5.2 WATER QUALITY AND GROUNDWATER

The project would involve the buildout of an additional three million square feet of greenhouse~~s and associated structures~~development. Greenhouse development, as well as the open field agriculture operations, has historically impacted surface water quality through the discharge of nutrients and pesticides in runoff waters. Groundwater quality degradation has also occurred as a result of agricultural operations due to the infiltration of nutrient-laden irrigation water. Pumpage of groundwater to irrigate crops is the major demand on the Carpinteria Groundwater Basin. However, the basin contains sufficient water supplies to meet projected demand and no significant effects to water supply are anticipated.

A key issue is whether the proposed greenhouse development has the potential to cause greater water quality degradation than the levels associated with open field agricultural operations. Because the level of impact to water quality associated with agricultural activities (both greenhouse and open field) is largely dependent on the operation of each individual facility, design recommendations and other mitigation measures have been developed to minimize potential surface water impacts to the creeks, marsh, and adjacent ocean intertidal zone, and to minimize effects on groundwater resources.

5.2.1 Setting

a. Watershed Characteristics. The 7,196 acre Carpinteria Valley study area is drained primarily by seven coastal creeks: Toro Canyon, Garrapata, Arroyo Paredon, Santa Monica, Franklin, Carpinteria, and Rincon. Other small watersheds that drain portions of the study area are included in Drainage "E", Franciscan Channel, and coastal drainage. The geographic and physiographic characteristics of these watersheds are further discussed in Section 5.3.

Because these coastal creeks originate in the Santa Ynez Mountains and the Los Padres National Forest, the primary watershed coverage in most of the drainages is natural vegetation (Table 5.2-1). Agriculture is the primary cover in only the smaller local drainages, including Garrapata Creek, Franciscan Channel, and Drainage "E". Urban uses comprise the majority of the coastal drainage, and also much of Garrapata Creek, Franciscan Channel, and Drainage "E".

Table 5.2-1 Land Use Proportion In Watershed

Watershed	Land Use Percentage		
	Urban	Agriculture	Natural Vegetation
Toro Canyon Creek	19%	10%	71%
Garrapata Creek	34%	61%	5%
Arroyo Paredon	4%	15%	81%
Drainage "E"	40%	53%	7%
Franciscan Channel	11%	66%	23%
Santa Monica Creek	4%	10%	85%
Franklin Creek	20%	35%	45%
Carpinteria Creek	4%	16%	80%
Coastal drainage	64%	34%	1%
Rincon Creek	2%	13%	86%

Note: Percentages may not add to 100% due to rounding.
Source: Rincon Consultants, 1999; USEPA, Basins 2.0, 1999

The study area generally includes most of the agricultural portions of these watersheds, while excluding the natural lands to the north and the urbanized portions of the City of Carpinteria and the immediate coastal area. Within the study area, most of the greenhouse development occurs within the Arroyo Paredon, Franciscan Channel, Santa Monica Creek, and Franklin Creek watersheds (Table 5.2-2).

Table 5.2-2 Land Use By Watershed Within Study Area

Watershed	Acreage Within Study Area	Land Use Acreage			
		Residential	Greenhouse Related *	Other Agriculture	Natural Areas
Toro Canyon Creek	655	37	0	334	284
Garrapata Creek	325	92	0	216	17
Arroyo Paredon	842	88	122	358	274
Drainage “E”	72	0	27	40	5
Franciscan Channel	532	22	118	266	126
Santa Monica Creek	364	5	104	206	50
Franklin Creek	1,143	0	194	633	316
Carpinteria Creek	2,148	59	62	1,464	563
Coastal drainage	75	6	0	64	5
Rincon Creek	830	130	6	354	340

** Includes greenhouses, plant protection structures, shade structures, and accessory uses.*
Note: Numbers may not add to 100% due to rounding.
Source: Rincon Consultants, 1999; USEPA, Basins 2.0, 1999

Open field agricultural operations generally employ broadcast applications of nutrients and pesticides which have a higher susceptibility of off-site transport into local drainage systems via irrigation and precipitation runoff. The increased use of drip irrigation systems by local open field growers can help reduce agricultural tail-water discharge into local creeks. Open field growers also use sub-surface tile drains to route irrigation water and/or high groundwater away from the root zone to increase productivity and to minimize problems such as root rot. The collected irrigation water and groundwater is typically pumped directly into local drainages. Agricultural land with high water tables is primarily located north of Carpinteria Marsh between Nidever Road and Linden Avenue. The location of the tile drain system and their outlets to the surface drainage varies and is generally not well documented.

Existing greenhouses in the Valley range from aging structures constructed in the 1960s to new computer-automated facilities. Irrigation practices within older greenhouse structures typically do not employ nutrient or water recycling irrigation methods. Irrigation water percolates directly into the soil and is also collected by on-site drains and discharged directly into local storm drains and creeks. Irrigation practices within newer structures are managed differently by every grower. Hydroponic systems are increasing in use as a highly effective method for not only increasing crop productivity, but also for controlling nutrient and pesticide application rates. Some growers recycle and filter irrigation water several times, others hold the water once and use it to irrigate other crops. Most hydroponic systems are computer controlled and monitor nutrient and pH levels and other parameters. Growers have the ability to automatically alter the amount of nutrients and pesticides delivered via irrigation water depending upon crop needs. If properly managed, these systems can substantially decrease the net effluent discharge into the groundwater table and local drainage systems. It is estimated that only 21% of the greenhouses currently use this technology.

In addition to the agricultural uses, the study area also contains some residential neighborhoods, include Shepard Mesa located in the northeastern corner of the study area, Serena Park and Toro Canyon in the western end of the Study Area, and two smaller subdivisions, La Mirada and Ocean Oaks, north of Foothill Road between Nidever Road and Cravens Lane (Figure 5.1-1). Residential areas are a source of urban-related pollutants (such as oil and grease, rubber particulate matter, organic matter, home-use fertilizers and pesticides, etc.).

b. Surface Water Quality. Water quality within any particular drainage is highly variable in both space and time, and is dependent on the source and quantity of water and the potential for pollutants to enter the surface water body. Water quality data are generally lacking for most of the study area; however, water quality studies have been ongoing within the drainages that feed into the Carpinteria Salt Marsh due to concerns regarding this important ecological resource.

The inflow of nutrients into the Carpinteria Salt Marsh from its tributary creeks (Franklin, Santa Monica, Franciscan Channel, and Drainage "E") was investigated in the early 1990's (Page, et al, 1995). Nutrients studied included orthophosphate (PO_4-P) and three nitrogen species: nitrate (NO_3), nitrite (NO_2), and ammonium (NH_4). These nutrients have been implicated in the excessive growth of unwanted algal mats in the marsh, which causes a reduction in the biological value of the salt marsh (see also Section 5.8). It was determined that dissolved nitrate concentrations, but not ammonium or phosphate, were elevated in both stream flow and perched groundwater that was influent to the salt marsh. The nitrate was both spatially and temporally variable. The highest mean concentrations of nitrate-nitrogen[1] (43.4 milligrams per liter [mg/l]) were found in surface water in Drainage "E", with mean concentrations of 19.5 and 18.2 mg/l at the Franciscan Channel outlet and Franklin Creek, respectively. All of these drainages received significant input from agricultural irrigation runoff. Mean nitrate-nitrogen concentration was lowest (0.8 mg/l) within a drainage ditch that received flow from an urban area. While the majority of freshwater in-flow to the marsh is from surface drainages, groundwater seepage occurs primarily in the northwest portion of the marsh. Groundwater also enters the marsh indirectly via lateral seeps into local creeks, and through de-watering of areas with high groundwater.

Water seeping from the perched groundwater and tributary to Drainage "E" had nitrate-nitrogen concentrations of 60 - 80 mg/l, while a similar seep on Franklin Creek had concentrations of 28-99 mg/l. In contrast, ammonium (as nitrogen) and phosphate (as phosphorus) concentrations were generally lower and less variable, typically less than 0.5 mg/l for both at all stations. For comparison purposes, nitrate concentrations not to be exceeded in domestic or municipal water supplies is 10 mg/l (as nitrate-nitrogen; 45 mg/l as nitrate). The water quality guideline for irrigation water is less than 5 mg/l nitrate-nitrogen, with increasing problems for certain crops in the 5-30 mg/l range and severe problems at greater than 30 mg/l (Regional Water Quality Control Board, 1996). Excess nitrogen in irrigation water affects the production or quality of crops such as sugar beets, citrus, avocados, and apricots.

The nitrogen concentration is only an indicator of the output of nutrients to the salt marsh. The discharge volume also needs to be considered, since it is the total amount of nutrients that is

[1] *Nitrate-nitrogen (NO_3-N) refers to the mass of nitrogen contained in the nitrate compound. All concentrations are in terms of the nitrogen content only and converted from the micromolar (µM) concentrations reported by Page, 1999).*

available that results in excessive algal growth. Nitrogen inflow to the salt marsh was estimated by multiplying the concentration by the measured discharge. This yielded nitrate-nitrogen inflow of from 0.2 to 1.7 pounds per hour in September and October of 1992, to highs of up to 12.3 pounds per hour in January 1993. While these rates may vary considerably depending on the water flow regime, it is indicative of the large amount of nitrogen that is being exported into the salt marsh environment.

Additional nutrient sampling within Franklin Creek and Santa Monica Creek was conducted in 1997-1999 (Page, 1999). A goal of the study was to investigate how water quality changes in Santa Monica and Franklin Creeks as the water flows southward from the natural lands of the Los Padres National Forest, through the agricultural and urban areas, and into the salt marsh. Water samples were taken approximately every 10 days from October 1996 through November 1998 at the same locations as the earlier study and at three additional locations (Santa Monica Creek at the debris basin and Franklin Creek at two tributaries). In addition, water quality samples were collected from significant sources of irrigation runoff in August 1998 along Santa Monica and Franklin Creeks between the marsh and Foothill Road and in May 1999 along Santa Monica, Franklin, Arroyo Paredon and Carpinteria Creek. The August 1998 samples were from nine of the approximately 200 drains emptying into Santa Monica Creek and 18 of the approximately 200 drains that empty into Franklin Creek. Many of these drains appear to convey irrigation runoff from drop inlets, channels, and tile drains from agricultural lands. The sampling locations and concentrations are illustrated on Figure 5.2-1. The results indicated that the highest individual nitrate samples from drains to Santa Monica Creek reached 98.8 mg/l and the highest levels in drains tributary to Franklin Creek reached 280 mg/l.

Figure 5.2-2 illustrates the results of the sampling program at the inlets to the marsh during 1996 -1997. Similar to the previous study results, nitrate-nitrogen concentration was highest in Franklin Creek, Drainage “E”, and the Franciscan Channel. The variability in concentration over time illustrated in Figure 5.2-2 appears to be generally associated with the quantity and source of freshwater discharge. Concentrations were typically highest in summer and fall when the source of water was primarily irrigation runoff, and lower during the winter rains. Interestingly, the nitrate-nitrogen concentration in Santa Monica Creek from December 1996 to October 1997 was very low (less than 5 mg/l), especially when compared to the earlier study and the much higher concentration in November 1996. Figure 5.2-1 indicates that these lower values at the marsh inlet may be a result of dilution of the nitrate by urban irrigation return flows, since concentrations are almost an order of magnitude less from the downstream drains as compared to those drains next to the agricultural areas. A similar pattern is evident on Franklin Creek.

Ammonium-nitrogen concentration is much lower than nitrate-nitrogen, as indicated in Figure 5.2-2. However, higher concentrations of both nitrogen forms typically occurred during the periods of low flows. As compared to nitrate, the amount of nitrogen in the ammonium form is very small and does not add appreciably to the nutrient loading of the salt marsh. Phosphate concentrations are also relatively low, though highest in Santa Monica Creek. The high phosphate concentrations in Drainage “E” and Santa Monica Creek in late summer of 1997 may have been related to fertilizer applications within agricultural areas.

Figure 5.2-1 summary of page data map

Figure 5.2-2 page graphs nitrogen concentrations entering carp marsh

Additional nitrate samples taken in May 1999 at specific locations yielded very high values along Santa Monica Creek (108 mg/l) and Franklin Creek (121 and 283 mg/l) (Table 5.2-3). Samples taken at the same time in Arroyo Paredon (24.2 mg/l) and Carpinteria Creek (7.7 mg/l) were substantially lower, but similar to levels reported in the spring of 1997 for the other drainages. The Arroyo Paredon sample was taken in an area that received runoff from both open fields and greenhouses, while the Carpinteria Creek sample was from an area of orchards and open fields.

No direct correlation between drain sizes, adjacent land use, and nitrate concentration can be made since there is little information on the origin of the outlet pipes in Santa Monica Creek and Franklin Creek. Information on land uses adjacent to the outlet pipe was collected as indicated in Table 5.2-3; however, the number of land uses draining from a single outlet pipe may vary. It may be inferred that the small diameter outlet pipes only serve parcels directly adjacent to the creek, while larger diameter pipes would likely have been designed to convey water for a larger area, possibly serving multiple parcels and multiply land uses. Figure 5.2-3 shows the sampling locations for stations identified in Table 5.2-3.

For example, the highest concentration (283.4 mg/l) in May 1999 from a drain to Franklin Creek occurred adjacent to a greenhouse, but immediately upstream, a similar sized drain also adjacent to a greenhouse had one of the lowest levels (1.5 mg/l). The difference in nutrient concentrations from similar land uses (i.e., greenhouses) is largely dependent upon how each operation is managed and the type of crop grown on-site. The highest nitrate values in Santa Monica Creek tended to occur in drains that outlet from the side on which greenhouses were located (see Figure 5.2-1). Along Franklin Creek, high concentrations of nitrate came not only from drains near greenhouses, but also from drains that appear to come from urban areas immediately downstream of greenhouses. However, as illustrated in Figure 5.2-4, nutrient concentrations tended to increase by an order of magnitude between the data points sampled on Santa Monica and Franklin Creeks in the foothills and at the inlet to Carpinteria Marsh.

Little data is available on the concentrations of other chemicals, including pesticides, in surface runoff entering the Study Area drainages and the Carpinteria Salt Marsh. Studies in 1979 and 1980 had indicated that runoff entering the marsh from Drainage “E” was toxic to marsh invertebrates (Page, 1999). Organochloride pesticides and PCB (polychlorinated biphenyl) residues were detected in water samples from this drainage. Since then, the use of organochloride pesticides and PCBs has been eliminated by regulations. Additional screenings of sediment and mussel tissue in the marsh for residual organochorides and PCBs in 1994-1996 yielded low levels of DDT and its metabolites and endosulfan and its metabolites. The relatively low levels of detected pesticides suggest an improvement in water quality in the last 10 - 15 years, however, residual levels of DDT and organochloride pesticides remain in the soil and groundwater table. Little data is available regarding other pesticides and in other drainages.

As part of the current study, mayfly larvae (an aquatic invertebrate - *Ephemeroptera sp.*) were utilized as indicators of water quality through the study area. The preliminary bioassay experiments observed the survivorship of the mayfly larvae in water collected both upstream and downstream of various storm drains. The results suggest that the water quality entering Santa Monica and Franklin Creeks in the two drains tested is detrimental to the survival of

Table 5.2-3 Nitrate-Nitrogen Content of Flowing Drains Tributary to Santa Monica and Franklin Creeks (See Figure 5.2-3 for Station Locations)

Station	Location of samples (facing upstream)	Approximate drain diameter	Land Use		Concentration mg/l	
			Left side	Right side	Aug, 1998	May, 1999
Santa Monica Creek						
1	Channel on left side	21 ft	Urban	Urban	1.9	
2	Drain on right side	6 in	Urban	Urban	3.9	
3	Drain on right side	6 in	Urban	Urban	1.0	
4	Drain on left side	6 in	Greenhouse	Urban	95.9	
5	Left side	over top	Greenhouse	Field	31.3	108.2
6	Left side	over top	Greenhouse	Field	97.7	
7	Left side	over top	Greenhouse	Field	98.8	
8	Left side	over top	Greenhouse	Field	7.6	
9	Pipe on left on top	N/A	Greenhouse	Field	45.3	
Franklin Creek						
A	Drain on right side	32 in	Urban	Urban	1.3	
B	Drain on right side	24 in	Urban	Urban	0.5	
C	Drain on right side	72 in	Urban	Urban	17.0	
D	Drain on right side	72 in	Urban	Urban	17.1	
E	Drain on left side	32 in	Urban	Urban	8.0	
F	Drain on right side	6 in	Urban	Urban	25.4	
G	Drain on right side	6 in	Urban	Urban	42.5	
H	Drain on left side	6 in	Urban	Field	77.5	121.5
I	Drain on right side	6 in	Greenhouse	Urban	38.8	
J	Drain on left side	86 in	Greenhouse	Urban	79.1	
K	Drain on right side	6 in	Greenhouse	Urban	98.7	
L	Drain on left side	16 in	Greenhouse	Urban	281.5	283.4
M	Drain on left side	18 in	Greenhouse	Urban	1.5	
N	Drain on right side	6 in	Urban	Urban	50.1	
O	Right side	over top	Urban	Greenhouse	86.7	

Source: Page, 1999.

Figure 5.2-3 Key to Sampling locations

Figure 5.2-4 nutrients graphs

stream insects. These experiments indicate that the mayfly larvae are potentially useful indicators of the quality of the effluent entering the study area drainages.

Project Clean Water. During the autumn and early winter months of the 1998-1999 rainy season, the City of Santa Barbara, in conjunction with the County of Santa Barbara, City of Carpinteria, County of Ventura and Project Clean Water Stakeholders Groups, conducted a separate investigation of sources of elevated bacterial levels in seven coastal creeks (SBCo, 1999). These creeks included Carpinteria and Rincon Creeks. The sampling measured fecal coliform, total coliform, and *Enterococcus* (*E. coli*) at various stations throughout the creeks' position in the watershed, including the creek/ocean interface. As indicated in the February 2, 1999 staff report to the Board of Supervisors and City Council, the preliminary results do not identify a direct link between greenhouses and elevated bacterial counts in the two study area creeks sampled.

c. Groundwater Basin. The Carpinteria Groundwater Basin extends westward from Ventura County across the Carpinteria Valley to the Toro Canyon area (Figure 5.2-4). The basin encompasses about 7,680 acres (12 square miles). Total basin storage was estimated at 700,000 acre-feet (Geotechnical Consultants, Inc., 1986 Carpinteria Valley Water District, August 1996). The Available Storage (or working storage) is estimated to be 50,000 acre-feet (Groundwater Thresholds Manual; Baca, 1992). The basin is comprised of unconsolidated Pleistocene and Recent alluvial sediments underlain by older Tertiary bedrock formations. The basin is bounded on the north by exposures of Sespe and Coldwater formations and on the south by Monterey Formation bedrock uplifted along the Rincon Creek Thrust Fault. North of the Rincon Creek Thrust Fault is Storage Unit No. 1, which contains four aquifer layers (Aquifers A-D). A large portion of the southern area of this storage unit, including all of the Carpinteria Marsh, is under confined conditions due to the presence of near-surface impermeable clay layers. The northern and eastern portions of Unit No. 1 are recharge areas. The remainder of the basin (Unit No. 2) is located south of the thrust fault and is primarily under confined conditions.

Perched groundwater underlies much of the southern portion of the Carpinteria Valley, its approximate boundary depicted in Figure 5.2.5. Perched groundwater is a body of subsurface water that accumulates on a subsurface impermeable layer (such as clay) generally above the water table in the main water body of the basin. In addition to forming perched water bodies, impermeable layers cause the basin water body to be under confined conditions. In confined areas of the Carpinteria Basin, recharge to aquifers below the impermeable layers does not occur. Recharge of the deeper aquifers occurs in the eastern and foothill areas~~,~~. ~~as indicated on~~ Figure 5.2-5~~. This figure~~ depicts the general location of the confined groundwater/recharge area boundary. A number of factors determine the precise delineation of the recharge area; the precise confined groundwater area could be somewhat larger or smaller. The depth of the perched groundwater table varies among locations and over time. Shallowest depths range from 50 to 80 centimeters [cm (19.7 to 31.5 inches)], while the deepest perched table ranged from 170 to 360 cm (66.9 to 141.7 inches). However, it has also been reported at up to 30 feet below the ground surface in some locations (Santa Barbara County, 1986). Existing wells do not produce from the perched aquifers because they generally contain water of poor quality.

Figure 5.2-5 Groundwater Basin

Collection of data and evaluation of the groundwater resources in the Carpinteria Valley area have historically been performed by the United States Geological Survey (USGS) in conjunction with the Santa Barbara County Water Agency and the Carpinteria Valley Water District. Data collection began by USGS in 1941. At the time of the District's formation in 1941, groundwater levels were declining. Hydrographs for the basin indicate that prior to the importation of surface water from Lake Cachuma, groundwater levels fell below sea level. Since the 1986-1991 drought, when levels declined as well production increased, water levels have nearly returned to the historic high level brought about by the very wet winter of 1983. Safe yield of the basin is estimated to be about 5,000 acre-feet/year (GCI, 1986).

The 5,000 AFY Safe Yield figure has been accepted by the County Water Agency. However, this figure applies to the basin as a whole, including the Ventura County portion and the Toro Canyon portion. The County considers the Safe Yield available to the Carpinteria Valley (excluding Ventura County and Toro Canyon) to be 4294 AFY. When last updated as part of the County Groundwater Thresholds Manual (Baca, 1992), the Carpinteria Basin was estimated to be in a state of surplus (long-term average annual supply exceeded long-term average annual demand). This conclusion was reached even when buildout of all existing lots in the basin was considered (Baca, 6-12-91). Since 1992, the Carpinteria Valley Water District has obtained a 2,000 AFY entitlement for the State Water Project. Thus, the Carpinteria area has a substantial surplus of long-term water supply. Groundwater basin overdraft in the foreseeable future is not anticipated in the Carpinteria area.

Groundwater pumpage from the basin has varied greatly over the last 60 years depending upon the availability of surface water, precipitation and land use. The safe yield is the amount of water which can be withdrawn from a groundwater basin annually without degrading the quality of the subsurface water and/or altering the strata which holds the water. Estimated pumpage for ~~1998~~ 2000 reached ~~2,950~~3810 acre-feet, ~~(2,481~~ 2400 acre-feet from private wells and ~~469~~ 1410 acre-feet from district wells, ~~) according to Norm Cota of the CVWD~~ (Fugro West, Inc., 2001). District pumping historically averaged about ~~2,200~~ 1807 acre-feet per year (AFY) from 1984 to 2000, however, due to the availability of state water the need for pumping district wells has ~~sharply~~ declined. As indicated above, safe yield of the basin (i.e. safe yield available to the CVWD) is estimated to be about 4,294 AFY. Due to the use of State Water, reduced pumpage by the District is expected to continue in the future and the basin will remain in surplus.

The location of Carpinteria Valley Water District wells are indicated on Figure 5.2-5. The depth of these wells extend 900 - 1250 feet and tap the third aquifer (Aquifer C). Private wells in the area generally are more shallow and tap the upper two aquifers (A and B), which are located generally about 300 and 700 feet deep.

d. Groundwater Quality. ~~According to Santa Barbara County's Greenhouse Development Compilation and Assessment (1986 - Final Draft), degradation of the water quality of the Carpinteria Valley groundwater basin, particularly in near-surface aquifers, has resulted from infiltration of irrigation water and septic tank wastewater into the basin's recharge area. Nitrate levels had been rising at that time, an indication of degradation from irrigation return flows. According to the Carpinteria Valley Water District (1996), chloride, a common seawater constituent, is generally low in samples taken from the basin. It is believed that the Rincon Thrust fault acts as a barrier to seawater intrusion. Total Dissolved Solids (TDS)~~

concentrations range from a low 450 to moderate 980 parts per million. The District's 1996 report indicated that there are no known contamination problems in the Carpinteria Groundwater Basin at this time. Santa Barbara County's 1986 Greenhouse Development Compilation and Assessment indicated that groundwater quality degradation due to nitrates in the perched aquifer had resulted from infiltration of both irrigation water and deteriorating septic systems. Historical studies of the basin completed by the CVWD, Santa Barbara County Water Agency, and the U.S. Geologic Survey that date back to the 1940s reflect the presence of nitrate ion in wells scattered across the basin. In August 1996, the Carpinteria Valley Water District adopted an AB 3030 Groundwater Management Plan and has embarked on a comprehensive semiannual sampling program to evaluate groundwater quality in the basin including nitrate ion concentrations. Annual reports of basin conditions prepared for 1999 and 2000 indicate the presence of elevated nitrate ion concentrations in several shallow, agricultural wells perforated in the perched aquifer and "Aquifer A" in the west-central part of the basin. While these data indicate elevated nitrate ion as early as the 1960s, concentrations in a few wells have increased significantly in the 1990s. The 2000 Annual Report suggests that these might be attributable to considerable fluctuation in groundwater levels that occurred after the drought and mobilization of nitrate ions in the unsaturated zone.

While the presence of nitrate ion in the shallow wells is of concern to the CVWD, no trends of increasing nitrate are present in the deeper wells or in the CVWD's drinking water wells. Nitrate concentrations in these deeper wells are significantly below the safe drinking water standard of 45 mg/l (Table 5.2-3.1). The CVWD is embarking upon a wellhead protection program and an abandoned wells survey to address the potential for these old wells to act as conduits between the shallow and deep aquifers.

Table 5.2–3.1 Nitrate Levels in Carpinteria Valley Water District (in parts per million as NO_3)

Year of Sample	Location				
	El Carro	High School	Lyon	Smillie	Santa Ynez
1990	ND	1.3	3.5	ND	ND
1991	6.2	0.4	3.5	ND	11
1992	8	ND	ND	ND	2.2
1993	ND	<0.4	5.3	ND	2.7
1994	ND	<1.0	5.3	12.5	ND
1995	ND	ND	ND	ND	ND
1996	ND	0.7	3.9	ND	ND
1997	ND	<2.0	4.9	12.7	ND
1998 (Spring)	ND	23.6	ND	ND	ND
1998 (Fall)	ND	<2.0	5	11.6	ND
1999 (Spring)	26.3	<2.0	9	11.3	ND
2000 (Spring)	15.7	<2.0	4.9	11.8	ND
2000 (Fall)	6.8	<2.0	17.8	13.5	ND
2001 (Spring)	<2.0	<2.0	8.6	13	ND

Notes: ND = No Data
All values in milligrams per liter (mg/l)
California Department of Health Services currently established Maximum Contaminant Level (MCL) for nitrate (as NO_3) is 45 mg/l
< indicates less than
Source: Carpinteria Valley Water District, May 2001

Private Septic System. Recent concerns that septic systems are contributing to nitrate groundwater contamination in the shallow aquifer are unsubstantiated. According to the County Environmental Health Services (EHS), septic systems in the Carpinteria Valley that are maintained in proper working order would not present any groundwater contamination problems except in areas of high groundwater (Telecom. Paul Jensen, EHS - May 2001). EHS permits septic systems on a case-by-case basis to ensure that site conditions can accommodate the proposed uses, and requires that each system have a 100% expansion area as a backup if the primary disposal field fails. Concern that a proliferation of greenhouses and packing facilities would create a high density of septic wastewater disposal that would degrade groundwater is unsubstantiated. For example, a single-family dwelling must be sited on a lot no smaller than one acre in order to accommodate a septic system. The average dwelling generates 375 gallons/day in peak flows. At 20 gallons/day per employee, a greenhouse and packing facility would need to employ 19 people to equal the peak flows of one single family dwelling. Apart from infill development, any new greenhouse development would be sited on lots greater than five acres in size. Thus, the density of septic wastewater disposal would be less than if the Valley were to be developed with residential uses. The State Water Resources Control Board only becomes involved in wastewater disposal if 2,500 gallons/day or more are to be disposed (i.e. associated with large commercial operations with 125 employees).

A recent study investigating nutrients in groundwater in the study area has detected relatively high nitrogen levels in shallow groundwater (Page, 1999). The study included measurements of the shallow perched groundwater table to determine if it was a source of nutrients entering the marsh. Nitrate was the most prevalent nutrient and also the most variable in concentration. The highest concentration (75.6 mg/l) was detected in the Franciscan Channel drainage north of the salt marsh. Ammonium and phosphate concentrations were substantially less concentrated and variable. The study concluded that the majority of nitrate in the perched groundwater was consumed (taken up) by vegetation along the northern periphery of the marsh.

While the principal source of nitrate to the salt marsh is from surface runoff, the seepage of nitrate-enriched groundwater into the salt marsh drainage channels is a potentially important source of excessive nutrient loading in the marsh. Stable isotopes of nitrogen were used to determine if the nitrate in the groundwater was from fertilizer and if it formed a substantial part of the nitrogen used for algal growth. Stable isotopes were used based on the fact that many fertilizers are made from atmospheric nitrogen (though nitrogen fertilizers are also from organic sources). The results were inconclusive, but appeared to indicate that the algae were using fertilizer nitrate exported via surface water from Santa Monica and Franklin Creeks. The close correspondence between the type of nitrogen in the marsh macroalgae and that present in the adjacent waters indicate that the algae are using the most readily available source of nitrogen. Given the high levels of nitrate in groundwater seeping from the perched aquifer, this may be a significant continuing source of nutrient loading to the salt marsh.

e. Regulatory Setting.

Surface Water. The protection of water quality in the study area drainages is under the jurisdiction of the Regional Water Quality Control Board, Central Coast Region (RWQCB). The regulatory authority of the RWQCB is provided by the federal ~~and state~~ Clean Water Act~~s~~ (CWA) and the state Porter-Cologne Water Quality Control Act. The RWQCB establishes requirements prescribing the quality of point sources of discharge and establishes water quality objectives through the Water Quality Control Plan for the local basin. The National Pollutant Discharge Elimination System (NPDES) permit system created by the federal CWA is used to regulate point source discharges to surface water. Surface water discharges are also regulated by the RWQCB under the ~~state CWA~~Porter-Cologne Act through waste discharge requirements (WDRs).

A "point source" discharge is a controlled flow that occurs at a specific location, such as a pipe from municipal and industrial wastewater treatment facilities. Most point source discharges have been controlled, and surface water quality planning is now focusing on the control of "non-point sources'" which are diffuse in both terms of their origin and mode of transport to surface and ground waters. Unlike point sources, non-point source pollutants often enter waters in sudden pulses and large quantities as rain, irrigation, and other types of runoff mobilize and transport the contaminants. Examples include lawn and garden chemicals from urban areas transported by rain or irrigation runoff; household and automotive care products dumped onto streets and into gutters; fertilizers, pesticides, and sediment washed off agricultural lands; and various air particulate contaminants that are deposited from the atmosphere. Currently, the primary non-point source control is that of sediment transport that could occur due to construction activity on areas greater than five acres. Agricultural practices~~, including greenhouse irrigation runoff,~~ have not previously been ~~regulated~~subject to NPDES permit requirements due to an agricultural exemption.

Within the Carpinteria Valley, approximately 3,540 acres are in open field agriculture or orchard production and currently draw this exemption. In addition there are 1,700 acres of agriculturally zoned lands that are comprised of natural vegetation and riparian areas. Impacts resulting from the conversion of these lands to agricultural production is an existing potential outcome permitted by the existing AG-I zone district; however, such conversion is expected to be minimal as most of these lands occur on steep slopes and the majority of suitable land for agriculture has already been converted. Greenhouses, however, have not been included in the NPDES permit exemption. -Greenhouse projects may avoid regulation if they follow practices that retain irrigation tailwater on site; however, National Pollutant~~Pollution~~ Discharge Elimination System (NPDES) permits are required for any greenhouse operation that discharges into area drainages (Telecomm. Mike Higgins, RWQCB, May 2001). Potential conversion of uncultivated land to open field or orchard agriculture and construction of less than 20,000 sf cumulative of greenhouse development per legal lot are governed by existing zone district provisions, which will not change under the proposed project and therefore, are part of the environmental baseline.

Water quality objectives are established based on the designated beneficial uses for a particular surface water or groundwater basin. Beneficial uses designated for the Study Area creeks within the South Coast Hydrologic Unit (as indicated in Table 5.2-4) include municipal and domestic water supply (MUN), agricultural supply (AGR), groundwater recharge (GWR), water contact (REC1) and non-contact recreation (REC2), wildlife habitat ((WILD), cold freshwater habitat (COLD), warmwater fish habitat (WARM), migration of aquatic organisms (MIGR), fish spawning habitat (SPWN), biological habitats of special significance (BIOL), rare, threatened, or endangered species (RARE), estuarine habitat (EST), freshwater replenishment (FRESH), and commercial and sport fisheries (COMM).

Table 5.2-4 Identified Uses of Inland Surface Waters

Waterbody	MUN	AGR	GWR	REC1	REC2	WILD	COLD	WARM	MIGR	SPWN	BIOL	RARE	EST	FRESH	COMM
Toro Canyon	X		X	X	X	X		X					X	X	X
Arroyo Paredon	X	X	X	X	X	X		X	X	X		X	X	X	X
Carpinteria Salt Marsh				X	X	X		X	X	X	X	X	X		X
Santa Monica	X	X	X	X	X	X	X	X		X	X			X	X
Franklin	X	X	X	X	X	X	X	X	X	X		X		X	X
Carpinteria	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gobernador	X		X	X	X	X	X	X		X					X
Rincon	X	X	X	X	X	X	X	X	X	X		X	X	X	X

Source: Regional Water Quality Control Board, Central Coast Region, 1996.

The basin plan contains narrative and specific numerical objectives for a variety of parameters and potential pollutants based on these beneficial use designations.

Under Section 303(d) of the federal Clean Water Act, a water body may be listed as "impaired" due to the amount of pollutants that it contains. Those water bodies on the list generally may not receive additional inputs of pollutants until such time that Total Maximum Daily Loads (TMDLs) are established for the water body. Carpinteria Salt Marsh and Carpinteria Creek are contained on the 1998 California list of "impaired waters" as approved by the US Environmental Protection Agency (May 12, 1999). The primary pollutants of concern and the source for the Carpinteria Salt Marsh are nutrients and organic enrichment/low dissolved oxygen due to agricultural sources, priority organics from urban runoff and storm drains, and sedimentation/siltation from agriculture, construction/land development, and storm drains. The primary pollutant of concern for Carpinteria Creek is ~~pathogens (~~coliform bacteria~~,~~ (particularly *E. coli*), which indicates fecal contamination, usually from an unknown source. ~~From agricultural, sanitary disposal, and non-point sources.~~ It is noted that while impaired water bodies have been listed, there is as yet no regulatory process to deal with the issue and TMDLs have not yet been established in any watershed in the state. According to RWQCB, ~~U~~until such time as TMDLs are established for Carpinteria Salt Marsh and Carpinteria Creek, existing regulations that determine when a discharge permit is required continue to be in effect.

Groundwater**.** Overlying landowners in most of California may extract percolating groundwater and put it to beneficial use without approval from the State Water Resources Board, any local jurisdiction, or a court. California does not have a permit process for regulation of groundwater use. In several basins, however, groundwater use is subject to regulation in accordance with court decrees adjudicating the groundwater rights within the basins. The Carpinteria Groundwater Basin has not been adjudicated and is not regulated with regards to water withdrawal. However, the Carpinteria Valley Water District is the agency responsible for groundwater management in the Carpinteria Valley, and as such is in charge of providing water for the City of Carpinteria, the rural areas of Carpinteria and the Toro Canyon area between approximately Garrapata Creek and Nidever Road. In addition, the District coordinates well location so as not to create adverse impacts to groundwater quality and is responsible for the administration of the Groundwater Basin Data Collection Program that includes bi-annual water level monitoring and collection and analysis of water quality samples from 31 wells and surface water stations. The Montecito Water District has the same functions for the westernmost portion of the study area, including Serena Park and areas immediately east of and west of Toro Canyon Road.

While groundwater withdrawal is not directly regulated, discharges to groundwater are regulated by the Regional Water Quality Control Board under both the federal ~~and state~~ Clean Water Act~~s~~ and the state Porter-Cologne Water Quality Control Act, similar to discharges to surface water. Groundwater within the basin is designated for existing beneficial uses that include municipal and domestic water supply, industrial service and process supply, and agricultural supply. As part of the Regional Water Quality Control Plan, objectives for groundwater quality have been set for the Carpinteria Basin. These objectives are intended to serve as a water quality baseline for evaluating water quality management, and not as a specific standard or criteria. Median values based on data averages have been established and are shown in Table 5.2-5.

Table 5.2-5 Median Values for Groundwater Quality in the Carpinteria Basin

Constituent	Objective, mg/l
Total Dissolved Solids	700
Chloride	100
Sulfate	150
Boron	0.2
Sodium	100
Nitrogen	7

Application and Storage of Agricultural Chemicals. Pesticide and herbicide application is regulated by federal and state laws and falls under the jurisdiction of the County Agricultural Commissioner. The Agricultural Commissioner's Office issues permits for California restricted materials to both greenhouse and open field growers. This permit process evaluates application methods along with many other criteria in order to avoid offsite drift and runoff, safe handling and container disposal in order to minimize any potential offsite impacts due to pesticide and herbicide use.

Proper storage of pesticides, herbicides, and fertilizers for safe containment is regulated by Article 80 of the Uniform Fire Code. The Carpinteria-Summerland Fire Protection District is responsible for this program in the Carpinteria Valley.

5.2.2 Impact Analysis

a. Methodology and Significance Thresholds. Potential water quality effects are based on typical nutrient and other contaminant emission rates associated with the existing and proposed uses. A potentially significant impact would occur if the project were to result in a substantial adverse change in the water quality of study area creeks or groundwater that would prevent the achievement of water quality goals or objectives for the local drainages. Direct violations of water quality standards (as opposed to objectives) or waste discharge requirements is considered a significant effect.

The Central Coast Regional Water Quality Control Board's (RWQCB) Basin Plan indicates that maximum contaminant level (MCL) discharge of nitrate (NO_3) is regulated under the drinking water standard of 45 mg/l (10 mg/l as nitrate-nitrogen) if the potential beneficial use of surface water for domestic and municipal supply is to be maintained. The MCL for ionized ammonium at the receiving water is limited to 0.025 mg/l. The Basin Plan also includes a narrative objective regarding "biostimulatory substances" (i.e., nutrients) that directly affect the growth of algae. It is stated that water discharge shall not contain these substances in amounts that would cause the increase in the amount of algae. This discretion is determined on a case by case basis. An adverse or significant environmental surface water condition occurs when concentrations exceed the RWQCB's drinking water MCL of 45 mg/l, the ionized ammonium level at receiving waters exceeds 0.025 mg/l, or when the local regulatory agency determines that discharged nitrogen levels are causing detrimental or significant algal response. The RWQCB does not have MCLs for nitrite or phosphate.

In groundwater basins identified as being in a state of overdraft (i.e. average annual pumpage exceeds the Safe Yield of the basin) a Threshold of Significance for groundwater extraction is established according to the procedures outlined in the County's *Environmental Thresholds and Guidelines Manual.* The Threshold is a value in acre-feet per year of groundwater consumption that is the point at which the new water demand associated with a project under review is considered significantly adverse.

In the case of the Carpinteria Basin, no Threshold of Significance has been established because the basin is in a state of surplus. As described previously in this section, available water supplies in this basin substantially exceed demand. Unless the net new water demand associated with the project (i.e. an increase in water use beyond the pre-existing water use) were to put the basin in a state of overdraft, the demand of the project would not be considered a significant impact.

b. Project Impacts. The following briefly summarizes the anticipated impacts associated with additional greenhouse development. As stated previously, the zone district provisions governing conversion of uncultivated lands to agriculture and construction of less than 20,000 sf per legal lot of cumulative greenhouse development remain unchanged in the proposed project; therefore, future impacts associated with such development, if any, are part of the environmental baseline. Further discussion is provided under each impact statement.

Short-term Impacts. During construction of the individual greenhouses, there is the potential for erosion of soil surfaces, potentially leading to siltation/sedimentation of the local drainage system and the Carpinteria Salt Marsh. This potential ~~effect~~ impact would be effectively addressed by standard erosion control measures included in the required grading permit.

Long-term Impacts.

Water Quantity. Construction of three million square feet of greenhouse ~~structures~~ development would cover about 70 acres of land. If these structures were located in the recharge area of the Carpinteria Basin, long-term recharge to the basin would be reduced. Based on a study by Geotechnical Consultants (June 1976), the average annual recharge is about

0.35 AF per acre. Thus, 70 acres of impermeable surfaces would reduce recharge by about 25 AFY. Geotechnical Consultants approximated the boundary of the recharge area as shown in Figure 5.2-5. However, given the uncertainty of subsurface data there may be variability in the precise location of the recharge area. Based on Geotechnical Consultants boundary, ~~In this case, however, about 90%~~approximately 80% of the proposed greenhouses are located outside the recharge area of the basin within the area of confined conditions. Therefore, the remaining 14 acres of impermeable surfaces which could be constructed within the recharge area would reduce recharge by approximately 4.9 acre-feet per year (14 acres * 0.35 AF of recharge per acre). The proposed project would result in a negligible loss in recharge to the Carpinteria groundwater basin. The perched water zone above the confining layers would be affected, but this would not result in any significant impact. The perched water zone is not pumped due to poor water quality and is actively drained in some areas to lower the water table. In any case, there is no established threshold of significance for the Carpinteria Basin and these effects would not change the surplus status of the basin.

The water demand associated with the greenhouse operations, based on water duty factors in the Groundwater Thresholds Manual (Baca, 1992) may be greater than the open field agricultural operations that would be replaced. As an example, using the 1.6 AFY/acre factor for avocados and the 4.0 AFY/acre factor for flowers (chrysanthemums), the potential increase due to conversion to greenhouses could be up to 168 AFY. While a substantial amount of water, it would not represent a significant impact, as the basin would remain in a state of surplus.

*Water Quality***.** As indicated previously, a major concern in the area is the discharge of nutrients and pesticides into the local drainage system where they can affect the biological conditions within the Carpinteria Salt Marsh, natural bottomed creeks (Toro Canyon Creek, Garrapata Creek, Arroyo Paredon Creek, Carpinteria Creek, and Rincon Creek), and the ocean. Nutrient enrichment of the Carpinteria Salt Marsh (or any estuary) is of potential concern because it has been shown that the addition of inorganic nitrogen (nitrate, ammonium) to estuarine systems can stimulate algal growth. When algal mats form in channels and on tidal flats, they have been found to reduce the abundance and diversity of the fauna living within and on the marsh substrate, inhibit bird feeding behavior, reduce available oxygen for aquatic species, and impact water and sediment chemistry (Page, 1999).

Restricting major greenhouse development (more than 20,000 sf cumulative per parcel) to the proposed AG-I-CARP zone district would not result in additional water quality impacts (e.g. erosion, sedimentation, etc.) associated with farmers converting undeveloped land into open field agricultural production. The AG-I-OF zone district retains the provisions of the existing AG-I zone district except for greenhouse development of 20,000 sf or more. The conversion of land to open field and orchard agriculture and the construction of less than 20,000 sf of greenhouse development per legal lot are permitted under the existing zone district, as well as the proposed AG-I-OF. As stated in Section 3.0, most land that is suitable for greenhouse cultivation has already been converted to agriculture. Eliminating the *opportunity* to construct greenhouses on slopes greater than 5% will not create an incentive to bring more natural lands into cultivation, as greenhouse development would not have occurred on these slopes anyway. Furthermore, conversion of natural lands to open field and orchard cultivation could occur irrespective of the proposed project. As discussed in Section 3.0, Environmental Setting, these zone district provisions and the impacts associated with their continuation are a part of the environmental baseline and will continue whether or not the project is approved. Therefore, there are no reasonably foreseeable significant water quality impacts associated with the proposed AG-I-OF zone district.

The project impacts identified below would result from potential buildout of 3.0 million sf of greenhouse development in the proposed AG-I-CARP zone district.

Impact W-1 Greenhouse buildout has the potential to degrade the surface water quality and groundwater quality through the discharge of irrigation and surface runoff water containing fertilizers and other agricultural chemicals.

The construction of 3 million sf of greenhouse ~~structures~~ development has the potential to affect surface and groundwater through the discharge of waste products into the drainages. Potential contaminants within discharges would include the following:

- Nutrients within irrigation tailwater,
- Pesticide runoff,
- Runoff from roof drains,
- Boiler blowdown wastes,
- Water softener regeneration brines, and
- Runoff from compost and soil mixing areas.

It must be recognized that the open field agricultural activities which would be replaced by greenhouse development have a similar if not greater potential for adverse affects on water quality. Whether in a greenhouse or on an open field, agricultural operations can result in surface water and groundwater quality degradation due to the use of fertilizers and other agricultural chemicals. Surface runoff or deep percolation of agricultural return waters containing fertilizers and pesticides are the potential sources of pollution. Degradation resulting from in-ground agricultural operations is characterized by increased levels of nitrate, chloride, calcium and total dissolved solids (TDS). As discussed below, the way in which agricultural operations are conducted is critical to the level of nutrient and chemical emissions. Thus, any individual new greenhouse included in the project could cause an increase in surface and groundwater degradation above the level associated with the existing onsite agricultural operation. This would represent a potentially significant impact. The mitigation measures listed below would serve to assure that adverse water quality effects would not be exacerbated.

Greenhouses and plant protection structures can vary substantially in the methods by which they are operated. Figure 5.2-1 indicates that high nutrient levels may be associated with runoff from greenhouse areas, particularly from those that were constructed prior to 1981. The nutrients are contained in irrigation tail-waters that are discharged from greenhouse areas, as well as potentially from runoff from compost and potting soil piles. The volume of tail-water and the nutrient content will vary substantially depending on watering method, growing method, feeding method, and crop type. The older greenhouses frequently have plants grown in either containers or in soil and are watered via hoses or pulsating sprinklers. Fertilizer ~~feeding~~ application can vary from hand application, hose aspirators, to proportional injectors at individual plants. Newer greenhouses tend to be more technological with drip irrigation, precisely measured and computer controlled fertilizer and pesticide application, and raised beds with no irrigation tail-water runoff. Irrigation runoff and possible discharge to the groundwater basin is also dependent on the crop, with cut flowers typically being planted in soil, while container plants and vegetables may be fully isolated from the native soil. Similarly, the amount and type of pesticide use varies with crops, with biological controls generally being used on long growing vegetable crops. However, a number of flower growers have tried and are using biological control methods. Standard insecticides and fungicides ~~being~~are also used for cut flowers, which have a brief growing period and rapid crop turnover. It is speculative to assume what type of system or crops may be employed at any of the individual greenhouses that could be developed under the proposed project.

Irrigation water from the Carpinteria Groundwater Basin typically has a low total dissolved solids (TDS) content and salt buildup within soils or in container plants is not a problem within the area. Consequently, the need to flush the soil or container plants with excess water that is then discharged to the drainage system does not typically occur in the area. In addition, the need to soften irrigation water, which could lead to the discharge of regenerant liquids and brines, does not typically occur in the area. However, growers using hydroponic systems use reverse osmosis to remove excess salts from recirculating waters. Back-flushing is used periodically to clean the reverse osmosis systems. If not disposed of properly, the reverse osmosis wastewater could lead to high TDS discharges to either the surface water, or to groundwater via a leach field. Discharge directly into a surface water body could potentially result in degradation of beneficial uses of that water for wildlife habitat and cold and warm water fisheries (as indicated for Franklin and Santa Monica Creeks in Table 5.2-3). Such a discharge would require a permit from the RWQCB.

Greenhouse operations can include hot water and steam systems to increase the temperature within the greenhouse and to sterilize soil prior to planting. Boilers used for these systems can generate brines if they are an open system and require boiler blowdown to remove the scaling of minerals within the boiler tank. The discharge of brines that are associated with this blowdown waste to surface waters could be a significant impact depending on quantity and needs to be examined on a project-by-project basis. Direct discharge of this wastewater to a surface water body (as opposed to disposal via a leach field system) is considered a point source, and would require a NPDES permit from the RWQCB.

As previously discussed, most of the greenhouse development provided for under the proposed zoning ordinance would occur within the area containing confined groundwater and outside of the recharge areas for those aquifers. The Carpinteria Valley Water District Water wells are located in the deeper aquifers, which receive recharge from areas generally north of the greenhouse development. Water quality sampling of ~~these~~ District drinking water wells does not indicate any contamination problems and no significant effects to the water quality of these deep wells are expected.

Impact W-2 **Stormwater runoff from greenhouse operations has the potential to degrade the surface water quality of the study area and the Carpinteria Salt Marsh, and the adjacent ocean intertidal zone with elevated levels of stormwater runoff pollutants.**

Greenhouses, accessory structures, and associated parking areas create impermeable surfaces that collect rain water and typically discharge it via either small storm drains, drainage ditches, or via overland flow to the major creeks. The greenhouse structures in themselves would not be sources of contaminants, but as this rain runoff passes overland, it may pick up contaminants associated with greenhouse operations. In particular, stormwater runoff from accessory uses such as parking lots and roadways contain various pollutants associated with motor vehicles, including petroleum compounds, heavy metals, asbestos, rubber, etc. Contaminants would add to the existing pollutant load that already is experienced within local creeks and the Carpinteria Salt Marsh. Assuming that parking lots and roads would comprise 1% of the three million square feet of greenhouse area, about 30,000 square feet or nearly 1 acre of new roadway and pavement that can collect adverse materials would be created. Based on standard loading rates for highways, this amount of development could generate an additional 19 pounds per year of organic material (BOD), 216 pounds per year of suspended sediment, and 3 pounds per year of total nitrogen (Wanielista, et al., 1996). This additional amount of material is not considered significant on a project-level basis.

Impact W-3 Construction and reconstruction of greenhouses has the potential to degrade the surface water quality within the study area and the Carpinteria Salt Marsh with elevated levels of silt/sediment.

Silt and soil particulates can become suspended in storm runoff water during the construction of greenhouses and accessory uses. If routed into creeks that empty directly into the Carpinteria Salt Marsh, the sediment has the potential to negatively affect the water chemistry of the marsh. Sediment exacerbates water clarity/turbidity problems. Subsequently, water temperatures increase and dissolved oxygen levels decrease. These physical changes, coupled with the sediment smothering eggs, larvae, breather holes or adults, have the potential to impact biological resources. In addition, certain pollutants preferentially bind (chelate) to sediments, increasing mobility through and stability in the environment (Pepper, et. al, 1996). Whereas pollutants would normally rapidly degrade, chelated chemicals have the potential to be transported deep within the marsh and render otherwise isolated biological resources susceptible to their toxicity.

Once the greenhouses are developed, sediment load from within the greenhouse depends on its design, the type of crop being grown, and the greenhouse drainage system. In general, greenhouses protect the underlying soil from incident rainfall and would act to essentially eliminate virtually all erosion of material. While landscaping and setback areas adjacent to the greenhouses would still be subject to erosion, this area would be substantially less than that associated with open field crops or orchards, and sediment deposition from the greenhouse operations would not be considered a significant impact.

Open field agriculture throughout the foothills and adjacent to creeks within the valley floor typically have greater soil erosion impacts that contribute to the overall sediment load entering local creeks and the Carpinteria Marsh. The increased use of “berry hoops” throughout the study area during the last several years resulted in significant erosion problems, localized flooding, and loss of topsoil (particularly when constructed on sloping terrain). Precipitation falling on the expanse of plastic berry hoops immediately drains off-site to low-lying areas.

Drainage control features for berry hoops are virtually absent since they are currently exempt from discretionary review.

The proposed AG-I-CARP and AG-I-OF zone districts classify berry hoops as temporary structures. The maximum lot coverage proposed for temporary structures is 20,000 sf per parcel. Proposed development standards would require that temporary structures greater than 5,000 sf in area shall be subject to Flood Control District review to mitigate potential drainage and erosion impacts. These measures would help to reduce loss of topsoil, erosion, and localized flooding impacts within the study area.

5.2.3 Mitigation Measures

a. Existing Policies. The Santa Barbara County Article II Coastal Zoning Ordinance contains policies that are part of the Santa Barbara County Coastal Land Use Plan. These policies shall serve as development standards for all developments subject to the permit provisions of Article II. Additional development standards are included in Section 35-97 of the Coastal Zoning Ordinance, which contains the *Environmentally Sensitive Habitat Area Overlay District (ESH).* The sections pertinent to water quality and groundwater are included below.

Sec. 35-60 Water and Other Public Utilities.

(1). The long-term integrity of groundwater basins or sub-basins located wholly within the coastal zone shall be protected. To this end, the safe yield as determined by competent hydrologic evidence of such a groundwater basin or sub-basin shall not be exceeded except on a temporary basis as part of a conjunctive use or other program managed by the appropriate water district. This policy shall not apply to appropriators or overlying property owners who wish to develop their property using water to which they are legally entitled pursuant to an adjudication of their water rights.

Sec. 35-97.9 Development Standards for Wetland Habitats.

(6). Wastewater shall not be discharged into any wetland without a permit from the California Regional Water Quality Control Board finding that such discharge improves the quality of the receiving water.

Sec. 35-97.18 Development Standards for Native Plant Community Habitats [Salt Marsh Vegetation].

(2). When sites are graded or developed, areas with significant amounts of native vegetation shall be preserved. All development shall be sited, designed, and constructed to minimize impacts of grading, paving, construction of roads or structures, runoff, and erosion on native vegetation.

b. Proposed Development Standards.

Mitigation W-1 **Construction Grading and Soil Erosion Management.** Excavation and grading shall be limited to the dry season of the year (i.e. April 15th to November 1st) unless a Public Works approved erosion control plan is in place and all measures therein are in effect. ~~In accordance with the National pollution Discharge Elimination System (NPDES) permit, a Storm Water Pollution Prevention Plan (SWPPP) shall be developed and available onsite.~~ *(Addresses Impact W-3)*

c. Additional Proposed Mitigation Measures. The following mitigation measures are required to minimize the potential degradation of surface water quality through discharge of nutrients~~, pesticides,~~ or brines.

Mitigation W-2 **Water Quality Management Plan.** Applicants shall prepare a water quality management plan for review and approval by P&D, EHS, RWQCB and the Carpinteria Valley Water District (approving agencies may vary depending on individual proposed greenhouse projects). ~~The plan shall include, but not be limited to, information on nutrient delivery systems and wastewater disposal methods. The location of all existing and proposed surface and sub-surface drainage facilities shall be mapped.~~ The water quality management plan shall incorporate the following components:

a. A flow diagram of the proposed water system to be used, including average and maximum daily flows.
b. The mapped location of all existing and proposed surface and sub-surface drainage facilities.
c. Information on water and nutrient delivery systems.
d. Pesticide Best Management Practices as defined and required by the County Agricultural Commissioner.
e. The location and type of treatment and disposal facilities for irrigation, washwater, boiler blowdown, water softener regeneration brines, and retention basins.
f. Best Management Practices(BMPs), including but not limited to the following:
   i) Use of water systems that minimize surface water transport (i.e., trickle, drip, mist, hydroponic irrigation systems).
   ii) Use of water and nutrient recycling technologies.
   iii) Employment of fertilization methods that maximize the efficiency of nutrient delivery and uptake such as controlled-release fertilizers (CRF) or liquid fertilizer (LF).
   iv) Implementation of Integrated Pest Management techniques.

Leachate Management. Compost, ~~and~~ fertilizer and pesticides shall be stored in a manner that minimizes generation of leachate ~~in accordance with Article 80 of the Uniform Fire Code~~. Leachate controls include covering compost piles and fertilizer storage with a roof and locating storage areas outside of the 100-year flood plain. Uncovered Sstorage areas shall be located at least 250 feet from a waterway (i.e. storm drain, creek, salt marsh or ocean) unless it can be demonstrated that no adverse effect on water quality will result. Should any discharge occur that could impair the water quality of the receiving body, then a discharge permit will be required from the Regional Water Quality Control Board.

~~**Water Softener**~~ **Brine Management.** High saline brines ~~from water softener units~~ shall not be discharged to the storm drain or allowed to percolate into the groundwater unless it can be demonstrated that no adverse effect on groundwater quality will result. Waste brine shall be contained and disposed of in accordance with federal, state, county and local regulations and requirements. Should any discharge occur that could impair the water quality of the receiving body, then a discharge permit will be required from the Regional Water Quality Control Board. *(Addresses Impact W-1 & 2)*

Mitigation W-3 **Groundwater Monitoring.** ~~Applicants shall install upgradient and downgradient groundwater monitoring wells. Water quality tests shall be taken on a periodic basis with data submitted to the County, RWQCB, and Carpinteria Valley Water District, and kept by applicant as public record. Detection of contamination definitively tied to the permitted greenhouse would cause a subsequent review of the facility and operational methods. Groundwater testing and monitoring should be coordinated with the Carpinteria Valley Water District's Groundwater Basin Data Collection Program, a component of its AB 3030 Groundwater Management Plan. At a minimum, periodic testing should occur on an annual basis, or as frequently as needed as determined by the District.~~ Applicants shall reimburse the Carpinteria Valley Water District (CVWD) for costs related to additional groundwater testing and reporting as deemed necessary by CVWD to monitor nitrate loading of groundwater caused by applicant's development. Said costs may also include those caused by the installation of monitoring wells deemed necessary by CVWD. All data and reports prepared by CVWD shall be submitted as public record to the CVWD Board of Directors and the County Planning & Development Department. Nitrate loading found to be in excess of District standards, as a result of the groundwater testing by CVWD, shall cause a subsequent review of the greenhouse facility and operations by CVWD in consultation with Planning & Development. All subsequent review costs shall be paid for by the applicant. *(Addresses Impact W-1)*

Mitigation W-4: A Watershed Management Program shall be established to ensure improvement in surface water quality and to provide for the long-term protection of the ecological functions and values of the Carpinteria Salt Marsh and its coastal stream tributaries from detrimental impacts originating in the watershed. The Watershed Management Program shall include a water quality monitoring program to identify the type, source and concentration of possible pollutants. Planning and Development shall seek available funding for monitoring and coordinate planning and implementation with the Agricultural Commissioner, RWQCB, UC Santa Barbara Natural Reserve System, City of Carpinteria, County of Santa Barbara Public Works Department, members of the public and other appropriate parties (including agricultural representatives) and the Carpinteria Salt Marsh Management Advisory Committee. *(Addresses Impact W-1, W-2 and W-3)*

Mitigation W-5: Planning and Development shall coordinate with the Environmental Protection Agency and Regional Water Quality Control Board to establish Total Maximum Daily Loads (TMDL) for Carpinteria Salt Marsh and Carpinteria Creek., ~~which have been identified as "impaired waters" by the USEPA (May 1999).~~ *(Addresses Impact W-2 and W-3)*

Mitigation W-6 The Carpinteria-Summerland Fire Protection District shall review and approve storage areas for pesticides, herbicides and fertilizers. ~~A~~ ~~s~~Storage areas for pesticides, herbicides and fertilizers shall be designed with the following mandatory components, and/or other requirements as deemed necessary by the District:

a. A low berm shall be designated around the interior floor to prevent migration of materials in the event of a spill. Any spilled material shall be disposed of in accordance with Carpinteira-Summerland Fire Protection District requirements.
b. The floor shall be a concrete slab.
c. The berm shall be designed to provide 100% containment of any stored liquids. *(Addresses Impact W-1)*

Mitigation W-7 In the event that storage, handling or use of hazardous materials within the provisions of AB 2185/2187 occurs on site, the applicant shall implement a Hazardous Materials Business Plan (HMBP). *(Addresses Impact W-1)*

5.2.4 Residual Impacts.

Impacts W-1 through 3. With implementation of the above measures, impacts on groundwater and surface water quality would be ***less than significant (Class II).***

5.2.5 Cumulative Impacts.

The proposed project addresses the cumulative effect of greenhouse expansion within the Study Area as a result of the proposed zoning ordinance changes. Additional cumulative growth is expected to occur within the City of Carpinteria as undeveloped land parcels are converted to urban uses and in the Toro Canyon Planning Area, where additional residential development may be anticipated. This cumulative development within the Carpinteria Valley may cause an increase in the amount of pollutants, such as nutrients and urban contaminants (oil and grease, organic material), that are discharged to the local creeks, other receiving water bodies (i.e. Carpinteria Salt Marsh), groundwater and the adjacent ocean intertidal zone. In addition, future cumulative construction activity also may increase the amount of sediment eroded, transported in the creeks, and deposited either in the Carpinteria Salt Marsh or along the ocean intertidal zone.

The inability to regulate non-point source pollution from cumulative projects (urban and non-greenhouse projects) within the City of Carpinteria and throughout the study area, combined with additional point and non-point source pollution from buildout of the proposed project, would result in a ***significant and unavoidable (Class I)*** water quality impact to Carpinteria Marsh.