Section 5.8:

Hydrology and Water Quality

SECTION 5.8
HYDROLOGY AND WATER QUALITY

5.8.1 PURPOSE

This section describes the existing conditions related to hydrology, drainage, and water quality within the City of Fullerton. Where significant impacts are identified, mitigation measures are identified to avoid or reduce these impacts to a less than significant level. Hydrologic and drainage impacts that could result from implementation of The Fullerton Plan are identified.

5.8.2 EXISTING REGULATORY SETTING

FEDERAL

Clean Water Act

The Clean Water Act (CWA) is a Federal law intended to protect surface waters of the United States (U.S.), which include lakes, rivers, coastal wetlands, and "waters of the U.S." The CWA regulates all discharges to waters, which are considered illegal unless authorized by an appropriate permit. Discharge of dredged and fill materials, construction-related storm water discharges, and other activities that may result in discharges of pollutants to waters of the U.S. are regulated by the permit. If waters of the U.S. are located on a project site, the project is likely to discharge to them, due to site topography and/or drainage characteristics. Potential discharges to such waters would be considered an impact, and the applicant would be required to obtain a CWA Section 401 Water Quality Certification from the appropriate Regional Water Quality Control Board (RWQCB).

The CWA specifies that discharges to waters are illegal, unless authorized by an appropriate permit. The permits regulate the discharge of dredged and fill materials, construction-related storm water discharges, and activities that may result in discharges of pollutants to "waters of the U.S.". Section 404 of the CWA establishes a permit program for the discharge of dredge or fill materials into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE). If waters of the U.S. are located on or downstream of a project site, the project may discharge to them, and if impacts on them are anticipated, the project must obtain a CWA Section 401 Water Quality Certification from the appropriate RWQCB. Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES), a permitting system for the discharge of any pollutant (except for dredge or fill material) into waters of the U.S. This permitting program is administered by the RWQCBs. In addition, Section 303 and 304 of the CWA provide for water quality standards, criteria, and guidelines.

National Pollutant Discharge Elimination System (NPDES)

The National Pollutant Discharge Elimination System (NPDES) program is administered by the Environmental Protection Agency (U.S. EPA), which provides oversight in California to the Regional Water Quality Control Boards. The CWA established the NPDES permit system to regulate discharges to surface waters of the U.S. from municipal and industrial sources. The

NPDES permit is required to identify limits on allowable concentrations and mass emissions of pollutants contained in discharges. General requirements regarding NPDES permits are given in Sections 401 and 402 of the CWA. Section 307 identifies certain criteria that the EPA must consider in establishing effluent limits for priority pollutants.

In 1987, the CWA was amended to require NPDES permits for non-point sources (i.e., stormwater) pollutants in discharges. The NPDES regulations are intended to improve stormwater quality discharged to receiving waters to the "maximum extent practicable" (MEP) through the implementation of structural and non-structural Best Management Practices (BMPs). BMPs may range from regulatory measures (local design requirements for drainage facilities); public policy measures (labeling of storm drain inlets to notify public of potential impacts on receiving waters caused by dumping); public education (educational campaigns or posted signage); and/or, structural measures (installation of grass swales or detention ponds).

The two basic types of NPDES permits issued are individual and general permits. An individual permit is a permit specifically tailored to an individual facility. Once a facility submits the appropriate application(s), the permitting authority develops a permit for that particular facility based on the information contained in the permit application (e.g., type of activity, nature of discharge, receiving water quality). The authority issues the permit to the facility for a specific time period (not to exceed five years) with a requirement that the facility reapply prior to the expiration date.

A general permit covers multiple facilities within a specific category. General permits may offer a cost-effective option for permitting agencies because of the large number of facilities that can be covered under a single permit. General permits may be written to cover categories of point sources having common elements, such as: 1) storm water point sources; 2) facilities that involve the same or substantially similar types of operations;, 3) facilities that discharge the same types of wastes or engage in the same types of sludge use or disposal practices; 4) facilities that require the same effluent limits, operating conditions, or standards for sewage sludge use or disposal; and 5) facilities that require the same or similar monitoring.

General permits, however, may only be issued to dischargers within a specific geographical area such as city, county, or state political boundaries; designated planning areas; sewer districts or sewer authorities; state highway systems; standard metropolitan statistical areas; or urbanized areas. By issuing general permits, the permitting authority allocates resources in a more efficient manner to provide more timely permit coverage. For example, a large number of facilities that have certain elements in common may be covered under a general permit without expending the time and money necessary to issue an individual permit to each of these facilities. In addition, using a general permit ensures consistency of permit conditions for similar facilities.

Federal Emergency Management Agency (FEMA)

On March 1, 2003, the Federal Emergency Management Agency (FEMA) became part of the U.S. Department of Homeland Security (DHS). FEMA's primary mission is to reduce the loss of life and property and protect the Nation from all hazards, including flooding, among others. The Federal Emergency Management Agency (FEMA) performs the following: advises on building codes and flood plain management; teaches people how to get through a disaster; helps equip local and state emergency preparedness; coordinates the federal response to a disaster; makes

disaster assistance available to states, communities, businesses and individuals; trains emergency managers; supports the nation's fire service; and administers the national flood and crime insurance programs.

Flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. The term "100-year flood" is defined by FEMA, as the flood elevation that has a one percent chance of being equaled or exceeded each year. A "500-year flood" is one which has a 0.2 percent chance of occurring each year. A 500-year flood event would be slightly deeper and cover a greater area than a 100-year flood event.

Flood zones are geographic areas that FEMA defines, based on studies of flood risk. The zone boundaries are shown on flood hazard maps, also called Flood Insurance Rate Maps (FIRM). High Risk Zones or Special Flood Hazard Areas (Zone A) are high-risk flood areas where special flood, mudflow, or flood-related erosion hazards exist and flood insurance is mandatory. Low-to-Moderate Risk Zones or Non-Special Flood Hazard Areas (Zones B, C, X) are areas that are not in any immediate danger from flooding caused by overflowing rivers or hard rains. Insurance purchase is not required in these zones.

FEMA is responsible for administering the National Flood Insurance Program (NFIP), which enables property owners in participating communities to purchase insurance as protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all Zones A, which are communities subject to a 100-year flood event. In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the Nation's floodplains on Flood Insurance Rate Maps (FIRM).

FEMA is mandated by the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards and provide FIRMs for local and regional planners to further promote safe floodplain development. Flood risk data presented on FIRMs are based on historic, hydrologic, hydraulic, and meteorological data, as well as flood control works, open-space conditions, and development. To prepare a FIRM that illustrates the extent of flood hazards in flood-prone communities, FEMA conducts an engineering study referred to as Flood Insurance Study (FIS). Using information collected in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a flood that has a 1-percent or greater chance of being equaled or exceeded during any given year, referred to as a base or 100-year flood.

STATE/REGIONAL

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act acts in cooperation with the CWA to establish the State Water Resources Control Board (SWRCB). The SWRCB is divided into nine regions, each overseen by a RWQCB. The SWRCB, and thus each RWQCB, is responsible for protecting California's surface waters and groundwater supplies.

The Porter-Cologne Water Quality Control Act develops Basin Plans that designate the beneficial uses of California's rivers and groundwater basins. The Basin Plans also establish narrative and numerical water quality objectives for those waters. Basin Plans are updated every three years and provide the basis of determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. The Porter-Cologne Water Quality Control Act is also responsible for implementing CWA Sections 401-402 and 303(d) to SWRCB and RWQCBs.

State Water Resources Control Board and Regional Water Quality Control Board

The State Water Resource Control Board (SWRCB) administers water rights, water pollution control, and water quality functions throughout the State, while the Regional Water Quality Control Boards (RWQCB) conduct planning, permitting and enforcement activities.

While the U.S. EPA allows two permitting options to meet NPDES requirements (individual permits and general permits), the SWRCB has elected to adopt one statewide General Permit for Discharges of Storm Water Associated with Construction Activity (Statewide Construction General Permit (CGP), Order No. 2009-0009-DWQ, NPDES No. CAS000002) for California that applies to all construction-related storm water discharges, except for those on tribal lands in the Lake Tahoe Hydrologic Unit and those performed by the Department of Transportation (Caltrans).

The City of Fullerton is located within the jurisdiction of the Santa Ana RWQCB (Region 8).

Dischargers whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling, or excavation. The General Permit requires all dischargers whose construction activity disturbs one-acre or more to:

- Prepare Storm Water Pollution Prevention Plans (SWPPP) before construction begins;
- File a Notice of Intent (NOI) with the State Board before construction begins; and
- File a Notice of Termination with the State Board once construction is complete.

Storm Water Pollution Prevention Plan. The SWPPP is directed toward construction staff and describes the erosion and runoff control measures to be used during and after construction, and provides a plan to inspect and maintain these control measures. The SWPPP may be revised during construction in response to changed conditions, or if the properly installed BMPs are ineffective in preventing sediment transport off the site. Revisions to the SWPPP are also required if there are changes in activities which could result in a significant amount of pollutants discharged in storm water.

Notice of Intent. The NOI certifies that the applicant will comply with conditions in the statewide general NPDES permit. It is not a permit application and does not require approval, although an annual fee must be submitted with the NOI.

Notice of Termination. The State Board must be notified (via a Notice of Termination form) once construction is complete. It must also be notified if a change of ownership occurs during construction. In this case, a revised NOI must be submitted, and the SWPPP must be revised by the new owner to reflect any changes in construction conditions.

The general construction permit requires that the project owner arrange for maintenance of drainage/storm water control facilities after project completion; maintenance may be done by private parties or by a public agency such as a community service district. Municipalities may require maintenance agreements. Construction project proponents may request to be placed under individual NPDES permits rather than the general permit. The Regional Board may issue individual storm water NPDES permits to construction projects when more stringent controls are necessary to protect water quality. Individual construction projects may also be regulated under a municipality's NPDES management program.

The Municipal Storm Water Permitting Program regulates storm water discharges from municipal separate storm sewer systems (MS4s). MS4 permits were issued in two phases: Under Phase I, for medium (serving between 100,000 and 250,000 people) and large (serving more than 250,000 people) municipalities, and Phase II, for smaller municipalities. Under Phase I, the RWQCB have adopted NPDES storm water permits for medium and large municipalities, most of which are issued to a group of co-permitees encompassing an entire metropolitan area. The MS4 permits require the discharger to develop and implement a Storm Water Management Plan/Program with the goal of reducing the discharge of pollutants to the maximum extent practicable (MEP). MEP is the performance standard specified in Section 402(p) of the Clean Water Act. The management programs specify what BMPs would be used to address certain program areas.

The City is regulated under the NPDES Phase I Municipal Stormwater Permit's water quality requirements issued by the Santa Ana RWQCB to Orange County permittees (Order No. R8-2009-0030). This permit requires the creation of a Drainage Area Management Plan (DAMP) that reduces the pollution content of stormwater to the Maximum Extent Practicable (MEP). The purpose of the Orange County DAMP is to satisfy NPDES permit conditions for creating and implementing a Storm Water Management Plan/Program to reduce pollutant discharges to the MEP. The DAMP contains guidelines on structural and nonstructural BMPs for meeting the NPDES goals. The DAMP identifies activities required to implement the minimum control measures required under the Municipal Permit. In order to ensure that construction sites implement the appropriate pollution control measures, the 2003 DAMP details recommended BMPs to be applied to new development and significant redevelopment in Orange County. Projects are identified as either priority projects or non-priority projects.

The Land-Use Planning for New Development and Redevelopment Component of the DAMP requires each co-permittee to minimize the short and long-term impacts on receiving water quality from new development and redevelopment. Each co-permitee's general plan or equivalent plan will include water quality and watershed protection principles and policies to direct land use decisions and require implementation of consistent water quality protection measures for development projects.

LOCAL

City of Fullerton Drainage Master Plan Update

The City of Fullerton Drainage Master Plan Update (October 1996) (Drainage Master Plan) identifies major system deficiencies and proposes corrective improvements that would be incorporated in future land development. The Drainage Master Plan provides cost estimates for the needed improvements and prioritizes drainage improvement projects for purposes of the City's Capital Improvements Program (CIP).

City of Fullerton Municipal Code

CHAPTER 12.18 (WATER QUALITY ORDINANCE)

Fullerton Municipal Code (FMC) Chapter 12.18 prohibits illicit connections and prohibited discharges to the City's storm drain system and requires all new development and significant redevelopment comply with the DAMP and any conditions and requirements established by the City. Prior to the issuance by the City of a grading permit, building permit or nonresidential plumbing permit for any new development or significant redevelopment, the planning agency would review the project plans and impose terms, conditions and requirements on the project in accordance with the ordinance. If the new development or significant redevelopment will be approved without application for a grading permit, building permit or nonresidential plumbing permit, the planning agency (Community Development Department and Engineering Department) would review the project plans and impose terms, conditions and requirements on the project in accordance with the ordinance prior to the issuance of a discretionary land use approval or, at the City's discretion, prior to recordation of a subdivision map.

SECTION 14.01.015 (FLOOD ZONE DEVELOPMENT)

FMC Section 14.01.015 establishes rules and regulations applicable to work within flood hazard areas as identified on the latest Flood Insurance Rate Map, as issued by the Federal Insurance Administration as Zones A, AE, AO, and Floodways. The City Engineer is required to review all permit applications for substantial improvements or new construction within the AO, A, and AE zones to determine whether proposed building sites will be reasonably safe from flooding.

CHAPTER 16.05 (PUBLIC IMPROVEMENTS, DEDICATIONS, PERFORMANCE AGREEMENTS, AND IMPROVEMENT SECURITIES)

FMC Chapter 16.05 establishes requirements for the design of public improvements, including drainage improvements. Drainage facilities are required to be provided and installed as necessary to protect the lots, parcels, buildings, or structures involved from flooding and to prevent excessive flooding of the public streets. The facilities are required to be designed to prevent flooding of the first floor level, as defined by the Federal Insurance Administration from storm runoff emanating from a one hundred-year frequency storm. Public streets are required to be protected from flooding from runoffs of a ten-year frequency storm, in accordance with policies and criteria determined by the City Engineer. Protection to higher levels may be required by the City Engineer, dependent upon the degree of flood risk involved, the topography, location, local drainage patterns, and the requirements of the Orange County Flood

Control District. Hydrologic and hydraulic calculations and studies for all such facilities are subject to the review and approval, of the City Engineer.

5.8.3 EXISTING ENVIRONMENTAL SETTING

WATERSHED

The City of Fullerton is located within the San Gabriel Coyote Creek Watershed. The Coyote Creek Watershed covers approximately 41.3 square miles in the northwest corner of Orange County and also includes portions of the cities of Brea, Buena Park, Fullerton, La Habra, and La Palma. The main tributary of this watershed, Coyote Creek, flows from Riverside County and empties into the San Gabriel River.

Drainage within the City is characterized by two distinct geographical features. The southerly portion of the City consists primarily of a flat, planar type area with a gradual slope to the south and west. The northerly part of the City consists of abruptly rising foothills, with the crest terminating at the City's limits.

Regional Drainage Facilities

Several major watercourses and dam facilities provide protection against major flood flows from runoff generated in watersheds north and east of the City. The most significant of these facilities include Imperial Channel (south of and parallel to Imperial Highway on the north boundary of the City) and Brea Creek Reservoir and Brea Creek Channel (extends along the base of the foothills), which are maintained by the U.S. Army Corps of Engineers and the Orange County Flood Control District (OCFCD), respectively. Fullerton Reservoir and Fullerton Creek (extends from east to west through the center of the City); Houston Storm Channel (southerly boundary of the City); Placentia Storm Channel (extends along the easterly boundary of the City); and Carbon Creek Channel (southeast corner of the City) are all operated by the OCFCD. All of these regional drainage facilities have insufficient capacity for a 100- year storm.[1]

Local Drainage Facilities

Smaller drainage facilities which drain into the major channels and reservoirs are the responsibility of the City for construction, operation, and maintenance. For the most part, the existing local drainage facilities within the City of Fullerton have capacity to carry flood flows from storms of less than a 10-year recurrence interval. Those facilities constructed in the late 1950s, and subsequent to that time, generally have capacities approximating a 10-year frequency storm. Existing drainage deficiencies occur within the City, particularly in the flatter areas, from the foothills to the south. The majority of the current drainage deficiencies are addressed in the 25-year Capital Improvement Program for design and construction. The construction of the Commonwealth/State College Storm Drain project removed the threat of flooding from major portions of the eastern section of the City.[2]

[1] City of Fullerton Local Hazard Mitigation Plan, August 2010.

[2] Ibid.

Localized Flooding

Localized flooding occurs throughout the Fullerton planning area. Existing storm flow facilities are often inadequate in providing drainage protection to the City. Numerous roads, both arterial and local residential streets, throughout the City are subject to flooding in heavy rains. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. The *Local Hazard Mitigation Plan* identifies the following locations typically subject to localized flooding:

- South Brookhurst and 91 Freeway;
- Artesia Avenue, west of Gilbert Street;
- South Euclid Street at 91 Freeway;
- 100 Block of East Rosslyn Avenue; and
- 1417 West Malvern Avenue.

FLOODING AND FLOODPLAIN MAPPING

The City of Fullerton is susceptible to various type of flooding events, as described below:

- ***Riverine Flooding.*** Defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the City of Fullerton planning area, riverine flooding is largely caused by heavy and continued rains, increased outflows from upstream dams, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of any flood control structures. The warning time associated with slow rise floods assists in life and property protection.

- ***Flash Flooding.*** Describes localized floods of great volume and short duration. This type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation.

- ***Localized Flooding.*** Problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.

- ***Dam Failure.*** Results from the failure of one or more upstream dams. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Impacts to life safety depend on the warning time and the

resources available to notify and evacuate the public. Major loss of life could result, and there could be associated health concerns as well as problems with the identification and burial of the deceased; refer to the Dam Inundation discussion below.

FEMA established standards for floodplain mapping studies as part of the National Flood Insurance Program (NFIP). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. The City of Fullerton is a participant in the NFIP.

The term "100-year flood" is defined by the Federal Emergency Management Agency (FEMA) as the flood elevation that has a one percent chance of being equaled or exceeded each year. A "500-year flood" is one which has a 0.2 percent chance of occurring each year. A 500-year flood event would be slightly deeper and cover a greater area than a 100-year flood event.

FEMA designates flood zones based on flood risk in the area. Land areas that are at high risk, within one percent annual chance of flooding are called Special Flood Hazard Areas, or floodplains. These areas are indicated on Flood Insurance Rate Maps (FIRMs). In communities that participate in the National Flood Insurance Program, mandatory flood insurance purchase requirements apply to all A Zones, which are communities subject to a 100-year flood event.

The majority of the City is located outside the one percent chance (100-year) flooding. However, there are areas of the City that have been identified as located within 100-year flood areas; refer to Exhibit 5.8-1, *FEMA Flood Zones*.

DAM INUNDATION

In addition to flood hazards, the City of Fullerton is also subject to potential flooding in the event of dam failure. When dams are constructed for flood protection, they usually are engineered to withstand a flood with a computed risk of occurrence. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped and fail. Overtopping is the primary cause of earthen dam failure in the United States. Dam failures can also result from any one or a combination of the following causes: earthquake; inadequate spillway capacity resulting in excess overtopping flows; internal erosion caused by embankment or foundation leakage or piping or rodent activity; improper design; improper maintenance; negligent operation; or failure of upstream dams on the same waterway.

There are two dams located within the City of Fullerton and five dams located outside of the City that pose a risk should the dam fail. Six of these dams have been classified as high hazard dams and one as significant hazard; refer to Table 5.8-1, *Dams with Potential Flood Risk to Fullerton*, and Exhibit 5.8-2, *Dams of Concern/Inundation Areas*. Dams assigned the high hazard potential classification are those where failure or mis-operation would probably cause loss of human life. Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

Table 5.8-1
Dams with Potential Flood Risk to Fullerton

Dam	Hazard Class	Stream	Type	Purpose
Brea	High	Brea Creek	Earthen-rockfill	Flood Control
Carbon Canyon	High	Carbon Canyon Creek	Earthen-rockfill	Flood Control
Fullerton	High	Fullerton Creek	Earthen-rockfill	Flood Control
Prado	High	Santa Ana River	Earthen-rockfill	Flood Control
Diemer Reservoir	High	Offstream	Other	Water Supply
Orange County Reservoir	High	Tributary of Fullerton Creek	Earthen-rockfill	Water Supply
Yorba	Significant	Tributary of Santa Ana River	Earthen-rockfill	Flood Control

Source: City of Fullerton Local Hazard Mitigation Plan, August 2010.

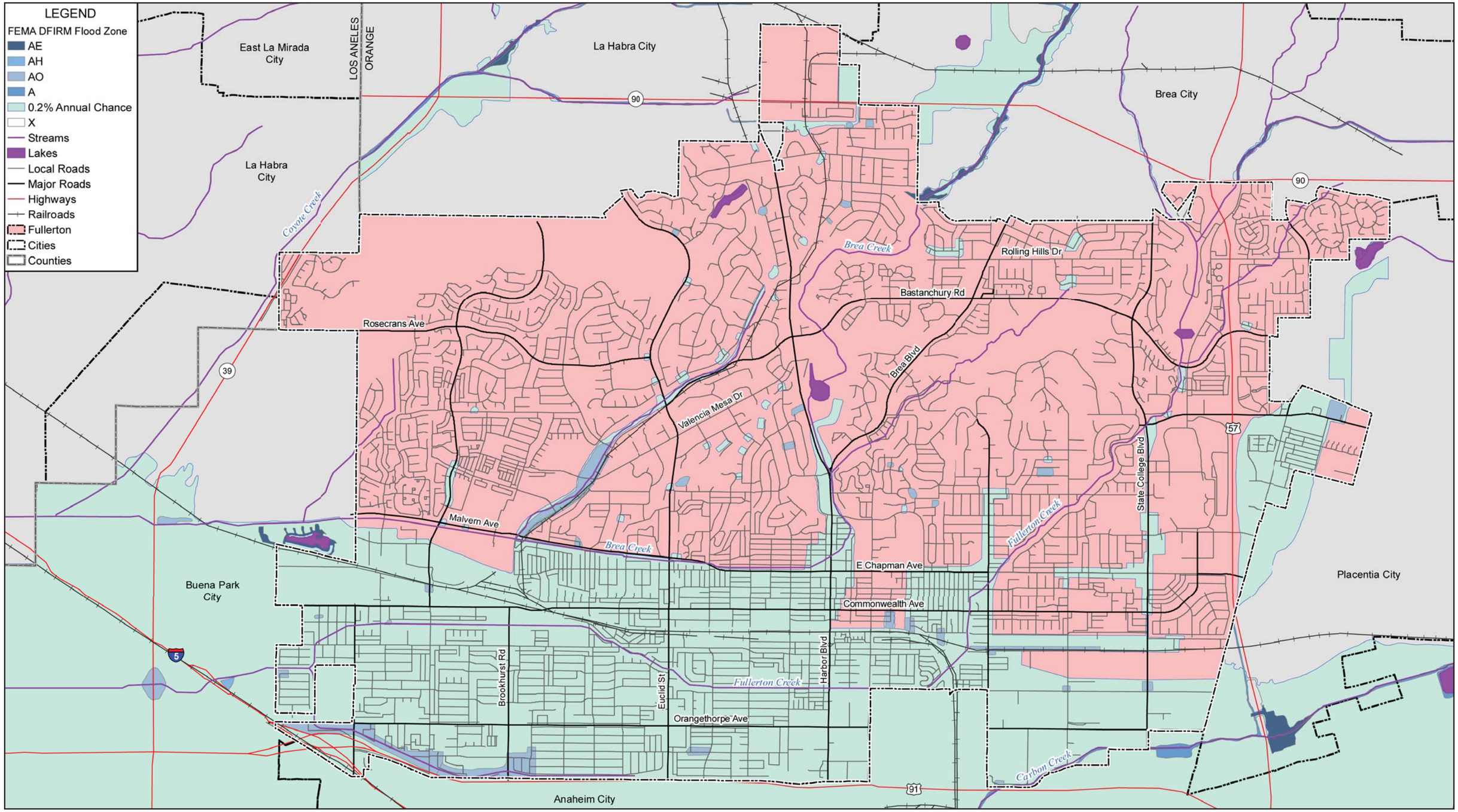
Based on inundation mapping, of the seven dams with a potential to impact the City, four of them pose the greatest threat should a failure occur: Brea, Carbon Canyon, Fullerton, and Prado. A catastrophic failure of any of these dams could have a significant impact on the City of Fullerton. The failure of any of these dams would cause downstream flooding and would likely result in loss of life and property. The potential magnitude of a dam failure depends on the time of year and the base flow of the stream when the failure occurs. During the winter months, when stream flows are higher, the impact to the area would be much greater and evacuation times much less. It is possible that the remaining two high hazard dams, Diemer and Orange County, as well as the one significant hazard dam, Yorba, could also impact the City of Fullerton, based on their classification; however, inundation mapping was not available to substantiate the level of potential impact.[3]

GROUNDWATER

The Lower Santa Ana River Groundwater Basin (Basin), also known as the Orange County Groundwater Basin, underlies the north half of Orange County beneath broad lowlands. The Basin covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, the Pacific Ocean to the southwest, and terminates at the Orange County line to the northwest, where its aquifer systems continue into the Central Basin of Los Angeles County. The aquifers comprising this Basin extend over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits.

The Basin is managed by The Orange County Water District (OCWD) for the benefit of municipal, agricultural, and private groundwater producers. The Basin meets approximately 60 to 70 percent of the water supply demand within the boundaries of OCWD. There are 19 major producers including cities, water districts, and private water companies, extracting water from the Basin serving a population of approximately 2.55 million.

[3] Ibid.



Sources: City of Fullerton, FEMA, State of California, and CAL OES. Map compiled by amec, August 2009.

NOT TO SCALE

RBF CONSULTING

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THE FULLERTON PLAN 2030
PROGRAM ENVIRONMENTAL IMPACT REPORT

FEMA Flood Zones

Exhibit 5.8-1

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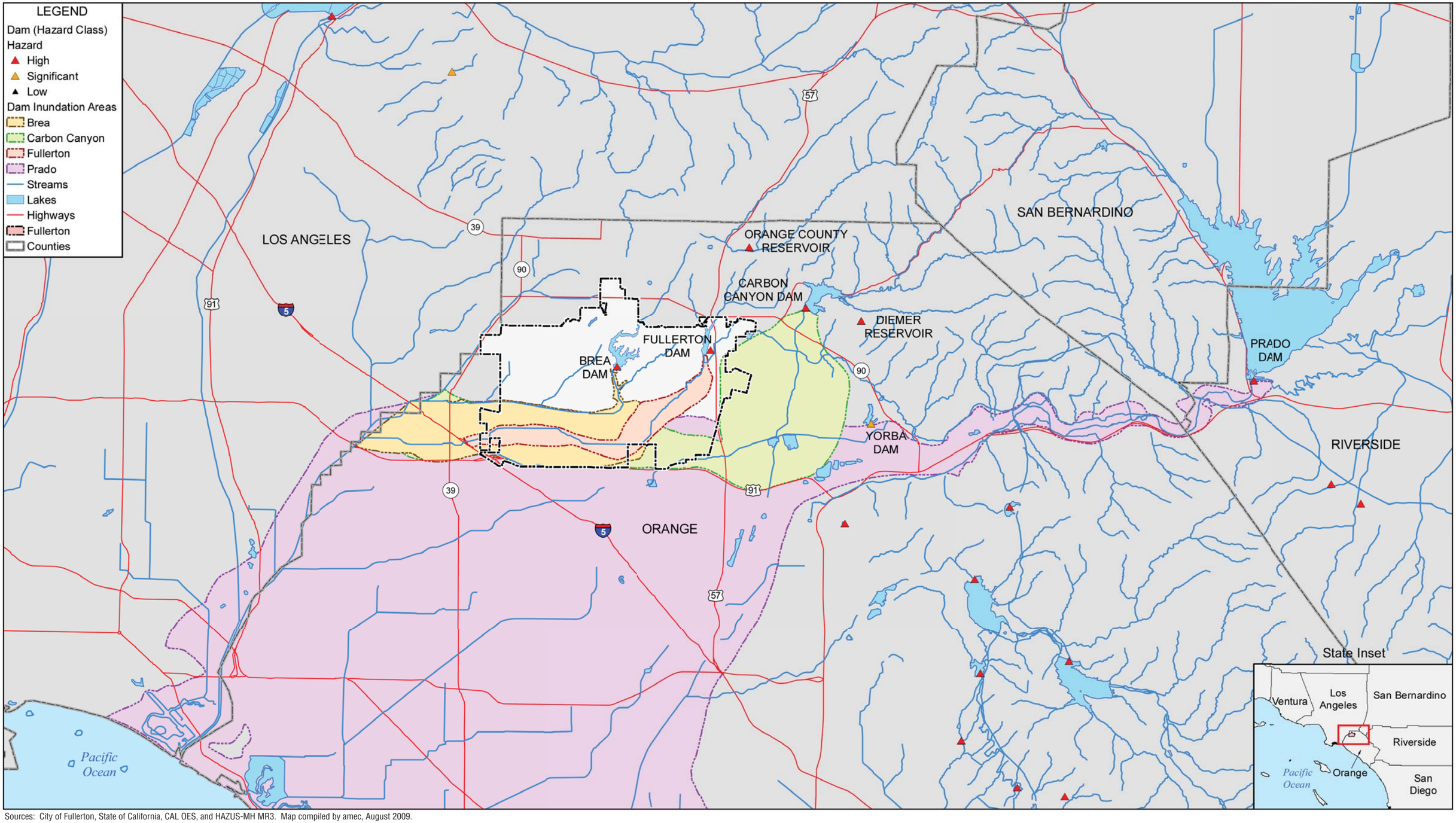

Sources: City of Fullerton, State of California, CAL OES, and HAZUS-MH MR3. Map compiled by amec, August 2009.

NOT TO SCALE

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THE FULLERTON PLAN 2030
PROGRAM ENVIRONMENTAL IMPACT REPORT

Dams of Concern/Inundation Areas

Exhibit 5.8-2

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STORMWATER QUALITY

Storm water quality is a significant concern in southern California as storm water runoff is a significant contributor to local and regional pollution and the largest source of unregulated pollution to the waterway and coastal areas of the United States. Federal, State, regional, and local regulations require the City to control the discharge of pollutants to the storm drain system, including the discharge of pollutants from construction sites and areas of new development or significant development. The following discusses typical pollutants found in storm water runoff.

Point Source Pollutants

Historically, point-source pollutants have consisted of industrial operations with discrete discharges to receiving waters. Over the past several decades, many industrial operations have been identified as potential sources of pollutant discharges. For this reason, many types of industrial operations require coverage under the State of California's General Industrial Permit. This permit regulates the operation of industrial facilities and monitors and reports mechanisms to ensure compliance with water quality objectives. State regulations require industrial operations to comply with California's General Industrial Permit, which significantly lessens impacts on the quality of receiving waters. However, industrial operations that are not covered under the General Industrial Permit's jurisdiction may still have the potential to affect the water quality of receiving waters. These industrial operations would be considered non-point-source pollutants.

Non-Point Source Pollutants

Effects of urbanization most often result in an increase in pollutant export from the urban area. An important consideration in evaluating storm water quality within a city, is to evaluate whether it impairs the beneficial use to the receiving waters. Non-point source pollutants have been characterized by the following major parameters to assist in determining and using the pertinent data. Receiving waters can assimilate a limited quantity of various constituent elements; however, there are thresholds beyond which the measured amount becomes a pollutant and results in an undesirable impact. The following background information on these standard water quality parameters provides an understanding of typical urbanization impacts.

SEDIMENT

Sediment is made up of tiny soil particles that are washed or blown into surface waters. It is the major pollutant by volume in surface water. Suspended soil particles can cause the water to look cloudy or turbid. The fine sediment particles also act as a vehicle to transport other pollutants including nutrients, trace metals, and hydrocarbons. Construction sites are the largest source of sediment for urban areas under development. Another major source of sediment is stream bank erosion, which may be accelerated by increases in peak rates and volumes of runoff due to urbanization.

NUTRIENTS

Nutrients are a major concern for surface water quality, especially phosphorous and nitrogen. The orthophosphorous form of phosphorus is readily available for plant growth. The ammonium form of nitrogen can also have severe effects on surface water quality. The ammonium is converted to nitrate and nitrite forms of nitrogen in a process called nitrification. This process consumes large amounts of oxygen, which can impair the dissolved oxygen levels in water. The nitrate form of nitrogen is very soluble and is found naturally at low levels in water. When nitrogen fertilizer is applied to lawns or other areas in excess of plant needs, nitrates can leach below the root zone, eventually reaching groundwater. Orthophosphate from auto emissions also contributes phosphorus in areas with heavy automobile traffic. As a general rule of thumb, nutrient export is greatest from development sites with the most impervious areas. Other problems resulting from excess nutrients are 1) surface algal scums; 2) water discolorations; 3) odors; 4) toxic releases; and, 5) overgrowth of plants. Common measures for nutrients are total nitrogen, organic nitrogen, total Kjeldahl nitrogen (TKN), nitrate, ammonia, total phosphate, and total organic carbon (TOC).

TRACE METALS

Trace metals are primarily a concern because of their toxic effects on aquatic life and their potential to contaminate drinking water supplies. The most common trace metals found in urban runoff are lead, zinc, and copper. Fallout from automobile emissions is also a major source of lead in urban areas. A large fraction of the trace metals in urban runoff are attached to sediment and this effectively reduces the level, which is immediately available for biological uptake and subsequent bioaccumulation. Metals associated with the sediment settle out rapidly and accumulate in the soils. Also, urban runoff events typically occur over a shorter duration, which reduces the amount of exposure that could pollute the aquatic environment. The toxicity of trace metals in runoff varies with the hardness of the receiving water. As total hardness of the water increases, the threshold concentration levels for adverse effects increases.

OXYGEN-DEMANDING SUBSTANCES

Aquatic life is dependent on the level of dissolved oxygen (DO) in water. When organic matter is consumed by microorganisms, DO is consumed in the process. A rainfall event can deposit large quantities of oxygen-demanding substances in lakes and streams. The biochemical oxygen demand of typical urban runoff is on the same order of magnitude as the effluent from an effective secondary wastewater treatment plant. A DO problem arises when the rate of oxygen-demanding material exceeds the rate of replenishment. Oxygen demand is estimated by the direct measure of DO and indirect measures such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), oils and greases, and total organic carbon (TOC).

BACTERIA

Bacteria levels in undiluted urban runoff usually exceed public health standards for recreational water contact. Studies have found that total coliform counts exceeded EPA water quality criteria at almost every site and almost every time it rained. The coliform bacteria that are detected may not be a health risk in themselves, but are often associated with human pathogens.

OIL AND GREASE

Oil and grease contain a wide variety of hydrocarbons some of which could be toxic to aquatic life in low concentrations. These materials initially float on water and create the familiar rainbow-colored film. Hydrocarbons have a strong affinity for sediment and quickly become attached to it. The major source of hydrocarbons in urban runoff is through leakage of crankcase oil and other lubricating agents from automobiles. Hydrocarbon levels are highest in the runoff from parking lots, roads, and service stations. Residential land uses generate less hydrocarbons export, although illegal disposal of waste oil into storm water can be a local problem.

OTHER TOXIC CHEMICALS

Priority pollutants are generally related to hazardous wastes or toxic chemicals and can be sometimes detected in storm water. Priority pollutant scans have been conducted in previous studies of urban runoff, which evaluated the presence of over 120 toxic chemicals and compounds. The scans rarely revealed toxins that exceeded the current safety criteria. The urban runoff scans were primarily conducted in suburban areas not expected to have many sources of toxic pollutants (with the possible exception of illegally disposed or applied household hazardous wastes). Measures of priority pollutants in storm water include - 1) phthalate (plasticizer compound); 2) phenols and creosols (wood preservatives); 3) pesticides and herbicides; 4) oils and greases; and 5) metals.

PHYSICAL CHARACTERISTICS OF SURFACE WATER QUALITY

The amount of pollutants in surface runoff is determined by the quantity of a material in the environment and its characteristics. In an urban environment, the quantity of certain pollutants in storm water systems is generally associated with the intensity of the land use. For instance, a high volume of automobile traffic makes a number of potential pollutants (such as lead and hydrocarbons) more available. The availability of a material, such as a fertilizer, is a function of the quantity and the manner in which it is applied. Applying fertilizer in quantities that exceed plant needs leaves the excess nutrients available for loss to surface or groundwater.

The physical properties and chemical constituents of water have traditionally served as the means for monitoring and evaluating water quality. Evaluating the condition of water through a water quality standard refers to its physical, chemical, or biological characteristics. Water quality parameters for storm water make up a long list and are classified in many ways. In many cases, the concentration of an urban pollutant, rather than the annual load of that pollutant, is needed to assess a water quality problem. Some of the physical, chemical or biological characteristics that evaluate the quality of the surface runoff are outlined below.

Dissolved Oxygen (DO)

DO in the water has a pronounced effect on the aquatic organisms and the chemical reactions that occur. It is one of the most important biological water quality characteristics in the aquatic environment. The DO concentration of a water body is determined by the solubility of oxygen, which is inversely related to water temperature, pressure, and biological activity. Dissolved oxygen is a transient property that can fluctuate rapidly in time and space. Dissolved oxygen

represents the status of the water system at a particular point and time of sampling. The decomposition of organic debris in water is a slow process and the resulting changes in oxygen status respond slowly also. The oxygen demand is an indication of the pollutant load and includes measurements of Biochemical Oxygen Demand (BOD) or Chemical Oxygen Demand (COD).

Biochemical Oxygen Demand (BOD)

The BOD is an index of the oxygen-demanding properties of the biodegradable material in the water. Samples are taken from the field and incubated in the laboratory at 20 degrees Celsius, after which the residual DO is measured. The BOD value commonly referenced is the standard five-day values. These values are useful in assessing stream pollution loads and for comparison purposes.

Chemical Oxygen Demand (COD)

The COD is a measure of the pollutant loading in terms of complete chemical oxidation using strong oxidizing agents. It can be determined quickly because it does not rely on bacteriological actions as with BOD. COD does not necessarily provide a good index of oxygen demanding properties in natural waters.

Total Dissolved Solids (TDS)

TDS concentration is determined by evaporation of a filtered sample to obtain residue whose weight is divided by the sample volume. The TDS of natural waters varies widely. There are several reasons why TDS are an important indicator of water quality. Dissolved solids affect the ionic bonding strength related to other pollutants such as metals in the water. TDS are also a major determinant of aquatic habitat. TDS affects saturation concentration of dissolved oxygen and influence the ability of a water body to assimilate wastes.

pH

The pH of water is the negative log, base 10, 10, of the hydrogen ion (H+) activity. A pH of seven is neutral; a pH greater than seven indicates alkaline water; a pH less than seven represents acidic water. In natural water, carbon dioxide reactions are some of the most important in establishing pH. The pH at any one time is an indication of the balance of chemical equilibrium in water and affects the availability of certain chemicals or nutrients in water for uptake by plants. The pH of water directly affects fish and other aquatic life and generally toxic limits are pH values less than 4.8 and greater than 9.2.

Alkalinity

Alkalinity is the opposite of acidity, representing the capacity of water to neutralize acid. Alkalinity is also linked to pH and is caused by the presence of carbonate, bicarbonate, and hydroxide, which are formed when carbon dioxide is dissolved. A high alkalinity is associated with a high pH and excessive solids. Most streams have alkalinities less than 200 mg/l and ranges of alkalinity of 100-200mg/l seem to support well-diversified aquatic life.

Specific Conductance. The specific conductivity of water, or its ability to conduct an electric current, is related to the total dissolved ionic solids. Long-term monitoring of a project's waters can develop a relationship between specific conductivity and TDS. Its measurement is quick and inexpensive and can be used to approximate TDS. Specific conductivities in excess of 2,000 micro-ohms per centimeter (µohms/cm) indicate a TDS level too high for most freshwater fish.

Turbidity

The clarity of water is an important indicator of water quality that relates to the ability of photosynthetic light to penetrate. Turbidity is an indicator of the property of water that causes light to become scattered or absorbed. Turbidity is caused by suspended clays and other organic particles. It can be used as an indicator of certain water quality constituents such as predicting the sediment concentrations.

Nitrogen (N)

Sources of nitrogen in storm water are from the additions of organic matter or chemical additions to water bodies. Ammonia and nitrate are important nutrients for the growth of algae and other plants. Excessive nitrogen can lead to eutrophication since nitrification consumes DO in the water. Organic nitrogen breaks down into ammonia, which eventually becomes oxidized to nitrate-nitrogen (N/N), a form available for plants. High concentrations of N/N in water can stimulate growth of algae and other aquatic plants, but if phosphorus (P) is present, only about 0.30 mg/l of N/N is needed for algal blooms. Some fish life can be affected when N/N exceeds 4.2 mg/l. There are a number of ways to measure the various forms of aquatic nitrogen. Typical measurements of nitrogen include Kjeldahl nitrogen (organic nitrogen plus ammonia); ammonia; nitrite plus nitrate; nitrite; and, nitrogen in plants. The principal water quality criteria for nitrogen focuses on nitrate and ammonia.

Phosphorus (P)

Phosphorus is an important component of organic matter. In many water bodies, phosphorus is the limiting nutrient that prevents additional biological activity from occurring. The origin of this constituent in urban storm water discharge is generally from fertilizers and other industrial products. Orthophosphate is soluble and is considered to be the only biologically available form of phosphorus. Since phosphorus strongly associates with solid particles and is a significant part of organic material, sediments influence concentration in water and are an important component of the phosphorus cycle in streams. The primary methods of measurement include detecting orthophosphate and total phosphorus.

EXISTING STORMWATER QUALITY

The City of Fullerton lacks any measured data on storm water runoff quality. In the absence of site-specific data, expected storm water quality can be qualitatively discussed by relating typical pollutants to specific land uses. Existing development within the City includes residential, commercial, industrial, public/religious, open space/parks/recreation, agricultural, as well as vacant land.

Residential and urban development is often a significant source of storm water pollution. Development and redevelopment activities have two primary effects on water quality; they are sources of erosion and sedimentation during the construction phase and they have long-term effects on runoff once the development is complete. Residential and urban development can affect water quality in three ways:

- Impervious surfaces associated with development increase the rate and volume of storm water runoff, which increase downstream erosion potential;
- Urban activities generate dry-weather ("nuisance") flows, which may contain pollutants and/or may change the ephemeral nature of streams and the degradation of certain habitats; and
- Impervious surfaces increase the concentration of pollutants during wet weather flows.

The potential for negative water quality effects is generally correlated to the density of development and the amount of impervious area associated with the development. Detached residential development has the potential to generate sediments such as nutrients and organic substances (including fertilizers), pesticides (from landscape application), trash and debris (including household hazardous waste), oxygen demand, oil and grease (from driveways and roads), and bacteria and viruses.

Municipal Activities and Development

Infrastructure and facilities (roads, streets, highways, parking facilities, storm drains and flood management facilities) present a threat to water quality. Other facilities such as parks, airfields, water treatment plants, wastewater reclamation plants, landfills and transfer centers, and corporate yards also present water quality issues. Municipalities may also own and administer areas and activities tributary to impaired water bodies and/or water quality sensitive areas that might be harmful to water quality.

Commercial, Civic, and Industrial Activities and Development

Certain commercial activities have the potential to generate pollutants that can negatively affect storm water quality. Auto repair shops in particular have the potential to generate heavy metals, oils, toxic chemicals, and other oxygen-demanding substances. In addition, restaurants have the potential to generate pollutants such as grease, trash, and other oxygen-demanding substances.

Industrial activities can significantly affect water quality, depending on the type of pollutants and activity. In general, industrial activity is associated with effects on ambient water temperature, alkalinity levels of total suspended solids and oxygen demand. Certain industrial uses may entail the generation of heavy metals, nutrients, toxic chemicals, and other pollutants. Industrial uses that take place indoors do not have storm water pollutant exposure and present little threat to storm water quality.

5.8.4 SIGNIFICANCE THRESHOLDS AND CRITERIA

Appendix G of the *CEQA Guidelines* contains the Initial Study Environmental Checklist, which was included with the Notice of Preparation to show the areas being analyzed within the EIR; refer to Appendix A of this EIR. The Initial Study includes questions relating to hydrology and water quality. The issues presented in the Initial Study Checklist have been utilized as thresholds of significance in this Section. Accordingly, a project would typically have a significant impact on hydrology and water quality if the project would result in any of the following:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern on the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or
- Inundation by seiche, tsunami, or mudflow.

Based on these standards, the effects of The Fullerton Plan have been characterized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant impact level through the application of mitigation, it is categorized as a significant unavoidable impact.

5.8.5 PROJECT IMPACTS AND MITIGATION MEASURES

WATER QUALITY

- **IMPLEMENTATION OF THE FULLERTON PLAN COULD VIOLATE WATER QUALITY STANDARDS AND WASTE DISCHARGE REQUIREMENTS.**

Impact Analysis: Future development associated with implementation of The Fullerton Plan may contribute to water quality degradation in the City, especially within the 12 Focus Areas targeted for additional growth. Runoff from disturbed areas would likely contain silt and debris, resulting in a long-term increase in the sediment load of the stormdrain system serving the City. There is also the possibility for chemical releases at future construction sites. Substances such as oils, fuels, paints, and solvents may be transported to nearby drainages, watersheds, and groundwater in storm water runoff, wash water and dust control water. The significance of these water quality impacts would vary depending upon the level of construction activity, weather conditions, soil conditions, and increased sedimentation of drainage systems within the area.

Maintaining and improving water quality is essential to protect public health, wildlife, and the local watershed. Water conservation and pollution prevention can be dramatically improved through proactive efforts of residents and through City policies. New development and significant reconstruction projects within the City would be required to comply with Chapter 12.18 of the City's Municipal Code, which requires compliance with the DAMP and any conditions and requirements established by the City in order to meet Federal and State water quality requirements related to storm water runoff. The Fullerton Plan contains goals, policies, and actions to reduce water quality impacts. The Fullerton Natural Environment Element Goal 20 (A healthy watershed and clean urban runoff) and associated policies and actions would reduce impacts to watersheds and urban runoff caused by construction projects and the design or operation of a site or use. Further, new development projects would be required to meet Federal, State, and local water quality standards and implement mitigation (if necessary) to reduce impacts to less than significant. Compliance with the City's Municipal Code, Orange County DAMP, goals, policies, and actions of The Fullerton Plan, and Mitigation Measures HYD-1 and HYD-2 would reduce water quality and waste discharge impacts to a less than significant level.

Proposed General Plan Update Policies and Actions:

P19.5 ***Water Quality***
Support projects, programs, policies and regulations to ensure the quality of the water supply.

P20.1 ***Regional Watersheds***
Support regional and subregional efforts to support functional and healthy watersheds.

P20.2 ***Urban Runoff Management***
Support regional and subregional efforts to support cleaner and reduced urban runoff.

P20.3 ***Product Handling and Disposal Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff from the improper handling and disposal of commercial products.

P20.4 ***Local Watersheds***
Support projects, programs, policies and regulations that support a functional and healthy watershed within neighborhoods and districts.

P20.5 ***Water Quality of Focus Areas***
Support projects, programs, policies and regulations to encourage site and infrastructure improvements within the City's Focus Areas to support cleaner and reduced urban runoff.

P20.6 ***Construction Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by private and public construction projects.

P20.7 ***Development Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by the design or operation of a site or use.

A20.1 ***Revise Street Standards***
Revise the City's street standards to allow and encourage bio-filtration systems/ planters and the use of permeable pavement.

A20.2 ***Green Streets and Parking Lots***
Implement demonstration projects in select neighborhoods and districts to show how streets and parking lots can be improved with bio-filtration systems/planters and the use of permeable pavement.

Mitigation Measures:

HYD-1 Prior to issuance of any Grading or Building Permit, and as part of the future development's compliance with the NPDES requirements, a Notice of Intent shall be prepared and submitted to the Santa Ana RWQCB providing notification and intent to comply with the State of California General Construction Permit. Also, a Stormwater Pollution Prevention Plan (SWPPP) shall be reviewed and approved by the Director of Engineering for water quality construction activities on-site. A copy of the SWPPP shall be available and implemented at the construction site at all times. The SWPPP shall outline the source control and/or treatment control BMPs to avoid or mitigate runoff pollutants at the construction site to the "maximum extent practicable." All recommendations in the Plan shall be implemented during area preparation, grading, and construction. The project applicant shall comply with each of the

recommendations detailed in the Study, and other such measure(s) as the City deems necessary to mitigate potential stormwater runoff impacts.

HYD-2 Prior to issuance of any Grading Permit, future development projects shall prepare, to the satisfaction of the Director of Engineering, a Water Quality Management Plan or Stormwater Mitigation Plan, which includes Best Management Practices (BMPs), in accordance with the Orange County DAMP. All recommendations in the Plan shall be implemented during post construction/operation phase. The project applicant shall comply with each of the recommendations detailed in the Study, and other such measure(s) as the City deems necessary to mitigate potential water quality impacts.

Level of Significance After Mitigation: Less Than Significant Impact.

GROUNDWATER DEPLETION

■ DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN WOULD NOT DEPLETE GROUNDWATER SUPPLIES.

Impact Analysis: The City receives its water from two main sources, the Lower Santa Ana River Groundwater Basin (Basin), which is managed by the Orange County Water District (OCWD) and imported water from the Metropolitan Water District of Southern California (Metropolitan). Implementation of The Fullerton Plan would allow for additional development, potentially resulting in an increase in the City's population, and thus, an overall increase in total water demand. As a result, future development associated with implementation of The Fullerton Plan may contribute to the depletion of groundwater supplies.

The 2010 UWMP anticipates that the City is capable of meeting the water demands of its customers in normal, single dry, and multiple dry years between 2015 and 2035. As indicated in Section 5.16, Water Supply, although implementation of The Fullerton Plan would potentially result in population growth greater than anticipated by the 2010 UWMP, significant impacts to water supplies are not anticipated. The City would continue to monitor water demand and supplies and adjust supply and demand projections as part of the UWMP process. Future development would be reviewed by the City on a project-by-project basis to ensure adequate water supplies and infrastructure are available to accommodate future projects. The City would be required to comply with SBx7-7, which requires urban retail water suppliers to develop urban water use targets to help meet the 20 percent statewide water reduction goal by 2020 and the interim 10 percent goal by 2015. Additionally, The Fullerton Plan Water and Growth Management chapters are intended to ensure that water supplies and infrastructure are available to meet the needs of current and future development within the City. Goal 19 and associated policies and actions would ensure an adequate water supply is available to serve future development. Goal 7 and associated policies and actions would provide for growth and development that is aligned with infrastructure capabilities. Further, The Fullerton Plan supports conservation efforts (Policy 19.2) and sustainable water practices (Policy 19.7) in regional and local planning efforts. With adherence to The Fullerton Plan goals, policies, and actions and the FMC Water Supply Shortage Conservation Plan and Landscaping and Irrigation Requirements, as well as compliance with the Fullerton UWMP, impacts to groundwater supplies would be reduced to a less than significant level.

Proposed General Plan Update Policies and Actions:

P19.1 ***Agency Coordination for Water Supplies***
Support regional and subregional efforts to ensure that an adequate water supply, including groundwater, remains available.

P19.2 ***Conservation Efforts***
Support regional and subregional efforts to promote water efficiency and conservation.

P19.3 ***New Technologies***
Support projects, programs, policies and regulations to encourage the use of new technologies which reduce water use.

P19.4 ***Adequate Supply***
Support projects, programs, policies and regulations to maintain adequate quantities of water, including groundwater, available to the City now and in the future.

P19.6 ***Focus Area Planning***
Support projects, programs, policies and regulations to evaluate ways to conserve and reduce water use as part of community-based planning of Focus Areas.

P19.7 ***Sustainable Water Practices in New Development***
Support projects, programs, policies and regulations to encourage water efficient practices in site and building design for private and public projects.

A19.1 ***Partnerships with Local and Regional Agencies***
Create partnerships and governance structures that allow for a comprehensive approach to water supply management to improve the reliability of local groundwater, imported water supplies, and the development of alternative water resources, such as seawater desalination and recycled water.

A19.2 ***Education Programs with Local Water Districts***
Coordinate and cooperate with the Metropolitan Water District of Southern California, Orange County Water District, and Municipal Water District of Orange County to expand and strengthen educational and public relations programs regarding the importance of water conservation through co-sponsored public workshops, website links, and informational brochures.

Mitigation Measures: No further mitigation is required beyond compliance with the proposed General Plan Update Policies and Actions.

Level of Significance After Mitigation: Less Than Significant Impact.

DRAINAGE SYSTEM CAPACITY

- **DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN COULD CREATE OR CONTRIBUTE RUNOFF WATER WHICH COULD EXCEED THE CAPACITY OF EXISTING OR PLANNED STORMWATER DRAINAGE SYSTEMS OR PROVIDE SUBSTANTIAL ADDITIONAL SOURCES OF POLLUTED RUNOFF.**

Impact Analysis: Buildout of The Fullerton Plan would result in the development of approximately 10,183 new dwelling units and approximately 10.7 million square feet of non-residential uses. Development associated with implementation of The Fullerton Plan may contribute to the runoff, which could exceed the capacity of the existing drainage system.

A storm drain or stormwater conveyance system are private and public drainage facilities, other than sanitary sewers, through which surface water runoff (typically in urban areas) is transported to another location where the water is discharged to a natural drainage or water course (most likely) or to a treatment facility. The main purpose of the storm drain system is to prevent flooding by transporting water away from developed areas.

Growth and urbanization place increased pressure on storm drain capacities. In general, increased urbanization increases the amount of impervious (paved) surfaces, thus reducing the amount of water that would normally infiltrate into the soil. Rainfall, irrigation runoff, and nuisance flows accumulate on impervious surfaces and flow downstream via the storm drain system to surface waters. The storm drain system is not connected with the sanitary sewer system; therefore, urban runoff is not filtered to remove trash, cleaned, or otherwise treated before it is discharged to surface waters. As a result, storm drains have become increasingly important component in managing water quality impacts in addition to reducing flooding.

The City of Fullerton Drainage Master Plan Update (October 1996) identifies major system deficiencies and proposes corrective improvements to serve future development. The objective of the Master Plan Update is to determine the facilities needed to achieve City flood protection goals for the 10-year and 100-year storm events. In order to determine deficiencies, the Master Plan Update considers the land use designations identified by the existing General Plan, as well as anticipated development, including the West Coyote Hills. Although The Fullerton Plan anticipates additional growth within the Focus Areas, The Fullerton Plan does not propose significant changes to the existing General Plan land use designations. Proposed land use changes primarily consist of modifications to specific parcels to reflect existing on the ground land uses and resolve inconsistencies with existing zoning. Overall, the Land Use Plan use designations under The Fullerton Plan remain relatively unchanged.

The potential increase in imperviousness associated with implementation of The Fullerton Plan would impact existing storm drain and flood control facilities. New development projects associated with implementation of The Fullerton Plan would be required to ensure project-specific and citywide drainage systems have adequate capacity to accommodate new development. The City recognizes the need to monitor and improve the storm drain system in order to ensure it adequately accommodates future development. The City would utilize its CIP to evaluate and prioritize infrastructure maintenance and improvement (Action 7.1). Policies proposed in The Fullerton Plan would ensure that potential impacts to urban runoff associated with construction and development activities are addressed. Furthermore, implementation of

the required mitigation measure would require new development projects to be designed to reduce impacts related to the drainage system capacity. Compliance with the City's Municipal Code, the goals, policies, and actions included in The Fullerton Plan, and Mitigation Measure HYD-3 would ensure drainage system capacity impacts are reduced to a less than significant level.

Proposed General Plan Update Policies and Actions:

3.23 ***Neighborhood-Based Community Enhancement***
The City acknowledges the success of recent neighborhood-based community enhancement efforts such as the Richman Park neighborhood. The City shall identify specific neighborhood focus areas to establish strategies, programs, and improvements to address deferred maintenance, overcrowding, infrastructure deficiencies, and other issues that affect neighborhood quality. The City shall aggressively pursue local, State, and federal funding to assist in the improvement of identified neighborhoods.

P7.1 ***Balanced Decisionmaking***
Support regional and subregional efforts to focus growth and development within areas that can be adequately served by existing and planned infrastructure systems.

P7.2 ***Housing Growth***
Support projects, programs, policies and regulations to accommodate housing growth consistent with the Regional Housing Needs Assessment in areas of the City with existing and planned infrastructure capabilities.

P7.3 ***Infrastructure Planning***
Support projects, programs, policies and regulations to plan for appropriate levels and types of infrastructure based on the desired character of each neighborhood or district.

P7.4 ***Focus Area Planning***
Support projects, programs, policies and regulations to evaluate infrastructure capabilities as part of community-based planning of Focus Areas.

P7.5 ***Appropriate Development Scale***
Support projects, programs, policies and regulations to ensure that development is appropriate in scale to current and planned infrastructure capabilities.

P11.8 ***Financing***
Support policies, programs, and regulations that facilitate the use of creative financing tools for revitalization efforts that alleviate blight, stimulate private-sector investment, upgrade public infrastructure and facilities, and provide quality affordable housing.

P20.5 ***Water Quality of Focus Areas***
Support projects, programs, policies and regulations to encourage site and infrastructure improvements within the City's Focus Areas to support cleaner and reduced urban runoff.

P20.6 ***Construction Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by private and public construction projects.

P20.7 ***Development Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by the design or operation of a site or use.

A7.1 ***Capital Improvement Program***
Utilize the Capital Improvement Program to evaluate and prioritize infrastructure maintenance, replacement and improvement.

A20.1 ***Revise Street Standards***
Revise the City's street standards to allow and encourage bio-filtration systems/ planters and the use of permeable pavement.

A20.2 ***Green Streets and Parking Lots***
Implement demonstration projects in select neighborhoods and districts to show how streets and parking lots can be improved with bio-filtration systems/planters and the use of permeable pavement.

Mitigation Measures:

HYD-3 Prior to site plan approval, the project owner/developer(s) shall be required to coordinate with the City of Fullerton Engineering Department to determine requirements necessary to mitigate impacts to drainage improvements in order to accommodate storage volumes and flood protection for existing and future runoff. Proposed projects shall implement mitigation measures, if required, to the satisfaction of the City of Fullerton Public Works Director. For any new storm drainage projects/studies that have the potential to impact adjacent jurisdictions' storm drainage systems, the developer shall submit said studies to the applicable jurisdiction for review and approval.

Level of Significance After Mitigation: Less Than Significant Impact.

DRAINAGE PATTERNS

- **DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN WOULD NOT RESULT IN ALTERATION OF DRAINAGE PATTERNS OF THE SITE OR AREA, INCLUDING ALTERATION OF A STREAM OR RIVER, RESULTING IN SUBSTANTIAL EROSION, FLOODING, OR SIGNIFICANT RISK OF LOSS.**

Impact Analysis: The Fullerton Plan does not propose altering any drainage patterns. All applicable standards would be applied to future development projects to ensure that they are not constructed in a way that would alter a stream or river, or result in substantial erosion or flooding. Therefore, less than significant impacts would occur in this regard. Also, refer to flooding and dam inundation impacts discussions below.

Proposed General Plan Update Policies and Actions:

P20.6 ***Construction Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by private and public construction projects.

P20.7 ***Development Impacts***
Support projects, programs, policies and regulations to reduce impacts to watersheds and urban runoff caused by the design or operation of a site or use.

P25.2 ***Waterways Preservation***
Support projects, programs, policies and regulations to preserve the City's public creeks and lakes such as Tri City Lake, Bastanchury Greenbelt Creek, and Laguna Lake; pursue collaborative efforts to restore channelized portions of Brea Creek and Fullerton Creek.

P25.9 ***Mitigation of Impacts on Waterways***
Support projects, programs, policies and regulations to consider and mitigate project level impacts to public waterways at the site and building design stages.

A26.1 ***Flood Channel Improvements***
Encourage the Orange County Flood Control Districts to make improvements to regional drainage channels to alleviate the potential for flooding within the City of Fullerton.

A7.1 ***Capital Improvement Program***
Utilize the Capital Improvement Program to evaluate and prioritize infrastructure maintenance, replacement and improvement.

Mitigation Measures: No further mitigation is required beyond compliance with the proposed General Plan Update Policies and Actions.

Level of Significance After Mitigation: Less Than Significant Impact.

FLOOD HAZARD

- **DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN WOULD NOT RESULT IN THE PLACEMENT OF HOUSING OR STRUCTURES WITHIN A 100-YEAR FLOOD HAZARD AREA.**

Impact Analysis: As indicated on Exhibit 5.8-1, portions of the City are located within 100-year flood zones, as mapped by FEMA. Buildout of The Fullerton Plan would result in the development of approximately 10,183 new dwelling units and approximately 10.7 million square feet of non-residential uses within 12 Focus Areas. The Airport Industrial, Transportation Center, North Harbor Corridor, Education, and Southeast Industrial Focus Areas include land within the 100-year flood zones. Therefore, future development associated with implementation of The Fullerton Plan could involve the development of new housing and/or structures within an identified 100-year flood hazard.

Encroachments, including fill, new construction, substantial improvements, and other new development within a floodway are prohibited. Development proposed within a floodplain would be required to obtain a Conditional Letter of Map Revision (CLOMR) to be filed with the Federal Insurance Administrator. Upon completion of the encroachments, FEMA would issue a Letter of Map Revision (LOMR). Future development associated with implementation of The Fullerton Plan would be subject to the City's Municipal Code. Development within a FEMA flood zone would be reviewed in accordance with FMC Section 14.01.015 to determine proposed building sites would be reasonably safe from flooding. FMC requires specific siting, design, and construction requirements for development within a flood zone. Compliance with the City's Municipal Code and the policies and actions included in The Fullerton Plan would reduce impacts associated with a 100-year flood hazard to a less than significant level.

Proposed General Plan Update Policies and Actions:

P26.5 ***Hazard Specific Development Regulations***
Support projects, programs, policies and regulations to utilize hazard specific development regulations to mitigate risks associated with identified potential natural hazards, including flooding, wildland fires, liquefaction, and landslides when development does occur.

A26.1 ***Flood Channel Improvements***
Encourage the Orange County Flood Control Districts to make improvements to regional drainage channels to alleviate the potential for flooding within the City of Fullerton.

A26.2 ***Project Review***
Review the City's natural hazards maps to determine potential risks to people and buildings and to develop appropriate mitigation measures to address and minimize risks.

A26.3 ***Flooding***
Review on-site and off-site flood hazards for all projects located within areas subject to flooding during a 100-year storm event.

Mitigation Measures: No further mitigation is required beyond compliance with the proposed General Plan Update Policies and Actions.

Level of Significance After Mitigation: Less Than Significant Impact.

DAM INUNDATION

- **FUTURE DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN WOULD NOT RESULT IN NEW USES BEING LOCATED IN DAM INUNDATION AREAS OF THE CITY POTENTIALLY EXPOSING PEOPLE OR STRUCTURES TO A SIGNIFICANT RISK OF LOSS, INJURY OR DEATH.**

Impact Analysis: The City of Fullerton is subject to potential flooding in the event of dam failure. Portions of the City are in the inundation areas associated with the Brea, Carbon Canyon, Fullerton, and Prado dams.

Buildout of The Fullerton Plan would result in the development of approximately 10,183 new dwelling units and approximately 10.7 million square feet of non-residential uses within 12 Focus Areas. As indicated on Exhibit 5.8-2, the southern portion of the City, including the North Harbor Corridor, Airport Industrial, Commonwealth Corridor, Downtown, Chapman Corridor, Education, Southeast Industrial, Harbor Gateway, and Orangethorpe Corridor Nodes Focus Areas are within dam inundation areas. Thus, development within these areas associated with implementation of The Fullerton Plan could potentially expose people or structures to flooding associated with dam failure. Dam failure flooding would vary in the City depending on which dam fails and the nature and extent of the dam failure and associated flooding.

Development associated with implementation of The Fullerton Plan would be subject to the provisions of FMC Section 14.01.015, which provides development provisions to reduce flooding. Additionally, The Fullerton Plan includes policies and actions that would minimize the potential for flooding to impact property and human life. In the event of an emergency, such as dam failure, the City's Emergency Operations Plan (March 2004) would be implemented. The Emergency Operations Plan is intended to provide guidance for the City's planned response to extraordinary emergency situations, associated with natural disasters, terrorism, technological incidents, and nuclear defense operations. The Emergency Operations Plan concentrates on the management, and concepts and response procedures relative to large-scale disasters. The Fullerton Plan policies and actions and compliance with the procedures identified in the Emergency Operations Plan would reduce potential impacts involving dam inundation to a less than significant level.

Proposed General Plan Update Policies and Actions:

P26.5 ***Hazard Specific Development Regulations***
Support projects, programs, policies and regulations to utilize hazard specific development regulations to mitigate risks associated with identified potential natural hazards, including flooding, wildland fires, liquefaction, and landslides when development does occur.

A26.1 ***Flood Channel Improvements***
Encourage the Orange County Flood Control Districts to make improvements to regional drainage channels to alleviate the potential for flooding within the City of Fullerton.

A26.2 ***Project Review***
Review the City's natural hazards maps to determine potential risks to people and buildings and to develop appropriate mitigation measures to address and minimize risks.

Mitigation Measures: No further mitigation is required beyond compliance with the proposed General Plan Update Policies and Actions.

Level of Significance After Mitigation: Less Than Significant Impact.

INUNDATION BY SEICHE, TSUNAMI, OR MUDFLOW

- **DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN WOULD NOT RESULT IN INUNDATION OF NEW USES BY SEICHE, TSUNAMI, OR MUDFLOW.**

Impact Analysis: A seiche is a periodic oscillation of a body of water resulting from seismic shaking or other causes that can cause flooding. According to the City's *Local Hazard Mitigation Plan*, earthquake-induced seiches are not considered a risk in the City of Fullerton. Impacts would be less than significant in this regard.

A tsunami is a series of waves generated by large earthquakes that create vertical movement on the ocean floor. Tsunamis can reach more than 50 feet in height, move inland several hundred feet, and threaten life and property. Often, the first wave of a tsunami is not the largest. Tsunamis can occur on all coastal regions of the world, but are most common along margins of the Pacific Ocean. Tsunamis can travel from one side of the Pacific to the other in a day, at a velocity of 600 miles an hour in deep water. A locally generated tsunami may reach the shore within minutes. As discussed in Section 5.7, Geology and Soils, due to its inland location, the potential for a tsunami to impact the City is considered to be low. Impacts would be less than significant in this regard.

There is the potential for mudflow to occur with flood events. Future construction associated with implementation of The Fullerton Plan would be required to meet all applicable Federal, State, and local building, seismic, water quality, flood, and drainage standards, as previously discussed above. Additionally, The Fullerton Plan includes policies and actions to address flooding and flood hazards within the City. It is anticipated that with implementation of these policies and actions and the City's *Municipal Code*, mudflow hazards within the City would be reduced to a less than significant level.

Proposed General Plan Update Policies and Actions: The Fullerton Plan does not include policies or actions that pertain specifically to seiche or tsunami. Refer to the Policies and Actions cited above for flooding.

Mitigation Measures: No mitigation measures are required.

Level of Significance After Mitigation: Not applicable.

5.8.6 CUMULATIVE IMPACTS

- **FUTURE DEVELOPMENT ASSOCIATED WITH IMPLEMENTATION OF THE FULLERTON PLAN AND CUMULATIVE DEVELOPMENT COULD RESULT IN CUMULATIVELY CONSIDERABLE IMPACTS RELATED TO HYDROLOGY, DRAINAGE, AND WATER QUALITY.**

Impact Analysis: Cumulative hydrology and water quality impacts associated with implementation of The Fullerton Plan are analyzed based on development within the City of Fullerton and associated impacts to the regional drainage facilities under the jurisdiction of the Santa Ana RWQCB. The Fullerton Plan, as mitigated, would not significantly impact drainage courses and hydrologic flows throughout the City.

Future development projects would be required to mitigate specific hydrologic impacts on a project-by-project basis. Additionally, the City's Municipal Code incorporates Federal and State regulations and guidelines pertaining to storm water runoff to reduce or eliminate regional water quality impacts. Impacts associated with future development in the City and the region would be addressed at a site-specific level to ensure their cumulative impact would be less than significant.

Additional local drainage facilities would be constructed by developers or the City as they become necessary. During the development approval process, developers are "conditioned" to construct necessary storm drain facilities. In addition, projects may be conditioned to contribute a fair-share cost towards the design and construction of regional drainage facilities. Thus, implementation of The Fullerton Plan would not result in cumulatively considerable hydrology, drainage, or water quality impacts.

Proposed General Plan Update Policies and Actions: Refer to the Policies and Actions cited above.

Mitigation Measures: Refer to Mitigation Measures HYD-1 through HYD-3.

Level of Significance After Mitigation: Less Than Significant Impact.

5.8.7 SIGNIFICANT UNAVOIDABLE IMPACTS

Impacts related to hydrology and water quality associated with implementation of The Fullerton Plan would be less than significant by adherence to and/or compliance with goals, policies, and actions in The Fullerton Plan and the recommended mitigation measures. No significant unavoidable hydrology and water quality impacts would occur as a result of buildout of The Fullerton Plan.

5.8.8 SOURCES CITED

City of Fullerton, *City of Fullerton General Plan,* 1996.

City of Fullerton, *City of Fullerton General Plan Final Environmental Impact Report*, June 1994.

City of Fullerton, *Drainage Master Plan Update*, October 1996.

City of Fullerton, *Emergency Operations Plan*, March 2004.

City of Fullerton, *Local Hazard Mitigation Plan*, August 2010.

City of Fullerton Municipal Code.

RBF Consulting, *The Fullerton Plan Draft*, August 2011.