4.5 Water Resources

This section addresses the potential Project impacts on: (1) water quality standards, (2) surface water quality due to discharges, (3) any change of groundwater quality, (4) the quantity or movement in the availability of surface or groundwater, and (5) community water services. For each subtopic, existing conditions, thresholds of significance, impacts, and mitigation measures are addressed.

The proposed Project involves two principal phases. The first is a remediation and restoration phase, which addresses soil and groundwater contamination due to existing petroleum-related contamination. This phase will include the demolition of existing buildings, excavation of contaminated soil, capping of contaminated areas, site recontouring, and revegetation. Overall, the completion of the remediation activities is intended to reduce ecological risk, improve the function and value of the various on-site wetlands, improve groundwater recharge, increase nutrient and pollution removal, and provide increased flood-flow management. The remediation and restoration activities, however, will result in surface disturbances across the Project Site, potentially impacting surface water quality, groundwater quality, and hydrologic characteristics of the site. Any recontouring of the Project Site could impact water flow and tributary characteristics. In addition, the placement of caps over areas of contamination at various locations could potentially affect infiltration rates and alter runoff volumes.

The second component of the Project involves developing portions of the site through entitlements for commercial and industrial land uses. The Applicant's goal is to develop a portion of the Project Site with approximately 800,000 square feet of commercial and industrial development. Approximately 51 acres of the 332-acre site are proposed for development. The remaining portion of the Project Site is intended to be dedicated as open space.

As part of the second component, the Applicant has proposed two development options. The first would be development in the City of San Luis Obispo. Under this option, once remediation is complete the property would be annexed into the City for development. The second development option would be in the County of San Luis Obispo.

Construction activities occurring as part of the development phase have the potential to impact surface water quality, groundwater quality, and groundwater quantity. The completed development could potentially impact water quality and quantity. Under the County Development Plan, existing on-site groundwater wells would supply water for the Project. The additional water demand for the Project has potential impacts to the groundwater availability. With the County Development Plan, wastewater from the development would be treated at an on-site wastewater treatment plant. Section 4.6 discusses the wastewater impacts.

Under the City Development Plan, the proposed development area would be annexed into the City of San Luis Obispo and would be served by the City by extending the existing water service utilities. Impacts associated with supplying the Project from the existing City water service utility is discussed in Section 4.13, Public Services and Utilities.

Under the City Development Plan, wastewater from the Project would be handled by the existing City wastewater system. Impacts associated with the use of the City wastewater system are discussed in Section 4.6, Wastewater.

The completed development also has the potential to impact on-site hydrology, surface water, and groundwater quality. Due to the increase in impervious area from the development, stormwater runoff could increase. The development also has the potential to impact surface and groundwater quality due to pollutant transportation from parking lots, building roofs, pesticides, and fertilizers. This section analyzes any potential water impacts due to the completed development.

4.5.1 Environmental Setting

4.5.1.1 Physical Setting

The Project Site is within the unincorporated area of San Luis Obispo County south of the San Luis Obispo city limits along Tank Farm Road. The tank farm, constructed in 1910, was used as an accumulation point for petroleum pipelines from the San Joaquin Valley. The property slowly withdrew from operation and by the late 1990s the site was fully decommissioned.

Currently the site is mostly undeveloped and consists of both native and non-native grasslands, but is dominated by non-native annual grasslands. The site also contains both natural wetlands and wetlands from water accumulation within the former oil storage facilities. Cattle currently graze the open space for fire prevention and weed control. Urban developments within the City of San Luis Obispo and the San Luis Obispo County Regional Airport surround the Project Site.

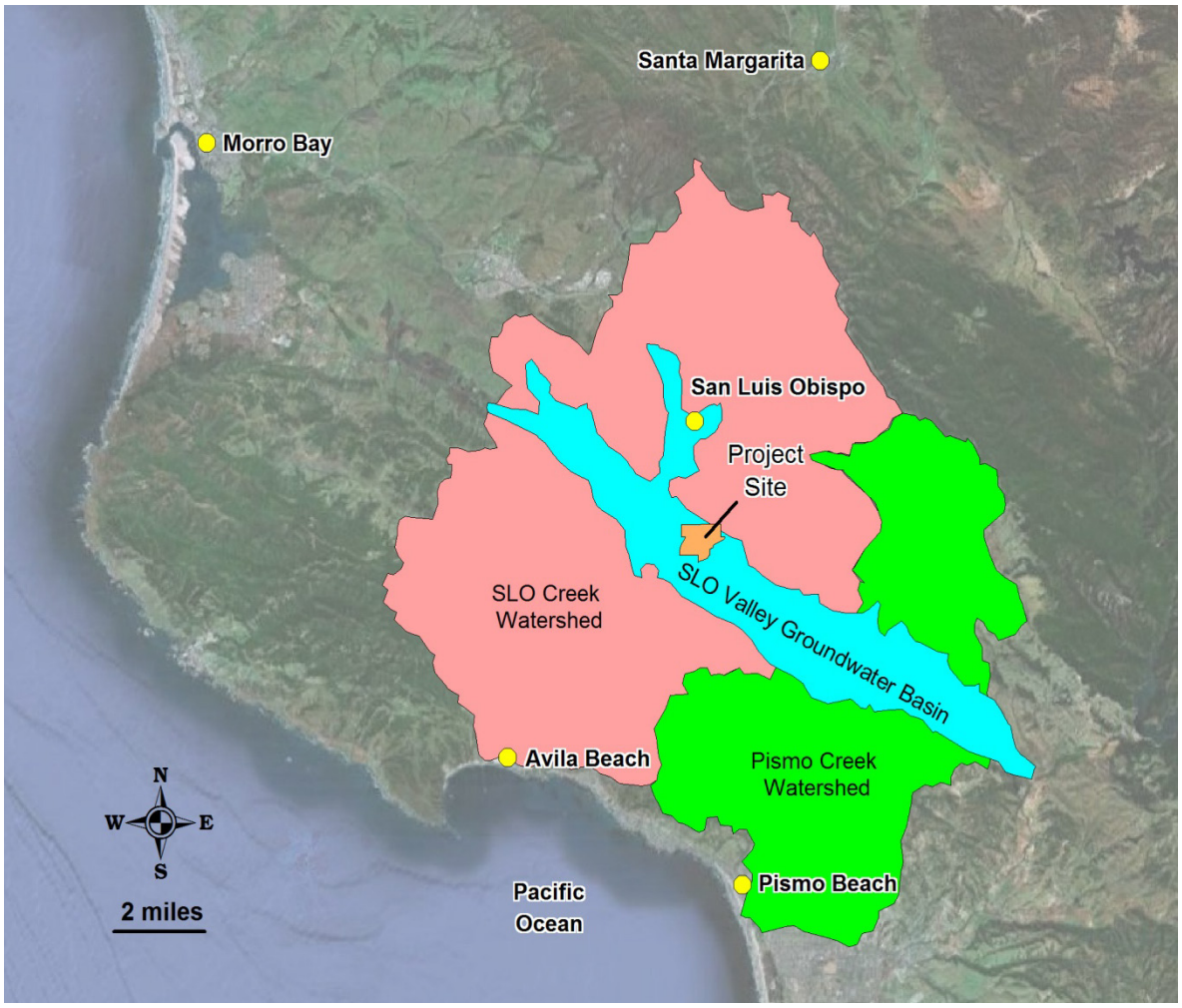
The 332-acre Project Site drains from north to south. Natural slopes ascend to the north and northeast at gradients up to 2:1 (horizontal to vertical). Total relief across the Project Site is approximately 40 feet. Current adjacent land use is mainly undeveloped open space.

4.5.1.2 Surface Waters

The entire Project Site is contained within the San Luis Obispo Creek watershed as shown in Figure 4.5-1. The creek starts in the foothills of the Lopez Mountains and discharges to the Pacific Ocean at Avila Beach. Its course is approximately 1,500 feet from the tank farm site at its closest point. The tank farm itself lies across or adjacent to tributaries to San Luis Obispo Creek. This is relevant since the site lies within the special management zone that the City of San Luis Obispo and San Luis Obispo County have established for managing San Luis Obispo Creek.

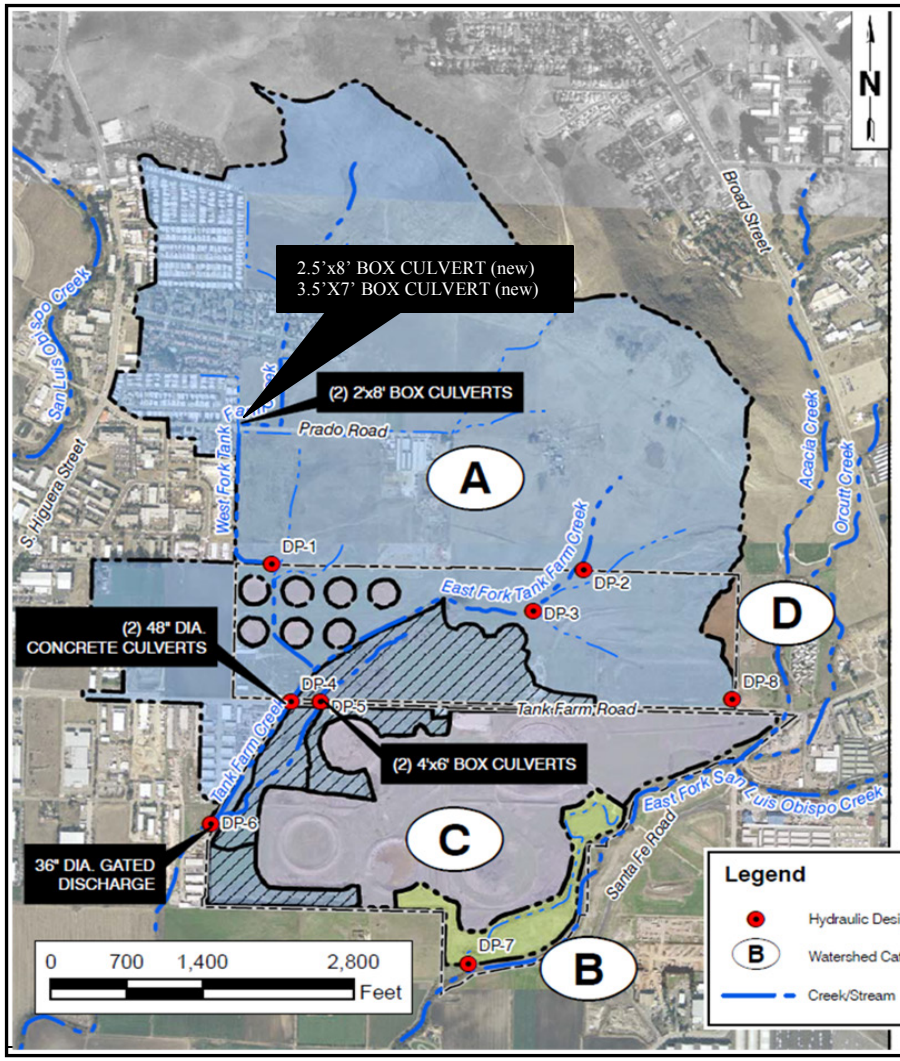
The Project Site has three primary watersheds/catchments as shown in Figure 4.5-2. The areas shown in Figure 4.5-2 are the watershed/catchment areas that have the potential to affect the Project Site.

Figure 4.5-1 SLO Valley Watersheds and Groundwater Basin



Source: Adapted from DWR 2013 and SLOWS 2007.

Figure 4.5-2 Overview of the Watersheds that Relate to the Chevron Tank Farm Property Site



WATERSHED ID	ONSITE (ac)	OFFSITE (ac)	TOTAL (ac)
WATERSHED A TANK FARM CREEK WATERSHED	160.1	476.5	636.6
WATERSHED B ONSITE TRIBUTARY TO THE EAST FORK OF SAN LUIS OBISPO CREEK	19.1	0.0	19.1
WATERSHED C ONSITE HYDROLICALLY ISOLATED DEPRESSIONS	139.1	0.8	139.9
WATERSHED D ONSITE AREA TO THE EAST WHICH DRAINS OFFSITE	4.0	0.0	4.0
OTHER OTHER MINOR OFFSITE DRAINAGE	11.0	0.0	11.0
TOTAL	333.3	477.3	810.6

NOTES:
1) DIAGONAL HATCHED AREAS ARE TRIBUTARY TO THE NORTH MARSH AND AUXILIARY TANK FARM CREEK AND ARE NOT ENGAGED IMMEDIATELY DURING A STORM,

Source: Hydrology Study (Avocet 2009)

The first is Tank Farm Creek (Watershed A in Figure 4.5-2); the second is the small portion of the site tributary to the East Fork of San Luis Obispo Creek (Watershed B in Figure 4.5-2), and the third is the collection of isolated depressions and basins created during the historical petroleum storage operations (Watershed C in Figure 4.5-2). A small portion of the site along the east property line (Watershed D in Figure 4.5-2) drains via sheet flow onto the adjoining property. Other minor catchments formed by the berm along the southeast property line account for the remainder of the site area.

Tank Farm Creek

Tank Farm Creek is an approximately two-mile long tributary of the East Fork of San Luis Obispo Creek, which is, in turn, a tributary to San Luis Obispo Creek. Tank Farm Creek splits into two separate reaches on-site (East Fork and West Fork), north of Tank Farm Road (see Figure 4.5-2). The West Fork of Tank Farm Creek extends almost due north and is, for the most part, channelized and serves both urban and natural catchments. The East Fork of Tank Farm Creek is a southwest trending reach that begins in the South Street Hills that border Broad Street.

Approximately 4,000 feet of Tank Farm Creek, slightly more than 30 percent of its total length, is upstream of the discharge point and is fed by a total runoff area of approximately 628 acres. This is the principal watershed for the Project. One hundred fifty acres of the watershed are on-site, while the remaining 478 acres are located off-site. The highest and lowest points of the watershed are at 592 feet above mean sea level (amsl) and 113 feet amsl, respectively. This is an overall slope of 6 percent. However, on-site the watershed is relatively flat with a slope of only 0.3 percent. It is estimated that 13 percent of the watershed is urban and relatively impervious. Unpaved areas are characterized by pasture or naturally vegetated ground consisting of sands, silts, and clays.

Tank Farm Creek runs along the western property boundary in a channel and passes beneath Tank Farm Road via two 48-inch-diameter steel culverts (hydraulic design point DP-4 in Figure 4.5-2). Tank Farm Creek discharges from the Project Site at a headwall – a retaining wall designed to provide retention for a culvert or drainage ditch – that is located near the southwest corner of the site (hydraulic design point DP-6 in Figure 4.5-2). The headwall has two 36-inch-diameter gate valves that were constructed as part of the petroleum storage operation, to provide a means of retaining a catastrophic release of oil on-site. The property downstream of the headwall (property not owned by the Applicant) has been filled to the top of the headwall, closing off one of the 36-inch-diameter gate valves. This has the practical effect of halving the discharge capacity of Tank Farm Creek at this location, which increases the likelihood of local flooding in this area. Hydraulic changes to the system are discussed in Section 4.5.4, within the Impact WR.5 analysis.

A secondary channel joins Tank Farm Creek just upstream of the headwall. It drains approximately 55.2 acres. This secondary channel passes under Tank Farm Road via two 4-foot-high by 6-foot-wide (48 square feet total flow area) box culverts (hydraulic design point DP-5 in Figure 4.5-2). Although the topography north of Tank Farm Road is flat, the relatively low invert elevation of the box culverts prevents the structure from effectively decreasing peak stormwater flows.

At the eastern point of the operations area Tank Farm Creek splits into its east and west forks see Figure 4.5-2). Following the forks upstream, the West Fork runs nearly due north, while the East Fork branches to the northeast. The on-site configuration of the forks has been altered from the pre-development past through the use of berms and containment structures that were used to minimize the migration of petroleum spills. The East Fork drains an area of approximately 169 acres. This portion of the Tank Farm Creek Watershed is almost entirely overland flow; only 0.6 acre (0.4 percent) is paved. In the lower part of the basin, the slope is relatively flat and consists of a greater proportion of silt or clay soils.

Just north of the Project Site two new box culverts were installed under Prado Road as part of a recent road extension project. In addition, the two existing box culverts were extended to the south. In addition, a new retention basin was constructed just south of Prado Road and north of the Project Site.

The West Fork drains approximately 336 acres. From its branch off the Tank Farm Creek to the point where it enters the site along the north property line, the West Fork follows a poorly defined channel that has a slope of just 0.4 percent and only 4 feet of relief.

As part of a hydraulic study that was conducted for the Project (See Appendix F) existing site conditions were evaluated for a 24-hour storm with recurrence intervals of 2, 10, 25, 50 and 100 years. The key design points (DP) and pond features considered in the existing conditions analysis are shown in Figure 4.5-2. DP-1 is where the West Fork of Tank Farm Creek enters the SLO Tank Farm along the north property line. DP-2 is where the East Fork and the reach that drains former Reservoir 4. DP-4 and DP-5 represent the two 48-inch diameter round culverts and the two 4-foot by 6-foot box culverts, respectively that cross under Tank Farm Road. DP-6 is the discharge point through the headwall for Tank Farm Creek. Table 4.5-1 provides the peak flow from the design points shown in Figure 4.5-2. Table 4.5-2 summarizes the peak flows and volumes for the off-site discharge from the Tank Farm Creek Watershed.

Table 4.5-1 Summary Of Peak Surface Water Flows – Existing Conditions

Design Point	Peak Flow (cubic feet per second)				
	2-Year	10-Year	25-Year	50-Year	100-Year
DP-1	214.7	432.0	548.1	623.0	690.7
DP-2	39.1	85.0	111.9	130.9	149.9
DP-3	57.8	135.9	182.4	216.0	249.8
DP-4	114.6	255.8	324.8	377.6	433.4
DP-5	72.4	205.7	286.8	340.6	395.5
DP-6	57.8	77.7	83.3	84.2	85.2
DP-7	0.4	2.1	3.2	4.0	4.8
DP-8	3.5	7.8	10.4	12.2	14

Source: Hydrology Study (Avocet 2009) (see Appendix F).

Table 4.5-2 Summary Of Peak Flows and Volumes for Tank Farm Creek Off-site Discharge - Existing Conditions

Storm Event	Volumes (ac-ft)				Peak Flow(1) (cfs)		
	Existing 36" Discharge	Storage	Overflow	Total	Existing 36" Discharge	Overflow	Total
2-Year 24-Hour Storm	40.4	27.2	0.0	67.6	57.8	0.0	57.8
10-Year 24-Hour Storm	72.1	71.1	0.0	143.2	77.7	0.0	77.7
25-Year 24-hour Storm	92.1	92.3	4.7	189.2	83.3	79.2	162.5
50-Year 24-hour Storm	95.9	98.4	28.3	222.5	84.2	166.1	250.2
100-Yer 24-hour Storm	97.1	103.3	56.2	256.5	85.2	287.2	372.5

ac-ft – acre-feet
cfs – cubic feet per second
Source: Hydrology Study (Avocet 2009) (see Appendix F).

A review of the tables and the information provided in Appendix F shows that the existing stormwater management infrastructure is inadequate for storms exceeding the 10-year recurrence interval (4.7 inches in a 24-hour period). The majority of stormwater is routed directly to the headwall (DP-6 in Figure 4.5-2) to discharge off site. Consequently, the limited storage capacity south of Tank Farm Road is quickly exceeded, and the substantially greater storage capacity north of Tank Farm Road is never mobilized. This issue is addressed in Section 4.5.4, Impact WR.5.

Tributary to East Fork of San Luis Obispo Creek

The Project Site also contains approximately 19 acres that discharge directly to the East Fork of San Luis Obispo Creek Watershed B in Figure 4.5-2. The tributary area is in the southeast portion of the Project Site. It includes an old meander of the East Fork of San Luis Obispo Creek and is connected to the active channel by a12-inch-diameter gate valve that appears to have rusted open. DP-7 in Figure 4.5-2 shows the location of the discharge point.

It is estimated that peak discharge from the gate valve (Design Point DP-7) ranges between 0.4 and 4.8 cubic feet per second for the 2-year and 100-year storms, respectively (See Table 4.5.1, DP-7). The proposed Project would not involve any development in this area.

This watershed area contains an auxiliary channel and an oxbow (U-shaped channel) that were cut-off from the East Fork of San Luis Obispo Creek by construction of a containment berm along the southeast property line.

On-site Hydraulically Isolated Depressions

From 1910 until the early 1980s, the tank farm was used for storing crude oil transported via pipeline from the San Joaquin Valley. Although the site no longer handles petroleum, the remnants of that use are still found across the site. The most prominent features are the vestiges of the former storage facilities. There were six large earthen reservoirs ranging in capacity between 775,000 and 1,350,000 barrels. The reservoirs were constructed by excavating a circular

or elliptical depression, which was then lined with wire-mesh-reinforced concrete. The walls were also reinforced concrete but were variously constructed either vertically or integrated into the sloping sides of the depression. All but one of these reservoirs is located south of Tank Farm Road. Figure 2-2 shows the location of these reservoirs.

In addition, 21 steel aboveground storage tanks, capable of holding 55,000 barrels of oil each, were located north of Tank Farm Road. Their historical locations are also shown in Figure 2-2. On April 7, 1926, a series of lightning strikes resulted in a massive fire at the tank farm. By April 11, 1926, all but a few thousand barrels in inventory had been burned to coke or spread across the site. Following the 1926 fire, four large reservoirs were repaired and continued in service for several more decades. Ten of the aboveground storage tanks were rebuilt and used through the 1980s. The last aboveground storage tank, which was used most recently to store fire water, was removed from the site in August 2000. The reconstruction effort included expanding fire breaks and enlarging the containment areas surrounding the reservoirs and aboveground storage tanks. This created numerous hydraulically closed depressions across the site, many of which became wetlands and habitat for environmentally protected species.

Today there are about 23 hydraulically isolated depressions at the site that cover about 140 acres. The location and size of each of the depressions is shown in Figure 4.5-3. These depressions have no hydrologic connection to either Tank Farm Creek or the East Fork of San Luis Obispo Creek. In effect, changes in storage occur only from direct precipitation, evapotranspiration, or infiltration. Except under extraordinary circumstances there is no runon or runoff associated with these depressions.

Other Minor Watersheds

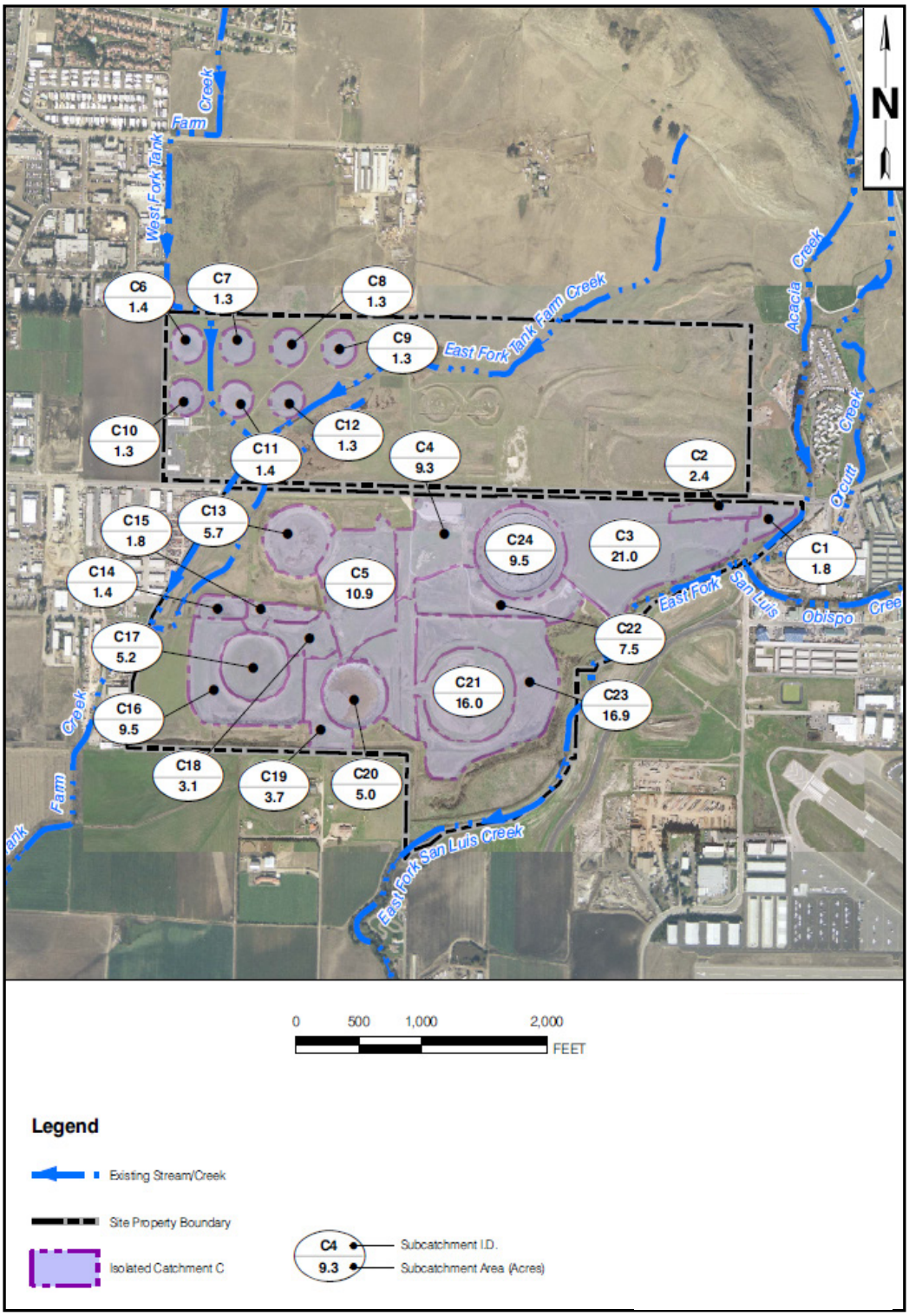
Minor watersheds are those catchments at the site that are relatively small, and do not possess clearly defined channels. There are two minor watersheds on the site. The first includes approximately 11 acres of berm slope that drains into Acacia Creek and the East Fork of San Luis Obispo Creek. This area is negligible with respect to the overall watershed and is not changed by either remediation and restoration or development, and is not discussed further in this document.

The second minor watershed is referred to as Watershed D in Figure 4.5-2. Approximately 11 acres of the site drains east via sheet flow to the adjacent property. Peak runoff flow rates range from 3.5 cubic feet per second for the 2-year storm up to 14 cubic feet per second for the 100-year storm. Total runoff volume is estimated to be between 0.4 and 1.5 acre-feet for the 2- year and 100-year storms, respectively.

100-Year Flood Plain

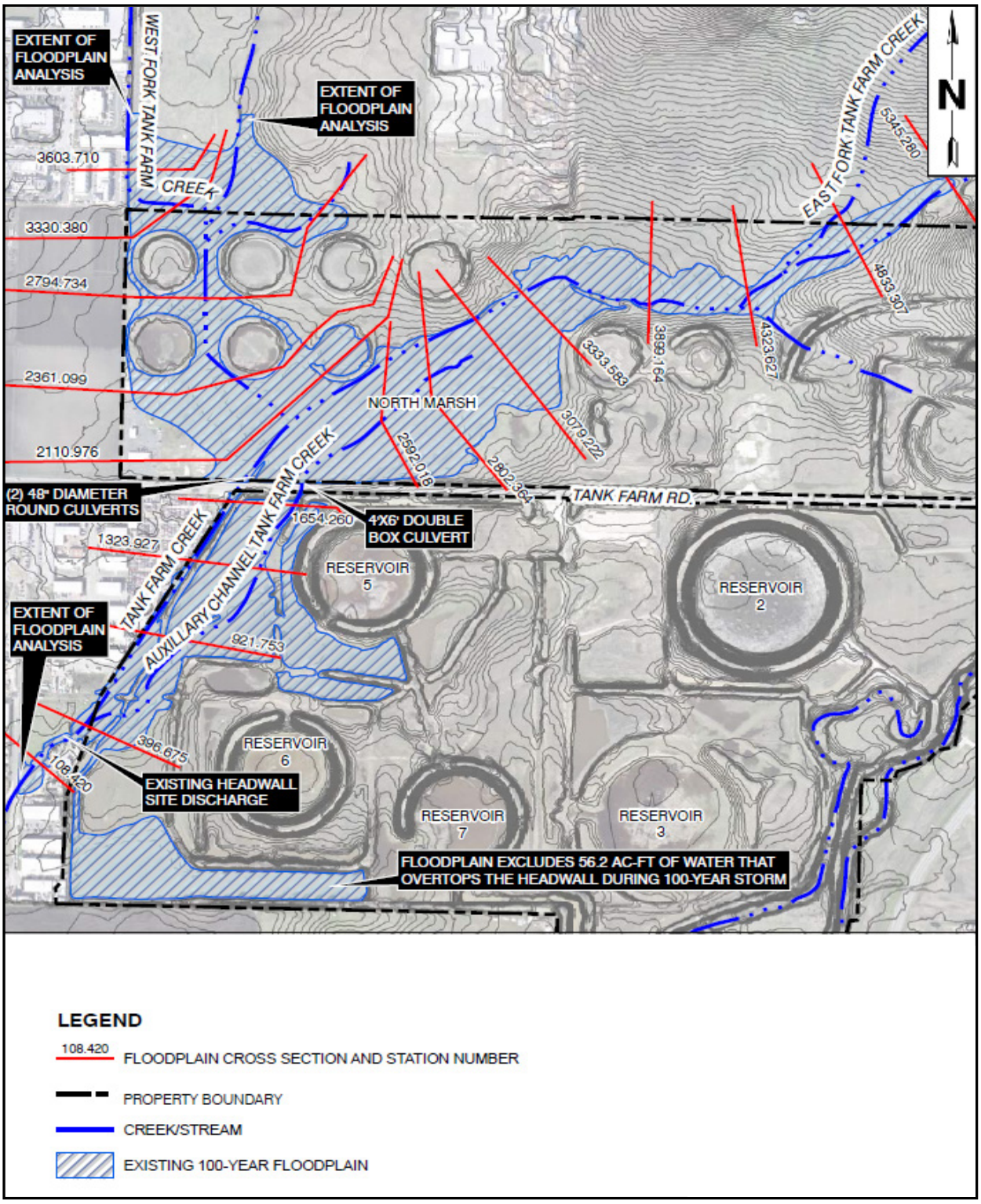
A 100-year floodplain analysis was performed as part of the Hydrology Study for the proposed Project (see Appendix F). Figure 4.5-4 shows cross section locations used in the analysis and the estimated lateral extent of the flood plain. The cross sections developed for the analysis and the computer-generated results are provided in Appendix F. The entire flood plain within the property boundary occupies approximately 57 acres. At the northern property boundary, the flood stage is at an approximate elevation of 122.8 feet above mean sea level (amsl).

Figure 4.5-3 On-site Isolated Catchments Existing Conditions



Source: Hydrology Study (Avocet 2009)

Figure 4.5-4 100-Year Flood Plain Existing Conditions



Source: Hydrology Study (Avocet 2009)

At Tank Farm Road, it is estimated that the flood stage is at 120.2 feet amsl, and at the headwall, the flood stage has decreased to an estimated 119.5 feet amsl. North of Tank Farm Road, it appears that the flood stays within the limits of the Project Site boundary. South of Tank Farm Road, the flood stage is nominally within the property boundary. However, the hydrology analysis also shows that about 56 acre-feet of water overtop the headwall during a 100-year storm.

Surface Water Quality

Surface water from the site has been monitored and sampled on a periodic basis since about 1998 at various locations on the Project Site. There have been oil sheens and/or oil droplets sometime observed in Reservoirs 3, 5, and 7.

Surface water samples have been chemically analyzed for the presence of various hydrocarbons that could be associated with the oil contamination at the Project Site. Surface water samples are chemically analyzed for the presence of total petroleum hydrocarbon (TPH) in the C_{10} to C_{40} carbon range characterized as crude oil. During some of the past sampling, tests were done for benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX), and polyaromatic hydrocarbons (PHAs). Testing for these compounds stopped in 2002 since all of the readings had been below the detection limit of 0.0005 parts per million (ppm).

TPH levels have for the most part been below the State of California Maximum Containment Level of 1 ppm TPH, with the majority of the surface water samples have had TPH below 0.1 ppm. During the 2011 sampling, the maximum TPH concentration was found to be approximately 0.5 ppm. Additional information on surface water quality can be found in Appendix H.1, Attachment 5.

4.5.1.3 Groundwater

The San Luis Obispo Valley Groundwater Basin underlies the San Luis and Edna Valleys and is bound on the northeast by the Santa Lucia Range and on the southwest by the San Luis Range. Figure 4.5-1 shows the location of the San Luis Obispo Valley Groundwater Basin in relation to the Project Site. The groundwater basin is an elongated trough of relatively recent (Pleistocene and Holocene age) sediments approximately 13 miles long and 2 miles wide. It is recharged primarily by streams flowing from the northeast. This basin, as described in the California Department of Water Resources (DWR) Bulletin 118 report (published 2/27/2004), includes two areas separated by a groundwater divide- the San Luis Obispo Creek valley (San Luis) area and the Pismo Creek valley (Edna) area. The proposed Project is in the San Luis area. These basin areas have distinct groundwater recharge and production characteristics and are considered sub-basins in the draft San Luis Obispo County Master Water Report (SLOC 2012).

The San Luis portion of the San Luis Obispo Valley groundwater basin is comprised of shallow alluvial sediments and deeper marine sedimentary beds that have been deposited in the San Luis Obispo Creek valley. The basin area has formed as a result of tectonic activity that has uplifted the Irish Hills and down-dropped the valley floor. As a result, the basin sediments increase in thickness toward the southwest where the deeper deposits butt against the Los Osos Valley fault.

The most recent estimates of groundwater in storage and average annual recharge were made by DWR in 1997. Groundwater in storage within the San Luis area was estimated at 16,300 acre-feet. Average annual recharge to the San Luis area was estimated at 2,200 acre-feet per year. Recharge varies depending on available storage for recharge waters. During periods where groundwater levels are low, more recharge can occur. Recharge is comprised of percolation of rainfall, percolation of stream flow, and irrigation return flows and wastewater discharge percolation. The City of San Luis Obispo discharges their wastewater to San Luis Obispo Creek near the downstream edge of the main groundwater basin area and would also be a recharge source.

Groundwater levels have been monitored in the vicinity of the Project for over 50 years and at the Project Site for more than 10 years. Figure 4.5-5 shows the Project area groundwater contour map from October 2011. The groundwater contour map shows that the groundwater surface slopes to the southwest. The critical years to document water levels are in the driest years on record when the heaviest pumping was occurring. Prior to the "miracle March" of 1991, the water levels were at their lowest levels in late 1990 and early 1991. Groundwater generally flows from east to west at a gradient of 0.006 foot drop per foot distance. The water level elevation on the east side of the tank farm was at 132 feet amsl and at 102 feet amsl in the southwest corner of the Project Site in February 1991 (Cleath 2002).

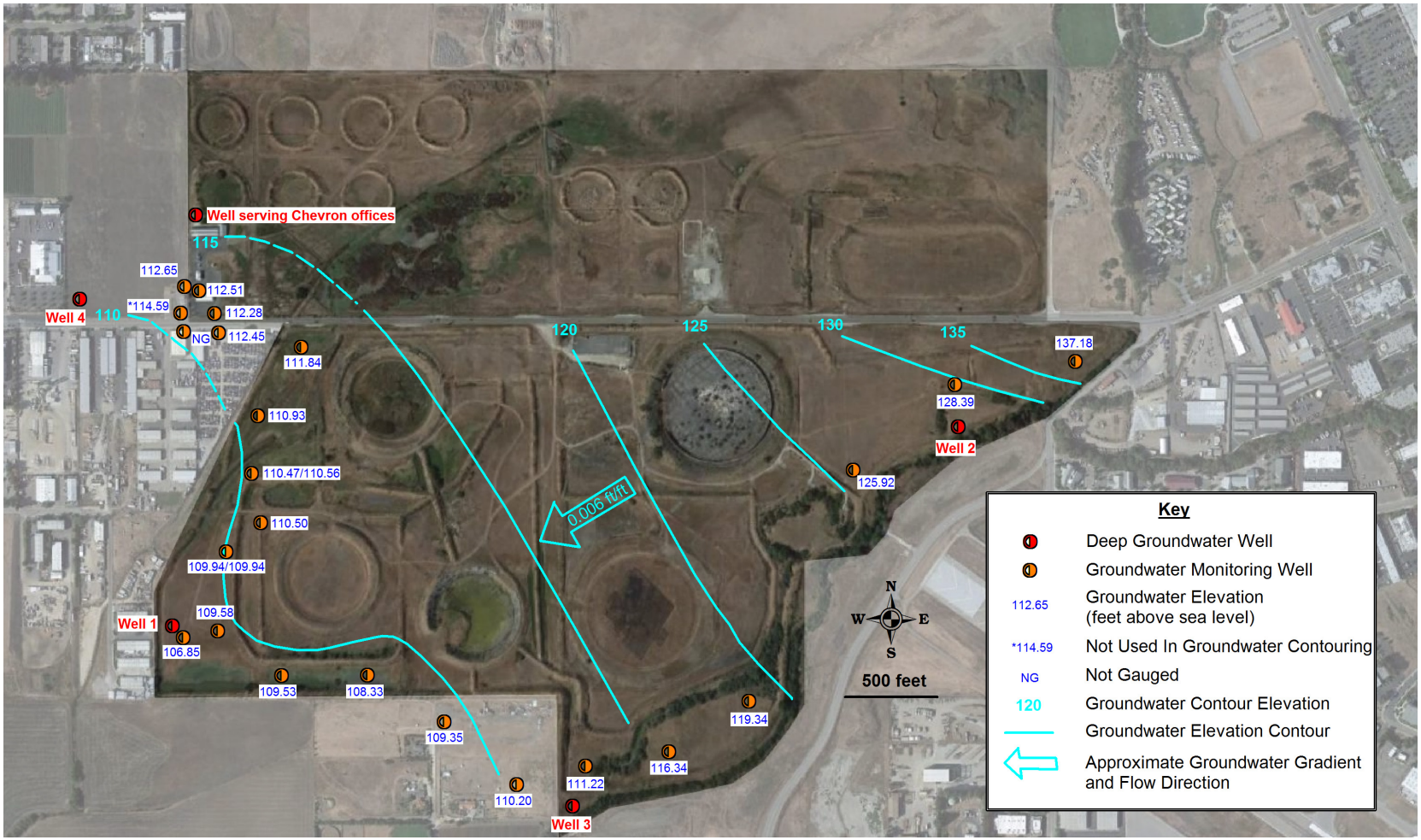
The 2003 groundwater pumpage in the San Luis area was estimated at 390 acre-feet. Agricultural water use in the San Luis area of the groundwater basin east of San Luis Obispo Creek is estimated to be about 230 acre-feet per year (Cleath-Harris 2011).

The City's groundwater extractions began in the late 1980's, peaked at about 2,000 acre-feet in 1990 and declined to about 100-150 acre-feet per year (AFY) in the mid-1990's and has remained at about the same amount since that time. The City wells that produce water from the basin include one well on Prado Road for construction water, one potable well near Los Osos Valley Road and Froom Ranch Road, and one potable well located at Fire Station #4 at the corner of Los Osos Valley Road and Madonna Road, and two wells at the City's Laguna Lake Golf Course used for irrigation.

Based on the documented figures for groundwater extractions, current total groundwater extractions in the San Luis area are estimated to be in the range of 1,000-1,200 AFY (Cleath-Harris 2011). Groundwater extractions are significantly less than the safe yield for the basin area, whether it be the DWR estimate of 2,000 AFY (Bulletin 18, 1958), the DWR estimate of 2,000-2,500 AFY (unpublished findings, 1997), or the Boyle Engineering (1991) estimate of 3,650 AFY for average annual recharge to the basin.

The current office buildings on the Project Site (in the Northwest Operations Area) use a 140-foot deep well to provide non-potable water to the office buildings (see Figure 4.5-5). The current water use for the office buildings is about one acre-foot per year. Approximately 0.67 AFY of water from the well is used for cattle watering on the Project Site. Allowing for some additional water use on the Project Site related to industrial activities, groundwater extractions are estimated at about 2 AFY. The well currently serving the Project Site (within the Northwest Operations Area) would not be used for the City or County Development Plan components of the Project.

Figure 4.5-5 Project Site Groundwater Elevation Contours and Well Locations



Source: Cleath-Harris 2011; MRS 2013.

The Applicant also has four other groundwater wells that would be used for the Remediation and Restoration and County Development Plan components of the Project. Figure 4.5-5 shows the location of these wells.

The City Development Plan component of the Project would utilize water provided by the City Utilities Department, and the existing groundwater wells would not be used. Once remediation was completed, the three wells located on the Project Site would be plugged and abandoned. A forth well is owned by another property owner, but Chevron has rights to use the water from this well.

Petroleum hydrocarbons released during historical site operations between 1910 and the early 1980s, and a fire in 1926 has impacted groundwater at the Project Site. The Project Site contains a network of 30 shallow groundwater wells that have been used to monitor hydrocarbon contamination levels in the shallow groundwater. In addition, there are four deep groundwater wells that have been tested for the presence of hydrocarbons.

Groundwater samples are chemically analyzed for the presence of TPH in the C_{10} to C_{40} carbon range characterized as crude oil, in the C4 to C10 carbon range characterized as gasoline, and tests are also done for BETX.

TPH levels have for the most part been below the State of California Maximum Containment Level of 1 ppm TPH; however, some of the shallow wells have had TPH-Crude levels as high as 10 ppm. TPH-Gasoline levels have been lower than TPH-Crude, typically averaging less than 0.05 ppm; however, some of the wells have had TPH-Gasoline levels as high as 7.0 ppm. The wells that have had the highest TPH concentrations are located near the Northwest Operations Area of the site, just north of Tank Farm Road.

The four deep groundwater wells, which would be used for the remediation and restoration, and County Development Plan components of the Project, have been tested for TPH as well as a host of other water constituents. All of the wells had non-detect levels of TPH (levels were below the practical quantitation limit). The analysis of the groundwater samples showed that the water met drinking water standards (Cleath 2002).

A review of the groundwater sampling results indicates that TPH and BETX contamination is limited to the shallow groundwater in close proximity to the most highly contaminated areas of the site, which would be the old operations area. The groundwater monitoring data collected from 1989 to 2003 by Unocal at the direction of the RWQCB indicated that although groundwater comes in contact with TPH in soil below the ground surface, there is no dissolved-phase TPH problem, and there is no off-site migration of contaminated groundwater (McDaniel Lambert, 2012).

However, the RWQCB has indicated that dissolved phase total petroleum hydrocarbons (TPH) and benzene have been detected off-site immediately south and west of the Northwest Operations Area. However, Chevron's monitoring of natural attenuation parameters has indicated that degradation of the TPH and benzene is occurring (RWQCB 2013).

Additional information on the shallow surface water quality can be found in Appendix H.1, Attachment 6.

4.5.2 Regulatory Setting

4.5.2.1 Federal Policies and Regulations

Safe Drinking Water Act of 1974

The Environmental Protection Agency (EPA) implements the Safe Drinking Water Act of 1974 (SDWA), the primary federal regulation controlling drinking water quality in every public water system in the United States. The SDWA authorizes the EPA to establish and enforce guidelines for drinking water to protect against both naturally occurring and manmade contaminants.

Although Congress initially passed the SDWA in 1974, it amended the law significantly in 1986 and 1996. The Act originally set standards for the treatment of individual constituents, including pesticides, trihalomethanes, arsenic, selenium, radionculides, nitrates, toxic metals, bacteria, viruses, and pathogens. The amendments to the Act made some significant changes, most of which created more stringent protection of drinking water sources. The amended Act also greatly enhanced the existing law by implementing operator training, funding for water system improvements, and public information as important components of safe drinking water.

The Clean Water Act

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulates quality standards for surface waters. Under the CWA, the EPA has implemented many pollution control standards for the industry along with water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless the EPA authorized a National Pollutant Discharge Elimination System (NPDES) permit.

Federal Emergency Management Agency Flood Zones

The Federal Emergency Management Agency has delineated both special hazard flood areas and risk premium flood zones applicable to individual communities. The Flood Insurance Rate Maps help private citizens and insurance companies locate properties in flood risk areas, aid lending institutions when making loans, and administer floodplain management regulations in order to mitigate flood damage. The majority of the Project Site is located in Zone X, which is outside the 1% annual chance floodplain. Portions of the Project located along Tank Farm Creek and the East Fork of San Luis Obispo Creek are located within Zone A, which has a 1% annual chance of flooding. Due to grading operations and improvements, the Federal Emergency Management Agency flood limit delineations within the Project Site may be altered.

4.5.2.2 State Policies and Regulations

State Water Resources Control Board

The State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCB) are the principal state agencies with primary responsibility for the coordination and control of water quality. The SWRCB enforces the water quality standards set forth in the Clean Water Act for State of California on behalf of the United States EPA. Most of the SWRCB objectives are based on the California Code of Regulations, Title 22, State Drinking

Water Standards. The City of San Luis Obispo lies within Region 3, the Central Coast Regional Water Quality Control Board.

Under Section 401 of the Clean Water Act, applicants for a federal license or permit such as a Section 404 Permit must obtain certification from the state (RWQCB), or a waiver of certification, that the activity would not adversely affect water quality.

On July 12, 2013, the Central Coast Region RWQCB adopted Resolution Number R3-2013-0032 regarding Post-Construction Stormwater Management Requirements intended to focus on discharges that threaten beneficial uses and to require implementation of Best Management Practices to reduce stormwater pollutant discharges to the maximum extent practicable and protect water quality and beneficial uses.

The Porter-Cologne Water Quality Control Act of 1987

Water Quality in California is governed by the Porter-Cologne Water Quality Control Act of 1987, which assigns overall responsibility for water rights and water quality protection to the SWRCB and requires the SWRCB to develop and enforce water quality standards within California. California has been delegated the authority to issue NPDES permits for all areas within its boundaries, except Indian lands.

Safe Drinking Water and Toxic Enforcement Act of 1986

The Safe Drinking Water and Toxic Enforcement Act of 1986 provides two methods for administratively listing chemicals known to the state to cause cancer or reproductive toxicity. The first method is if a body considered to be authoritative by state-qualified experts, such as the EPA or FDA, has formally identified the chemical as causing cancer or reproductive toxicity. The second method applies if a state or federal agency has formally required that the chemical be labeled or identified as causing cancer or reproductive toxicity. The criteria for the listing these chemicals is outlined in 22 CCR Section 12902.

Groundwater Management Act of 1992

The Groundwater Management Act, commonly referred to as Assembly Bill 3030, provides local public agencies with increased management authority over groundwater resources. Groundwater is a valuable natural resource within California and Assembly Bill 3030 ensures safe production and quality by encouraging local agencies to work cooperatively within their jurisdictions to manage groundwater resources (California Water Code Section 10750).

4.5.2.3 Local Policies and Regulations

San Luis Obispo County

The County of San Luis Obispo encompasses approximately 3,300 square miles of land and has more than 260,000 residents. The San Luis Obispo County Flood Control and Water Conservation District Act establishes the County Board of Supervisors' authority to ensure sustainable water uses, reliable water supplies, and better water quality. The County Public Works Department has developed an Integrated Regional Water Management Plan, which promotes coordination with state-wide water planning efforts.

City of San Luis Obispo

The City of San Luis Obispo is the sole water purveyor within the city limits, allowing the City to maintain uniformity of water service and distribution standards. The City therefore, maintains control over water quality and ensures its consistency with the City's General Plan and Urban Water Management Plan in order to maintain an efficient long-term supply. The City manages and plans for future development and for water supplies based on the amount of water that can be supplied each year in critical drought conditions. As a result of the City's inadequate water supply to meet anticipated build-out under the General Plan, the City contracted with the County for 3,380 acre-feet per year of water from the County's Nacimiento pipeline, which began delivering water to the City in 2011. Overall, the City takes into account reservoir Safe Annual Yield based on historical hydrological data, contractual Dependable Yield from Nacimiento Reservoir, and recycled water availability/usage to estimate annual Water Resources Availability.

Drainage Design Manual

The City of San Luis Obispo also regulates hydrologic and hydraulic design of channel modifications and drainage structures within the city limits and unincorporated areas within San Luis Obispo County through its Drainage Design Manual. The manual provides criteria and planning procedures for floodplains, waterways, channels, and closed conduits in the San Luis Obispo Creek watershed. This manual should be used in conjunction with the City's Construction Standard Specifications and Engineering Standards for projects. Section 1010.B of the City's Engineering Standards includes limited Drainage and Erosion Control Standards for development projects.

4.5.3 Significance Criteria

The following water resources impacts would be considered significant if the proposed Project would:

1. Violate any water quality standards

Water quality impacts would be considered potentially significant if development of the proposed Project would substantially degrade water quality or violate any water quality standards or waste discharge requirements.

2. Discharge into surface waters or otherwise alter surface water quality.

Water quality impacts would be considered potentially significant if development of the proposed Project would result in the degradation of surface water, including indirect impacts to the threatened and endangered species downstream of the Project Site.

3. Change the quality or quantity of groundwater.

Groundwater quality impacts would be considered potentially significant if development of the proposed Project would result in the degradation of groundwater water, including point source and non-point source impacts, according to established water quality standards. Groundwater quantity impacts would be considered significant if development substantially depleted groundwater supplies or interfered substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table.

4. Change the quantity or movement of available surface.
Hydrologic impacts would be deemed potentially significant if the development of the proposed Project created or contributed run-off water that exceeded the capacity of stormwater drainage systems. In addition, hydrology impacts would be considered potentially significant if development of the proposed Project substantially altered the existing drainage pattern of the site in a manner which resulted in substantial erosion, siltation or flooding, on or off site.

4.5.4 Remediation Project Impacts and Mitigation Measures

The remediation and restoration phase of the Project would consist of demolishing existing buildings, excavating top soil, site recontouring, capping areas with clean soil, pipe decommissioning along with addressing soil and groundwater contamination and mitigating the existing impacts to waters of the U.S., wetlands, threatened and endangered species, and rare plant habitats. In addition, impacted near-surface soils affected by petroleum would be excavated in order to improve the function of a capping system or to mitigate as identified ecological risk. The proposed Project may also include blasting of portions of the flower mound. Since all of the blasting would be done above ground, this activity would not affect groundwater wells in the vicinity of the Project Site. See Section 4.8, Noise and Vibration for a discussion of vibration associated with the blasting operations.

Construction activities during the remediation and restoration phase would include mobilization, clearing and grubbing, staging, improving site access, borrow areas, site grading and chemical usage. Construction water would be available on site through the use of existing wells located at the southernmost tip of the site and along the eastern edge of the site south of Tank Farm Road. Water storage tanks, pump facilities and distribution network will be temporarily placed on-site.

Impact #	Impact Description	Phase	Residual Impact
WR.1	The remediation phase of the Project could result in short-term, impacts to surface water quality, including indirect impacts to beneficial uses such as threatened and endangered species habitat, due to polluted runoff during construction.	Remediation	Class II

The remediation phase of the Project would include excavation, grading, possible blasting of the flower mound, and other earthwork. An increase in soil erosion and sediment transport to the surrounding surface waters would occur due to runoff waters sheet flowing over the exposed areas. The increased sedimentation could potentially degrade surface water quality and adversely impact sensitive, threatened and endangered species known to inhabit the surrounding area including the Acacia Creek and the East Fork of San Luis Obispo Creek. In addition, the increased soil erosion and siltation could impact the municipal storm drain system, possibly resulting in clogged drainage channels, pipes, culverts and/or basins and, therefore, violate the City's Storm Water Management Plan. The impact would be considered potentially significant.

Mitigation Measures

In order to mitigate surface water quality impacts to less than significant levels during the remediation phase, all pertinent regulatory requirements shall be satisfied and appropriate erosion control measures shall be put into effect on the Project Site.

WR-1a *Prior to the issuance of any construction/grading permit and/or the commencement of any clearing, grading or excavation, a Notice of Intent (NOI) shall be submitted to the California SWRCB Stormwater Permit Unit. Compliance with the General Permit includes the preparation of a SWPPP, which shall identify potential pollutant sources that my affect the quality of discharges to stormwater, and shall include the design and placement of Best Management Practices (BMPs) to effectively prohibit the entry of pollutants from the Project Site into surface water sources or wetlands or storm drains.*

WR-1b *The Surface Water Quality Management Practices summarized below shall be implemented to reduce potential impact to surface water quality during construction-related activities.*

1. *Soil stockpiles and graded slopes shall be covered after 14 days of inactivity and 24 hours prior to and during inclement weather conditions.*
2. *Fiber rolls shall be placed along the top of exposed slopes and at the toes of graded areas to reduce surface soil movement, as necessary.*
3. *A routine monitoring plan shall be implemented to ensure success of all on-site erosion and sedimentation control measures.*
4. *Dust control measures shall be implemented to graded areas during construction activities to control fugitive dust.*
5. *Streets surrounding the Project Site shall be cleaned daily or as necessary.*
6. *Best Management Practices shall be strictly followed to prevent spills and discharges of pollutants on-site (material and container storage, proper trash disposal, construction entrances, etc.).*

Residual Impacts

Implementation of the proposed mitigation measures would reduce the identified potentially significant impact to *less than significant with mitigation (Class II)*.

Impact #	Impact Description	Phase	Residual Impact
WR.2	The use of groundwater resources as a water supply for remediation could substantially deplete groundwater supplies or interfere substantially with groundwater recharge.	Remediation	Class III

The remediation component of the Project would require the use of groundwater resources as a water supply for remediation and construction activities. Water would be supplied by four

existing wells whose locations are shown in Figure 4.5-5. Three of these wells are located on the Project Site, and one is just west of the Project Site. Table 4.5-3 provides estimates of the water use for the remediation component of the Project.

The water demand would peak occur in year three of the remediation phase of the Project at approximately 148 acre-feet per year. The four existing wells can provide about 153 acre-feet per year of water (Cleath 2003), which is sufficient to meet the needs of the remediation component of the Project.

Table 4.5-3 Estimated Water Demand for Remediation and Restoration by Year (acre-feet per year)

Work	Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Remediation	**Dust Control**	25	25	25	0	0	0	0	0
	Compaction Moisture	25	25	25	0	0	0	0	0
Restoration	**Nursery**	21	40	63	64	19	6	2	0
	Plantings		35	35	35	0	0	0	0
Total		71	125	148	99	19	6	2	0

Source: Cleath, 2011. See Appendix G.2

Based on the documented figures for groundwater extractions, current total groundwater extractions in the San Luis area are estimated to be in the range of 1,000-1,200 acre-feet per year. Groundwater extractions are significantly less than the safe yield for the basin area, whether it be the Department of Water Resources (DWR) estimate of 2,000 acre-feet per year (Bulletin 18, 1958), the DWR estimate of 2,000-2,500 acre-feet per year (unpublished findings, 1997) or the Boyle Engineering (1991) estimate of 3,650 acre-feet per year for average annual recharge to the basin.

Recharge is comprised of percolation of rainfall, percolation of streamflow, and irrigation returnflows and wastewater discharge percolation. The City of San Luis Obispo discharges their wastewater to San Luis Obispo Creek near the downstream edge of the main groundwater basin area and would also be a recharge source for the Project Site (Cleath 2011).

High levels of groundwater use during remediation would only last for three to four years, and therefore would be a short-term impact. Given the small amount of water use relative to the yield of the basin, and the short-term use, the impacts to groundwater basin from the remediation component of the Project would be less than significant.

Water level interference on neighboring wells was evaluated for the four wells. Table 4.5-4 provides the water interference data for the wells.

Table 4.5-4 Water Level Interference

Well #	Discharge Rate (gpm)	Radius of Influence[1] (ft)	Closest Neighboring Well (ft)	Interference (ft)
1	140	650	200	9
2	30	50	1,000	<1
3	20	250	700	<1
4	40	350	600	<1

1. Approximate one foot of water level drawdown at radius.
Source: Cleath 2003

There are no neighboring wells within the effective radius of influence for Wells 2, 3, or 4. There is one supply well for a small business park within the sphere of influence of Well 1. Water level interference at this well would be estimated at a maximum of nine feet. A review of the construction for this well indicates that it taps a shallower aquifer zone (60-100 feet deep) than is tapped by Well 1 (100-180 feet deep). As such smaller water level interference would be expected due to this difference in well construction (Cleath 2003).

The estimated changes to groundwater storage in the vicinity of the proposed Project Site during drought years are provided in Table 4.5-5.

Table 4.5-5 Estimated Changes to Ground Water Storage in Vicinity of Project Site

Groundwater Extraction (AFY)	Change in Storage from 1991 (af)	Change in Water Level from 1991 (ft)
43[a]	0	0
52	-9	-0.1
221	-178	-2.2
230	-187	-2.4

a. Represent baseline conditions based upon the 1991 drought conditions. The water extraction value is mainly from agricultural irrigation at the Forrest parcel.
Source: Cleath 2003

Based upon the data provided in Table 4.5-5, if the remediation was to occur during a drought year, water levels could decline in the vicinity of the Project Site by about one foot during the peak year of remediation. During the other years the decline would be less since less groundwater extraction would be needed.

The drop in water levels from normal fall conditions to drought condition in 1991 across the basin averaged 12.3 feet for the three deeper wells monitored by the County (Cleath 2003). Adding the additional maximum one foot for storage declines for remediation water use, results in an estimated 13-foot static water level drop during drought in the vicinity of the Project Site.

During the peak year of remediation, the combined impact on neighboring wells from both water level interference and decline in storage during drought years from the proposed Project would be less than three feet at most wells. The closest well could see declines of as much as 10 feet, with the majority of this being due to interference.

Given that this level of groundwater decline might potentially occur for a three year period, it would not be expected to significantly impact local ground water conditions in the vicinity of the Project Site. Therefore, the local groundwater impacts would be considered less than significant.

Mitigation Measures

Minimal impacts are expected to groundwater levels during the remediation phase of the proposed Project; however, the following mitigation measure is recommended to further reduce impacts generated by the Project

WR-2 *The Applicant shall work with the City of San Luis Obispo to obtain reclaimed water for use during the Remediation Project.*

Residual Impacts

Impacts associated with groundwater use during remediation would be *less than significant (Class III)*.

Impact #	Impact Description	Phase	Residual Impact
WR.3	The excavation of the contaminated soils could bring contaminant constituents to the surface where they could be mobilized by stormwater or irrigation activities.	Remediation	Class II

According to the Remedial Action Plan, the remediation phase of the proposed Project would require the excavation of areas contaminated by surface hydrocarbons due to the previous oil storage use. Initial field investigations have shown that there are isolated pockets of plastic hydrocarbons which are the byproducts of the site fire and operational spills which have previously occurred on-site. The excavations would bring these constituents to the surface where they can be mobilized by stormwater or irrigation activities. The following mitigation measures will ensure that contaminated soils do not enter watercourses, wetlands, storm drain systems or spread across the Project Site thereby reducing the impact to less than significant levels.

Mitigation Measures

Treatment options for contaminated soils would vary depending on the constituents present in the soils; however, conducting the appropriate testing and assessing the appropriate treatment options are necessary.

WR-3a *Contaminated soils that will be removed, relocated or treated on-site shall be managed according to the procedures and practices of the California Stormwater BMP Handbook. The Applicant shall conduct pre-construction environmental assessments of any contaminated soil prior to construction and have a specific treatment and BMP plan in order to prevent surface water, ground water or stormwater pollution.*

WR-3b *All necessary precautions and preventive measures shall be taken to prevent the flow of water, including ground water, from mixing with contaminated soil. If water does enter an excavation and becomes contaminated, such water shall be discharged into*

clean watertight holding tanks and treated or disposed of in accordance with federal, state and local laws.

WR-3c Polluted soils shall not be stockpiled on-site without an approved stockpiling plan. The stockpiling plan shall detail the method to be used to prevent runoff from leaving the area, and could include measures such as covering and berming. The stockpiling plan shall be consistent with the requirements specified in AQ.1d and BIO-7c. Stockpiles shall not be permitted near storm drains or watercourses.

WR-3d The Applicant shall provide training to employees and contractors in contaminated soil identification, handling and disposal procedures. Regular meetings shall be held to discuss and reinforce disposal procedures.

WR-3e Plastic sheeting, tarps, sandbags, straw wattles, silt fencing, and any other implemented BMP devices shall be treated as contaminated materials and shall be removed and disposed of according to the local regulatory agencies.

Residual Impacts

Implementation of the proposed mitigation measures would reduce the identified potentially significant impact to *less than significant with mitigation (Class II)*.

Impact #	Impact Description	Phase	Residual Impact
WR.4	The construction of the remediation caps may increase or concentrate storm runoff flowing onto erodible soils from impervious surfaces.	Remediation	Class II

According to the Remedial Action Plan, the remediation phase of the Project would involve the construction of five earthen caps located in reservoirs 3, 4, 5 and 7, as well as in the Northwest Operations Area. These caps would be constructed of structural fill from Project borrow areas in order to separate impacted materials from potential human and ecological receptors. After clearing and grubbing, a layer of fill would be put in place and compacted to Project specifications. A layer of geotextile fabric would then be laid, which would provide a warning, if applicable depending on cap location, to future construction workers that the underlying soil is potentially contaminated. Once the fabric is laid, the cap would be constructed. In order to promote proper drainage across the site, each cap's thickness and composition would vary due to differing design objectives and individual site constraints.

The construction of each cap would create a relatively impermeable surface area which will have a potentially significant impact of increased or concentrated storm runoff flowing onto erodible soils from impervious surfaces.

Mitigation Measures

Minimal impacts are expected to the surrounding areas due to the construction of the caps, however, in an effort to minimize any impacts, erosion control measures should be implemented during remediation construction activities.

WR-4a The impervious surface of the caps shall be designed to ensure that storm water discharge to surrounding conveyances is non-erosive..

WR-4b The Surface Water Quality Management Practices summarized below shall be implemented to reduce potential impact to surface water quality during construction-related activities associated with remediation caps.

- *Fiber rolls, or other equivalent techniques, shall be placed along the top of exposed edges of the cap and at the toes of graded areas to reduce surface soil movement, as necessary.*
- *Areas surrounding caps which are disturbed during construction shall be re-vegetated, as soon as is practical, prior to the beginning of the rainy season.*
- *Sandbags, or other equivalent techniques, shall be utilized along each graded cap area to prevent siltation transport to the surrounding areas.*

Residual Impacts

Implementation of the proposed mitigation measures would reduce the identified potentially significant impact to *less than significant with mitigation (Class II)*.

Impact #	Impact Description	Phase	Residual Impact
WR.5	Grading and recontouring of the site could result in changes to surface water flows, thereby increasing surface water runoff from the Project Site.	Remediation	Class III

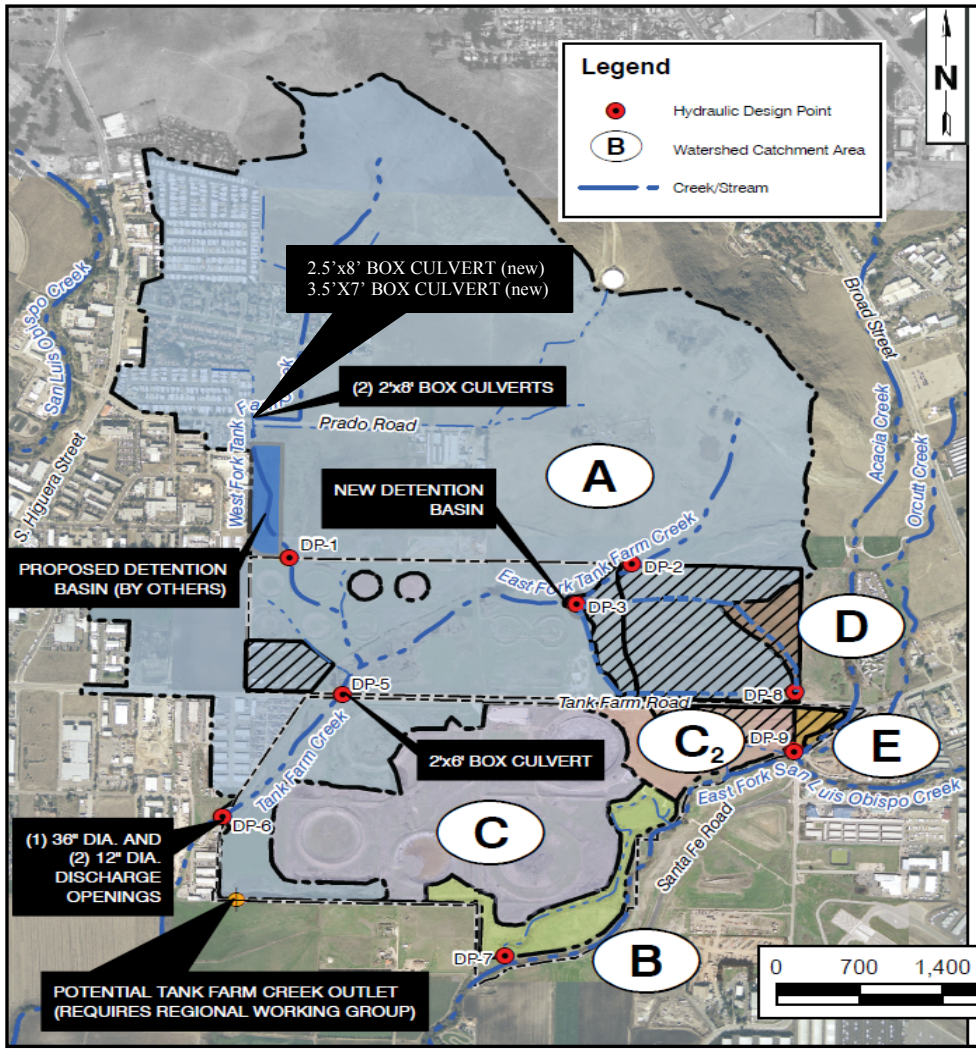
The major activities that would occur during remediation are capping of the Northwest Operations Area and the Reservoir 4 area, remediation of the North Marsh, and restoration of the riparian function of Tank Farm Creek. The Applicant is proposing to restore as much of the original ecological function to the Tank Farm Creek corridor as possible. The Applicant is also proposing to grade the development pads as part of the remediation project. This would result in substantial changes to the topography, as well as to the stormwater management infrastructure at the Project Site. Figure 4.5-6 shows the watersheds/catchments for the post-remediated site. Impacts associated with each of these watersheds/catchments are discussed below.

Tank Farm Creek

The major stormwater infrastructure changes proposed by the Applicant for the Tank Farm Creek watershed as part of the remediation project include the following:

South of Tank Farm Road, the Applicant is proposing to combine into a single streambed the existing property line channel and auxiliary channel. A typical cross-section of the combined streambed is shown in Figure 4.5-7. The channel would consist of an overall slope of about 0.2 percent and about 3 feet of relief.

Figure 4.5-6 Overview of Watersheds for Tank Farm Project Site Post Remediation and Development

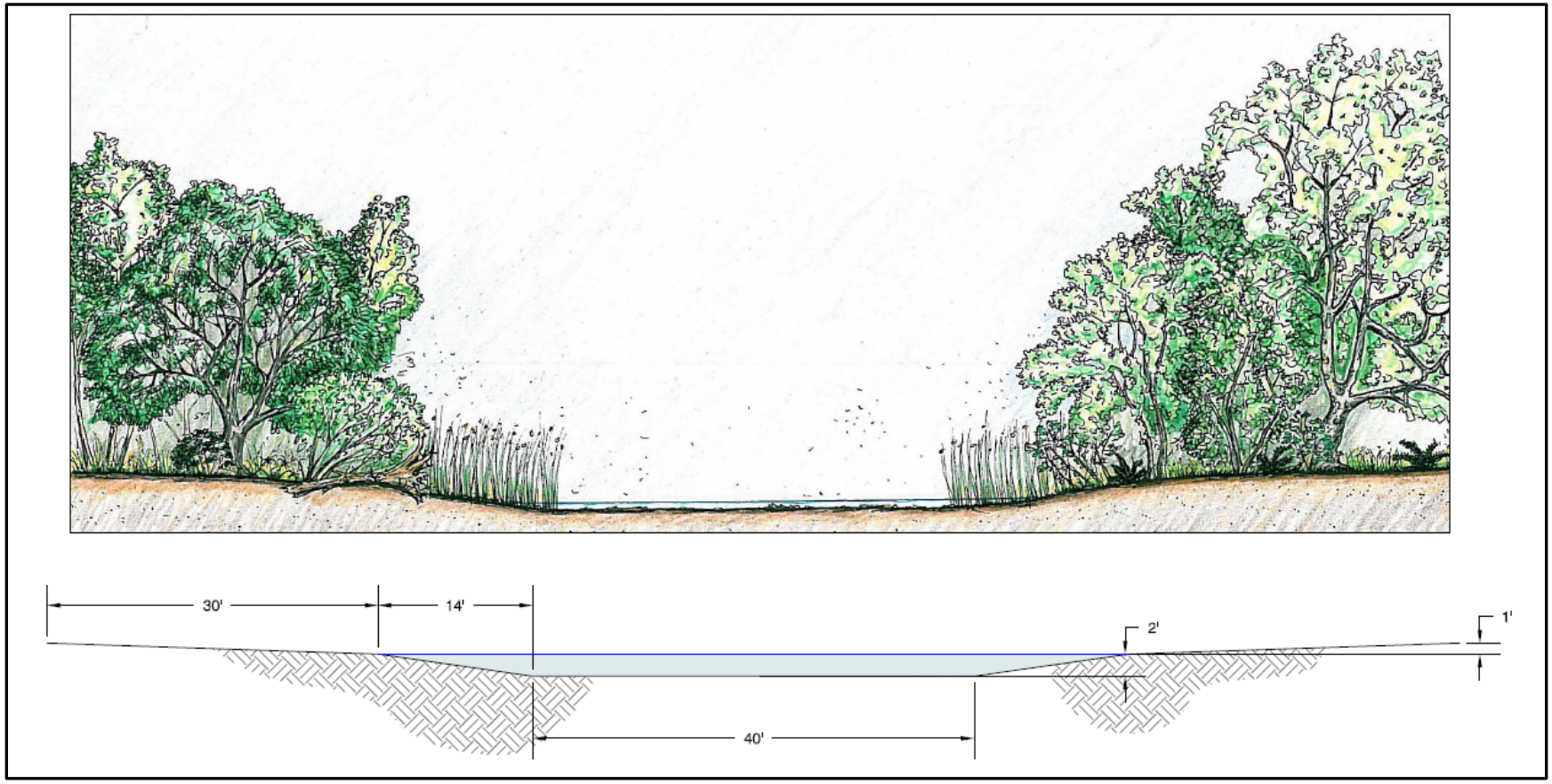


WATERSHED ID	ON-SITE (ac)	OFF-SITE (ac)	TOTAL (ac)
WATERSHED A TANK FARM CREEK WATERSHED	164.1	476.5	640.7
WATERSHED B ON-SITE TRIBUTARY TO THE EAST FORK OF SAN LUIS OBISPO CREEK	19.1	0.0	19.1
WATERSHED C ON-SITE HYDROLICALLY ISOLATED DEPRESSIONS	107.9	0.0	107.9
WATERSHED C_2 EAST FORK SAN LUIS OBISPO CREEK WATERSHED	22.3	0.6	22.9
WATERSHED D ON-SITE AREA TO THE EAST WHICH DRAINS OFF-SITE	7.0	0.0	7.0
WATERSHED E EAST FORK SAN LUIS OBISPO CREEK WATERSHED	2.8	0.2	3.0
OTHER OTHER MINOR OFFSITE DRAINAGE	10.1	0.0	10.1
TOTAL	333.3	477.3	810.6

NOTES:
1) DIAGONAL HATCHED AREAS ARE AREAS DESIGNATED FOR DEVELOPMENT.

Source: Hydrology Study (Avocet 2009)

Figure 4.5-7 Illustration of Typical Post Remediation Tank Farm Creek Channel



Source: Hydrology Study (Avocet 2009)

The Applicant also proposes to bore two 12-inch-diameter outlets near the bottom of the existing headwall, where Tank Farm Creek exits the Project Site. As discussed in Section 4.5.1.2, the area south of Tank Farm Road has limited detention capacity that is quickly consumed during a large storm event. This modification would allow for more controlled discharges and also prevent over-topping of the berm system. The new outlet inverts would be set at an elevation of 112.5 feet amsl, the local pond bottom. The existing 36-inch-diameter outlet would remain.

The area south of Tank Farm Creek would be used as a borrow source for up to 41,000 cubic yards of soil. This would increase the overall detention capacity south of Tank Farm Road by approximately 14 acre-feet, a 19 percent increase over the existing condition.

A cap would be constructed over the former Northwest Operations Area as part of remediation, and would serve as a pad for future development. Runoff from the cap would be routed into ditches along the upper perimeter and discharged to adjacent drainage features via hardened drops.

One of the most significant restoration-driven changes is the reconfiguration of the North Marsh and Tank Farm Creek. As depicted, the East and West Forks of Tank Farm Creek will merge in the North Marsh rather than being routed around it. The typical channel sections will be similar to the illustration shown in Figure 4.5-7.

The North Marsh would be increased in area by approximately 8 acres, mostly through removing historical debris. The creek would be routed through a single barrel of the box culvert beneath Tank Farm Road. The two 48-inch-diameter round culverts to the west and the other barrel of the box culvert would be abandoned. A weir would be constructed in the remaining box culvert barrel, raising its invert elevation by 2 feet. These modifications not only create an additional 17.5 acre-feet of storage capacity within the North Marsh, but also additional wetland resources.

Supplemental stormwater storage capacity would be created by lowering the berms surrounding five of the former above ground storage tanks in the North Marsh area. Lowering of the berms would provide approximately 6.7 acres of additional storage.

Another significant topographic alteration would be the capping of former Reservoir 4. This area would be used for future development. Grading of the area would produce large, gently sloped preliminary pads. It will also establish the alignment and rough grade of the Santa Fe Road extension and the interior local roads. New ditches would be established in the area to manage runoff. The new ditches would be routed to a detention pond.

Additional information on these proposed stormwater modifications are provided in the Hydrology Study (Appendix F), and design and engineering drawings for these changes can be found in the Remedial Action Plan (Appendix A.1). The proposed Project would result in some changes to upstream water surface elevations, but the changes would help to assure there is no lateral spreading of surface runoff on to adjacent properties.

These changes in topography and stormwater management control at the proposed Project Site would result in changes in the peak surface water flows at various locations. Table 4.5-6 shows the peak surface water flows at various design points (DP) within the Project Site. The locations of the DP are shown in Figure 4.5-6. The round culverts beneath Tank Farm Road, represented

as design point DP4, would be removed as part of the remediation project, which would result in short-term impacts to habitat and species inhabiting these areas but an overall improvement in habitat quality and function in the long-term (see Section 4.2.4). As discussed above, the existing gate valve that discharges to the East Fork of San Luis Obispo Creek (DP7 in Figure 4.5-6) would be removed as part of the remediation component of the Project.

Table 4.5-6 Summary Of Peak Surface Water Flows – Post Remediation Conditions

Design Point	Peak Flow (cubic feet per second)				
	2-Year	10-Year	25-Year	50-Year	100-Year
DP-1	203.6	480.5	665.0	787.2	902.5
DP-2	47.4	99.4	129.0	149.8	170.7
DP-3	22.8	90.2	127.7	150.9	174.7
DP-4	--	--	--	--	--
DP-5	20.7	65.9	86.2	98.1	107.4
DP-6	20.8	57.2	74.3	81.5	87.9
DP-7	--	--	--	--	--
DP-8	6.2	10.8	13.4	15.2	17.0
DP-9	14.3	26.7	33.6	38.4	43.1

The locations of the Design Points (DP) are shown in Figure 4.5.6.
Source: Avocet Hydrology Study (see Appendix F).

Table 4.5-7 summarizes the peak flows and volumes for the off-site discharge from the Tank Farm Creek Watershed for various storm events. With the proposed changes to the topography and stormwater management control the volume of stormwater that can be stored on site would increase for all of the storm events evaluated. For the 100-year storm the on-site storage capacity would increase from 103.3 to 190.8 acre-feet. Overflows of the headwall would also be eliminated, and the peak flow rates off of the site into Tank Farm Creek would be reduced.

Table 4.5-7 Summary Of Peak Flows and Volumes for Tank Farm Creek Off-site Discharge – Post Remediation and Development Conditions

Storm Event	Volumes (acre-feet)				Peak Flow (cubic feet per second)			
	Existing and New Discharges	Storage	Overflow	Total	Existing 36" Discharge	Two New 12" Discharge	Overflow	Total
2-Year 24-Hour Storm	19.6	46.7	0.0	66.2	11.1	9.7	0.0	20.8
10-Year 24-Hour Storm	58.5	93.0	0.0	151.5	42.5	14.6	0.0	57.2
25-Year 24-Hour Storm	75.9	130.5	0.0	206.4	57.9	16.5	0.0	74.3
50-Year 24-Hour Storm	82.7	161.7	0.0	244.4	63.9	17.5	0.0	81.5
100-Yer 24-Hour Storm	91.0	190.8	0.0	281.8	69.4	18.5	0.0	87.9

Source: Hydrology Study (Avocet 2009) (see Appendix F).

For the 100-year storm event the peak flow into Tank Farm Creek would be reduced from 372.7 to 87.9 cubic feet per minute. This would substantially reduce the amount of stormwater runoff from the Project Site over the existing conditions. Therefore, surface water runoff impact on Tank Farm Creek would be less than significant.

Tributary to East Fork of San Luis Obispo Creek

Very little of the topography of the East Fork of San Luis Obispo Creek watershed (Watershed B in Figure 4.5.6) would be changed as part of the remediation project. Limited remediation and no development would occur in this area. The Applicant has proposed to open the existing auxiliary channel to the East Fork of San Luis Obispo Creek at the location of the existing 12-inch diameter gate valve by removing a portion of the existing berm (DP-7 in Figure 4.5-2 shows the location of proposed opening). The Applicant also proposes to open the isolated oxbow to the East Fork of San Luis Obispo Creek by removing a portion of the berm that separates the oxbow from the creek. Additional information on these proposed creek modifications are provided in the Hydrology Study (Appendix F), and design and engineering drawings for these changes can be found in the Remedial Action Plan (Appendix A.1).

Runoff from this area would still drain into the East Fork of San Luis Obispo Creek. However, as observed before, the contribution from this 19-acre catchment has insignificant effect on a watershed that is measured in square miles. The removal of the berm to open up the oxbow and the auxiliary channel would improve surface flows in this area and increase functional habitat. The direct connection will also increase the potential floodplain storage over the existing conditions. Therefore, surface water runoff impact on East Fork of San Luis Obispo Creek would be less than significant.

On-site Hydraulically Isolated Depressions

Some of the isolated catchments would be disturbed by remediation and restoration efforts. Most of that work would not significantly alter the overall hydrologic function within the closed watershed. A thorough discussion of particular hydrologic and hydraulic features of the remediation work in this area is provided in the Remedial Action Plan (Appendix A.1). The anticipated configuration of the isolated catchments after remediation is shown in Figure 4.5-8.

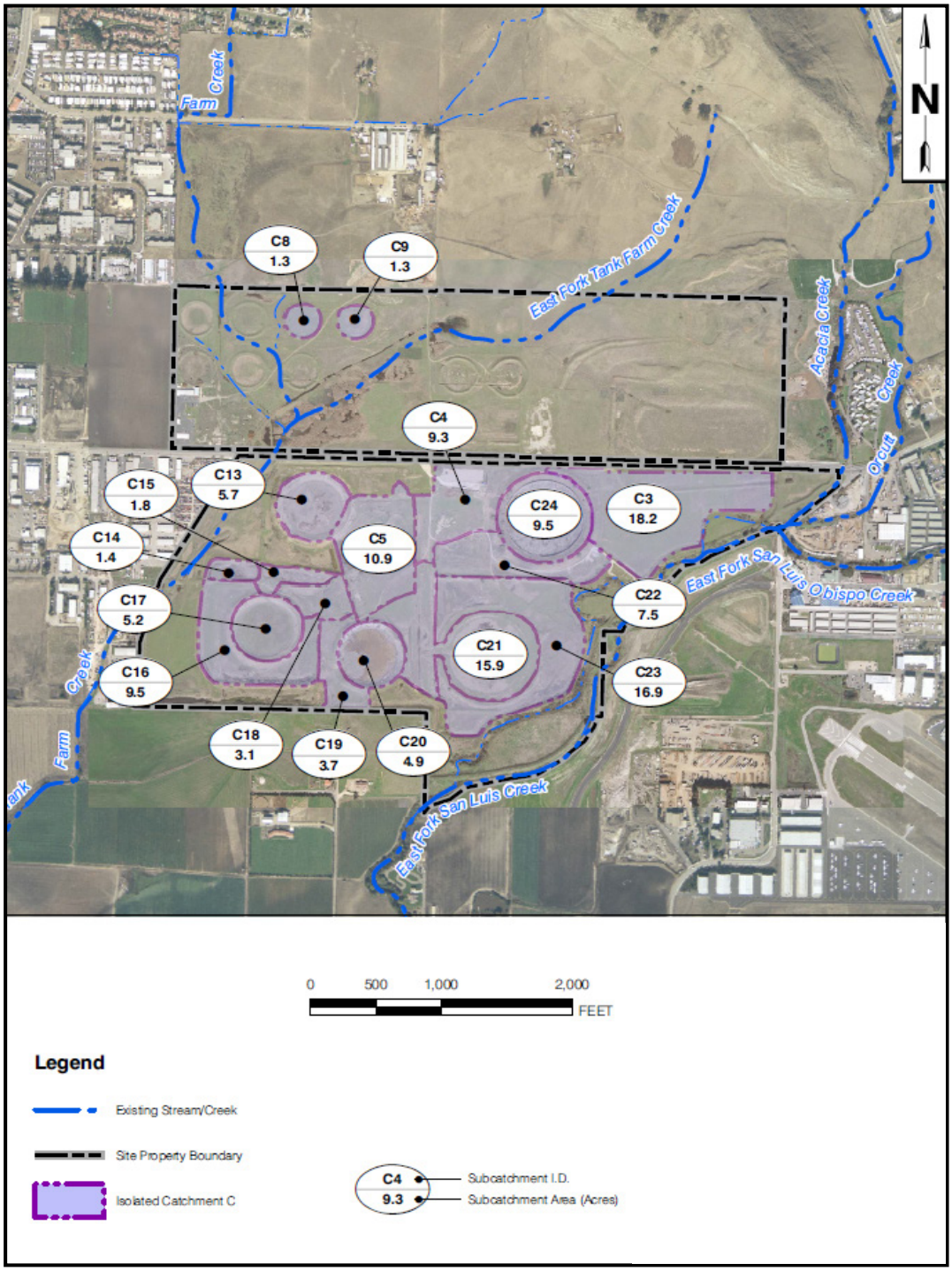
North of Tank Farm Road, five of the seven containment berms for the former aboveground storage tanks would be lowered, as discussed in the Tank Farm Creek section above. The lowering of these berms would now make these five areas part of the Tank Farm Creek Watershed area.

The eastern portion of the isolated catchments, that part south of Tank Farm Road, would be used for development. It would also be used as a borrow source for topsoil during remediation. One of the final tasks during remediation would be backfilling to establish rough grade pads for future development in this area. This area is Watershed C_2 in Figure 4.5-6. This separate isolated area would be about 23 acres in size.

A detention and sedimentation basin would be built just south of the development areas to contain erosion of the soil cover. Runoff from the pads would occur as sheet flow, but would be concentrated into small channels and directed to the new basin. The sizing of the basin and the hydraulic function of the ditches are presented in the Remedial Action Plan (Appendix A.1).

Runoff from this area would be retained on site, but could be discharged to the East Fork of San Luis Obispo Creek, or one of the adjacent oxbows, if that were deemed to be ecologically advantageous. Given that the runoff from this area would be contained on site, surface water runoff impact on the East Fork of San Luis Obispo Creek would be less than significant.

Figure 4.5-8 On-site Isolated Catchments Post Remediation and Development



Source: Hydrology Study (Avocet 2009)

Watershed E, which is located on the far eastern portion of the site just north of Tank Farm Road (see Figure 4.5-6) would be separated from its original isolated catchment by the extension of Santa Fe Road. With this change in grade, this 10-acre catchment would now drain, via a naturally vegetated perimeter ditch, to Acacia Creek. Peak flows would range between 14 and 43 cubic feet per second, for the 2-year and 100-year storms, respectively. Total discharge for the 100-year storm is estimated to be 5 acre-feet, while the total discharge from the 2-year storm is anticipated to be less than 2 acre-feet. These volumes and flow rates are insignificant compared to those for Acacia Creek and the East Fork of San Luis Obispo Creek. Therefore, surface water runoff impact on Acacia Creek and the East Fork of San Luis Obispo Creek would be less than significant.

Other Minor Watersheds

Watershed D (See Figure 4.5-6) is a small area of the Project Site (approximately 11 acres) that currently drains east via sheet flow to the adjacent property. This area would be part of the development, and grading of the pads would occur as part of the remediation activities. At the conclusion of the remediation activities this area would be increased to seven acres. Runoff would be collected in a ditch along the property line that would discharge into the shoulder ditch that runs along Tank Farm Creek and from there into Acacia Creek (see Design Point DP-8 in Figure 4.5-6. A small basin located just before the ditch along Tank Farm Road would be used to attenuate the peak flow and to reduce sediment load. The peak flows through this channel are provided in Table 4.5-3. These volumes and flow rates are insignificant compared to those for Acacia Creek and the East Fork of San Luis Obispo Creek. Therefore, surface water runoff impact on Acacia Creek and the East Fork of San Luis Obispo Creek would be less than significant.

Mitigation Measures

No mitigation is required since impacts are less than significant.

Residual Impacts

Impacts associated with surface water runoff would be *less than significant (Class III)*.

4.5.5 City Development Plan Impacts and Mitigation Measures

Under the City Development Plan component of the Project, development would be annexed into the City limits and utilize City water. Although groundwater from on-site wells would be used for the remediation and restoration phase of the Project, no groundwater from the on-site wells would be used by the development component of the Project. The impacts of the use of City water are discussed in the Public Services and Utilities Section of the EIR (Section 4.13).

Impact #	Impact Description	Phase	Residual Impact
WR.6	Paving and development could result in changes to surface water flows thereby increasing surface water runoff from the Project Site.	Development	Class III

As discussed in Impact WR.5, most of the grading for the future development would occur as part of the remediation component of the Project. In addition, most of the site-wide stormwater infrastructure would be installed as part of the remediation component of the Project. As such, much of the discussion in Impact WR.5 would also apply to the City Development Plan, and all changes to the watersheds would occur as part of the remediation aspect of the Project.

However, development would alter the character of portions of the watershed and the means by how some of the water is conveyed across the site. The two most significant changes would be construction of a storm drain system with drop inlets, catch basins, and other urban type infrastructure, and the degree to which the developed areas are paved. Figure 4.5-6 shows the proposed development areas (hatched areas on the figure).

The development changes would be expected to be minor relative to the degree of paving that will occur since most of the grading would occur as part of the remediation aspect of the Project. For the purpose of this analysis it has been assumed that 80 percent of the development area would be paved or converted to impervious rooftop, and 20 percent remains as landscaping.

The former Northwest Operations Area and the eastern development (former Reservoir 4 and Flower Mound) north of Tank Farm Road would be part of the Tank Farm Creek Watershed. The Northwest Operations Area development would include minor modification of the grades and the installation of catch basins and storm drains. Proposed development-related infrastructure to manage stormwater is provided in the Hydrology Study (Appendix F). Only backbone or tract-level infrastructure is shown. The Applicant has not yet developed lot-level infrastructure.

A considerable portion of this area already has impervious surfaces from the existing offices and other structures. Stormwater from this area and road currently flows into the naturally vegetated channel along Tank Farm Road. With the City Development Plan, stormwater draining from approximately 48 acres of land will be collected into catch basins and storm drains and routed into the North Marsh Area. Table 4.5-8 shows the peak surface water flows at various design points (DP) within the Project Site for post development. The locations of the DP are shown in Figure 4.5-6.

Paving the eastern development area would substantially increase runoff through DP3 (Table 4.5-8) relative to the existing and post-remediation conditions. However, the detention and sedimentation pond, discussed under the remediation aspect of the Project, would be engineered to accommodate this volume and flow rate. In accordance with RWQCB and AASP development requirements, the detention basin would supplement other proposed best management practices, such as the vegetated swale along Tank Farm Road and the lot-level stormwater infrastructure (e.g., catch basin trash and oil/water separators) that would be designed during implementation of the City Development Plan.

Table 4.5-8 Summary Of Peak Surface Water Flows – Post Development Conditions

Design Point	Peak Flow (cubic feet per second)				
	2-Year	10-Year	25-Year	50-Year	100-Year
DP-1	203.7	480.6	665.0	787.2	902.6
DP-2	36.7	82.3	129.0	127.5	149.3
DP-3	51.9	140.7	127.7	202.5	226.6
DP-4	--	--	--	--	--
DP-5	22.7	68.4	88.6	100.2	109.2
DP-6	22.5	58.3	75.0	81.5	86.8
DP-7	--	--	--	--	--
DP-8	--	--	--	--	--
DP-9	3.5	6.1	7.5	8.5	9.5

The locations of the Design Points (DP) are shown in Figure 4.5-6.
Source: Hydrology Study (Avocet 2009) (see Appendix F).

The increased runoff from the development area following paving would be absorbed by the improvements to the detention capacity of the North Marsh that is discussed as part of Impact WR.5 in the Remediation Impact section above. Consequently, flow rates at DP5 (the box culvert across Tank Farm Road) and DP6 (the Headwall discharge of Tank Farm Creek from the Project Site) would remain substantially less than the existing condition and would be similar to those for the post-remediation condition, especially for larger storms.

As part of the City Development Plan on the eastern part of the site just north of Tank Farm Road, a new detention/sedimentation basin would be constructed for the treatment of runoff before discharging to the existing isolated on-site ponds. This basin is discussed in Impact WR.5 as part of the remediation component of the Project. The basin would collect runoff from approximately 8.5 acres of developed portion of the site west of the proposed Santa Fe Road extension. After development the ponds used for storing the stormwater from this area would store approximately 2 and 6.2 acre-feet of runoff for the 2-year and 100-year storms, respectively. The added runoff is a direct result of paving and other impermeable surfaces that coincide with development activities and a slightly larger catchment area generated as a result of developmental grading. None of the stormwater from this area would be discharged off-site.

The remaining development east of the Santa Fe Road extension (approximately 2 acres) would drain via sheet flow to Acacia Creek. The runoff from this area would be greatly reduced (DP9 in Table 4.5-8) relative to the post-remediation condition due to catchment reconfiguration from grading and storm drain construction activities. Runoff is expected to discharge to Acacia Creek via sheet flow at a rate of approximately 3.5 and 9.5 cubic feet per second for the 2-year and 100-year storms, respectively. These volumes and flow rates are insignificant compared to those for Acacia Creek and would not be expected to have any significant impact on bank storage or recharge.

Based upon the discussion above, surface water runoff impact from the City Development Plan component of the Project would be less than significant.

Mitigation Measures

No mitigation is required since impacts are less than significant.

Residual Impacts
Impacts associated with surface water runoff would be *less than significant (Class III)*.

Impact #	Impact Description	Phase	Residual Impact
WR.7	Flooding of development structures or redirection of flood flows could occur if buildings are built within the 100-year flood plain.	Development	Class III

Figure 4.5-9 show the 100-year flood plain for post remediation and development. A number of the proposed grading activities discussed above would serve to change the area of the site that would be within the 100-year flood plain. The Applicant in conjunction with the Lead Agency would be required to obtain a Conditional Letter of Map Revision (CLOMR) and a letter of Map Revision (LOMR) from the Federal Emergency Management Administration (FEMA). These documents would change the 100-year flood zone maps for the Project Site. None of the development areas would be within the 100-year flood plain. Therefore, the impacts would be less than significant.

Mitigation Measures
No mitigation is required since impacts are less than significant.

Residual Impacts
Impacts associated with flooding would be *less than significant (Class III)*.

4.5.6 County Development Plan Impacts and Mitigation Measures

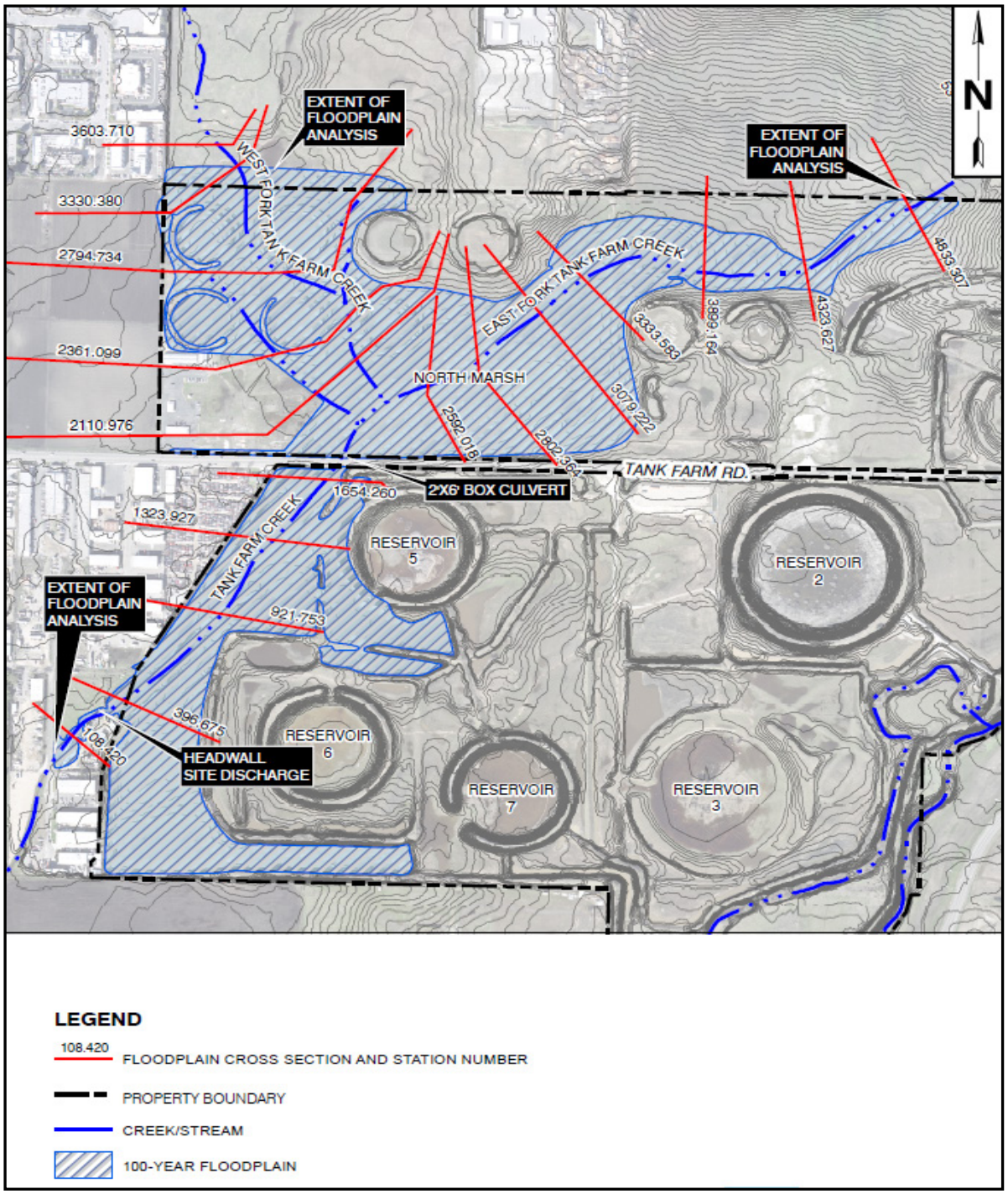
Under the County Development Plan component of the Project, development would remain in the County and the Project Site would not be annexed into the City of San Luis Obispo. Development for the County Development Plan would be similar to the City Development Plan, and all of the impacts discussed for the City Development Plan would apply to the County Development Plan component of the Project.

As discussed in Impact WR.5, most of the grading for the development would occur as part of the remediation aspect of the Project. In addition, most of the site-wide stormwater infrastructure would be installed as part of the remediation. As such, much of the discussion in Impact WR.5 would also apply to the County Development Plan, and all changes to the watersheds would occur as part of the remediation component of the Project.

The County of San Luis Obispo does not currently have potable water facilities in the area of the Project Site. As such, the Applicant has proposed to use existing groundwater wells to supply water for the development component of the Project.

In addition, under the County Development Plan, a wastewater treatment facility would be built to handle all the wastewater from the development. Impacts associated with the wastewater treatment facility have been discussed in the Wastewater section of the EIR (Section 4.6).

Figure 4.5-9 100-Year Flood Plan Post Remediation and Development



Source: Hydrology Study (Avocet 2009)

Impact #	Impact Description	Phase	Residual Impact
WR.8	The use of groundwater for the County Development Plan could result in substantially depleted groundwater supplies or interfere substantially with groundwater recharge.	Development	Class II

Wells pumping groundwater from the San Luis Obispo Valley groundwater basin would provide water for the Project. The County Development Plan would include three on-site wells to provide water and a wastewater treatment facility to provide water and sewer service to the development. The Applicant has prepared conceptual designs for these facilities. Appendix A.2 provides a preliminary design and assessment for the wastewater treatment facilities. There are four existing water wells that are being proposed to supply the County Development Plan aspect of the Project: Wells 1, 2, 3 and 4 (see Figure 4.5-5). These wells have been constructed and tested. Water quality results indicate that the water is suitable for domestic water use purposes (Cleath 2002). Currently, one well is being used for livestock water and the others are capped.

The water pipelines for the County Development Plan would be a new system designed specifically for this component of the Project and would include a dual pipe system to allow for delivery of potable and recycled water. Water storage facilities would include separate storage for the recycled water (100,000 gallons) and pumped groundwater (1,000,000 gallons).

Wastewater would be treated at a centralized treatment facility, resulting in effluent that would be required to meet water quality standards for use as a non-potable water supply (referred to as "recycled" water). This recycled water would be used for irrigation and toilet uses (more than 50 percent of the total water demand). A portion of the recycled water during the rainy season would have to be discharged due to the reduction in landscaping water demand. Additional information on the wastewater treatment plant can be found in Section 4.6, Wastewater.

The gross water demand for the County Development Plan would be met with pumped groundwater and recycled water. The amount of groundwater pumpage would vary depending on seasonal demand fluctuations and instantaneous demand fluctuations that would be balanced by the amount of water stored in the water supply water tanks. Estimated groundwater pumping rates for average and peak conditions are shown in Table 4.5-9. This represents the long-term water use for the development once it is fully built out.

Table 4.5-9 Water Supply Requirements for Full Development

Unit	Gross Demand	Recycled Water	Groundwater Pumpage	Groundwater Peak Month	Groundwater Peak Flow
Acre-feet per year	119.7	61.6	58.1		--
Average Daily Demand, gallons	106,900	55,000	51,900	88,000	---
Gallons per minute	74	38	36	61	153

Source: SB 610 Water Supply Assessment, Appendix G.2.

Build out of the full County Development Plan is expected to occur over a 25 year period. During these first 25 years there would be reduced water demand for the development, but additional water demand for construction. Table 4.5-10 provides an estimate of the of the projected groundwater extraction rates for the Project by each of the five development phases.

Table 4.5-10 Project Groundwater Extractions by Development Phase (acre-feet per year)

Years from Start of Remediation	4	9	14	19	24	Full Buildout
Remediation and Restoration	99	0	0	0	0	0
Development Construction	7	7	7	7	7	0
Development						
Phase 1	7					
Phase 2		43				
Phase 3			49			
Phase 4				53		
Phase 5					58	58
Total Extractions	113	50	56	60	65	58

There is also an additional one-year demand of 27 acre feet for development for each phase of the Project. This additional water demand could be meet by the well that is currently used at the site (Well #4), which has a long-term yield of about 19 acre-feet per year.
Source: SB 610 Water Supply Assessment, Appendix G.2.

The amount of groundwater extractions that would be required for the Project would increase as the phases are built out. Once the Project has reached build-out, the long-term water demands would stabilize at those values estimated in Table 4.5-9.

A brief description of the County Development Plan by phase is listed below. Each of the five development phases proposes approximately 160,000 square feet of development. Descriptions below include features unique to each phase, the gross water demand (recycled and pumped groundwater) of that phase and the cumulative, net water demand (pumped groundwater) for the Project.

Phase 1 would involve the wastewater plant and the western industrial development and eastern Lot 4 commercial services development. The gross water demand for Phase 1 would be roughly 15 acre-feet per year. Net groundwater extraction would meet about half of this demand at 7 acre-feet per year.

Phase 2 would include additional industrial and commercial development along with the hotel and recreational fields. The gross water demand for Phase 2 would be roughly 72 acre-feet per year. Net groundwater would meet half of this demand at 36 acre-feet per year. Adding Phase 2 to Phase 1, the cumulative net groundwater extraction would be 43 acre-feet per year.

Phase 3 would include further development of commercial service and industrial zoned lands. The gross demand for Phase 3 would be 13 acre-feet per year. Net groundwater production would meet slightly less than half of this demand at 6 acre-feet per year. Adding Phase 3 to Phase 1 and 2, the cumulative net groundwater production would be 49 acre-feet per year.

Phase 4 is entirely industrial. The gross water demand for Phase 4 would be 9 acre-feet per year. Net groundwater extraction would meet slightly less than half of this demand at 4 acre-feet per year. Adding Phase 4 to the other Phases, the total groundwater extraction would be 53 acre-feet per year.

Phase 5 would be entirely commercial service. The gross water demand for Phase 5 would be about 12 acre-feet per year. Net groundwater extraction would meet slightly less than half of this demand at 5 acre-feet per year. Adding Phase 5 to Phases 1-4, the cumulative net groundwater production would be 58 acre-feet per year.

The groundwater supply facilities proposed for the County Development Plan aspect of the Project are four existing deep groundwater wells. The reliable long-term yield for each of these wells has been estimated by Cleath & Associates in 2003 based on pumping test information, aquifer characteristics and historic groundwater level fluctuations (including drought years) and interference factors. Table 4.5-11 provides a summary of the long-term yields and capacity for each of the wells.

Table 4.5-11 Long-Term Yield and Source Capacity for Groundwater Wells

Well	Long-Term Yield (afy)	Source Capacity (gpm)	Average use (hours per day)
Well 1	113	140	12
Well 2	8	30	4
Well 3	13	20	10
Well 4	19	40	7
Total	153	230	

Source: Cleath 2003

Based on these long-term yield calculations, the wells would be able to produce 45 percent more water than what is estimated for groundwater extraction in the water demand calculation of the development project assuming the use of recycled water. The source capacity of the existing project wells (190 gpm) should be sufficient to provide for the peak Project groundwater demand of 180 gpm.

As part of this EIR, a Water Supply Assessment was conducted pursuant to the requirements of Senate Bill (SB) 610 (refer to Appendix G.2). This analysis found that the San Luis area goundwater basin would not be overdrafted as a result of the Project's extraction of groundwater. The long-term basin groundwater yield is significantly higher than the combined Project extraction and projected extraction from the City, agricultural and rural domestic wells.

Based on the documented figures for groundwater extractions, current total groundwater extractions in the San Luis area are estimated to be in the range of 1,000-1,200 acre-feet per year. Groundwater extractions are significantly less than the safe yield for the basin area, whether it be the Department of Water Resources (DWR) estimate of 2,000 acre-feet per year (Bulletin 18, 1958), the DWR estimate of 2,000-2,500 acre-feet per year (unpublished findings, 1997) or the Boyle Engineering (1991) estimate of 3,650 acre-feet per year for average annual recharge to the basin.

The Water Supply Assessment determined that the total water supplies available during normal, single-dry and multiple-dry water years within a 20-year projection would meet the projected water demand for the project in addition to the demand of existing and other planned future uses.

Therefore, the impacts to basin wide groundwater supply from the County Development Plan component of the Project would be less than significant.

As discussed above under impact WR.2, water level interference on neighboring wells was evaluated for the four wells (see Table 4.5-4, which provides the water interference data for the wells).

There are no neighboring wells within the effective radius of influence for Wells 2, 3, or 4. There is one supply well for a small business park within the sphere of influence of Well 1. Water level interference at this well would be estimated at a maximum of nine feet. A review of the construction for this well indicates that it taps a shallower aquifer zone (60-100 feet deep) than is tapped by Well 1 (100-180 feet deep). As such smaller water level interference would be expected due to this difference in well construction (Cleath 2003).

The estimated changes to groundwater storage in the vicinity of the Project Site during drought years are provided in Table 4.5-5. Based upon the data provided in Table 4.5-5, at full development build-out during a drought year, water levels could decline in the vicinity of the Project Site by about 0.2 feet due to the use of the on-site water wells.

The drop in water levels from normal fall conditions to drought condition in 1991 across the basin averaged 12.3 feet for the three deeper wells monitored by the County (Cleath 2003). Adding the additional 0.2 feet for storage decline at full build out, results in an estimated 12.5-foot static water level drop during drought in the vicinity of the Project Site.

During full buildout, the combined impact on neighboring wells from both water level interference and decline in storage during drought years from the proposed Project would be less than one foot at most wells. The closest well could see declines of as much as nine feet, with the majority of this being due to interference.

The potential for a nine-foot interference level at the nearest well during the build-out phase of the Project could impact the water supply from this neighboring well. As such, this localized impact could be potentially significant.

Mitigation Measures

WR-8a *The applicant shall implement water conservation best management practices including: selection of drought-tolerant, low water-consuming plant varieties and use of low flow plumbing fixtures.*

WR-8b *The Applicant shall conduct annual monitoring of Wells 1, 2 and 3 on a semi-annual basis to determine water levels and correlate to water production values. The production rates shall be metered at the wells. This information shall be used to define drawdowns. The results of the monitoring and analysis shall be submitted to the County Public Works and Planning and Development Departments for review on a semi-annual basis. In the event that the analysis shows a measurable loss of the well*

production rate, the Applicant shall reduce groundwater extractions from Well 1 to eliminate the potential for groundwater interference.

Residual Impacts

Implementation of the proposed mitigation measures would reduce the identified potentially significant impacts to *less than significant with mitigation (Class II)*.

Impact #	Impact Description	Phase	Residual Impact
WR.9	The use of groundwater for the County Development Plan could result in the migration of hydrocarbons from the shallow ground water to the deep groundwater wells.	*Development*	*Class II*

Petroleum released during site operations between 1910 and the early 1980s has impacted soil and groundwater underlying the Project Site. A number of investigations have been conducted since the late 1980s to assess the nature and distribution of hydrocarbons in soil and groundwater. These investigations have identified three principal areas of subsurface petroleum occurrence:

- Northwest Area - underlying the former Northwest Operations Area. This area includes several smaller, separate occurrences that underlie former pipelines and former steel ASTs located north and northeast of the field offices. Vertically, residual petroleum in this area is limited to a depth of approximately 25 feet, but mostly occurs in the 10- to 15-foot depth range.
- Northeast Area - beneath former Reservoir 4. Petroleum-impacted soil and bedrock were found to extend from the ground surface to depths of up to 50 feet.
- Southern Area – underlying most of the Project Site south of Tank Farm Road. Impacted soil occurs primarily in the 5- to 25-foot depth range. Locally, impacted soil extends as deep as 50 feet below Reservoirs 2 and 3. A portion of the subsurface petroleum in this area extends onto private property south of the Project Site.

Within these areas, the petroleum does not exist as a contiguous, homogeneous body, but rather occurs largely (in terms of volume) within the intergranular space of more permeable sand lenses and, to a lesser degree, as thin films of viscous petroleum in root pores and along fractures in fine-grained silts and clays (Groundwater Technology 1991).

Due to the nature of alluvial systems, such as that underlying the Project Site, these permeable sand lenses are laterally and vertically discontinuous, separated by fine-grained, low permeability sediments. Consequently, the liquid oil has become trapped and is stratigraphically contained by the fine-grained sediments.

The crude oil's high viscosity alone renders it hundreds to thousands of times less mobile than water. Computer simulations and over 20 years of monitoring have shown that the subsurface liquid petroleum plume has achieved equilibrium and there is no further lateral migration.

The potential for impacts to on-site water wells constructed outside of petroleum impacted soil areas are more likely to result from dissolved petroleum constituents. The vast majority of the petroleum impact at the Project Site is geochemically incapable of generating a dissolved hydrocarbon fraction capable of significantly degrading downgradient groundwater quality. However, the petroleum underlying the Northwest Operations Area is capable of producing a dissolved hydrocarbon fraction that could potentially impact groundwater wells.

The deep groundwater wells, which would be used for the County Development Plan aspect of the Project, have been tested for TPH as well as a host of other water constituents. All of the wells had levels of TPH that were below the practical quantification limit (i.e., non-detects). The analysis of the groundwater samples showed that the water met California drinking water standards (Cleath 2002). Three of these wells are located on the southern and eastern boundary of the southern parcel, a considerable distance from the former Northwest Operations Area (refer to Figure 4.5-6), which has shown to have the highest levels of TPH contamination in the shallow groundwater. A fourth well is located off-site, approximately 550 feet west of the former Northwest Operations Area, north of Tank Farm Road. There is also an existing groundwater well in this area that is currently used to provide non-potable water to the tank farm offices. The location of this well is shown in Figure 4.5-6. The Applicant is not proposing to use this well for remediation or County Development Plan. The RWQCB has express concern about using the existing well in the Northwest Operations Area and Well #4 as a source of drinking water or other domestic use due to the potential for dissolved TPH contamination (Kukol, 2013).

In the Northwest Operations Area the petroleum in the saturated zone also contains a light fraction (C5-C20), including benzene. This light fraction is responsible for the Northwest Operations Area being the only area of the site where groundwater containing dissolved petroleum (TPH and benzene) exceeds concentrations greater than maximum contaminant levels (MCLs). Subsequent studies have demonstrated that natural processes have limited dissolved-phase impacts to areas immediately adjacent to the southwest corner of the Northwest Operations Area (Avocet 2011, See Appendix G.3). Shallow groundwater in the vicinity of the groundwater wells has shown TPH levels below 0.6 ppm, which is below the State of California Maximum Containment Level of one ppm TPH.

As the deep groundwater wells are used for extraction, they would create a cone of depression that could draw contaminated groundwater from the shallow saturated zone into the deep saturated zone (greater than 50 feet) causing contamination of the drinking water.

Tests were performed to determine the degree of hydraulic communication between the shallow, petroleum-impacted, and deep (e.g., greater than 50 feet) saturated zones on the Project Site situated north and south of Tank Farm Road. These tests involved the installation of two “water supply” wells within or immediately adjacent to petroleum-impacted soils and constructed in accordance with County of San Luis Obispo well construction standards (minimum annular seal depth of 50 feet). The tests were monitored by one or more observation wells completed in the shallow saturated zone (<30 feet) and located at varying distances and directions from the water supply wells. The water supply wells were pumped for 24 hours while water levels in both the supply and observation wells were continuously recorded using pressure transducers and data loggers. Groundwater samples, collected from the supply wells at the beginning, middle, and end of the tests, were submitted to an analytical laboratory and tested for TPH and BTEX. The

aquifer tests revealed that sustained drawdowns in excess of 20 feet in the supply wells had no significant effect on water levels in the shallow saturated zone. Furthermore, the laboratory analytical results revealed no detectable concentrations of TPH (<100 µg/l) or benzene (<0.5 µg/l). The conclusion of both aquifer tests was that the degree of communication between the shallow and deep (e.g., greater than 50 feet) saturated zones is limited (Avocet 2011, See Appendix D.3). In addition the following evidence would indicate that migration of petroleum hydrocarbon constituents to deeper pumped zones is highly unlikely*:*

- Numerous years of groundwater monitoring have not show any migration of contamination to the deep groundwater that would be used for providing drinking water.
- Studies focused on the petroleum hydrocarbon itself in various areas of the Tank Farm property have not shown any contamination of the deep groundwater.
- Investigation of vertical gradients with the groundwater would indicate that contamination does not migrate to the deep groundwater.
- The currently used onsite supply well has not induced downward migration of even the most mobile petroleum hydrocarbon mixture on the Tank Farm site.

The results of the long-term monitoring, current supply well and the various studies would indicate that that it is highly unlikely that contamination from the shallow saturated zone would move into the deep zone and impact the groundwater wells. Even with this extensive amount of study and evaluation, it is not possible to define the geology and hydrogeology or the nature and extent of various waste constituents with 100 percent certainty. In addition, the pump test of the wells were of a short duration tests lasting only a few days, and may not be fully representative of the conditions when the groundwater wells are in long-term use and during periods of drought. Therefore, there is a potential for migrating contaminants to impact the groundwater wells, which would be a significant impact.

Mitigation Measures

WR-9a *Prior to issuance of building permits for Phase I of the County Development Plan, the Applicant shall prepare and implement a sentinel monitoring program that would include wells positioned and constructed to specifically monitor inflowing water in the vicinity of the groundwater wells that would provide information on any approaching petroleum-related constituents of concern. If petroleum-related constituent of concern are detected, then an adsorptive carbon canister system or other method approved by the RWQCB and the County shall be installed to assure that the water from the well meets drinking water standards. .*

WR-9b *Upon completion of the remediation activities, the Applicant shall abandon the existing groundwater well located in the Northwest Operations Area. The well shall be abandoned in accordance with applicable Department of Water Resources requirements.*

WR-9c *The Applicant shall not use Well #4 as a source of water for the County Development Plan.*

Residual Impacts

Implementation of the proposed mitigation measure would assure that the groundwater from the wells if it became contaminated would be treated to meet drinking water standards.

Adsorptive carbon canisters is a proven technology that is widely accepted by regulatory agencies and used by many water users. The City of San Luis Obispo implemented such technology on select supply wells in the early 1990s to reduce concentrations of chlorinated hydrocarbons to acceptable regulatory drinking water standards.

As such, this impact would be *less than significant with mitigation (Class II)*.

4.5.7 Cumulative Analysis

The County Development Plan aspect of the Project proposes the use of groundwater from existing on-site wells. Significant cumulative impacts may occur to the groundwater source, neighboring properties water supply, and the existing wells if excessive drawn-down were to occur. Based upon the Water Supply Assessment Report (Appendix G.2), the total water supplies available during normal, single-dry and multiple-dry water years within a 20-year projection would meet the projected water demand for the Project in addition to the demand of existing and other planned future uses. Therefore, cumulative impacts to groundwater would be less than significant for the County Development Plan.

Impacts associated with the use of water provided through the City's utility system for the City Development Plan aspect of the Project are discussed in the Public Services and Utilities Section of the EIR (Section 4.13). The City's Urban Water Management Plan and the Water Supply Assessment prepared by the City of San Luis Obispo for the Project (Appendix G.1) shows that the City can provide water to the proposed Project during normal, single-dry and multiple-dry water years within a 20-year projection and meet the projected water demand for the project in addition to the demand of existing and other planned future uses. Therefore, cumulative impacts to groundwater would be less than significant for the City Development Plan.

The region of influence or surface water quality-related impacts would be limited to those cumulative projects located within the same watershed. The remediation and development components of the Project would be designed to reduce the flow of stormwater off the site from the current existing conditions. The King Ventures and Serra Meadows development located to the north of the Project Site have constructed a retention basin just north of the Project Site boundary in the Tank Farm Creek watershed (see Figure 4.5-6). The basin would help control stormwater flows into the North Marsh areas of the Project Site. This would serve to limit the cumulative surface water impacts to less than significant.

Another cumulative condition is associated with the outlet to Tank Farm Creek downstream of the Project Site. At present, the creek downstream of the Project Site outlet is routed through an existing industrial development, across land slated for future development, and finally across agricultural lands until joining the East Fork of San Luis Obispo Creek. Even though stormwater flows from the Project Site, including the Project, would be reduced over the existing conditions, potential future development in this area could be affected by flow regime. Improved hydraulic performance and better flood management could be achieved by routing Tank Farm Creek

through the southern property line of the Project Site (see Figure 4.5-6) and establishing a riparian corridor that continues the proposed Project's restoration plan to the downstream confluence. However, developing and implementing that proposal would require a regional working group that would include land owners adjacent to Tank Farm Creek, the City of San Luis Obispo, and the Public Works Department of San Luis Obispo County, as well as various regulatory agencies. The above notwithstanding, given that the Project would reduce stormwater flows compared to existing conditions, the Project's cumulative impacts to stormwater flows would be less than significant.

4.5.8 Mitigation Monitoring Plan

4.5.8.1 Remediation Mitigation Monitoring Plan

Mitigation Measure	Plan Requirements and Timing	Compliance Verification		
		Method	Timing	Responsible Party
WR-1a	Prior to the issuance of any construction/grading permit and/or the commencement of any clearing, grading or excavation, a Notice of Intent (NOI) shall be submitted to the California SWRCB Stormwater Permit Unit. Compliance with the General Permit includes the preparation of a SWPPP, which shall identify potential pollutant sources that my affect the quality of discharges to stormwater, and shall include the design and placement of BMPs to effectively prohibit the entry of pollutants from the Project Site into surface water sources or wetlands or storm drains.	Review of Plan & Site Inspection	Plan Review and submittal prior to any grading permits for Remediation or Construction. Site Inspections shall occur on an ongoing basis during construction.	RWQCB County of San Luis Obispo
WR-1b	Surface Water Quality Management Practices shall be implemented to reduce potential impact to surface water quality during construction-related activities. 1. Soil stockpiles and graded slopes shall be covered after 14 days if inactivity and 24 hours prior to and during inclement weather conditions. 2. Fiber rolls shall be placed along the top of exposed slopes and at the toes of graded areas to reduce surface soil movement, as necessary. 3. A routine monitoring plan shall be implemented to ensure success of all on-site erosion and sedimentation control measures. 4. Dust control measures shall be implemented to graded areas during construction activities to control fugitive dust. 5. Streets surrounding the *Project Site* shall be cleaned daily or as necessary. 6. Best Management Practices shall be strictly	Review of Plan & Site Inspection	Plan Review and submittal prior to any grading permits for Remediation or Construction. Site Inspections shall occur on an ongoing basis during construction.	RWQCB County of San Luis Obispo

Mitigation Measure	Plan Requirements and Timing	Compliance Verification		
		Method	Timing	Responsible Party
	followed to prevent spills and discharges of pollutants on-site (material and container storage, proper trash disposal, construction entrances, etc).			
WR-2	The Applicant shall work with the City of San Luis Obispo to obtain reclaimed water for use during the Remediation Project.	Review of agreement between City and Applicant	Prior to grading permit for remediation	County of San Luis Obispo
WR-3a	Contaminated soils that will be removed, relocated or treated on site shall be managed according to the procedures and practices of the California Stormwater BMP Handbook. The owner/developer shall conduct pre-construction environmental assessments of any contaminated soil prior to construction and have a specific treatment and BMP plan in order to prevent surface water, ground water or stormwater pollution.	Review of Plans, SWPPP report and Site Inspections	During remediation and Construction phases.	RWQCB County of San Luis Obispo
WR-3b	All necessary precautions and preventive measures shall be taken to prevent the flow of water, including ground water, from mixing with contaminated soil. If water does enter an excavation and becomes contaminated, such water shall be discharged into clean watertight holding tanks and treated or disposed of in accordance with federal, state and local laws.	Review of Plans, SWPPP report and Site Inspections	During remediation and Construction phases.	RWQCB County of San Luis Obispo
WR-3c	Polluted soils shall not be stockpiled on site without an approved stockpiling plan. The stockpiling plan shall detail the method to be used to prevent runoff from leaving the area, and could include measures such as covering and berming. The stockpiling plan shall be consistent with the requirements specified in AQ.1d and BIO-7c.. Stockpiles shall not be permitted near storm drains or watercourses.	Review of Plans, SWPPP report and Site Inspections	During remediation and Construction phases.	County of San Luis Obispo
WR-3d	The Applicant shall provide training to employees and contractors in contaminated soil identification, handling and disposal procedures. Regular meetings shall be held to discuss and reinforce disposal procedures.	Review of Plans, SWPPP report and Site Inspections	Prior to and during Remediation and Construction phases.	RWQCB County of San Luis Obispo
WR-3e	Plastic sheeting, tarps, sandbags, straw wattles, silt fencing, and any other implemented BMP devices shall be treated as contaminated materials and shall be removed and disposed of according to the local regulatory agencies.	Review of Plans, SWPPP report and Site Inspections	During remediation and Construction phases.	County of San Luis Obispo
WR-4a	The impervious surface of the caps shall be designed to ensure that storm water discharge to surrounding conveyances is non-erosive.	Review of Plans, and Site Inspections	Remediation Phase	County of San Luis Obispo
WR-4b	The Surface Water Quality Management Practices shall be implemented to reduce potential impact to surface water quality during construction-related activities associated with remediation caps. • Fiber rolls, or other equivalent techniques, shall	Review of Plans, and Site Inspections	During remediation and Construction phases.	RWQCB County of San Luis Obispo

Mitigation Measure	Plan Requirements and Timing	Compliance Verification		
		Method	Timing	Responsible Party
	be placed along the top of exposed edges of the cap and at the toes of graded areas to reduce surface soil movement, as necessary. • Areas surrounding caps which are disturbed during construction shall be re-vegetated, as soon as is practical, prior to the beginning of the rainy season. • Sandbags, or other equivalent techniques, shall be utilized along each graded cap area to prevent siltation transport to the surrounding areas.			

4.5.8.2 City Development Plan Mitigation Monitoring Plan

No specific mitigation measures were identified for the City Development Plan. The majority of the water impacts associated with the development would occur during the remediation project. This would include the preliminary grading of the development pads and the installation of the site wide stormwater infrastructure. As such, a number of the mitigation measures identified for the remediation project would be applicable to the City Development Plan.

4.5.8.3 County Development Plan Mitigation Monitoring Plan

The majority of the water impacts associated with the development would occur during the remediation project. This would include the preliminary grading of the development pads and the installation of the site wide stormwater infrastructure. As such, a number of the mitigation measures identified for the remediation project would be applicable to the County Development Plan.

Mitigation Measure	Plan Requirements and Timing	Compliance Verification		
		Method	Timing	Responsible Party
WR-8a	The applicant shall implement water conservation best management practices including; selection of drought-tolerant, low water-consuming plant varieties and use of low flow plumbing fixtures.	Review and approval of plans.	During lifetime of the Development Plan	County of San Luis Obispo Planning and Development Department

Mitigation Measure	Plan Requirements and Timing	Compliance Verification		
		Method	Timing	Responsible Party
WR-8b	The Applicant shall conduct annual monitoring of Wells 1, 2 and 3 on a semi-annual basis to determine water levels and correlate to water production values. The production rates shall be metered at the wells. This information shall be used to define drawdowns. The results of the monitoring and analysis shall be submitted to the County for review on a semi-annual basis. In the event that the analysis shows a measurable loss of the well production rate, the Applicant shall reduce groundwater extractions from Well 1 to eliminate the potential for groundwater interference.	Review of semi-annual monitoring reports	During lifetime of the Development Plan	County of San Luis Obispo Planning and Development Department
WR-9a	Prior to issuance of building permits for Phase I of the County Development Plan, the Applicant shall prepare and implement a sentinel monitoring program that would include wells positioned and constructed to specifically monitor inflowing water in the vicinity of the groundwater wells that would provide information on any approaching petroleum-related constituents of concern. If petroleum-related constituents of concern are detected, then an adsorptive carbon canister system or other method approved by the RWQCB and the County shall be installed to assure that the water from the well meets drinking water standards.	Review of monitoring plan Review of monitoring reports Review of design of adsorptive carbon canister system	Prior to issuance of building permits Ongoing during life of development	RWQCB County of San Luis Obispo Planning and Development Department
WR-9b	Upon completion of the remediation activities, the Applicant shall abandon the existing groundwater well located in the Northwest Operations Area. The well shall be abandoned in accordance with applicable Department of Water Resources requirements.	Review of well abandonment records	Upon completion of remediation activities.	RWQCB County of San Luis Obispo Planning and Development Department
WR-9c	The Applicant shall not use Well #4 as a source of water for the County Development Plan.	Inspection of water supply piping. Review of documents releasing water rights to the well owner/	Prior to issuance of building permits for Phase I	RWQCB County of San Luis Obispo Planning and Development Department

4.5.9 References

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