Phenols	0.1 mg/l
PCBs	0.3 μg/l (micrograms per liter)
Phthalate Esters	0.002 μg/l

Source: *Water Quality Control Plan, Central Coast Region.*

TABLE 10.B: SOUTH COAST GROUNDWATER SUBBASIN MEDIAN GROUNDWATER OBJECTIVES

Constituent	Objective (mg/L)[1]
Total Dissolved Solids	700
Chloride	50
Sulfate	150
Boron	0.2
Sodium	100
Nitrate	5[2]

Source: *Water Quality Control Plan, Central Coast Region.*

[1] Objectives are median values based on data averages; objectives are based on preservation of existing quality or water quality enhancement believed attainable by control of point sources.

[2] Measured as Nitrogen.

"The term waters of the United States means:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce . . . ;

(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams) . . . the use, degradation or destruction of which could affect interstate or foreign commerce . . . ;

(4) All impoundments of waters otherwise defined as waters of the United States under the definition; and

(5) Tributaries of waters defined in paragraphs (a) (1)–(4) of this section."

The major purpose of the NPDES program is to protect human health and the environment by protecting the quality of water that would eventually end up in drinking water, recreational water supplies, etc. Pursuant to the NPDES program, permits that apply to storm water discharges from municipal storm drain systems, specific industrial activities, and construction activities that disturb one acre or more have been issued. NPDES permits establish enforceable effluent limitations on discharges, require monitoring of discharges, designate reporting requirements, and require the permittee to perform best management practices (BMPs). Industrial (point source) storm water permits are required to meet effluent limitations; municipal permits are governed by the maximum extent practicable (MEP) application of BMPs.

State General Permit for Storm Water Discharges Associated with Construction Activity (General Construction Permit). In accordance with NPDES regulations, the State of California requires that any construction activity disturbing one acre or more of soil comply with General Construction Permit (Water Quality Order 99-08-DWQ). To obtain authorization for proposed storm water discharges pursuant to this permit, the landowner (discharger) is required to submit a Notice of Intent (NOI) to the State Water Resources Control Board (SWRCB), prepare a Storm Water Pollution Prevention Plan (SWPPP), and implement BMPs detailed in the SWPPP during construction activities. Dischargers are required to implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate storm water pollution. The purpose of the SWPPP is to prevent construction pollutants from contacting storm water and to keep products of erosion from moving off site into receiving waters. Certain discharges of nonstorm water, such as irrigation and pipe flushing/testing are permitted as long as they do not cause or contribute to a violation of any water quality standard, violate any provision of the General Construction Permit, require a nonstorm water permit (such as that issued by RWQCB), or violate provisions of the Basin Plan.

Construction BMPs are provided in Table 10.C. These construction BMPs, as well as operational BMPs for different development categories, were developed by the California Storm Water Quality Association, an advisory body of municipal agencies, and are presented in four handbooks: *California Stormwater BMP Handbooks-Construction Activities*, *California Stormwater BMP Handbooks-New Development and Redevelopment*, *California Stormwater BMP Handbooks Municipal*, and *California Stormwater BMP Handbooks-Industrial/Commercial* (2003).

TABLE 10.C: CONSTRUCTION BMPS

Identifier	Name
Erosion Control—Limits soil erosion from water	
EC-1	Scheduling
EC-2	Preservation of Existing Vegetation
EC-3	Hydraulic Mulch
EC-4	Hydroseeding
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles and Mats
EC-8	Wood Mulching
EC-9	Earth Dikes and Drainage Swales
EC-10	Velocity Dissipation Devices
EC-11	Slope Drains
EC-12	Streambank Stabilization
EC-13	Polyacrylamide
Sediment Control—Limits transport of sediment off site	
SE-1	Silt Fence
SE-2	Sediment Basin
SE-3	Sediment Trap
SE-4	Check Dam
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-8	Sandbag Barrier
SE-9	Straw Bale Barrier
SE-10	Storm Drain Inlet Protection
Wind Erosion Control—Limits soil erosion from wind	
WE-1	Wind Erosion Control
Tracking Control—Prevents tracking of sediment/hazardous materials from the site	
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
TC-3	Entrance/Outlet Tire Wash
Nonstorm Water Management—Controls hazardous materials	
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving Operations
NS-12	Concrete Curing
NS-13	Concrete Finishing
NS-14	Material over Water
NS-15	Demolition Adjacent to Water
NS-16	Temporary Batch Plants
Waste Management—Controls disposal of waste	
WM-1	Material Delivery and Storage

Identifier	Name
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/Septic Waste Management
WM-10	Liquid Waste Management

Source: *California Stormwater Handbooks—Construction Activities* (2003)

Municipal NPDES Permit. The City of Santa Barbara is considered a Phase II Small Municipal Separate Storm Sewer System (MS4). In accordance with the Storm Water Phase II Final Rule, the City of Santa Barbara must obtain NPDES permit coverage by developing a Storm Water Management Program (SWMP). As of August, 2003, a SWMP was submitted to the RWQCB and is pending approval. Although the City of Santa Barbara is not covered under the State General Permit No. CAS000004 for Small MS4s at this time, it intends to implement the guidelines set forth in the Design Standard Section, Attachment 4, which specifies site design and postconstruction volumetric and flow-based treatment control BMPs for development/redevelopment projects that fall under specific categories. One of the categories, 100,000 square feet or more of commercial development, is equivalent to the proposed project.

Treatment control BMPs are a class of physical structures designed to treat, infiltrate and/or remove pollutants of concern from storm water runoff. Treatment control BMPs should be selected for a project based on pollutants associated with the applicable land use and any impairments to receiving waters.

In addition to the Small MS4 permit specifications, the Cottage Hospital redevelopment project is required to comply with the City of Santa Barbara Municipal Code, Chapter 16.15.010, *Water Pollution Prohibited*, which prohibits the discharge of any pollutants into the public MS4 system.

Clean Water Act, Section 303(d). Section 303 of the Clean Water Act requires that the State adopt water quality standards for surface waters. The Basin Plan contains water quality objectives considered necessary to protect the specific beneficial uses it identifies. Section 303(d) specifically requires the State to develop a list of impaired water bodies and subsequent numeric Total Maximum Daily Loads (TMDLs) for whichever constituents impair a particular water body. These constituents include inorganic and organic chemical compounds, metals, sediment, and biological agents.

A revised list of impaired waters pursuant to Section 303(d) was approved by the USEPA in July 2003. Mission Creek (8.6 miles) is listed as impaired by pathogens and unknown toxicity. The potential sources for pathogens are urban runoff/storm sewers and transient encampments and for unknown toxicity are urban runoff/storm sewers. The TMDL documents for both of these pollutants are considered low priorities.[1]

The TMDL is the total amount of a constituent that can be discharged while meeting water quality objectives and protecting beneficial uses. It is the sum of the individual load allocations

[1] 2002 CWA Section 303(d) List of Water Quality Limited Segment, www.swrcb.ca.gov.

for point source inputs (e.g., an industrial plant), load allocations for nonpoint source inputs (e.g., runoff from urban areas), and natural background, with a margin of safety.

10.4 HYDROLOGY/WATER - EXISTING SETTING

SETTING - PROJECT SITE CONDITIONS

➢ Hydrology (Existing Conditions)

At the project site, storm water typically flows south (on north to south running streets: Junipero Street, Pueblo Street and Los Olivos) and east (on west to east running streets: Oak Park Lane, Castillo Street, Bath Street), resulting in a southeasterly flow direction (Figure 10.1). Mission Creek is the downstream receiving water body and receives storm water runoff flowing in the southeasterly direction from the following three discharge points within the vicinity of the project:

- A 24-inch catch basin southwest of Alamar Avenue on Junipero Street,
- A catch basin at the intersection of Pueblo Street and Calle Real,
- A catch basin at the intersection of Padre Street and Oak Park Lane,

During a flood event, a significant amount of flow travels along Castillo Street between Junipero Street and Pueblo Street. Since there are no existing storm drain systems in this area aside from the 24-inch reinforced concrete pipe (RCP) on Junipero Street, all flow is surface flow.

Table 10.D summarizes the existing peak flow conditions for a 25-year storm event for the project site.

TABLE 10.D: EXISTING ON-SITE 25-YEAR STORM PEAK FLOWS

Location	Total Area (ac)	Impervious Area (ac)	25-year Peak Flow (cfs)[1]
Main Hospital	9.92	8.43	16.9
Knapp Parking	2.17	1.74	3.7
Pueblo Parking	2.40	1.84	4.0
Total	14.5	12.01	24.6

Source: Fuscoe (2004)

SBCH is located in the South Coast subbasin of the Santa Barbara Groundwater Basin. Several geotechnical investigations have been conducted at the project site in the past (refer to Chapter 8.0, Geophysical). Perched groundwater (shallow, isolated groundwater) and seepage has been encountered at relatively shallow depths of 21 to 41 feet below the existing ground surface.

[1] Cubic feet per second

Groundwater was found to occur in perched conditions with multiple zones of water or seepage at differing elevations.[1]

➢ Floodplain (Existing Conditions)

According to the Flood Insurance Rate Map (FIRM) Panel 4 of 11, dated December 3, 1991, the project site lies within Zone AH. Zone AH is designated as a special flood hazard area inundated by flood depths of 1 to 3 feet during a 100-year flood, with base flood elevations determined.

Penfield & Smith's Flood Report[2] also confirms that the project site is located in the overland flooding areas of Mission Creek. During a 100-year flood, Mission Creek breaks out in the vicinity of De La Vina Street (located upstream of the project site) and results in a flow of approximately 3,200 cfs through City streets, including Castillo Street, a primary recipient of this flood flow. FEMA has designated the breakout region east of the creek from Da La Vina to U.S. 101 as Zone AH, a flood hazard area.[3] Figure 10.2 shows existing 100-year flood conditions for the project site and surrounding area.

➢ Water Quality

Runoff from the project site drains to the City storm drain system, which discharges into Mission Creek. Within the proximity of the project site, Mission Creek flows south along Alamar Avenue and turns southeast to parallel the U.S. 101. Mission Creek ultimately discharges into the Pacific Ocean approximately two miles from the project site. The Mission Creek Watershed is approximately 7,786 acres and extends approximately 7.5 miles from the ocean to the ridge of the Santa Ynez Mountains at 3,985 feet above mean sea level.[4]

Several pollutants are commonly associated with stormwater runoff, including sediment, nutrients, bacteria, oxygen-demanding substances, petroleum products, heavy metals, toxic chemicals, and floatables. The anticipated and potential pollutants in storm water or urban runoff for various land uses are illustrated in Table 10.E. The existing hospital would yield pollutants similar to a commercial/industrial development, as shown in the table. Anticipated pollutants associated with urban runoff and their impacts on water quality and aquatic habitat are described in more detail below.

Sediments. Natural sediment loads are important to downstream environments by providing habitat, substrate, and nutrition; however, increased sediment loads can result in several negative effects to downstream environments. Excessive sediment can be detrimental to aquatic life by interfering with photosynthesis, respiration, growth, and reproduction. In addition, pollutants that adhere to sediment, such as nutrients, trace metals, and hydrocarbons, can have other harmful effects on the aquatic environment when they occur in elevated levels.

---

1 Fugro West, Inc. *Parking Structure below Phase 4 Scheme* memorandum, September 10, 2003.

2 *Cottage Hospital Replacement Project; Flood Report for the City of Santa Barbara, CA*. Penfield and Smith (July 7, 2004).

3 See City of Santa Barbara Flood Insurance Rate Map (060335 0004D) Panel 4 of 11, revised December 3, 1991. Flood Zone AH is designated as a special flood hazard area inundated by flood depths of 1 to 3 feet during a 100-year flood, with base flood elevations determined.

4 URS Greiner Woodward-Clyde. *South Coast Watershed Characterization Study, An Assessment of Water Quality Conditions in Four South Coast Creeks*. August 1999.

TABLE 10.E: ANTICIPATED AND POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE

Project Categories	General Pollutant Categories								
	Sediments	**Nutrients**	**Heavy Metals**	**Organic Compounds**	**Trash and Debris**	**Oxygen Demanding Substances**	**Oil and Grease**	**Pathogens**	**Pesticides**
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P[1]	P[2]	P	X
Commercial/ Industrial Development > 100,000 ft.[2]	P[1]	P[1]		P[2]	X	P[5]	X	P[3]	P[5]
Automotive Repair Shops			X	X[4,5]	X		X		
Restaurants					X	X	X	X	
Hillside Development > 5,000 ft.[2]	X	X			X	X	X		X
Parking Lots	P[1]	P[1]	X		X	P[1,5]	X		P[2]
Streets, Highways & Freeways	X	P[1]	X	X[4]	X	P[5]	X		

Source: *California Stormwater BMP Handbook- New Development and Redevelopment* (2003)

X = Anticipated
P = Potential
1 A potential pollutant if landscaping exists on site.
2 A potential pollutant if the project includes uncovered parking areas.
3 A potential pollutant if land use involves food or animal waste products.
4 Including petroleum hydrocarbons.
5 Including solvents.

Nutrients. Nutrients are typically composed of phosphorus and/or nitrogen. Elevated levels in surface waters cause excessive algae and other vegetative growth. As nutrients are absorbed, the vegetative growth decomposes, utilizing oxygen in the process and reducing dissolved oxygen levels. Dissolved oxygen is critical for support of aquatic life. The ammonium form of nitrogen (found in wastewater discharges) converts to nitrite and nitrate in the presence of oxygen, which further reduces the dissolved oxygen levels in water.

Heavy Metals. Bioavailable (easily absorbed into tissue) forms of trace metals are toxic to aquatic life. The most common metals found in urban runoff are lead, zinc, and copper. Sources of heavy metals in surface waters include emissions and deposits from automobiles, industrial wastewater, and common household chemicals. Lead, zinc, and copper typically account for 90 percent or more of heavy metal concentrations. The presence of heavy metals can adversely affect commercial fishing, recreational activities, and drinking water supplies.

Oxygen-Demanding Substances. Oxygen-demanding substances include plant debris (such as leaves and lawn clippings), animal wastes, and other organic matter. Microorganisms utilize dissolved oxygen during consumption of these substances, which reduces a water body's capacity to support aquatic life.

Bacteria. Bacterial levels in urban runoff can exceed public health standards for water contact recreation. Bacteria levels in streams within natural watersheds also can exceed standards for water contact recreation. A common source of bacteria is animal excrement.

Petroleum Hydrocarbons. Petroleum hydrocarbons include oil and grease, benzene, toluene, ethyl benzene, xylene, and polyaromatic hydrocarbons. Sources of petroleum hydrocarbons include parking lots and roadways, leaking storage tanks, auto emissions, and improper disposal of waste oil (EPA 1999). Some of these materials can be toxic to aquatic life at low concentrations.

Other Toxic Chemicals. Other toxic chemicals are generally related to hazardous wastes or industrial byproducts and can sometimes be detected in storm water, but are typically rare. The other toxic chemicals that do occur in measurable levels in tested storm water include phthalate (plasticizer compound), phenols and creosols (wood preservatives), pesticides and herbicides, and fuel additives such as methyl tertiary-butyl ether (MTBE).

SETTING - SURROUNDING CONDITIONS

➢ Hydrology (Surrounding Setting)

In Santa Barbara County (which includes the City of Santa Barbara), storm drains are designed to accommodate 25-year storm event peak flows. During a 50-year storm event, Mission Creek exceeds the maximum channel capacity and floods the area downstream of De La Vina Street.

Twenty-five year storm event peak flows were also calculated for several locations for the primary streets within the vicinity of the project site to identify off-site sheet flow hydrology conditions. Due to the absence of catch basins and storm drain systems within the vicinity of SBCH, Table 10.F lists the peak sheet flow conditions in cubic feet per second for the surrounding streets. In some instances, the sheet flow exceeds the top of the curve. Each location is identified with a corresponding location number, which depicts the amount of sheet flows flowing through that section of the street.

TABLE 10.F: EXISTING 25-YEAR STORM PEAK FLOW STREET CONDITIONS

Location Number	Street Name	Street Block	Street Flow (cfs)
1	Castillo	Quinto to Junipero	11.9
2	Junipero Street	Bath to Castillo	3.9
3	Junipero Street	Castillo to Fletcher	10.0
4	Castillo Street	Junipero to Pueblo (northwest portion)	32.7
5	Castillo Street	Junipero to Pueblo (southeast portion)	21.7
6	Junipero Street	Fletcher to Oak Park	8.4
7	Oak Park Lane	Junipero to Pueblo	15.7
8	Junipero Street	Oak Park to Alamar	6.9
9	Pueblo Street	Oak Park to Calle Real	41.4

Source: Fuscoe (2004)

The Mission Creek Watershed contains 47 percent open space (National Forest) in the upper reach, and 31 percent and 17 percent residential and commercial land uses, respectively, in the middle and lower reaches.[1] The middle reach (between State Street and Yanoali Street) is characterized by urban development and evidence of homeless encampments (trash, discarded blankets and clothing). Restoration of Mission Creek has been targeted by the Central Coast Regional Water Quality Control Board (RWQCB).[2]

The Santa Barbara Groundwater Basin is comprised of up to 1,000 feet of unconsolidated sediments, which include four identified aquifer units: shallow alluvium, upper and lower producing zone, and deep producing zone.[3] The upper, lower, and deep producing zones are aquifers that are physically separated by soil strata. Water is extracted from each of these zones for municipal and domestic purposes (e.g., irrigation, drinking water). Groundwater constitutes about ten percent of the water supply for the City of Santa Barbara.[4] Seawater intrusion occurrences existed in some areas of the South Coast subbasin; however, groundwater pumping has been drastically reduced and groundwater injection programs have been established, thereby reversing the trend of seawater intrusion. The County of Santa Barbara has determined that a substantial surplus in water supply is available to the City of Santa Barbara, and overdraft of the basin would not be reasonably foreseeable.[2]

➢ Water Quality (Surrounding Setting)

The City of Santa Barbara is located in the South Coast Hydrologic Unit. This Hydrologic Unit is comprised of a series of coastal-drainage streams, including Mission Creek, which originate

1 URS Greiner Woodward-Clyde. *South Coast Watershed Characterization Study, An Assessment of Water Quality Conditions in Four South Coast Creeks*. August 1999.
2 Regional Water Quality Control Board, Central Coast. Watershed Management Initiative. January 2002.
3 Fugro West, Inc. *Site Mitigation Plan, Santa Barbara Cottage Hospital Central Plant Improvement Project*, June 2003.
4 *Santa Barbara County Groundwater Report*, Santa Barbara County Public Works Water Resources Department, Water Agency Division, February 2001.

on the upper slopes of the south flank of the Santa Ynez Mountains.[1] The County Environmental Health Services Department (EHS) has frequently found bacteria at concentrations that exceed water quality standards at the mouths of these coastal-drainage streams, resulting in beach closures.[1] Mission Creek is currently listed as impaired for pathogens (disease-causing organisms such as bacteria and viruses) under the Clean Water Act (refer to Regulatory Framework in Section 10.3).

County EHS compiled data for three years (September 1996 to June 2000) to compare bacterial data at Santa Barbara County Beaches. Sampling was conducted at 17 beach sites in the surf zone. The results found that East Beach at Mission Creek had the highest mean total coliform counts, the highest mean *E. coli* counts and the second-highest mean *Enterococcus* counts.[2]

Other data compiled by County EHS includes the percentage of exceedances of bacterial standards at the County beaches. Exceedances of bacterial standards result in beach postings and closures. Table 10.G shows these percent exceedances for East Beach at Mission Creek

TABLE 10.G: PERCENT BACTERIAL STANDARDS EXCEEDANCES FOR EAST BEACH AT MISSION CREEK

Percent Exceedances	1998	1999	2000	2001	2002	2003
East Beach at Mission Creek	55%	27%	19%	39%	28%	15%
Average	30%	22%	21%	23%	12%	9%

Source: http//www.spcphd.org/ehs/PerEx1998-2003.htm

These results show a downward trend for bacterial concentrations for East Beach as well as the other beaches, on average.

There are a few differences between the sources and behaviors of the three indicator bacteria used by health services agencies to predict water quality. Total coliform bacteria are mostly nonpathogenic and are found naturally in the intestines of warm-blooded and cold-blooded animals as well as in plant and soil matter. Fecal coliform bacteria (e.g., *E. coli*) are a subgroup of total coliform bacteria. Unlike total coliforms, fecal coliforms can grow at elevated temperatures. They are associated only with the fecal material of warm-blooded animals. The presence of fecal coliforms or enterococci indicates that the receiving water has been contaminated with the fecal material of humans or other animals. Unlike coliforms, enterococci are not known to multiply in the environment; therefore, concentrations of these bacteria in a particular sample are generally lower than coliform concentrations.

Several studies have been completed that study the sources of fecal coliforms in urban watersheds. Sources include sanitary sewer overflows, illegal sanitary connections to storm drains, illegal disposal to storm drains, dogs, cats, rats, raccoons, pigeons, gulls, ducks, and geese.[3] The combination of high densities of people and animals and high percentages of impervious areas in urban watersheds contributes to high fecal coliform concentrations in coastal waters.

---

1 Regional Water Quality Control Board, Central Coast. *Watershed Management Initiative.* January 2002.

2 http://www.sbcphd.org/ehs/MeanComp.htm

3 *Microbes and Urban Watersheds: Concentrations, Sources, & Pathways*. Center for Watershed Protection, *Watershed Protection Techniques* 3(1): 554–565.

As part of its South Coast Watershed Characterization Study, URS (1999) collected samples along Mission Creek (and at other South Coast creeks) during five sampling events in August and September 1998 (dry weather), November 1998 (first rainfall) and January and March 1999. A summary of this data is provided in Table 10.H. The report found that there was a distinct pattern of increasing bacterial concentrations from the top of the watershed to the mouth of the creek, as the creek traverses increasingly dense urban development. Objectives for the other constituents analyzed were not exceeded.

Project Clean Water, a coalition of government agencies, community groups, and individuals, was established in 1998 to identify and implement solutions to creek and ocean water pollution on the South Coast. The County is joined in this effort by the Cities of Santa Barbara and Carpinteria, and members of groups such as the Urban Creeks Council, the Audubon Society, the Surfrider Foundation, Heal the Ocean, CURE, Coalition of Labor, Agriculture & Business, and the Community Environmental Council, as well as many community members.

Project Clean Water has conducted sampling throughout the County of Santa Barbara and sponsors studies of surface water issues. *The Santa Barbara County Creeks Bioassessment Program 2003 Annual Report and Index of Biological Integrity* evaluated the biological conditions in many reaches of the streams and creeks in the County. The report indicated that reaches of Mission Creek downstream of the project site (M1–Old Mission Creek at Bohnet Park and M2–Mission Creek at De la Guerra Street) are highly disturbed and were considered "very poor" with regard to biological integrity in 2000, 2001, 2002, and 2003.

The City of Santa Barbara Creeks Division conducts water quality monitoring of its watersheds. A summary of data form regular sampling locations along Mission Creek from June 2001 to May 2003 is shown in Table 10.I.[1] These samples were analyzed for *E. coli* concentrations.

This table indicates that *E. coli* concentrations increase as the sampling points move downstream. This is consistent with the findings of the other studies.

Total Dissolved Solids (TDS) concentrations in the Santa Barbara Groundwater Basin range from approximately 400 mg/L to 1,000 mg/L. Some isolated wells have shown much higher TDS concentrations. Samples from coastal wells contained chloride concentrations greater than 1,000 mg/L, which confirmed the presence of seawater intrusion. Effective pumping practices, combined with groundwater injection programs, have reversed the seawater intrusion trend.[2]

1 City of Santa Barbara Creeks Division. *Water Quality Monitoring Report*. December 2003.
2 *Santa Barbara County Groundwater Report*, Santa Barbara County Public Works Water Resources Department, Water Agency Division, February 2001.

TABLE 10.H: SUMMARY OF MISSION CREEK WATER QUALITY DATA (1998-1999)

Constituent	Mean Value (mg/L)	Median Value (mg/L)	Maximum Value (mg/L)	Water Quality Objective from Basin Plan (most restrictive objective only)
Dissolved Oxygen	9.84	10.00	12.9	Not below 5 mg/L
pH	8.04	8.07	8.3	Not below 7.0 or above 8.3
Total Organic Compounds	21.64	14.00	83	California Code of Regulations Title 22 limitations for individual organic compounds
Ammonia as Nitrogen	0.18	0	1.1	None
Total Kjedahl Nitrogen	0.92	0.80	2.1	Narrative objective for biostimulatory substance: below concentrations that promote algal growth that adversely affect beneficial uses
Nitrate as Nitrogen	0.83	0	3.9	Not exceed 45 mg/L
Nitrite as Nitrogen	0.14	0	1.8	Narrative objective for biostimulatory substance: below concentrations that promote algal growth that adversely affect beneficial uses
Phosphate as Phosphorus	0.26	0.14	0.80	Narrative objective for biostimulatory substance: below concentrations that promote algal growth that adversely affect beneficial uses
Phosphate	0.81	0.43	2.50	Narrative objective for biostimulatory substance: below concentrations that promote algal growth that adversely affect beneficial uses
Cadmium	0	0	0	Not exceed 0.003 mg/L in hard water or 0.0004 mg/L in soft water at any time
Chromium	0	0	0	Not exceed 0.05 mg/L in hard water or 0.05 mg/L in soft water
Copper	0.01	0	0.02	Not exceed 0.03 mg/L in hard water or 0.01 mg/L in soft water
Nickel	0	0	0	Not exceed 0.4 mg/L in hard water or 0.1 mg/L in soft water
Lead	0	0	0.014	Not exceed 0.03 mg/L in hard water or 0.03 mg/L in soft water
Mercury	0	0	0	Not exceed 0.0002 mg/L in hard water or 0.0002 mg/L in soft water
Zinc	0.04	0.04	0.09	Not exceed 0.2 mg/L in hard water or 0.004 mg/L in soft water
Total Petroleum Hydrocarbons	0.08	0	1	None
TPH NS	0.28	0	2.3	None
Biological Oxygen Demand	8.43	5.60	20	None for BOD. Biostimulatory substance narrative would apply, that is, waters shall be free of substances that result in increases in the BOD which adversely affect beneficial uses

Constituent	Mean Value (mg/L)	Median Value (mg/L)	Maximum Value (mg/L)	Water Quality Objective from Basin Plan (most restrictive objective only)
Chemical Oxygen Demand	59.60	41.00	140	None
Fecal Coliform (MPN/100 ml) Sampling Stations*				Based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200/100 ml, nor shall more than 10% of total samples during any 30-day period exceed 400/ml
MC 145+00 (Pueblo Street)	NP	< 500	NP	
MC 086+00 (Victoria Street)	NP	1,000	NP	
MC 084+00 (Anapamu Street)	NP	1,500	NP	
MC 034+00 Gutierrez Street)	NP	3,000	NP	
MC 011+00 (State Street)	NP	24,000	NP	

Source: URS (1999)
* Sampling stations downstream of the project site. Values are estimated from bar graph (Figure 9a).
NP = Values not provided in the report

TABLE 10.I: SUMMARY OF *E. COLI* CONCENTRATIONS IN MISSION CREEK

	MC 2800 (Upstream of Montecito Street)	Gutierrez Street bridge	Haley Street bridge	Haley Drain (under bridge)	Carrillo Street	Old Mission Creek (Anapamu Street) above MC	Bohnet Park	Westside Drain (E. Victoria Street)
Median	1,664	1,249	2,727	3,090	337	421	644	496
GeoMean	N/A	1,437	2,864	3301	384	494	628	696
Minimum	160	179	520	46	<1	<1	<1	<1
Maximum	>24,192	77,010	28,510	173,290	81,640	86,640	61,310	72,700
Total # of Samples	157	76	40	37	68	70	76	77

Source: City of Santa Barbara (2003)
MC = Mission Creek

10.5 HYDROLOGY/WATER - PROJECT FEATURES

The proposed project incorporates new storm drain and flood control facilities, as well as structural treatment BMPs, to reduce potential impacts to hydrology, floodplains, and water quality with implementation of the project. These features are outlined below.

PF 10-1 Hospital Storm Drain. For the main hospital, the majority of flows would be collected from the Diagnostic and Treatment Building and Centennial Building into a single storm drain system and discharged out onto Oak Park Lane through a parkway culvert. A smaller system would also collect on-site runoff from the southwest parking area of the west block and discharge through a parkway culvert onto Oak Park Lane as well. Lastly, a series of smaller storm drain collection systems would collect runoff from the patient pavilion buildings and discharge flows onto Pueblo Street in five separate points. All flows would drain southeasterly towards the proposed storm drain system along Oak Park Lane before discharging into Mission Creek. In certain instances, the on-site system may connect directly into the proposed storm drain improvement along Oak Park Lane in lieu of the parkway culvert option. These minor design drainage differences do not have any impact on the flooding or drainage assessments (Figure 10.3).

PF 10-2 Knapp Parking Structure Drain. A single storm drain system would collect flows from the proposed Knapp parking structure and existing building and drain southerly through a parkway culvert toward the intersection of Bath Street and Junipero Street (Figure 10.3).

PF 10-3 Pueblo Parking Structure and Child Care Center Drains. A single storm drain system would collect flows from the proposed Child Care Center and drain easterly through a parkway culvert to Los Olivos (Figure 10.3). A series of pipes, downspouts, gutters, and parkway culverts will drain the Pueblo parking structure out to Castillo Street and Pueblo Street.

PF 10-4 Concrete Box Storm Drain. A new 10-foot by 10-foot reinforced concrete box (RCB) would be constructed along Junipero Street that inlets near the intersection of Oak Park Lane and Padre Street to counter the effect of closing Castillo Street between Junipero Street and Pueblo Street and intercept overbank flows from Mission Creek upstream of the project site that occur during a 100-year storm event (Figure 10.3). Similar to other drainage improvements of this size, it is tentatively agreed upon that the County of Santa Barbara will maintain the storm drain box while the City of Santa Barbara will maintain the associated catch basins inlet and laterals.

PF 10-5 Mission Creek Inlet. The existing inlet into Mission Creek at the intersection of Padre Street and Oak Park Lane would be upsized to accommodate flows from the 10-foot by 10-foot RCB (PF 10-4) and design parameters set by the U.S. Army Corps of Engineers and Los Angeles County Public Works would be followed for connecting the side channel into the full concrete-lined flood control channel (Mission Creek).

PF 10-6 Landscape Design for Water Quality. The project would provide an additional 79,184 square feet of landscaping at the site. Landscaped areas would be designed to capture and infiltrate flows as feasible consistent with City requirements where feasible.

10.6 HYDROLOGY/WATER - LONG-TERM IMPACTS

Long-term impacts are those that could potentially occur once the project is completed and in operation. Significant long-term impacts are related to changes in land use and creation of impervious area. This section analyzes project-specific impacts, impacts of the specific plan, and cumulative impacts that could occur with completion of past, present, and reasonably foreseeable projects within the Mission Creek Watershed.

10.6.1 PROJECT LONG-TERM HYDROLOGY/WATER IMPACTS

➢ Hydrology Impacts (Project Long-Term)

The proposed project has the potential to result in significant hydrology impacts due to changes in drainage patterns with the proposed closure of Castillo Street.

As stated earlier in Section 10.4, in the existing condition, storm water flows within the streets surrounding SBCH until it is collected in catch basins on Junipero Street and Pueblo Street, which discharge to Mission Creek. The project proposes to capture storm water in a new subsurface storm drain system from the Main Hospital Building (PF 10-1, Hospital Storm Drain), the Knapp parking structure (PF 10-2, Knapp Parking Structure Drain), and the Pueblo parking structure (PF 10-3, Pueblo Parking Structure and Child Care Center Drains). These project features would serve to reduce storm flows in the streets in these areas (Castillo Street, Pueblo Street, Bath Street, Junipero Street, and Oak Park Lane) and put more flows within the underground storm drain system. The streets that would see the largest reduction in sheet flow are Castillo Street and the intersection of Junipero Street and Castillo Street. The proposed storm drain system is illustrated in Figure 10.3.

With the proposed project, the 25-year storm peak flows discharging from the site would decrease slightly (Table 10.J) due to the increase in landscaping/decrease in impervious area (PF 10-6, Increased Landscaping). The drainage pattern from most of the project site would be similar to the existing condition. However, since Castillo Street would be closed within the project area, existing flows on this street would be redirected to Junipero Street and Oak Park Lane catch basins (Figure 10.3 and Table 10.K). This would result in a significant increase of flows to Junipero Street between Fletcher Street and Oak Park Lane and to Oak Park Lane between Junipero Street and Pueblo Street. To alleviate additional storm water flows on Junipero Street and Oak Park Lane and provide additional flood protection from existing overbank flows from Mission Creek, a new storm drain line would be constructed that inlets near the intersection of Oak Park Lane and Padre Street (PF 10-4, Concrete Box Storm Drain).

TABLE 10.J: PROPOSED ON-SITE 25-YEAR STORM PEAK FLOWS

Location	Total Area (acres)	Impervious Area (acres)	Proposed Peak Flows (cfs)	Existing Peak Flows (cfs)	Change (Existing—Proposed (cfs)
Main Hospital	9.92	8.17	16.8	16.9	-0.1
Knapp Parking	2.17	1.60	3.6	3.7	-0.1
Pueblo Parking	2.40	1.64	4.0	4.0	No change
Total	14.5	11.41	24.4	24.6	-0.2

Source: Fuscoe (2004)

Table 10.K: Proposed 25-Year Storm Peak Flow Street Conditions

Location Number[1]	Street Name	Street Block	Existing Street Flow (cfs)	Proposed Street Flow without Project Features (cfs)	Proposed Street Flow with Project Features (cfs)	Net Change with Project Features (+/- cfs)
1	Castillo	Quinto to Junipero	11.9	12.4	12.4	+0.5
2	Junipero Street	Bath to Castillo	3.9	4.0	4.0	+0.1
3	Junipero Street	Castillo to Fletcher	10.0	34.6	0.0	-10.0
4	Castillo Street	Junipero to Pueblo NW portion)	32.7	0.0	0.0	-32.7
5	Castillo Street	Junipero to Pueblo (SE portion)	21.7	0.0	0.0	-21.7
6	Junipero Street	Fletcher to Oak Park	8.4	65.0	0.0	-8.4
7	Oak Park Lane	Junipero to Pueblo	15.7	90.0	9.9	-5.8
8	Junipero Street	Oak Park to Alamar	6.9	7.0	4.3	-2.6
9	Pueblo Street	Oak Park to Calle Real	41.4	53.6	9.5	-31.9

Source: Fuscoe (2004)

The proposed concrete box storm drain (PF 10-4) would not alter the amount of flood flows entering Mission Creek and therefore would not result in downstream flooding. This proposed project feature would be required to prevent significant flooding impacts at the project in the project area. Mission Creek would receive higher velocity flows at the Oak Park inlet; however, the creek is fully concrete lined at the existing inlet and no erosion or scour impacts would occur. This inlet would be resized to accommodate the increased flows and. This proposed project feature would be required to prevent significant flooding impacts at the inlet.

Because the proposed project involves closure of Castillo Street, runoff from this street would bypass the Junipero Street and Pueblo Street inlets to Mission Creek. This reach of Mission Creek is partially channelized and the vegetation is degraded.[2] The reductions in flow to the Junipero Street and Pueblo Street inlets would improve the local drainage conditions at these

1 Refers to the actual location within the street that the calculation was made.
2 Project Clean Water Annual Report. 1998–99.

collection points during storm events, and the reductions in flow would not result in adverse impacts to this section of the creek because this area of the creek is concrete-lined and vegetation is limited and degraded.

The proposed project would not result in an increase in impervious area and therefore would not reduce the opportunity for groundwater recharge. However, changes to groundwater rechargeability with implementation of the proposed project are considered minimal, because the amount of impervious area would only be reduced by one percent.

Because the proposed project would change the drainage pattern of the area, project features are required to prevent significant hydrological impacts with respect to storm flows. At the same time, the proposed project features to construct a new subsurface storm drain system (PFs 10-1, 10-2, 10-3, and 10-4) would convey the majority storm flows below the ground surface within the intersection of Junipero Street/Castillo Street and would also provide additional flood protection from existing overbank flows from Mission Creek during the 100-year storm, resulting in a beneficial impact. Without these project features, hydrology impacts would be significant.

As a an additional measure, a final hydrology and hydraulics study prepared in accordance with City standards is necessary to ensure that the proposed project features are appropriately designed. Construction of a new subsurface storm drain system (PFs 10-1, 10-2, 10-3, and 10-4) would provide a beneficial impact with respect to on-site and surrounding hydrology. They would be evaluated under Mitigation Measure HYD-3, Flood Hazard Reduction, for compliance with the Municipal Code. Likewise, the increase in landscaping (PF 10-6) would reduce storm flows slightly. ***Compliance with Mitigation Measures HYD-1 (Final Hydrology and Hydraulics Study) and HYD-3 would reduce potential hydrology impacts to less than significant levels.*** Mitigation Measures HYD-1 and HYD-3 would not result in adverse physical effects because they are standard regulatory review requirement to prevent environmental impacts.

➢ Floodplain Impacts (Project Long-Term)

The proposed project has the potential to increase 100-year flood elevations due to changes in drainage patterns with the proposed closure of Castillo Street and due to development within a 100-year flood hazard area. Any increase in the flood elevations would be considered a significant impact.

As mentioned above, the proposed drainage pattern would result in an increase of flows to Junipero Street between Fletcher and Oak Park Lane and to Oak Park Lane between Junipero Street and Pueblo Street, due to the closure of Castillo Street through the project site. In order to accommodate the change in drainage patterns due to the closure of Castillo Street and to accommodate existing upstream breakout flows from Mission Creek, a new RCB would be constructed within Junipero Street (PF 10-4). PF 10-4 would allow for approximately 1,800 cfs of overbank flows from Mission Creek to be diverted into this storm drain, thereby removing the flood potential for this runoff through the project area.

Under the existing condition, the 100-year floodplain covers a significant portion of the hospital property, including all areas southwest of Castillo Street, and also inundates all private property between Castillo Street and Mission Creek (Figure 10.2). Under the proposed condition, without project features, the closure of Castillo Street would result in increased

flooding in the regions west of the Castillo Street/Junipero Street intersection and south of Oak Park Lane, both of which contain private property and hospital property areas (Figure 10.5). The implementation of PF 10-4 (a 10' x 10' RCB within Junipero Street) would substantially reduce the flooding potential of these areas, thereby resulting in a decrease of flood elevations for those hospital and private properties (Figure 10.6). At the specific intersection of Castillo Street and Junipero Street; however, existing water surface elevations for a 100-year storm will increase by a range of 0.75 to 0.83 feet because inlet constraints do not allow for all the off-site sheet flows from Castillo Street and Junipero Street to be collected at one point along the culvert improvement. All structures within the vicinity of this increase in water surface elevations are owned by SBCH and this increase in flood elevation will be off-set by the continual reduction in flood elevations as sheet flows are diverted into the storm drain box all along Junipero Street between Castillo Street and Oak Park Lane. All areas southwest of Castillo Street would experience a decrease of water surface elevations during a 100-year flood ranging from 0.50 to 2.50 feet. That is, implementation of PF 10-4 would remove more than two City blocks southeast of the hospital from within the 100-year floodplain, thereby alleviating the mandatory flood insurance requirements for this area.

A flow gutter analysis was performed (Penfield & Smith 2004) to determine potential changes in sheet flow and identify potential impacts. This analysis found that the proposed new storm drain system (PFs 10-1, 10-2, 10-3, and 10-4) would reduce the overtopping of 100-year storm flood flows onto sidewalks and surrounding properties. That is, the 100-year storm flows would remain within the height of the street curbs. This is a beneficial impact. The City of Santa Barbara submitted a Conditional Letter of Map Revision (CLOMR) to the Federal Emergency Management Agency (FEMA) on May 28, 2003 reflecting the change proposed by the proposed project. FEMA responded to the CLOMR on October 8, 2003 and determined a revision to the Flood Insurance Rate Map (FIRM) would be warranted upon submittal of final detailed applications, certification forms, hydraulic analyses and fee payment. Mitigation Measure HYD-2 (Letter of Map Revision) requires the City to submit this information to FEMA prior to issuance of a grading or building permit for the proposed project.

In summary, the new storm drain system (PFs 10-1, 10-2, 10-3, 10-4) would provide a beneficial impact to the project site and surrounding area with respect to the 100-year floodplain. Mitigation Measures HYD-1 (Final Hydrology and Hydraulics Study) and HYD-2 (Letter of Map Revision) are required to verify the changes proposed by the project features and would reduce potential floodplain impacts to less than significant levels. Mitigation Measures HYD-1 and HYD-2 would not result in a physical effect on the environment because they are standard regulatory review requirements.

➢ Water Quality Impacts (Project Long-Term)

The proposed project does not involve a change in land use, and would not increase impervious area at the project site (PF 10-6, Increased Landscaping). However, the hospital may experience an intensification of uses and other operational changes (e.g., helipad operation) that could increase pollutant loadings to Mission Creek. Although the proposed project reduces the impervious surface area of the existing site, the proposed project may create new pollutant sources for storm water runoff contamination. As a result, the proposed project has the potential to cause or contribute to the exceedance of downstream receiving water quality standards.

The Municipal NPDES Permit and the City Storm Water Management Program require implementation of BMPs for new development/redevelopment projects to prevent significant impacts to water quality. Standard source control BMPs for design are shown in Table 10.L. These BMPs are practices that prevent pollution at the source. In addition to site design BMPs, the project is required to implement other source control BMPs to reduce impacts to water quality as detailed in Mitigation Measure HYD-5 (Project Storm Water Management Plan) and to implement water conservation measures to reduce runoff (PF 12-4 and Mitigation Measure PS-1).

TABLE 10.L: SOURCE CONTROL BMPS FOR DESIGN

Identifier	Name	Check One		Comment
		Included	Not Included	
SD-10	Site Design and Landscape Planning	√		PF 10-6, Mitigation Measure HYD-4
SD-11	Roof Runoff Controls	√		Mitigation Measure HYD-6
SD-12	Efficient Irrigation	√		Mitigation Measure HYD-4
SD-13	Storm Drain System Signs	√		Mitigation Measure HYD-6
SD-20	Pervious Pavements	√		Mitigation Measure HYD-6
SD-21	Alternative Building Materials	√		Mitigation Measure HYD-6
SD-30	Fueling Areas		√	No fueling areas
SD-31	Maintenance Bays and Docks		√	No maintenance areas
SD-32	Trash Enclosures	√		Mitigation Measure HYD-6
SD-33	Vehicle Washing Areas		√	No vehicle washing
SD-34	Outdoor Material Storage Areas	√		Mitigation Measure HYD-6
SD-35	Outdoor Work Areas	√		Mitigation Measure HYD-6
SD-36	Outdoor Processing Areas		√	No outdoor processing

Source: *California Stormwater Handbooks—New Development and Redevelopment* (2003).
SD = Site Design

The proposed project does not include treatment BMPs as part of the project description. However, the Municipal NPDES Permit requires the City to implement treatment BMPs in accordance with specific design standards for certain categories of development, which includes the proposed project. Table 10.M shows treatment control BMPs that have been determined to be applicable to the proposed project (Mitigation Measure HYD-6, Operation and Maintenance Plan). The proposed location of these BMPs is shown in Figure 10.4.

Several studies have been conducted to evaluate the effectiveness of treatment control BMPs at removing pollutants in urban runoff. Although results are variable, the California Storm Water Quality Task Force and other public agencies have designated high, medium, and low removal efficiencies for the standard treatment BMPs used in California and throughout the nation. These are shown in Table 10.N.

Due to project site sizing constraints, as well as poor soil characteristics (low infiltration rate), volume-based treatment BMPs such as infiltration trenches and constructed wetlands are infeasible for treating storm water runoff for the project site. Appropriate treatment control measures for the proposed land use include vegetated swales, landscaping, catch

TABLE 10.M: TREATMENT CONTROL BMPS

Identifier	Name	Identifier	Name	Check One		
Public Domain		Manufactured (Proprietary)		Included	Not Included	Comment
Infiltration						
TC-10	Infiltration Trench				√	Poor soil infiltration rates
TC-11	Infiltration Basin				√	Sizing constraints, poor soil infiltration rates
TC-12	Retention/Irrigation				√	Sizing constraints, poor soil infiltration rates
Detention and Settling						
TC-20	Wet Pond				√	Sizing constraints
TC-21	Constructed Wetland	MP-20	Wetland		√	Sizing constraints
TC-22	Extended Detention Basin				√	Sizing constraints
Biofiltration						
TC-30	Vegetated Swale			√		Mitigation Measure HYD-7
TC-32	Bioretention				√	Equivalent measures are proposed (refer to Table 10.N)
Filtration						
TC-40	Media Filter	MP-30	Media Filter	√		Mitigation Measure HYD-7
Flow through Separation						
		MP-50	Wet Vault		√	Equivalent measures are proposed (refer to Table 10.N)
		MP-51	Vortex Separator	√		Mitigation Measure HYD-7
		MP-52	Drain Insert	√		Mitigation Measure HYD-7
TC-60	Multiple Systems			√		Mitigation Measure HYD-7

Source: *California Stormwater Handbooks—New Development and Redevelopment* (2003).
TC = Treatment Control
MP = Manufactured (Proprietary)

TABLE 10.N: TREATMENT CONTROL BMP REMOVAL EFFICIENCIES

Pollutant of Concern	Treatment Control BMP Categories					
	Biofilters	**Detention Basins[2]**	**Infiltration Basins[3]**	**Wet Ponds or Wetlands**	**Filtration**	**Hydrodynamic Separator Systems[4]**
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	H/M (L for Turbidity)
Nutrients	L	M	H/M	H/M	LM	L
Organic Compounds	U	U	U	U	H/M	L
Trash and Debris	L	M	U	U	H/M	H/M
Oxygen-Demanding Substances	L	M	H/M	H/M	H/M	L
Bacteria and Viruses	U	U	H/M	U	H/M	L
Oil and Grease	H/M	M	U	U	H/M	L
Pesticides (nonsoil bound)	U	U	U	U	U	L

(1) Cooperative periodic performance assessment may be necessary. This Treatment Control BMP table will be updated as needed and as knowledge of storm water treatment BMPs improves.
(2) For detention basins with minimum 36- to 48-hour drawdown time.
(3) Including trenches and porous pavement.
(4) Also known as hydrodynamic devices and baffle boxes.
L: Low removal efficiency
H/M: High or medium removal efficiency
U: Unknown removal efficiency
Sources: Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993), National Stormwater Best Management Practices Database (2001), and Guide for BMP Selection in Urban Developed Areas (2001).

Biofilters include:
- Grass swales
- Grass strips
- Wetland vegetation swales
- Bioretention

Detention Basins include:
- Extended/dry detention basins with grass lining
- Extended/dry detention basins with impervious lining

Infiltration Basins include:
- Infiltration basins
- Infiltration trenches

Wet Ponds and Wetlands include:
- Wet ponds (permanent pool)
- Constructed wetlands

Filtration Systems include:
- Media filtration
- Sand filtration

Hydrodynamic Separation Systems include:
- Swirl Concentrators
- Cyclone Separators

Source: Orange County Drainage Area Management Plan, Exhibit 7.II: Model Water Quality Management Plan.

basin inserts, vortex separation, and/or media filtration (Mitigation Measure HYD-6). Hydrodynamic separation effectively removes trash and debris, sediments, and oil and greases, while media filtration has been reported to have high/medium removal efficiency capabilities for bacteria/virus and high removal efficiencies for organics. Either a hydrodynamic separator or media filtration unit is necessary near the terminus of the proposed storm drain line between the proposed Patient Pavilion and the Diagnostic and Treatment Building prior to its connection to the Oak Park Lane public storm drain improvement (Mitigation Measure HYD-6). In addition, catch basin inserts and vegetated swales effectively treat pollutants of concern related to parking lots, such as oil and grease. Catch basin inserts thus or equivalent are necessary for the Knapp and Pueblo parking structures located within the project boundary, while vegetated swales are anticipated to be located along Junipero Street adjacent to the Diagnostic and Treatment Building, Centennial Building, and Central Services Plant (Mitigation Measure HYD-6). Landscaping would be located throughout the project site, which would minimize impervious surfaces (PF 10-6, Increased Landscaping). The benefits associated with landscaping include infiltration, storm water retention, and reduced runoff velocities. Through this, landscaping is capable of removing storm water pollutants through physical and biological processes, including absorption, filtration, decomposition, sedimentation, and volatilization.

Since bacteria is associated with many land uses and it has impaired the beneficial uses of Mission Creek, it requires special consideration. Because the proposed project would result in a reduction of impervious area, it is anticipated that concentrations of bacteria from the project site would decrease due to the lower amount of runoff. Media filters have been found to be effective at removing bacteria, while hydrodynamic separators have some secondary bacterial removal by removing substrate such as trash and sediment (Table 10.N and Mitigation Measure HYD-6). Furthermore, the project site does not currently have any storm water treatment control BMPs in place.

Several studies have been completed that study the sources of bacteria in urban watersheds. Sources include sanitary sewer overflows, illegal sanitary connections to storm drains, illegal disposal to storm drains, dogs, cats, rats, raccoons, pigeons, gulls, ducks, and geese.[1] The combination of high densities of people and animals and high percentages of impervious area in urban watersheds contributes to high bacteria concentrations in coastal waters.[2] Refer to Chapter 9.0, Hazards and Hazardous Materials for a discussion of sewage hazards and medical waste as they relate to disease-causing bacteria (pathogens).

The design, location, and size of the treatment control BMPs evaluated for the proposed project are subject to change during the final design, but the combination of these types of BMPs would demonstrate compliance with the design criteria for treatment control BMPs as required in the Storm Water Management Plan and the Municipal NPDES Permit.

Adequate long-term maintenance of treatment BMPs is required to ensure that they perform as designed (Mitigation Measure HYD-6, Operation and Maintenance Plan).

The proposed project would be required to implement source control BMPs (Mitigation Measure HYD-5, Project Storm Water Management Plan) and treatment control BMPs

---

1 *Microbes and Urban Watersheds: Concentrations, Sources, & Pathways*. Center for Watershed Protection, *Watershed Protection Techniques* 3(1): 554–565.

2 Young, Katherine D. and Edward L. Thackston. *Housing Density and Bacterial Loading in Urban Streams.* Journal of Environmental Engineering. December 1999.

(Mitigation Measure HYD-6, Operation and Maintenance Plan) that are not currently being implemented. The Storm Water Management Plan is subject to review and approval by the City, which can require additional feasible BMPs (Mitigation Measure HYD-7, City Storm Water Management Plan Compliance).Water conservation practices to reduce runoff would be refined and expanded (PF 12-4 and Mitigation Measure PS-1, Water Conservation). The proposed project would be required to comply with City and State requirements regarding waste disposal (HYD-4, Water Pollution Control). Storm water runoff would be reduced due to the reduction in impervious area with implementation of the project (PF 10-6, Increased Landscaping). ***For these reasons, pollutant loadings to Mission Creek are anticipated to be lower with implementation of the project and prescribed mitigation measures, and no significant impacts to water quality would occur.***

10.6.2 HYDROLOGY/WATER - MITIGATION MEASURES (PROJECT LONG-TERM)

HYD-1 Final Hydrology and Hydraulics Study. During final design and prior to the issuance of any grading permits, a final hydrology and hydraulics study shall be submitted to and approved by the Public Works Director. The study shall include:

- Diversions, off-site areas that drain onto and/or through the project, and justification of any diversions.
- Evidence that the proposed drainage pattern would not overload the storm drain system.
- Indication of how the project grading, in conjunction with the drainage conveyance systems, including applicable swales, channels, street flows, catch basins, storm drains, and flood water retarding, would allow building pads to be safe from inundation from rainfall runoff which may be expected from all storms up to and including theoretical 100-year flood.

HYD-2 Letter of Map Revision. During final project design, and prior to the issuance of any grading permits, the applicant shall submit detailed applications, certification forms, and hydraulic analyses and obtain pre-review and approval from the City floodplain manager, and shall submit the completed Conditional Letter of Map Revision (CLOMR) application and obtain conditional approval from FEMA. Upon completion of project construction work within the floodplain, the applicant shall submit "as-built" construction documentation verifying conformance with the CLOMR to obtain pre-review and approval from the City floodplain manager, and shall submit the completed Letter of Map Revision (LOMR) application to obtain approval from FEMA.

HYD-3 Flood Hazard Reduction. During final project design, and prior to the issuance of any grading permits, the applicant shall ensure that the project complies with Chapter 22.24.160, General *Standards for Flood Hazard Reduction*, of the City of Santa Barbara Municipal Code.

HYD-4 Water Pollution Control. During project operation, the applicant shall ensure that waste, infectious waste, contamination or pollution or other substance which could impair the quality of a drainage is not deposited in any drain, drop inlet, conduit, or natural or artificial watercourse flowing into any storm drain, creek, lagoon or other waters of the State, consistent with the requirements of Chapter 16.15.010, *Water Pollution Prohibited*, of the City of Santa Barbara Municipal Code, and storage requirements of the State Medical Waste Management

Act (22CCR Sections 65600-65628). Compliance with this measure shall be enforced via periodic City inspections in compliance with its Storm Water Management Plan. Medical Waste Management Plan review and approval is required by Mitigation Measure HAZ-6.

HYD-5 Project Storm Water Management Plan. Prior to the issuance of any grading or building permit (whichever comes first), the applicant shall submit for review and approval by the Public Works Director, a Storm Water Management Plan (SWMP) specifically identifying best management practices (BMPs) that would be used onsite to control predictable pollutant runoff and target pollutants of concern. This SWMP shall identify, at a minimum, the routine structural and non-structural measures specified in the current Municipal NPDES Permit. The SWMP will include the following:

- Address site design BMPs (as applicable) such as minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "zero discharge" areas, and conserving natural areas;
- Include the applicable routine source control BMPs as defined in the Municipal NPDES Permit and City Storm Water Management Program. These BMPs shall include:
    - Roof drain outlets to landscaped areas where feasible.
    - Diversion of runoff around trash storage areas. Trash containers will be covered and walled to prevent off-site transport of trash.
    - All catch basins shall be stenciled with "No Dumping-Flows to Creek" or other equally effective message.
    - Parking lot and street sweeping on a regular basis (at least monthly).
    - Proper design of outdoor working areas and material storage areas to prevent discharge of sediment or pollutants to the storm drain system.
    - Pervious pavements where feasible.
    - Alternative building materials where feasible.
- Demonstrate how surface runoff and subsurface drainage shall be managed and directed to the nearest acceptable drainage facility.

HYD-6 Operational and Maintenance Plan. Prior to the issuance of any grading or building permit (whichever comes first), the applicant shall include in the SWMP the following additional information in a manner meeting the approval of the Public Works Director.

- Include post-construction structural treatment control BMPs as defined in the Municipal NPDES Permit and City Storm Water Management Program. As part of this requirement, the project shall include:
    - A hydrodynamic separation unit or media filtration system within the storm drain system near the terminus of the main storm drain line prior to its connection to the Oak Park Lane public storm drain to treat runoff from a portion of the East and West blocks associated with the project site. Hydrodynamic separators are designed to treat low-flow runoff and are well suited to remove trash, debris, sediment, particulates, and pollutants typically attached to sediment, such as trace metals from urban runoff. Media filtration units typically remove oil and grease, trash and debris, oxygen-demanding substances, bacteria and viruses, and organic compounds.

Vegetated swales or their equivalent along Junipero Street, adjacent to the Diagnostic and Treatment Building, Centennial Building, and Central Services Plant. Swales can effectively trap particulate pollutants (suspended solids & trace metals), promote infiltration, and reduce the flow velocity of storm water runoff.

Catch basin inserts or equivalent in storm drain inlets that receive parking lot runoff within the project site. Specific locations include the Knapp parking structure located at the "north block" and the Pueblo parking structure located at the "south block."

- Include a conceptual Operation and Maintenance (O&M) Plan that (1) describes the long-term operation and maintenance requirements for the post-construction Treatment Control BMP(s); (2) identifies the entity that would be responsible for long-term operation and maintenance of the referenced treatment control BMP(s); and (3) describes the proposed mechanism for funding the long-term operation and maintenance of the referenced treatment control BMP(s)

HYD-7 City Storm Water Management Plan Compliance. Prior to the issuance of a certificate of use and occupancy, the applicant shall demonstrate compliance with the SWMP in a manner meeting the satisfaction of the Public Works Director, including:

- Demonstrate that all structural best management practices (BMPs) described in the project's SWMP have been implemented, constructed and installed in conformance with approved plans and specifications;
- Demonstrate that the applicant has complied with all non-structural BMPs described in the project's SWMP; and
- Submit for review and approval an Operations and Maintenance (O&M) Plan for all structural BMPs for attachment to the SWMP.

10.6.3 SPECIFIC PLAN LONG-TERM HYDROLOGY/WATER IMPACTS

This section analyzes on-site or off-site hydrology, floodplain, and water quality impacts that could occur with build out and operation of the specific plan (SP-8).

➢ Hydrology Impacts (Specific Plan Long-Term)

Similar to the proposed project, long-term impacts could occur to hydrology due to changes in drainage patterns. Specific features and standard mitigation measures would be required to ensure that significant hydrology impacts do not occur with any future development (fourth nursing pavilion) allowed under the specific plan. These features may include storm drain improvements and increased landscaping as well as other site design BMPs to reduce storm flows from the area. Mitigation Measures required to reduce hydrological impacts for any new project (HYD-1, Final Hydrology and Hydraulics Study and HYD-3, Flood Hazard Reduction) are applicable to the specific plan. ***With specific project features and mitigation measures, implementation of the specific plan, in combination with the project, would not result in significant impacts to hydrology.***

➢ Specific Plan Long-Term Floodplain Impacts (Specific Plan Long-Term)

Similar to the proposed project, future development allowed under the specific plan could result in long-term flood elevation changes due to the change in the drainage patterns. The proposed future development would need to include specific features and standard mitigation measures to prevent potential significant floodplain impacts. Mitigation measures required to reduce floodplain impacts for any new project (HYD-1 and HYD-2, Letter of Map Revision) are applicable to the specific plan. ***With specific project features and mitigation measures, implementation of the specific plan, in combination with the project, would not result in significant impacts to floodplains.***

➢ Water Quality Impacts (Specific Plan Long-Term)

Similar to the proposed project, future development allowed under the specific plan could result in long-term water quality impacts due to increased impervious area or increased pollutant loadings. Implementation of future development allowed under the specific plan would require evaluation of potential pollutants that could discharge to the storm drain system and receiving waters and existing impairments of receiving waters. Project features such as reduction of impervious areas and mitigation measures such as source control BMPs, treatment BMPs, water conservation practices, and other Storm Water Management Plan requirements are required to prevent significant water quality impacts. Mitigation Measures required to reduce water quality impacts for any new project (HYD-4 (Water Pollution Control), HYD-5 (Project Storm Water Management Plan), HYD-6 (Operation and Maintenance Plan), and HYD-7 (City Storm Water Management Plan Compliance) are applicable to the specific plan. ***With specific project features and mitigation measures, implementation of the specific plan, in combination with the project, would not result in significant impacts to water quality.***

10.6.4 CUMULATIVE LONG-TERM HYDROLOGY/WATER IMPACTS

Impacts analyzed in this section are operational impacts that could occur on-site or off-site with implementation of the project, the specific plan, and any other reasonably foreseeable projects within the Mission Creek Watershed.

Past projects in the Mission Creek Watershed reflect a continuation of the existing urban/suburban pattern of development, which has resulted in modifications to Mission Creek and increases in impervious area and pollutant loads. The development of vacant lands and redevelopment of existing uses, could result in increased storm flows, flooding, changes to flood elevations, and urban pollutants in runoff from project sites. Development of NPDES regulations has focused on improving water quality by targeting new development and redevelopment and considering hydrology and floodplain changes. Each new project must comply with NPDES permitting requirements and the respective municipal code and include BMPs to prevent degradation of water quality as well as adverse hydrology and floodplain impacts.

➢ Hydrology Impacts (Cumulative Long-Term)

Implementation of the proposed project and/or future development under the Specific Plan has the potential to cumulatively contribute to hydrology impacts due to the change in the drainage pattern. However, each new project is subject to the requirements of the applicable municipal

code. These standard requirements have enforcement provisions to ensure that each project is not adversely affecting on-site and off-site hydrology. Project features and standard mitigation measures are necessary to prevent potential significant hydrology impacts that could occur when considering other development within the watershed. ***By adherence to the standard requirements and enforcement action by the City (Mitigation Measures HYD-1, Final Hydrology and Hydraulics Study and HYD-3, Flood Hazard Reduction) as well as project-specific features, the proposed project's contribution to combined effects on hydrology from past, present, and reasonably foreseeable projects within the Mission Creek Watershed would not be significant.***

- **Floodplain Impacts (Cumulative Long-Term)**

Implementation of the proposed project and/or future development under the Specific Plan has the potential to cumulatively contribute to long-term flood elevation impacts due to the change in the drainage pattern. Standard requirements and enforcement and project-specific features are applicable to floodplains and are necessary to prevent potential significant impacts. By adherence to the standard requirements and enforcement action by the City (Mitigation Measures HYD-1, and HYD-2, Letter of Map Revision) as well as project-specific features, ***the proposed project's contribution to combined effects on the floodplain from past, present, and reasonably foreseeable projects within the Mission Creek Watershed would not be significant.***

- **Water Quality Impacts (Cumulative Long-Term)**

Implementation of the proposed project and/or future development under the Specific Plan has the potential to cumulatively contribute to long-term water quality impacts due to changes in impervious area or increased pollutant loadings. Standard requirements and enforcement and project-specific features are necessary to reduce potential water quality impacts. Project-specific features such as reduction of impervious areas contribute to the reduction in potential significant water quality impacts. ***By adherence to the standard requirements and enforcement action by the City and State (i.e., Mitigation Measures HYD-4 [Water Pollution Control], HYD-5 [Project Storm Water Management Plan], HYD-6 [Operation and Maintenance Plan], and HYD-7 [City Storm Water Management Plan Compliance]) as well as project-specific features, the proposed project's contribution to combined effects on water quality from past, present, and other reasonably foreseeable projects within the Mission Creek Watershed would not be significant.***

10.7 HYDROLOGY/WATER IMPACTS - TEMPORARY CONSTRUCTION

Construction impacts are those that could potentially occur at any time throughout the four-phase construction period that affect on-site or off-site hydrology, floodplains, or water quality.

10.7.1 PROJECT CONSTRUCTION - HYDROLOGY/WATER IMPACTS

➢ Hydrology Impacts (Project Construction)

There is the potential for substantial hydrology impacts during construction of the proposed project due to changes in drainage patterns, which could result in localized flooding and soil erosion.

The proposed project includes several proposed storm drain improvements. As these improvements are being constructed over the four-phase construction period, there is the potential for storm water to collect in streets surrounding the hospital due to excavation activities. In addition, during the closure of Castillo Street, storm water would be rerouted and has the potential to cause flooding on Junipero Street between Fletcher Street and Oak Park Lane and on Oak Park Lane between Junipero Street and Pueblo Street.

Erosion and ponding of water in disturbed soil areas could occur, especially during the rainy season. Dewatering of perched groundwater may be required during deep excavations (refer to Chapter 8.0, Geophysical). Dewatering of groundwater must be conducted in compliance with RWQCB requirements so that it does not cause localized flooding or impair off-site water quality.

The proposed project would be required to comply with the provisions of the General Construction Permit. This permit requires preparation of a SWPPP and implementation of BMPs to address water and wind soil erosion, sediment discharge, sediment tracking, nonstorm water management such as water conservation and equipment cleaning, materials and waste management, and good housekeeping practices (Table 10.C). The City's Municipal Code details requirements to prevent significant impacts regarding erosion of on-site soils and requires preparation of an Erosion Control Plan. The Municipal Code also details requirements to reduce flood hazards.

Implementation of General Construction Permit requirements, an Erosion Control Plan, a Flood Hazard Reduction Plan, and RWQCB dewatering requirements would reduce potential hydrology impacts during construction of the proposed project to less than significant levels. ***Therefore, implementation of Mitigation Measures HYD-8 (General Construction Permit), HYD-9 (Erosion Control Plan), HYD-10 (Flood Hazard Reduction Plan) and HYD-11 (Dewatering) would reduce potential project construction-related hydrology impacts to less than significant levels.*** There would be no adverse physical effects from implementation of these mitigation measures because they are standard regulatory requirements to prevent adverse environmental effects.

➢ Floodplain Impacts (Project Construction)

Floodplains are typically defined by post-development boundaries only and construction activities associated with the proposed project are not anticipated to affect the existing 100-year floodplain boundary. There is a potential for localized flooding impacts, which are addressed above under hydrology. ***Therefore, construction-related floodplain impacts would not be significant, and no mitigation is required.***

➢ Water Quality Impacts (Project Construction)

Construction of the proposed project has the potential to substantially impact water quality due to the potential for discharge of sediments (from erosion or tracking), pollutants (from improper hazardous waste or solid waste management), or contaminated groundwater into the City's storm drain system.

Clearing, grading, excavation, and construction activities associated with the proposed project may create potential sources for runoff contamination, which would impact water quality due to sheet erosion of exposed soils and subsequent deposition of particles and pollutants in drainage areas. Grading activities, in particular, lead to exposed areas of loose soil, as well as sediment stockpiles that are susceptible to uncontrolled sheet flow. The use of materials such as fuels, solvents, and paints also presents a risk to surface water quality due to an increased potential for non-visible pollutants entering the storm drain system. If uncontrolled, these materials could lead to significant water quality problems, including sediment-laden runoff, prohibited non-storm water discharges, and ultimately the degradation of downstream receiving water bodies, such as Mission Creek. During construction, SBCH is required to adhere to the General Construction Permit and utilize applicable BMPs (Table 10.C) specifically identified in the SWPPP for the project in order to prevent construction-related pollutants from discharging from the site in accordance with permit requirements. The proposed project also must adhere to RWQCB requirements regarding dewatering of groundwater.

The City's Municipal Code provides requirements regarding erosion control, prohibition of water pollution, and prohibition of hazardous substances discharge in order to prevent significant impacts to water quality. The proposed project would be required to comply with these provisions during the construction period.

Construction sites are subject to inspection by the RWQCB (General Construction Permit) and would be subject to inspection by the City under the Municipal NPDES Permit. The General Construction Permit requires the discharger (contractor) to inspect the site prior to an anticipated storm, during extended storm events, and after actual storm events to ensure that BMPs are functioning properly. For construction activities that disturb one acre or more of soil (such as the proposed project), the SWRCB considers compliance with the provisions of the General Construction Permit to be sufficient to protect beneficial uses of receiving waters and prevent degradation of water quality. The Municipal Code requirements provide for some redundancy with respect to water quality protection. ***Therefore, implementation of Mitigation Measures HYD-8 (General Construction Permit), HYD-9 (Erosion Control Plan), HYD-11 (Dewatering), HYD-12 (Discharge of Hazardous Substances) and HYD-13 (Water Pollution Control) would reduce potential sediment or pollutant impacts to surface waters or groundwater, or other degradation of water quality, to less than significant levels.*** There would be no adverse physical effects from implementation of these mitigation measures because they are standard regulatory requirements to prevent adverse environmental effects.

10.7.2 HYDROLOGY/WATER - MITIGATION MEASURES (PROJECT CONSTRUCTION)

HYD-8 State General Construction Activity Permit. Prior to the issuance of any grading or building permits, the applicant shall demonstrate compliance under the State General Permit for Storm Water Discharges Associated with Construction Activity by providing a copy of the

Notice of Intent (NOI) submitted to the State Water Resources Control Board and a copy of the subsequent notification of the issuance of a Waste Discharge Identification (WDID) Number or other proof of filing in a manner meeting the satisfaction of the Public Works Director. Projects subject to this requirement shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP). A copy of the current SWPPP shall be kept at the project site and be available for City review on request.

HYD-9 Erosion Control Plan. Prior to the issuance of any grading or building permit, the applicant shall submit a Erosion Control Plan in a manner meeting approval of the Public Works Director, consistent with the City's *Procedures for the Control of Runoff into Storm Drains and Watercourses* to demonstrate compliance with local and state water quality regulations for grading and construction activities. The Erosion Control Plan shall address the specifications for each construction phase and shall identify how all construction materials, wastes, grading or demolition debris, and stockpiles of soil, aggregates, soil amendments, etc. shall be properly covered, stored, and secured to prevent transport into local drainages by wind, rain, tracking, tidal erosion or dispersion. The Erosion Control Plan shall also describe how the applicant would ensure that all BMPs would be maintained during construction of any public right-of-ways. A copy of the current Erosion Control Plan shall be kept at the project site and be available for City review on request.

HYD-10 Flood Hazard Reduction Plan. Prior to the issuance of any grading or building permit, the applicant shall submit a Flood Hazard Reduction Plan in a manner meeting approval of the Public Works Director, consistent with the City's General *Standards for Flood Hazard*. The Flood Hazard Reduction Plan shall address the specifications for each construction phase and shall identify how storm water runoff would be controlled to prevent flooding of adjacent streets and properties. The Flood Hazard Reduction Plan shall also describe how the applicant would ensure that flood-prevention BMPs would be maintained during construction of any future applicant-sponsored improvements made within the public rights-of-way. A copy of the current Flood Hazard Reduction Plan shall be kept at the project site and be available for City review on request.

HYD-11 Dewatering. Prior to construction of each phase, the Construction Contractor shall determine whether dewatering of groundwater would be necessary for implementation of the project. If dewatering is required, the Construction Contractor shall submit a Notice of Intent (NOI) to the Central Coast Regional Water Quality Control Board (RWQCB). The Construction Contractor shall comply with the provisions of the appropriate NPDES permit required by the RWQCB.

HYD-12 Discharge of Hazardous Substances. During project construction of each phase, the Construction Contractor shall ensure that hazardous substances are not deposited into any drain, drop inlet, conduit, or natural or artificial watercourse flowing into any storm drain, creek, lagoon or other waters of the State, consistent with Chapter 16.15.100, *Discharge of Hazardous Substances Prohibited*, of the City of Santa Barbara Municipal Code.

HYD-13 Water Pollution Control. During project construction of each phase, the Construction Contractor shall ensure that waste, infectious waste, contamination or pollution or other substance which could impair the quality of a drainage is not deposited in any drain, drop inlet, conduit, or natural or artificial watercourse flowing into any storm drain, creek, lagoon or other waters of the State, consistent with the requirements of Chapter 16.15.010, *Water Pollution Prohibited*, of the City of Santa Barbara Municipal Code.

10.7.3 SPECIFIC PLAN CONSTRUCTION HYDROLOGY/WATER IMPACTS

This section analyzes construction-related on-site or off-site impacts that could occur with build out of the specific plan, SP-8. Under the specific plan, the potential fourth nursing pavilion (100 beds) is anticipated to be constructed in place of existing buildings of the main hospital (Buildings K, I, E, etc.), which could result in water resources impacts.

➢ Hydrology Impacts (Specific Plan Construction)

Because construction activities associated with the Specific Plan only involve reconstruction of existing structures, no changes to drainage patterns or increases in storm water flows would occur. ***Therefore, there would be no significant impacts to hydrology related to future Specific Plan construction, and no mitigation would be required.***

➢ Floodplain Impacts (Specific Plan Construction)

As stated earlier, construction activities of the proposed project are not anticipated to affect the existing 100-year floodplain boundary. In addition, construction activities associated with the Specific Plan would involve reconstruction of existing structures. ***Therefore, there would be no significant impacts to floodplains related to future Specific Plan construction, and no mitigation would be required.***

➢ Water Quality Impacts (Specific Plan Construction)

Any future construction as allowed under SP-8 has the potential to cause water quality impacts because of the potential for sediment tracking and transport of hazardous materials and waste off site and into the storm drain system. These potential impacts are less than those for the proposed project since construction activities under the Specific Plan would only involve reconstruction of existing structures. Compliance with mitigation measures would prevent potential significant impacts. ***Therefore, implementation of Mitigation Measures HYD-8 (General Construction Permit), HYD-9 (Erosion Control Plan), HYD-11 (Dewatering), HYD-12 (Discharge of Hazardous Substances), and HYD-13 (Water Pollution Control) would reduce potential sediment or pollutant impacts to surface waters or groundwater, or other degradation of water quality, to less than significant levels.***

10.7.4 CUMULATIVE CONSTRUCTION - HYDROLOGY/WATER IMPACTS

The cumulative study area for hydrology, floodplains, and water quality is the Mission Creek Watershed, since projects within this watershed flow directly or indirectly to Mission Creek. Hydrology impacts are generally localized at the point of impact (i.e., storm drain connections and inlets to Mission Creek and adjacent properties), however, water quality impacts potentially could occur at a greater distance due to the ability of pollutants to be transported by water. Since this watershed is mostly built-out (with the exception of the National Forest), new construction projects would mostly involve redevelopment of existing developed properties.

Impacts analyzed in this section are construction-related impacts that could occur on-site or off-site with construction of the project, the specific plan, and any other reasonably foreseeable projects within the same construction period and located within the Mission Creek Watershed.

➢ Hydrology Impacts (Cumulative Construction)

Implementation of the proposed project and/or future development under the Specific Plan has the potential to cumulatively contribute to hydrology impacts during construction due to changes in the drainage pattern. To prevent adverse hydrology impacts, the City of Santa Barbara and other municipalities stipulate specific requirements in their respective municipal codes. In addition, each new project that involves one acre or more of soil disturbance is subject to the requirements of the State General Construction Permit, which includes requirements for water and wind soil erosion control, sediment discharge control, sediment tracking control, nonstorm water management (such as water conservation and equipment cleaning), materials and waste management, and good housekeeping. These City and State requirements have enforcement provisions to ensure that each project is not adversely affecting on-site and off-site hydrology (surface flow and groundwater) during construction. ***By adherence to the standard requirements and enforcement action by the City and the RWQCB as provided in Mitigation Measures HYD-8 (General Construction Permit), HYD-9 (Erosion Control Plan), HYD-10 (Flood Hazard Reduction Plan), and HYD-11 (Dewatering), the proposed project's contribution to combined effects on hydrology from past, present, and reasonably foreseeable construction projects within the Mission Creek Watershed would not be significant.***

➢ Floodplain Impacts (Cumulative Construction)

As stated earlier, construction activities in themselves do not affect physical floodplain boundaries. There is a potential for localized flooding with each new project, but this hydrological cumulative impact is addressed above. ***Therefore, the proposed project's contribution to combined effects on floodplains from past, present, and reasonably foreseeable construction projects within the Mission Creek Watershed would not be significant.***

➢ Water Quality Impacts (Cumulative Construction)

Implementation of the proposed project and/or future development under the Specific Plan has the potential to cumulatively contribute to water quality impacts due to construction activities and associated pollutants. Each new construction project has the potential to result in a substantial discharge of sediment or pollutants into surface waters or groundwater or to otherwise degrade water quality. Larger construction projects (greater than five acres) have a greater potential to impact water quality due to the amount of area disturbed. City and State requirements and enforcement for water quality during construction are designed to prevent adverse impacts to water quality. ***Therefore, by adherence to the standard requirements and enforcement action by the City and the RWQCB as set forth in Mitigation Measures HYD-8 (General Construction Permit), HYD-9 (Erosion Control Plan), HYD-11 (Dewatering), HYD-12 (Discharge of Hazardous Substances), and HYD-13 (Water Pollution Control), the proposed project's contribution to combined effects on water quality from past, present, and reasonably foreseeable construction projects within the Mission Creek Watershed would not be significant.***

10.8 SUMMARY OF HYDROLOGY/WATER IMPACTS

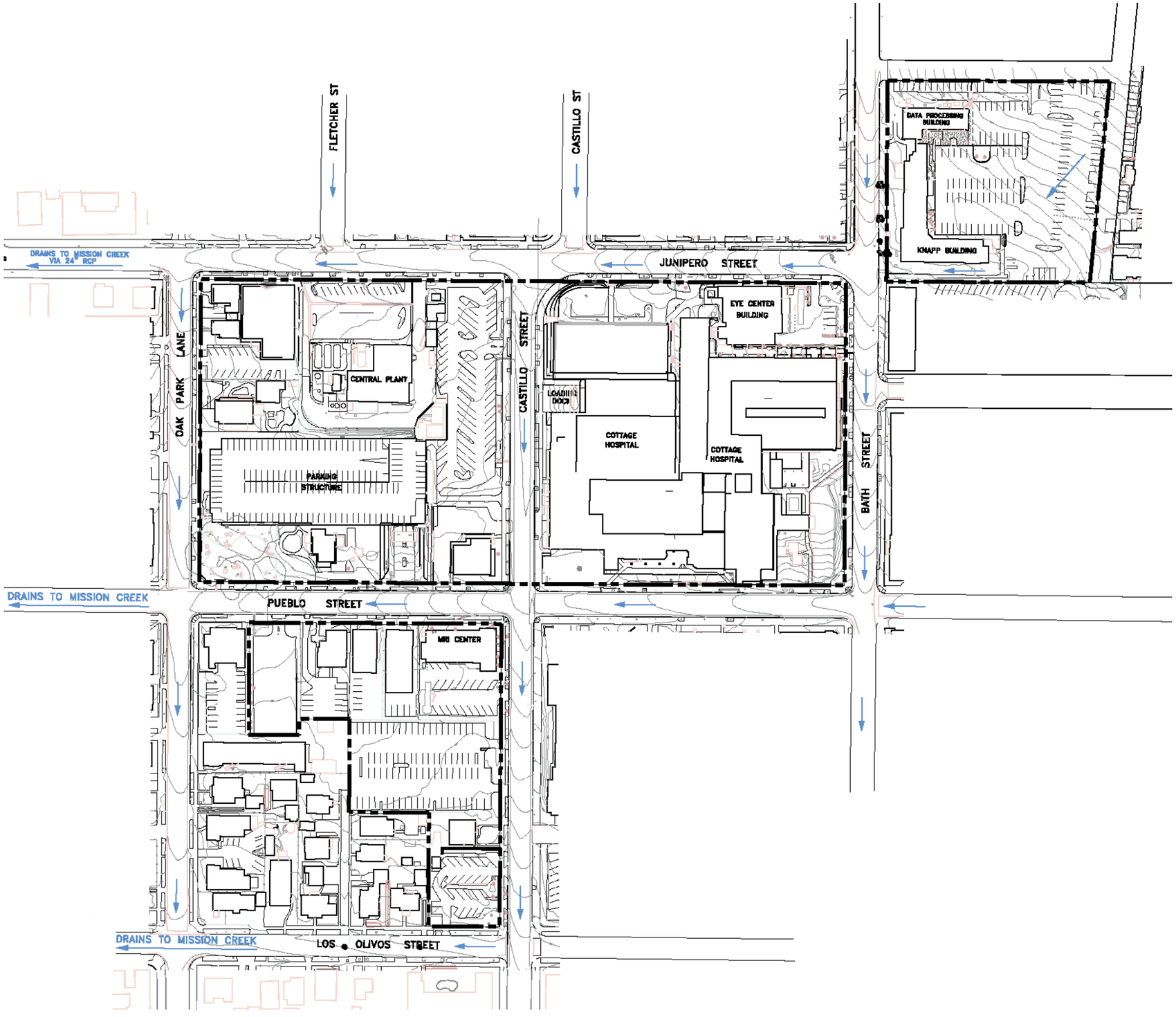
The proposed project and potential future development as allowed under the Specific Plan have the potential to result in the following long-term impacts:

- Substantial changes to the drainage pattern that could result in localized flooding;
- Increases in base flood elevations within a 100-year flood hazard area;
- Substantial discharge of sediment or pollutants into surface waters;
- Otherwise degrade water quality.

The proposed project and potential future development as allowed under the Specific Plan have the potential to result in the following temporary construction impacts.

- Substantial changes to the drainage pattern that could result in localized flooding,
- Substantial discharge of sediment or pollutants into surface waters.

With implementation of the project features and mitigation measures prescribed in this chapter, hydrology, floodplain, and water quality impacts would be less than significant with construction and implementation of the proposed project or future development allowed under the Specific Plan.



LEGEND

PROJECT SITE

DIRECTION OF FLOW

SOURCE: Fuscoe Engineering

LSA

FIGURE 10.1

Santa Barbara Cottage Hospital
Seismic Compliance and Modernization Plan
Existing Site Plan and Drainage

1:\CSB4300\GIS\Ex Hydro.cdr (9/23/04)