C.7 WATER RESOURCES AND HYDROLOGY

This section addresses the environmental setting and impacts related to the Proposed Project (Sections C.7.1 and C.7.2). Impacts of each alternative are presented in Sections C.7.3 (Santa Fe Alternative), C.7.4 (Cherry Alternative), C.7.5 (Paramount Alternative), C.7.6 (Alondra Alternative), C.7.7 (Bellflower Rail Alternative), C.7.8 (Artesia Alternative), C.7.9 (Shoemaker Alternative), and C.7.10 (No Project Alternative).

C.7.1 ENVIRONMENTAL BASELINE AND REGULATORY SETTING

Much of the information in Section C.7.1 is from the PEA (Section 3.4), and is not referenced for individual subsections below. The hydrological setting for the proposed project and all alternatives is the same, because the groundwater basins and surface water courses potentially affected by all route segments are identical.

C.7.1.1 Groundwater Basins

The project area is within the Coastal Plain hydrologic area of the Los Angeles River Basin. The Proposed Project and Alternative alignments are within the Central hydrologic subarea of this hydrologic unit. The West Coast hydrologic subarea bounds the Watson Station to the west.

Central Basin. The Central Basin is the largest groundwater basin in the watershed, covering an area of 277 square miles. In contrast, the West Coast Basin covers only 170 square miles. The surface over both basins, which is heavily urbanized, includes Los Angeles, Long Beach, and 32 other cities.

The Central Basin is crossed by three major surface streams: the Los Angeles River, the San Gabriel River, and the Rio Hondo. The San Gabriel River enters the Basin at Whittier Narrows, and runs south to the Pacific Ocean near Long Beach. The Rio Hondo enter the Basin at Whittier Narrows, parallel to the San Gabriel River, proceeds southwest, and joins the Los Angeles River midway across the Central Basin. The Los Angeles River enters Central Basin from the northwest through Los Angeles Narrows, and proceeds south across Central Basin, exiting through Dominguez Gap into West Coast Basin. Compton Creek originates near the intersection of the I-110 and I-105 Freeways, flows in a generally southeasterly direction and joins the Los Angeles River near Dominguez Hills.

Central Basin contains a number of shallow aquifers and three deeper aquifers. These deep aquifers, the Silverado, the Sunnyside, and the Lynwood, are the primary sources of groundwater for the Los Angeles County Drainage area (LACDA). Depth to groundwater in these deep aquifers is 200 to 400 feet below ground surface. Depth to groundwater in the shallow aquifers is 50 to 150 feet below ground surface. Depth to perched groundwater in the project areas has been reported at 15 to 40 feet below ground surface.

West Coast Basin. In West Coast Basin, deep aquifers that are considered distinct in the adjoining Central Basin are considered merged into a single aquifer unit. The total groundwater storage in the set of aquifers underlying West Coast Basin is estimated at 6.5 million acre-feet (Blomquist 1992).

The deep and shallow aquifers in Central Basin are recharged by underflow through Whittier Narrows from the north, and by percolation from San Gabriel River and the Rio Hondo, which flows into Montebello Forebay just south of the Narrows. This surface flow and the subsurface flow through the Narrows represent the outflow from the upstream San Gabriel Basin. San Gabriel River and the Rio Hondo are unlined in this area, increasing the opportunity for groundwater recharge. Whittier Narrows Dam, which is operated as a flood control and water conservation facility, contains flood flows for timely release to maximize recharge in the Forebay area. Montebello Forebay is an area where recharge occurs naturally. In contrast, groundwater recharge facilities are constructed to increase recharge. The Los Angeles Forebay area, located in the northwestern part of the Basin below the Los Angeles Narrows and to the west of Whittier Narrows, was largely eliminated as a source of recharge to Central Basin by urbanization of the surface over the Forebay area (Blomquist 1988a). Los Angeles Forebay's loss contributed to lowered groundwater levels, with the subsequent need for groundwater management and groundwater recharge facilities.

The aquifers in West Coast Basin are recharged by underflow from Central Basin across the Newport-Inglewood Uplift. The Dominguez Gap Spreading Grounds recharge the West Coast Basin aquifer from surface percolation. There is essentially no other recharge to the aquifers from surface percolation, due to a relatively impervious layer of clay at the surface (Blomquist 1988b).

Water Production and Use. Land use in the two Basins has undergone a change from agricultural to urban during this century. Consumptive use of water during this period actually dropped as urbanization increased. Groundwater pumping increased during this period, however, from 150,000 acre-feet per year in the 1930s to about 300,000 acre-feet per year in the 1950s (see Tables C.7-1 and C.7-2). California Department of Water Resources calculated that overdraft in 1957 was about 103,000 acre-feet per year. Due to overdraft of the groundwater basins between the turn of the century and the early 1960s, groundwater levels in some areas declined over 100 feet, and saltwater intrusion caused the abandonment of wells east of the Newport-Inglewood Uplift. The associated development of the San Gabriel Valley upstream from Central Basin also contributed to the decrease in recharge to Central Basin, while demand for groundwater in Central Basin increased (Blomquist 1992).

Water Wells. Table C.7-3 lists 7 municipal water wells located within 1/8 mile (660 feet) of the proposed pipeline route. Figure C.7-1 shows the locations of active water wells along the proposed and alternative pipeline routes.

Table C.7-1 Central Basin Water Production and Total Use by Decade

Period (years)	Water Use (thousand acre-feet)			
	Groundwater Extraction	Imports	Exports	Total Use
1962-1969	221	106	34	293
1970-1979	211	174	36	350
1980-1989	200	197	43	354
1990-1993[(a)]	188	209	11	386

NOTES: [(a)] During the 1992-1993 water year, 824 acre-feet of water were reclaimed in Central Basin. Reclaimed water had not previously been reported in the Basin's summary of operating conditions.
Source: California Department of Water Resource, 1993-1993, *Central Basin Watermaster Reports.*

Table C.7-2 West Coast Water Production and Total Use by Decade

Period (years)	Water Use (thousand acre-feet)			
	Groundwater Extractions	Imports	Exports	Total Use
1933-1939	48	23	13.0	70
1940-1949	68	43	1.3	109
1950-1959	79	97	2.5	173
1960-1969	61	203	8.6	256
1970-1979	60	250	12.0	298
1980-1989	53	277	10.7	320
1990-1992	51	269	5.8	315

Source: California Department of Water Resources, 1993-1993, *Central Basin Watermaster Reports.*

Table C.7-3 Municipal Water Wells near Pipeline Route

Location	Well #	Use	Owner
Corner of Susana Rd. and Victoria St.	97 *	Public Supply (new well scheduled to be installed in 1997)	Dominguez Water Co.
West side of Alameda St. across from Victoria St.	90 *	Public Supply	Dominguez Water Co.
East side of Downey Ave. between Artesia Blvd. and Ramona St.	n/a	Public Supply	Bellflower Home and Garden Water Co.
East side of Lakewood Blvd. between Artesia Blvd. and Ramona St. (2 wells)	n/a	Public Supply	Bellflower Home and Garden Water Co.
North side of Artesia Blvd. between Bixby Ave. and Woodruff Ave.	982F**	Public Supply	Somerset Mutual Water Co.
West side of Grand Ave. between Hacienda St. and Monterey St.	982D**	Public Supply	Somerset Mutual Water Co.
North side of Alondra St. between Thornlake Ave. and Belshire Ave.	1021H**	Public Supply	Park Water Co.

* Dominguez Water Co. well numbering system
** Well numbers used by Los Angeles County.

Figure C.7-1 Water Wells map

(To Download this figure, please see List of Figures on the table of contents)

Table C.7-4 shows wells within 660 feet of the proposed pipeline route that are used for purposes other than municipal water supply.

Table C.7-4 Wells for Other Purposes

Location	Well #	Use	Owner/Comment
East side of Alameda St. ½ block North of Victoria St.	883G	Test hole	
On Paramount Blvd., just South of the Southeast corner of Paramount Blvd. and Seaboard Ln.	933	Industrial - Boiler use	Well is not in service
On Hullett St. just East of Paramount Blvd.	943H	None	Well is capped and not in service
On Ramona Park near 65th St. and Coronado Ave.	942K	Groundwater Observation	City of Long Beach
Southeast corner of Artesia Blvd. and Virginia Ave.	962A	Public Supply	Bellflower Water Co. - Well has not been in service since 1988
South side of Beverly St. Between Clark Ave. and Ardmore Ave.	962H	Public Supply	Bellflower Water Co. - Well has not been in service since 1988
South side of Artesia Blvd. between Canehill Ave and Palo Verde Ave.	982B	None	Well is capped and not in service
West side of Jersey Ave. between 166th St. and 168th St.	1012G	Sprinkler system/ landscape irrigation	Artesia School District

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

Groundwater Quality. The ground water near the Rio Hondo approximates groundwater characteristics for the entire Basin. Average groundwater quality data for the two Basins compiled for 1991-92 are presented in Table C.7-5. Because these figures are averages over entire Basins, they may not represent water quality beneath the project area.

Table C.7-5 Average Water Quality in Central and West Coast Groundwater Basins

Basin	Water Quality Factor (mg/l)			
	TDS	Sulfate	Chloride	Hardness (as $CaCO_3$)
Central, average of 126 wells	411	86	48	230
West Coast, average of 11 wells	417	44	108	225

Notes: mg/l = milligrams per liter; TDS = Total Dissolved Solids; $CaCO_3$ = calcium carbonate.
Sources: Department of Water Resources, State of California, 1992, *Watermaster Service, Central Basin, Log Angeles County*, October; and Department of Water Resources, State of California, 1992, *Watermaster Service in West Coast Basin, Los Angeles County*, September.

Iron and manganese occasionally exceed standards in some wells. This sporadic problem is not a health hazard. High iron and manganese can precipitate as hydroxides, stain laundry and porcelain fixtures, and cause the taste and color of water to be objectionable. In addition to the general contaminants, the groundwater is subjected to many contaminants associated with hazardous waste from underground storage tanks and other sources.

C.7.1.2 Surface Water

Drainage Area. The project area is located in the lower part of the LACDA flood control system, which conveys runoff from a 1,459-square-mile drainage area. The characteristics of the drainage area and of the principal flood control channels in the project area are described below.

The principal streams in the drainage area are the Los Angeles River and San Gabriel River. The Rio Hondo can convey flood waters from San Gabriel River to the Los Angeles River during period of high runoff. The Los Angeles River drains 824 square miles and has a main channel length of approximately 51 miles. The headwaters of the Los Angeles River are in the Santa Susana Mountains, and it empties to the Pacific Ocean at Long Beach. Its principal tributaries are Pacoima Wash, Tujunga Wash, Burbank-Western Channel, Verdugo Wash, Sycamore Canyon, Arroyo Seco, the Rio Hondo, and Compton Creek.

The San Gabriel River drains 635 square miles and has a main channel length of approximately 58 miles. The San Gabriel River originates in the San Gabriel Mountains and empties to the Pacific Ocean at Seal Beach. The main tributaries of San Gabriel River are Big and Little Dalton Wash, San Dimas Wash, Walnut Creek, San Jose Creek, Brea Creek, Fullerton Creek, Coyote Creek, and Carbon Creek.

The lower Los Angeles River, from the Rio Hondo to the Pacific Ocean, is approximately 12.2 miles long. The Los Angeles River cross-section is trapezoidal over this entire reach. Between Glenn M. Anderson (Interstate-105) Freeway and Willow Street, the Los Angeles River is concrete lined. The general area of the Proposed Project is along this reach. From Willow Street to the Pacific Ocean, the Los Angeles River has a soft bottom and riprapped side slopes. Base widths are 300 feet from the Rio Hondo to Willow Street and, from that point on, vary from 470 to 510 feet. The Los Angeles River is leveed along its entire length from the Rio Hondo to the Pacific Ocean.

Depths of flow in the Los Angeles River range from about 13 to 21 feet. Velocities range from approximately 12 to 32 feet/second. Original design flow rates are 140,000 cubic feet/second from the Rio Hondo to Compton Creek, and 146,000 cubic feet/second from that point to the Pacific Ocean. Application of present-day freeboard requirements, based upon observed high flow conditions within the LACDA system, significantly reduces Los Angeles River capacity. Analyses carried out by the U.S. Army Corps of Engineers determined that “revised channel design capacities” vary between 127,000 and 146,000 cubic feet/second in the project reaches. Entrenched capacities vary from near zero at the channel mouth to a maximum value of approximately 100,000 cubic feet/second.

The primary tributary to the lower Los Angeles River is Compton Creek, which has its confluence at the Union Pacific Railroad crossing south of Del Amo Boulevard. Compton Creek has a revised channel design capacity of 13,750 cubic feet/second above the Los Angeles River, assuming no tailwater influence from the Los Angeles River. For existing conditions, a discharge of 140,000 cubic feet/second on the Los Angeles River would limit Compton Creek’s capacity to only 6,500 cubic feet/second.

C.7.1.3 Applicable Laws, Regulations, and Standards

A U.S. Army Corps of Engineers "404 Permit" will be required for any construction of the pipeline and pipeline alternative routes within the Waters of the United States or adjacent wetlands. Most of the stream channels crossed by the pipeline would be considered in the Waters of the United States as defined by the ordinary high water mark of the individual channels. The Corps of Engineers, in reviewing 404 permit applications, stresses avoidance of impacts, minimization of unavoidable impacts, and mitigation of unavoidable impacts to the Waters of the United States and wetlands. Any activities requiring a 404 permit would also require a Section 401 Water Quality Certification from the State Water Quality Control Board.

A California Department of Fish and Game (CDFG) "1603 Agreement" will be required for any new construction of the pipeline or pipeline alternative routes in riparian areas. The 1603 Agreement is similar to the 404 Permit, but the area of jurisdiction is typically defined on a case-by-case basis by the CDFG, and it is not, in a strict sense, a permit. It is an agreement between the project proponent and the CDFG regarding the location, nature and extent of disturbance, and mitigation.

Guidelines of the State Department of Health Services require that new wells be located at least 200 feet from a petroleum pipeline. Therefore, construction of an oil pipeline within 200 feet of an existing well would need to be reviewed by Health Services to ensure that the pipeline does not become a source of contamination for the well. Special pipeline casings or other contamination-preventing devices may be required within the 200-foot radius.

California Government Code Sections 51017.1 and 51017.2 require a Pipeline Wellhead Protection Plan to be prepared for pipelines located within 1,000 feet of a public drinking water well.

All cities and counties participating in the National Flood Insurance Program have floodplain regulations for activities within the floodplain. Floodplain regulations are intended to ensure that floodplain development is safe from flooding and causes no adverse impact on adjacent property. These regulations are applicable to the pipeline and new construction for the project as proposed and for alternative routes.

A General Construction Activity Storm Water Permit will be required from the California Regional Water Quality Control Board under National Pollution Discharge Elimination System (NPDES) regulations, specifically Order Number 96054, System Permit CAS614. A Storm-Water Pollution Prevention Plan (SWPPP) must be prepared in order to obtain the permit. The SWPPP will outline Best Management Practices to minimize water contamination during construction. Many of these Best Management Practices are included in the project description. These include, but are not limited to, "in the dry" crossings of streams, seeding or re-vegetation of disturbed areas according to an established re-vegetation and landscaping plan, using water bars, diversion channels and terraces to control erosion on steep terrain, maintaining construction sites in a sanitary condition, disposal of wastes at appropriate locations, control of stream sediments with straw bales or fabric filters, and treatment and disposal of hydrostatic test water according to local, State and Federal standards.

C.7.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: PROPOSED PROJECT

C.7.2.1 Significance Criteria

Impacts will be considered significant if any of the following occur:

- Permanent structures would be placed above ground and within the 100-year floodplain as defined by the Federal Emergency Management Agency.
- Lateral erosion, stream-bed scour, or long-term channel degradation would result in the buried pipeline being exposed to air or flowing water.
- The pipeline were to leak or rupture resulting in product flow into a watercourse or groundwater, or affecting the supply of groundwater.
- Flooding or scour would result in significant damage to a bridge or other structure on which the pipeline crosses. Significant damage to these structures is defined as placing the pipeline at risk of rupture, and lateral erosion which outflanks the structure, vertical sour which extends deeper than the structure piers or abutments, and over-topping of the structure or pipeline.
- Pipeline construction or operation would result in the discharge of contaminants (e.g., oil, gasoline, hydrostatic test water) into a river.
- After the use of Best Management Practices during pipeline construction, direct discharge of sediment into a flowing stream would occur.
- A flood event would result in flooding, scour, and erosion conditions in excess of the design criteria, with potential rupture of the pipeline and contamination of groundwater and surface water.

C.7.2.2 Applicant Proposed Measures

The Water Resources section of the PEA does not specifically list applicant measures. However, the following measures relevant to water resources are stated either in the project description or in other sections of the PEA.

1 If dewatering is required, the groundwater would be collected, tested for contamination and disposed in an approved manner. Any contaminated groundwater encountered would be pumped out of the trench and properly disposed.

2 Water crossing construction will occur in the dry season.

3 SFPP will use standard pipeline stream-crossing techniques including Best Management Practices for storm water during construction.

4 To reduce likelihood of accidental spills, refueling and lubrication of construction equipment will completed by refueling and lubrication activities with fuel tanks, fuel lines and the equipment having being placed in protective systems involving temporary berms and liners (e.g., hay bales and PVC plastic sheets). If accidental spills do occur, they will be quickly cleaned up using appropriate techniques and equipment.

5 Pipe welding, coating and similar work will not be completed within water courses.

6 At Compton Creek, the pipe will be buried a minimum of four feet below the 100-year scour depth of the stream channel.

7 The pipeline will be equipped with a computerized leak detection system that will alarm operating personnel when operational parameters are exceeded.

8 SFPP's spill response program includes an objective to initiate containment and control of large spills in less than one hour.

C.7.2.3 Impacts and Mitigation Measures for Pipeline Construction

This section is divided into sub-sections addressing pipeline construction impacts on groundwater and on surface water, and impacts of station construction.

C.7.2.3.1 *Impacts and Mitigation Measures for Construction: Groundwater*

Groundwater aquifers in the project area are in excess of 50 feet below ground surface and perched water is typically at least 15 feet below ground surface. Therefore, pipeline construction, which would rarely extend more than seven feet below the surface, does not have the potential to directly impact groundwater resources.

Perched groundwater could be encountered during pipeline construction. If dewatering is required, Applicant Proposed Measure 1 would be implemented, regarding collection and testing of groundwater. These procedures will result in groundwater impacts that are adverse but not significant (**Class III**).

C.7.2.3.2 *Impacts of Construction on Surface Water*

Surface water could be impacted during construction by disturbance of surface flows. This would occur only in an open cut waterway crossing, as proposed for Compton Creek. Construction of the open cut crossing of Compton Creek could increase sediment loading downstream, ultimately adversely impact receiving waters, a potentially significant impact. Applicant Proposed Measures 2 through 5 will reduce impacts; however, these measures do not provide enough specificity to allow monitoring for effectiveness, and the sedimentation is considered to be a potentially significant impact which can be mitigated by measure B-1, proposed in Section B.3, Biological Resources (**Class II**).

C.7.2.3.3 *Impacts of Station Modifications*

Construction of the terminal modifications will not impact surface or groundwater resources as there are no surface waterways affected by these modifications and modifications will occur above the highest level of groundwater.

C.7.2.4 Impacts of Pipeline Operation

This section focuses on the potential impacts of a pipeline leak or spill that could affect surface or groundwater. As described in Section C.11, a leak or spill is most likely to occur as a result of (1) third party actions (e.g., construction activities rupturing the pipeline), or (2) failure of a pipeline component (e.g., valves or flanges or pipe welds that can leak during pipeline operation). Depending on the location of such a leak or rupture, petroleum products could contaminate surface waters (including the marine environment) and/or groundwater.

C.7.2.4.1 *Impacts of a Pipeline Accident on Groundwater*

During operation of the pipeline the possibility exists that the pipeline may rupture or a pipeline component (valve or flange) could leak, releasing petroleum product into the environment. Section C.11 addresses the possibility of a pipeline leak or rupture, and describes SFPP's proposed leak detection system.

The ability of a petroleum product leak to impact groundwater resources is dependent on a number of complex variables including soil permeability, soil moisture content, depth to groundwater, stratigraphy, spatial distribution of the leak, and other factors. SFPP will install a computerized leak detection system that will alarm operating personnel when operational parameters are exceeded (e.g., when a pipeline rupture results in reduced pressure within the pipe). However, a leak detection system cannot detect a small leak, and it is possible for such a leak to continue unnoticed for a long period of time. An example of groundwater contamination caused by such a leak can be seen at the DFSP Norwalk Tank Farm (within which the SFPP Norwalk Station is located). A portion of this contamination at this site resulted from a leak on a component of SFPP's pipeline, resulting in contamination of approximately a one acre area of soil and ground water with gasoline components.

As shown in Table C.7-3, there are several water wells located along the proposed pipeline route. A leak or rupture in the vicinity of these wells could result in contamination of drinking water supplies.

SFPP states in the PEA that the likelihood of such a spill or leak occurring is so small that it should not be considered to be a significant impact. The safety analysis presented in Section C.11.2, confirms that the probability of a leak or spill occurring is small, but it is still considered likely that more than one pipeline leak will occur during the project lifetime.

Several mitigation measures are presented in Section C.11 (System Safety and Risk of Upset) to enhance SFPP's Safety and Leak detection system. However, pipeline leaks and spills are not completely preventable even with state-of-the-art safety measures. Therefore, the potential for a pipeline leak to contaminate groundwater is considered to be significant and not mitigable (**Class I**). Mitigation Measure H-1 is presented to minimize the likelihood of contamination of drinking water supplies.

Impact: Contamination of groundwater resulting from pipeline leak or rupture; potential contamination of water wells (**Class I**).

H-1 During final pipeline design, SFPP shall attempt to ensure that the pipeline is located at least 200 feet from any existing water well. Depending on the geology of any particular location, a greater separation or special pipeline design features (e.g., use of thicker walled pipe to further protect against third-party damage) may be required. In addition, in accordance with California Government Code Sections 51017.1 and 51017.2, if the pipeline is located within 1,000 feet of a public drinking water well, SFPP shall prepare a Pipeline Wellhead Protection Plan that describes SFPP's efforts to ensure pipeline integrity and response measures. A report on water wells, providing the information required in this measure, shall be submitted to the State Fire Marshal and the CPUC for review and approval prior to the start of construction.

C.7.2.4.2 *Impacts of a Pipeline Accident on Surface Water*

SFPP's proposed construction methodology for waterway crossings is as follows (described in more detail in Section B.4.1.8):

- Compton Creek: open cut trenching
- Los Angeles River: boring
- San Gabriel River: hanging pipe on bridge at Artesia Boulevard.

In the event of a pipeline failure, petroleum products could spill into a water course and potentially flow into the Pacific Ocean. The risk of such a spill occurring are addressed in detail in Section C.11. This section addresses the possible causes of such ruptures, and the potential impacts of such spills occurring in or adjacent to a waterway.

Pipeline Rupture from River Erosion and Scour. Because the Los Angeles River crossing will be bored and the pipe will be below the concrete bottom of the river channel, there is not considered to be a risk of scour at that crossing. The San Gabriel River crossing is proposed to be on a bridge, so no risk of scour exists at that location either. However, because Compton Creek is a soft-bottomed channel, scouring of stream beds may expose the pipe at the Compton Creek crossing, resulting in potential for pipeline rupture. This potential impact will be minimized because SFPP's applicant-proposed measure states that the pipe will be buried a minimum of 4 feet below the 100-year scour depth of the stream channel. However, Mitigation Measure H-2 provides additional specificity considered necessary for this measure to be enforceable.

Mitigation Measures for Erosion and Scour at Compton Creek

Impact: Potential for scour in Compton Creek to expose buried pipeline (assuming that the crossing is trenched) (**Class II**).

H-2 At the open-cut crossing of Compton Creek, the pipeline shall be buried at a depth of not less than 4 feet below the maximum depth of scour for a 24-hour flood, or 1.3 times the same depth of scour, whichever is greater. This depth shall be greater than the depth of the burial of the toe down of the levee walls. The Capital Flood discharge (50-year design frequency) shall be used to estimate scour. The scour depth shall be estimated by a registered Civil Engineer with experience in river sediment transport, using methods acceptable to the CPUC and U.S. Army Corps of Engineers. Compliance with this measure must be documented in an engineering report to be submitted to the CPUC and the State Fire Marshal for review and approval prior to completion of construction plans.

H-3 SFPP shall use a thicker walled pipe (wall thickness of at least 0.500 inches) or concrete coated pipe at the Compton Creek crossing (if this crossing is not bored) in order to protect the pipe from external damage. Such pipe and/or coating shall extend at least 10 feet outside of the levee walls, or within 5 feet of the valves on either side of the crossing. The proposed protection mechanism shall be shown on construction plans and approved by the State Fire Marshal and CPUC prior to the start of construction.

Alternatively, to eliminate the requirement for Mitigation Measures H-2 and H-3, the crossing of Compton Creek could be directionally drilled to reach a greater depth, providing greater safety against scour.

H-4 In place of Mitigation Measures H-2 and H-3, bore the Compton Creek crossing to a depth of at least 10 feet below the channel bottom.

Pipeline Rupture at Bridge Crossing. The PEA presents a spill scenario in which diesel fuel flowed from a pipeline rupture at the San Gabriel River crossing (where the pipeline is proposed to be hung from a bridge and therefore is most at risk to rupture). This spill scenario predicts that 35 percent of the diesel spill would evaporate. SFPP, in its PEA, estimated that 1.65 hours would elapse before such a spill would reach the mouth of the river channel and 2.68 hours would elapse before impacts to the shoreline would occur. In order to eliminate the possibility that the exposed pipe could be damaged and cause a spill that will reach the ocean, Mitigation Measure H-5 is recommended.

Impacts: Pipeline exposed at bridge crossing could result in spill reaching ocean **(Class I)**.

H-5 Bore the San Gabriel River crossing to minimize potential for a spill into the river.

Waterway Contamination from Pipeline Rupture. In addition to river scour, the pipeline at or near any of the waterways could rupture as a result of other causes (e.g., earthquake, flood or construction impact, or valve failure). Because storm drains would allow flow of spilled product from urban streets directly the waterways, a spill in urban streets could contaminate rivers or the marine environment. The Los Angeles and San Gabriel Rivers and Compton Creek, and downstream areas and harbors could be contaminated with petroleum products as a result of a pipeline rupture in or above the waterway (spilling either directly into the waterway or via storm drains).

Mitigation Measure SS-16 in Section C.11, System Safety, requires analysis of several spill scenarios and development of specific cleanup methods for waterways and the harbor. However, even with these measures, the potential for a spill to enter the waterways and the marine environment is considered to be significant **(Class I)**.

C.7.2.5 Secondary Impacts of Project Operation

As a result of the completion of the proposed project, there will be a significant increase in shipment of petroleum products via truck from Colton to Inland Empire destinations, and significantly increased throughput in the CalNev and Phoenix-West Pipelines to Nevada and Arizona, respectively. The potential impacts of these increased shipments to water resources would be increased size or frequency of pipeline product spills or trucking accidents that would result from the greater volume of product shipped (see Section C.11.6 for details). These impacts can be evaluated only qualitatively since the exact routes that would be traveled by trucks are not known. This increased risk of product spill is considered to be a potentially significant impact resulting from implementation of the proposed project. However, mitigation of those impacts is beyond the scope of this EIR, and not within the authority of the CPUC.

C.7.2.6 Cumulative Impacts

Future planned projects could contribute to cumulative impacts with the proposed pipeline by contributing to negative effects on water quality. Between Carson and Norwalk, this urban area is subject to additional in-fill urbanization and new industrial projects, such as those listed in Table B.10-1. Nearby proposed projects could have a cumulative impact on the environment in conjunction with the proposed pipeline, by causing sedimentation or increased runoff into stormdrains and waterways. However, because of the intense existing development of the region, projects within the project area would not cause significant cumulative impacts effect because this area is already primarily urbanized and the major drainage channels are protected from scour by channel lining. Therefore, cumulative hydrologic impacts are considered adverse but not significant **(Class III)**.

The proposed project also adds to the existing petroleum based infrastructure of the region. A catastrophic event such as a major earthquake could rupture oil storage tanks and/or pipelines in the area of the proposed project, resulting in cumulative effects of oil and petroleum products that could be transported to drinking water systems or into the ocean. The cumulative impacts of such events would be considered significant **(Class I)**; these impacts are also addressed in Section C.10 as utility co-location impacts. While each of the affected facilities or pipelines has developed contingency plans to reduce the potential impacts of such events, there are no mitigation measures that could prevent this type of cumulative impact if a major earthquake occurred.

C.7.2.7 Significant Unavoidable Impacts

Even with Mitigation Measures H-1 and B-7, potential contamination of ground water or surface water in the event of a pipeline rupture or ongoing leak is considered to be a significant and unavoidable impact. In addition, the cumulative risk of pipeline accidents in a major earthquake is a significant impact.

C.7.3 SANTA FE ALTERNATIVE SEGMENT

The Santa Fe Alternative includes a different location for crossing Compton Creek than that in the proposed project. However, the method of crossing (open-cut trenched crossing) would be the same. Therefore, impacts of this alternative would be the same as the proposed project, and Mitigation Measures H-1 through H-4 should be imposed. No water wells have been identified along the Santa Fe Alternative segment; however Mitigation Measure H-1 should be implemented to verify this fact.

C.7.4 CHERRY ALTERNATIVE SEGMENT

This alternative segment includes no waterway crossings, and groundwater levels are similar to those along the proposed project route. A water well is near the route segment, but it is out of service (see Table C.7-6) Mitigation Measure H-1 should be applied to minimize risk of contaminating water wells if a pipeline accident occurred.

Table C.7-6 Well Near Cherry Alternative

Location	Well #	Purpose	Provider
Southeast corner of Gardenia St. and 61st St.	933A	Not available	City of Signal Hill - Well is not in service

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

C.7.5 PARAMOUNT ALTERNATIVE SEGMENT

This alternative segment includes no waterway crossings, and groundwater levels are similar to those along the proposed project route. There is one water well near the alternative segment, as shown in Table C.7-7. It should be noted that this single well supplies 50-60% of the City of Paramount's total water production. Mitigation Measure H-1 should be applied to minimize risk of contaminating water wells if a pipeline accident occurred.

Table C.7-7 Well Near Paramount Alternative

Location	Well #	Purpose	Provider
Northeast corner of Downey Ave. and Monroe St.	951J	Public Supply	Paramount Water Co. - Well #14

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

C.7.6 ALONDRA ALTERNATIVE SEGMENT

The Alondra Alternative includes a crossing of the San Gabriel River in which the pipe would be hung from the Alondra Boulevard bridge. This is the same type of crossing proposed for the Artesia Boulevard crossing of the San Gabriel River under the proposed project. Table C.7-8 lists the 5 municipal and private wells near the Alondra Alternative segment.

Table C.7-8 Wells Near Alondra Alternative

Location	Well #	Purpose	Provider
Southwest corner of Lakewood Blvd. and Mayne St.	n/a	Public Supply	Peerless Water Co. - Well #3
West side of Lakewood Blvd. between Maple St. and Walnut St.	n/a	Public Supply	Peerless Water Co. - Well #2
Corner of Trabuco St. and Chicago Ave.	981C	Public Supply	Somerset Mutual Water Co.
Southwest corner of Alondra Blvd. and Virginia Ave.	961J	Not available	Bellflower Water Co. - Well has not been in service since 1988
South side of Alondra Blvd. between Bellflower Blvd. and Orchard Ave.	971E	Public Supply	Bellflower Water Co. - Well has not been in service since 1988

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

Mitigation Measures H-1 and H-5 should be applied to this alternative to reduce potential impacts to groundwater, surface waters and to improve spill response capabilities.

C.7.7 BELLFLOWER RAIL ALTERNATIVE SEGMENT

This alternative segment includes a bored crossing of the San Gabriel River, so likelihood of a spill directly into the river would be minimal. As shown in Table C.7-9, five water wells are located along the Bellflower Rail Alternative segment; Mitigation Measure H-1 should be applied to evaluate and reduce risk to water wells.

Table C.7-9 Wells Near Bellflower Rail Alternative

Location	Well #	Purpose	Provider
Southwest corner of Lakewood Blvd. and Mayne St.	n/a	Public Supply	Peerless Water Co. - Well #3
West side of Lakewood Blvd. between Maple St. and Walnut St.	n/a	Public Supply	Peerless Water Co. - Well #2
North side of railroad tracks near corner of Flora Vista St. and Eucalyptus Ave.	971F	Public Supply	Bellflower Water Co. - Well #833
On Orchard Ave between Belmont St. and Oak St.	971 C	Public Supply	Bellflower Water Co. - Well #759
On Flower St. east of Bixby Ave. (near 10010 Flower St.)	New	Public Supply	Bellflower Water Co. - Well #933

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

C.7.8 ARTESIA ALTERNATIVE SEGMENT

This alternative segment includes no waterway crossings, and groundwater levels are similar to those along the proposed project route. Table C.7-10 lists two active water wells in the vicinity of this route segment. Mitigation Measure H-1 should be applied to minimize significant (**Class I**) potential leak or rupture impacts on groundwater.

Table C.7-10 Wells Near Artesia Alternative

Location	Well #	Purpose	Provider
East side of Roseton Ave. ½ block South of Artesia Blvd.	1012K	Public Supply	Southern California Water Co.
North side of Artesia Blvd. between Barnhill Ave. and Grayland Ave.	1022H	Public Supply	Southern California Water Co.

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

C.7.9 SHOEMAKER ALTERNATIVE SEGMENT

This alternative segment includes no waterway crossings, and groundwater levels are similar to those along the proposed project route. This route segment would avoid construction in or near the Norwalk Station, which is currently undergoing remediation of groundwater contamination. As shown in Table C.7-11, one water well is located along this alternative segment, but it is also near the proposed route (near the corner of Alondra and Norwalk). Mitigation Measure H-1 should be applied to minimize significant (**Class I**) potential leak or rupture impacts on groundwater.

Table C.7-11 Wells Near Shoemaker Alternative

Location	Well #	Purpose	Provider
North side of Alondra Blvd. between Thornlake Ave. and Belshire Ave.	1021H**	Public Supply	Park Water Co.

Source: California Department of Water Resources and Los Angeles County Department of Public Works, Water Resources Division. Well number corresponds to numbering system used by the Los Angeles County.

C.7.10 NO PROJECT ALTERNATIVE

The No Project Scenario, as defined in Section B.9, includes increased throughput in the Phoenix-West Pipeline and significantly increased trucking of petroleum products in southern California and to Nevada. Increased throughput on the Phoenix-West Pipeline would occur, as defined by the No Project Scenario, and is also evaluated under Section C.7.2.6, Secondary Impacts. This increased throughput has the potential for increasing the size and frequency of pipeline spills, which is a significant impact (**Class I**).

A major component of No Project activities would be trucking of products in southern California and Nevada. Truck accidents are considered to be more likely to occur than accidents on pipelines. These accidents have the potential for contamination of surface waters, a significant impact (**Class I**) that is not mitigable in the scope of this EIR.

C.7.11 MITIGATION MONITORING PROGRAM

Table C.7-12 presents the Mitigation Monitoring Program for the measures identified in this section.

Table C.7-12 Mitigation Monitoring Program

Impact	Mitigation Measure	Location	Monitoring/Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Contamination of Compton Creek during open cut construction from sediment loading or accidental equipment spills/leaks (Class II).	See Mitigation Measure B-1 (Section C.3, Biological Resources)	Compton Creek crossing (if open-cut and not bored)				
Contamination of groundwater results from pipeline leak or rupture (Class I).	**H-1** Ensure that the pipeline is located at least 200 feet from any existing water well. Greater separation or special pipeline design features may be required. Prepare Pipeline Wellhead Protection Plan.	Areas within 1,000 feet of a water well	Approve water well report, pipeline design plan, and designs for groundwater protection	Plan/design protects water wells to extent feasible	CPUC, local water agencies, CSFM	Prior to construction
Scour in Compton Creek could expose buried pipeline (Class I)	**H-2** The pipeline shall be buried at a depth of not less than 4 feet below the maximum depth of scour for a 24-hour flood, or 1.3 times the same depth of scour, whichever is greater. **H-3** Use a thicker walled pipe (wall thickness of at least 0.500 inches) and/or concrete coated pipe. OR: **H-4** Bore Compton Creek crossings to a depth of at least 10 feet below the channel bottom.	Compton Creek crossing (if open-cut and not bored)	Approved engineer to review and approve engineering report describing detailed design of Compton Creek crossing	Engineering report shall present analysis of scour potential and rationale for data presented	CPUC, U.S. Army Corps of Engineers, CDFG, CSFM	Prior to construction
Pipeline rupture would cause contamination of San Gabriel River, downstream areas, and harbors (Class II)	**H-5** Bore San Gabriel River crossing.	San Gabriel River crossing	Approved engineer shall review and approve construction plans	Pipeline rupture does not occur within riverbed	CPUC, USACE, CDFG, CSFM	Prior to construction
Pipeline rupture would cause contamination of waterways and marine environment (Class I)	See Mitigation Measure SS-16 (Section C.11, System Safety).	All waterway crossings				

C.7.12 REFERENCES

Aspen (Aspen Environmental Group). 1996. Final EIS/SEIR, Pacific Pipeline Project. Prepared for California Public Utilities Commission. January.

SFPP (Santa Fe Pacific Pipeline Partners). 1997. Santa Fe Pacific Pipeline Partners Watson to Colton Expansion Project Proponent's Environmental Assessment and Amendment. Prepared for SFPP, L.P. by Woodward-Clyde Consultants. March and June.