This section discusses and analyzes surface hydrology and water quality characteristics associated with the project. The availability of groundwater supplies necessary to serve the project is discussed in Section 4.12, Utilities and Service Systems. Information presented in this section is primarily based on information contained within: the *Vineyards at Anderson Draft Specific Plan* (2007); the *Master Water Plan for the City of Anderson* (2006); the SB 610 water supply assessment prepared by the City of Anderson (**Appendix 4.7-1**); and the Tentative Map for Phase 2 of the project.

4.7.1 EXISTING SETTING

REGIONAL HYDROLOGY

The City of Anderson is situated at the far north end of the Sacramento Valley at the point where the valley meets the foothills of the Klamath and Cascade mountain ranges.

According to California Department of Water Resources Bulletin 160-05, titled "The California Water Plan Update", the state has been subdivided into ten hydrologic regions. The Vineyards at Anderson Specific Plan area is located in the north-central portion of the Sacramento River hydrologic region. The Sacramento River Hydrologic Region covers approximately 17.4 million acres (27,200 square miles) (DWR, Bulletin 118) and includes all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake, and Napa counties. Geographically, the Sacramento River hydrologic region extends south from the Modoc Plateau near the Oregon border to the Sacramento-San Joaquin River Delta. The Sacramento Valley, which forms the core of the region, is bounded to the east by the foothills of the Sierra Nevada and southern Cascades and to the west by the foothills of the Coast Range and Klamath Mountains. Another significant feature is the Sacramento River, which is the longest river system in the State of California, with major tributaries including the Pit, Feather, Yuba, Bear and American rivers.

The Sacramento River Hydrologic Region is the main water supply for much of California's urban and agricultural areas. Annual runoff in the Sacramento River Hydrologic Region averages about 22.4 million acre-feet, which is nearly one-third of the State's total natural runoff. Major water supplies in the region are provided through surface storage reservoirs. Shasta Lake is one of the two largest surface water projects in the region. In all, there are more than 40 major surface water reservoirs in the region. Approximately eight million acre-feet of water goes to municipal, industrial and agricultural uses, while approximately 2.5 million acre-feet is stored as groundwater. Much of the remainder of the runoff goes to dedicated natural flows, which support various environmental requirements, including in-stream fishery flows and flushing flows in the Sacramento River Delta.

SURFACE WATER RESOURCES

The Specific Plan area spans a total of approximately 2,442 acres, of which 1,688 acres are tributary to the Anderson Creek Drainage Basin to the north and 754 acres are tributary to Cottonwood Creek Drainage Basin to the south (see **Figure 4.7-1**). There are several minor drainages located on the site that are comprised of ephemeral and intermittent streams.[1] These local drainages are sub-basins to the larger Anderson and Cottonwood Creek drainage

[1] An ephemeral stream has flowing water only during precipitation events and for a short duration thereafter. Intermittent streams, on the other hand, have flowing water during most of the year because the stream is fed primarily by groundwater. However, during extended dry periods, intermittent streams may not have adequate groundwater supplies for flows to be sustained.

basins. Waters draining off the project area drain to the north, south, and east, and eventually drain to the Sacramento River.

Existing Drainages

The hydrologic features of the project site include approximately 93,211 linear feet of ephemeral streams and approximately 147,564 linear feet of intermittent streams (Gallaway, 2005). Drainages in the northern portion of the project area are tributary to Olinda Creek and Anderson Creek, which convey water from west to east through the project area. Olinda Creek forms a confluence with Anderson Creek a short distance east of the project site, with Anderson Creek eventually entering the Sacramento River approximately nine miles southeast of this confluence. These streams have extensive floodplains which support numerous jurisdictional wetland features. Frequent flooding in the winter months may cause these wetland features to be altered. Drainages within the southern portion of the project area flow south to Cottonwood Creek, which is also tributary to the Sacramento River.

Anderson Creek Drainage Basin

Anderson Creek originates roughly ten miles west of Anderson and drains an area that is approximately twelve square miles in size. Anderson Creek traverses the north-central portion of the Specific Plan area in a west-east direction. This drainage area is included in the City of Anderson's Drainage Study that was prepared by PACE Civil Engineering in November, 2000. The drainage study identifies two sub-basins of Anderson Creek that are within the project area (sub-basin 2000 and sub-basin 2500 as identified in the drainage study). According to the drainage study, the sub-basins that will be affected by the proposed project are:

- Sub-Basin No. 2000: 735 acres within the Vineyards Specific Plan area.
- Sub-Basin No. 2500: 953 acres – within the Vineyards Specific Plan area.

The City of Anderson's Drainage Study (PACE, 2000) is based on an U.S. Army Corps of Engineers HEC-1 hydrologic modeling program and a preprocessor program (APRE) developed specifically for the Anderson area.

Nearly 70 percent of the Specific Plan area drains to Anderson Creek through multiple sub-basins varying in size from five acres to 700 acres. These drainage courses are typically intermittent, flowing only during the rainy season and becoming dry during the summer months. Channel slopes within these swales are moderate and normally meander between the sides of the draw. Some of the draws contain man-made stock ponds that have been constructed to detain stormwater for stock ponds.[2]

Cottonwood Creek Drainage Basin

Cottonwood Creek originates near the crest of the coast range west of the project area and flows in an easterly direction south of the Specific Plan area. The Cottonwood Creek drainage basin is approximately 920 square miles in size and drains to the Sacramento River. Approximately 750 acres (30 percent) of the Specific Plan area are located within the Cottonwood Creek watershed. The project area encompasses swales and drainages that enter Crowley Creek, a tributary to Cottonwood Creek. The Crowley Creek drainage basin is approximately 2,270 acres in size, or approximately 3.5 square miles. The 2,270-acre Crowley

[2] Vineyards at Anderson Specific Plan (2007), Storm Drainage, page 64.

Creek sub-basin is located within Shasta County and includes the community of Cottonwood. This sub-basin has not been the subject of detailed studies.

GROUNDWATER RESOURCES

The project area is located at the northern end of the Sacramento Valley within the Anderson Groundwater Sub-basin of the Redding Groundwater Basin. The southern boundary of the Redding Groundwater Basin is the Red Bluff Arch, a subsurface uplift that separates the basin from the Sacramento Valley Groundwater Basin. Approximately half of the Redding Groundwater Basin lies in Shasta County with the remainder located in Tehama County to the south. The Redding Groundwater Basin is recharged by precipitation, snowmelt, the Sacramento River, and by a number of tributaries to the Sacramento River including Clear Creek, Cottonwood Creek, Hooker Creek, Battle Creek, and Cow Creek. The general direction of subsurface flows in the Redding Groundwater Basin is from northeast and northwest to south.

Geologically, the Sacramento Valley consists of fluvial sediments which have variable permeability rates dependent upon local geology. As a result, wells developed in areas with coarser aquifer materials will produce larger amounts of water than wells developed in fine aquifer materials (DWR, 2003, pg. 159). In general, well yields in the Sacramento Valley are good and range from one hundred to several thousand gallons per minute (DWR, 2003). Surface water supplies have historically been abundant in the northern portion of the Sacramento Valley with groundwater supplies primarily supplemented the surface water supply for both urban and agricultural purposes. With changing environmental laws and requirements, this balance is shifting to a greater reliance on groundwater resources, and conjunctive use of both supplies is occurring to a greater extent throughout the Sacramento Valley, particularly in drought years. Groundwater provides all or a portion of the municipal supply in many Sacramento Valley towns and cities including Anderson (DWR, 2003).

According to the Environmental Impact Report for the City of Anderson General Plan, the California Department of Water Resources (DWR) has monitored groundwater levels at two wells in the vicinity the Specific Plan area. Measurements at one of these wells, located within the City of Anderson downtown area, indicate that the groundwater level has generally fluctuated between 15 and 20 feet below the ground surface (PMC, 2007, pg. 4.12-1). Measurements at the second well, located east of the Vineyards project area, indicate that the groundwater level is more variable, generally staying within a range from 60 to 70 feet below the ground surface.

WATER QUALITY

Groundwater quality in the Sacramento River Hydrologic Region is generally excellent. However, natural water quality impairments do occur in the Redding Groundwater Basin where Cretaceous-age marine sedimentary rocks containing brackish to saline water are near the surface (DWR, 2003). Water from the older underlying sediments mixes with the fresh water in the younger alluvial aquifer and degrades water quality.

Water quality for all surface and ground water resources for the Sacramento Valley is regulated under the jurisdiction of the Central Valley Regional Water Quality Control Board (RWQCB). Water quality standards for all waters in the region are discussed in the RWQCB Basin Plan. The Basin Plan includes the entire Sacramento River and its tributaries and the entire San Joaquin River basin. The Sacramento River basin is approximately 27,200 square miles. The project area lies entirely within the RWQCB Basin Plan area.

Under Section 303(d) of the federal Clean Water Act, each state must prepare a list of waters that do not meet their water quality standards. Within the Redding Groundwater Basin, the Sacramento River and Little Cow Creek are on the "303(d) list". Streams that pass through the Specific Plan area, which include Anderson Creek and Olinda Creek, are not listed. These water resources meet the federal Clean Water Act standards.

CLIMATE AND PRECIPITATION

The Anderson area generally has warm, dry summers and mild winters. Temperatures of more than 100 degrees Fahrenheit occur nearly every year and temperatures drop below freezing during winter months. The total annual rainfall ranges from less than 20 inches at lower elevations to more than 40 inches at higher elevations. In the lower foothills region surrounding the project area, precipitation rarely falls as snow. For the area surrounding the project site, the following climatic trends have been observed (DWR, 2003):

- Average maximum temperature is approximately 97 degrees F.;
- Highest temperature observed was approximately 115 degrees F.;
- Lowest temperature observed has been approximately 16 degrees F.; and
- Average annual precipitation is approximately 30 inches.

FLOODING

The Anderson area has been prone to flooding from the Sacramento River and its tributaries. From 1904 to 1974, eleven severe floods have occurred (General Plan, 2007). The Sacramento River has been the main source of floodwaters, although Shasta Dam has provided regulation of river flows since its construction was completed in 1945. Other sources of localized flooding include Anderson Creek, Olinda Creek, and Spring Gulch. Floods generally result from intense and prolonged rainfall events during the period from October to March (General Plan, 2007).

The City of Anderson participates in the Federal Emergency Management Agency (FEMA) National Flood Insurance Program. The City of Anderson was mapped by FEMA in 1995 (FEMA Flood Insurance Rate Map Community Panel No. 060359001C, 1995). FEMA uses a 100-year storm as the basis for its coverage and calculates probable inundation profiles for major drainages based on existing land uses in each drainage. These profiles are projected onto existing topography in each basin. The majority of the Specific Plan area was mapped by FEMA in 1992 (FEMA Flood Insurance Rate Map Community Panel No. 0603580895C, 1992) and a section of the northern portion of the project area north of Anderson Creek was mapped by FEMA in 2006 (FEMA Flood Insurance Rate Map Community Panel No. 0603582980F, 2006). The Specific Plan area is overlain on these FEMA flood maps and is shown in **Figure 4.7-2**.

The areas of the project site that are adjacent to Olinda and Anderson Creeks, which are in the northern portion of the project area, are located in Flood Zone "A" as mapped by FEMA. Flood Zone "A" is defined as an area with a one percent annual chance of flooding from a 100-year storm event. No water depths or base flood elevations for a 100-year storm event are shown within these zones as detailed analyses are not performed for such areas.

The remainder of the project area is located in Flood Zone "C", as mapped by FEMA. Flood Zone "C" is defined as "areas with less than a one percent chance of flooding each year, areas that have a less than one percent chance of sheet flow flooding with an average depth of less than one foot, areas that have less than a one percent chance of stream flooding where the contributing drainage area is less than one square mile; or areas protected from floods by levees. No base flood elevations or depths are shown within Zone "C".

Review of the City of Anderson's 1995 FEMA Study indicates that the 100-year flood event for Anderson Creek approaches 2,500 cubic feet per second (Specific Plan, 2007). Anderson Creek's unstudied floodplain that runs through the project area consists of a broad rock-cobbled, reasonably flat floodplain with minor braided low-flow channels. The low-flow channel and floodplain are devoid of riparian habitat due to the seasonal nature of the stream's flow (SWA Group, 2007).

DAM FAILURE

Dam failure inundation is the flooding that results from full or partial collapse of a dam, which has several potential causes including strong seismic activity. Aside from the potential for direct structural impacts as a result of severe earthquakes, seismic activity may also produce powerful waves within impounded bodies of water, referred to as "seiches", that have the potential to breach dams. Landslides flowing into a reservoir may also be a source of potential dam failure or overtopping.

In 1994, the United States Bureau of Reclamation conducted modeling studies concerning the potential effects associated with structural failure of Shasta Dam, which is located on the Sacramento River approximately 26 miles upstream of the project area, and Whiskeytown Dam, which is located on Clear Creek approximately 17 miles northwest of the project area. A major failure of Shasta Dam would result in the inundation of most of Redding within less than an hour and most of the low lying areas within the City of Anderson within two hours. Failure of Whiskeytown Dam, while less catastrophic, would similarly inundate many of the low-lying areas of the City of Anderson within two hours.[3]

4.7.2 Regulatory Framework

FEDERAL

Clean Water Act (CWA)

The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. The statute employs a variety of regulatory and nonregulatory tools to control pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they

[3] PMC, 2007, pg. 4.12-12

can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water." The CWA regulates traditional "point source" facilities, such as municipal sewage plants and industrial facilities, as well as "non-point source" runoff from streets, construction sites, farms, and other wet weather sources.

Federal Emergency Management Agency (FEMA)

The City of Anderson and Shasta County are participants in the National Flood Insurance Program (NFIP), a Federal program administered by the Federal Emergency Management Agency (FEMA). Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 has adopted, as a desired level of protection, an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years, although such a flood may occur in any given year, also referred to as the 100-year storm event. The County is occasionally audited by the California Department of Water Resource (DWR) to insure the proper implementation of FEMA floodplain management regulations.

STATE

Surface and groundwater quality are protected in California via the Porter-Cologne Water Quality Control Act and associated regulations. The State of California administers most CWA programs through the Porter-Cologne Act, as well as numerous state regulatory programs. The Porter-Cologne Act enables formation of a State Water Resources Control Board and its regional water quality control boards to implement the regulatory programs of the law. These include both the surface water discharge programs of the CWA as well as programs and controls associated with discharge of waste to land (known as the Chapter 15 program) that may impact ground or surface water quality.

State Water Resources Control Board (SWRCB)

The SWRCB is composed of nine regional water quality control boards that are responsible for preserving California's water quality. The Regional Water Quality Control Boards (RWQCB) issue waste discharge permits, take enforcement action against violators, and monitor water quality. The SWRCB and the regional water quality control boards jointly administer most of the federal clean water laws. However, the SWRCB retains oversight responsibility and, like the federal Environmental Protection Agency (EPA), may intervene if it determines the proposed project is not in compliance with SWRCB regulations.

Central Valley Regional Water Quality Control Board, Region (RWQCB)

The Central Valley Regional Water Quality Control Board is the regional water quality control board responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters. In the project area, the RWQCB is responsible for protecting surface and ground waters from both point and non-point sources of pollution.

The City of Anderson and Shasta County are located within the boundaries of the RWQCB. This agency issues the necessary permits required to produce and distribute recycled water, and enforces Title 22 regulations set forth by the California Department of Health Services. The RWQCB is responsible for issuing Water Quality Certifications, pursuant to section 401 of the Clean Water Act. Under certain conditions, waivers of the Water Quality Certification may also

be granted. The RWQCB provides planning, monitoring, and enforcement techniques for surface and groundwater quality in the Central Valley region, including the Specific Plan area. A basin plan provides more specific information for specific waterways within the region, in terms of establishing monitoring techniques to control pollutant levels within the waterways. Daily self-monitoring by the individual water companies is required to ensure water quality standards are being met. Data from daily monitoring is compiled into reports and filed with the RWQCB. RWQCB also maintains stormwater quality as it relates to construction activities through a National Pollutant Discharge Elimination System (NPNES) permitting process.

The Central Valley Regional Water Quality Control Plan (Basin Plan) covers all the drainage basin areas for the Sacramento and San Joaquin Rivers. This plan describes the beneficial uses to be protected in these waterways, water quality objectives to protect those uses, and implementation measures to make sure those objectives are achieved.

The Central Valley Regional Water Quality Control Board (RWQCB) issues permits for activities that could cause impacts to surface waters and groundwater in the vicinity of any project site during construction and operation activities. Construction activities that result in the disturbance of more than one acre would be required to submit a Notice of Intent and Stormwater Pollution Prevention Plan (SWPPP) to the State Water Resources Control Board for coverage under the National Pollutant Discharge Elimination System (NPDES) State General Construction Permit.

California Department of Fish and Game (CDFG)

Under Section 1603 of the California Fish and Game Code, the CDFG must be notified of any project that substantially changes the bed, channel or bank of any stream, including streams with periodic flows. Any permanent or temporary channel crossings for roads, utilities or other purposes are subject to a Streambed Alteration Agreement with CDFG. Streambed Alteration Agreements typically come with conditions designed to avoid any adverse effects by a project on stream courses, habitat and water quality.

LOCAL

Shasta County Department of Agriculture and Weights and Measures

The Shasta County Department of Agriculture and Weights and Measures is entrusted with promoting and protecting the agricultural industry of the County and its environment. It regulates pesticide use in the County through the Pesticide Use Enforcement Program, which assures that pesticides are being used safely and effectively by regulating pesticide application. The County Agricultural Department is given the authority to regulate pesticide use as directed by the California Department of Pesticide Regulation.

City of Anderson General Plan

Although the City of Anderson General Plan does not have specific water quality-related policies, issues pertaining to hydrology are addressed in the Health and Safety Element of the General Plan. **Table 4.7-1** identifies those General Plan policies that are directly applicable to the proposed project and presents an evaluation of the consistency of the Specific Plan with these statements as required by CEQA. While this EIR analyzes the Specific Plan's consistency with the City of Anderson General Plan pursuant to State CEQA Guidelines Section 15125(d), the determination of the project's consistency with this General Plan ultimately rests with the City of Anderson City Council.

TABLE 4.7-1
SPECIFIC PLAN CONSISTENCY WITH CITY OF ANDERSON GENERAL PLAN POLICIES
HYDROLOGY AND WATER QUALITY

General Plan Goals and Policies	Consistency with General Plan	Analysis
Prevent damage from flooding. (FHP-1)	Yes	As noted above, the Specific Plan proposes development in portions of the FEMA designated flood Zone "A" along Anderson Creek. Improvements are proposed to Anderson Creek as part of the Specific Plan. These improvements consist of excavating a channel of sufficient size to contain the 100-year flood events and to lower the elevation of the floodplain to allow development adjacent to the banks of the creek. Hydraulic studies and governmental agency permits (Army Corps of Engineers, State Fish and Game) will be required to accomplish this.
Prevent drainage problems in future developments. (FHP-3)	Yes	Local drainage facilities for the proposed Specific Plan would include a conventional system made up of inlets and underground piping within the public streets and easements. Drainage would be discharged directly to Anderson Creek and piped outlets would be protected from any effects of a 100-year storm event. Further, the Specific Plan proposes to construct sufficient stormwater detention to ensure that post-construction peak flow rates do not exceed pre-construction rates. Storm drainage facilities shall be installed so as to permit orderly extension of service to the next phase of development with the Specific Plan.
Encourage basin-wide or regional drainage planning for the City. (FHP-4)	Yes	See analysis of project consistency with General Plan Policy FHP-4 above.
Detention facilities will meet the criteria established in the City of Anderson Standards and will be designed to minimize erosion. Capacities and design will be based on the stormwater runoff defined in the Anderson Drainage Study. (FHP-5)	Yes	Detention facilities will meet the criteria established in the City of Anderson Standards and will be designed to minimize erosion as defined in the Anderson Drainage Study. The number, location, and size of these facilities will be determined during the design stage for each of the various phases of the project. The intent of the design will be to detain stormwater for the period of time necessary to ensure that peak flow rates will not exceed the pre-development flow rates.
Possible joint uses for detention basins may include vineyards, trails, and tree planting. (FHI-2)	Yes	Specific Plan Policy 5.4.14 reiterates this General Policy and states, "Possible joint uses for detention basins may include vineyards, trails, and tree planting." Further, the Vesting Phase 2 Tentative Subdivision Map indicates that one of the four proposed detention basins would principally be developed as vineyards.

General Plan Goals and Policies	Consistency with General Plan	Analysis
Prohibit development in the floodway; discourage development in the 100 year floodplain. (FHI-3)	Yes	The Specific Plan proposes to designate approximately 1,298 acres as "undevelopable" common area. Candidate lands for the common area designation include drainage channels.
Require measures which eliminate or mitigate to acceptable levels (no net increase) run-off from future projects. (FHI-6)	Yes	Specific Plan Policy 5.4.11 states that sufficient stormwater detention facilities shall be constructed to ensure that post-construction peak flow rates do not exceed pre-construction rates. The number, location, and size of these facilities will be determined during the design stage for each of the various phases of the project. The intent of the design will be to detain stormwater for the period of time necessary to ensure that peak flow rates will not exceed the pre-development flow rates.

The Vineyards at Anderson Specific Plan

The proposed Vineyards at Anderson Specific Plan contains numerous policies regarding drainage, flooding and water quality. Specific Plan policies relevant to hydrology and water quality within Phase 2 of the proposed project area in the context of CEQA are summarized in **Table 4.7-2**. This table also provides an evaluation of Phase 2 relative to the pertinent Specific Plan policies as required by State CEQA Guidelines Section 15125(d). The final authority for interpretation of these policy statements and determination of the project's consistency rests with the City of Anderson City Council.

TABLE 4.7-2
PROJECT LEVEL (PHASE 2) CONSISTENCY WITH VINEYARDS AT ANDERSON SPECIFIC PLAN POLICIES
HYDROLOGY AND WATER QUALITY

Specific Plan Policies	Consistency with Specific Plan	Analysis
Discharge of storm drainage from the ridgetop development will be conveyed to the natural drainage channels contained within the common areas defined in the land use plan. The conveyance system will consist of underground piping and energy dissipators at the discharge points, which shall be located at channel bottoms. (Policy 5.4.2)	Yes, as mitigated	As part of the submittal of improvement plans a master drainage plan will be submitted along with the first final map for the Phase 2 project. The project applicant shall submit a master drainage plan of improvements and details for review by the City of Anderson Department of Public Works and the Central Valley Regional Water Control Board. The report shall be prepared by a qualified professional and shall, include features to protect downstream uses and property and drainage easements to accommodate downstream flows from this project. Project drainage features shall be designed to ensure no change in downstream flow conditions that would result in new or increased severity of flooding for each phase of development. The drainage details shall address storm drainage

Specific Plan Policies	Consistency with Specific Plan	Analysis
		management during construction and thereafter and shall propose "Best Management Practice" (BMP) measures to reduce erosion, water quality degradation, etc. Permanent water quality control features shall demonstrate that stormwater discharges from the project area would not result in pollutant levels or concentrations that would have a detrimental effect to aquatic life in the intermittent streams, vernal swales, and vernal pools located on the project site. Stormwater discharges shall be in compliance with all current requirements of the Central Valley Regional Water Quality Board. Storm drainage from on-site impervious surfaces shall be collected and treated to protect water quality. Refer to **MM 4.7.1b**.
Special design considerations for this component of the system (energy dissipators, trench collars, etc.) will be necessary to reduce the potential for increased erosion within the meandering natural channels that traverse the common area. (Policy 5.4.3)	Yes, as mitigated	Refer to analysis of Phase 2 consistency with Specific Plan Policy 5.4.2 above.
With the exception of a few public road crossings, utilities and the construction of embankments for detention facilities, the natural drainages will remain. (Policy 5.4.4)	Yes	As shown on the Vesting Phase 2 Tentative Map, aside from a few public road crossings, utilities and stormwater detention facilities, the natural drainages are proposed to remain relatively unchanged.
The number, location and size of these facilities (Local Drainage Basins) will be determined during the design stage for each of the various phases of the project. The intent of the design will be to detain stormwater for the period of time necessary to ensure that flow rates will not exceed the pre-development flows. As a general rule, it is the City of Anderson's policy to require detention of 100-year storm events. Detention of 10-year and 50-year events may not be required if existing downstream drainage structures are of sufficient size to allow passage of these lesser flow events without damage to the structures themselves or adjacent properties. (Policy 5.4.8)	Yes	Four detention ponds are proposed as the method of controlling peak discharges for the project runoff from the site. (See **Figure 3.0-7**.) The first detention basin, Detention Basin A, is proposed to be located at the north-central portion of Phase 2. This detention basin would have a capacity of 2.4 acre-feet of stormwater. Detention Basin B would be located east of Detention Basin A and would also be located at the north-central portion of the project. Detention Basin B would have a stormwater capacity of 1.7 acre-feet. A third facility, Detention Basin C, would have a capacity of 8.0 acre-feet and be located in the northern portion of Phase 2, along the eastern border of the project. The final proposed facility, Detention Basin D, would be placed in the central portion of the project, along the eastern boundary. This facility would have a capacity of 1.4 acre-feet.
Detention facilities will meet the criteria established in the City of Anderson Standards and will be designed to minimize erosion. Capacities and design will be based on the stormwater runoff defined in the Anderson Drainage Study. (Policy 5.4.10)	Yes, as mitigated	Mitigation Measure **MM 4.7.1b** states that, as part of the submittal of improvement plans for each phase of the project, a master drainage plan will be submitted. Such a drainage plan would identify Best Management Practices and ensure that water discharged from the

Specific Plan Policies	Consistency with Specific Plan	Analysis
		property is treated. As the stormwater is detained, the residency time on the surface of the detention area could provide vegetative filtration for the runoff prior to leaving the site. Generated runoff could also be treated through a series of baffles which allow the silts and heavy metals to settle out of the flow. The interceptors also utilize absorbent pillows that ride on the surface of the drainage in the various baffles. The project will include detention ponds with restricted outlets that will cause the majority of storm events that would produce sufficient runoff rates and velocities to transport sediments to create a temporary "pool" having minimal velocity on the upstream side of the restricted outlets and provided for settlement of sediments.
The project shall construct sufficient stormwater detention to ensure that post-construction peak flow rates do not exceed pre-construction rates. (Policy 5.4.11)	Yes, as mitigated	Refer to analysis of Phase 2 consistency with Specific Plan Policy 5.4.10 above.
Storm drainage facilities shall be installed so as to permit orderly extension of service to the next phase of development within the Plan Area. (Policy 5.4.13)	Yes	As noted above, four detention ponds are proposed as the method of controlling peak discharges for development-related runoff from the site.

4.7.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

The City of Anderson has determined that a project may have significant impacts on hydrology and water quality if it does any of the following:

1) Violate any water quality standards or waste discharge requirements.

2) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river in a manner resulting in substantial erosion or siltation on- or off-site.

3) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or substantially increase the rate or amount of surface runoff in a manner would result in flooding on- or off-site.

4) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage system or provide substantial additional sources of polluted runoff.

5) Otherwise substantially degrade water quality.

6) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

7) Place within a 100-year flood hazard area structures, which would impede or redirect flood flows.

8) Expose people or property to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

9) Result in inundation by seiche, tsunami, or mudflow.

METHODOLOGY

The hydrology and water quality analyses are based on: 1) a review of published information and reports regarding regional hydrology, climate, and geology; 2) consultation with agency representatives; and 3) review of the project applicant's technical studies, which include:

- SB 610 Water Supply Assessment
- Tentative Subdivision Map for Phase 2 of the Vineyards at Anderson.

The impact analysis considers water resource impacts from project construction and operation on-site as well as the construction of off-site facilities. The reader is referred to Section 4.11, Public Services, regarding groundwater quality impacts. Impacts to wetlands are discussed in Section 4.9, Biological Resources, of this document.

PROGRAM LEVEL (PROJECT BUILDOUT) IMPACTS AND MITIGATION MEASURES

Water Quality

Impact 4.7.1 Development of the proposed project may impact water quality and may violate water quality standards or waste discharge requirements or otherwise substantially degrade water quality. This impact is considered **potentially significant**.

Construction Water Quality Impacts

Vegetation removal and earth-moving activities associated with project construction may potentially impact water quality of surface waters, including Anderson Creek, Olinda Creek and Cottonwood Creek, as well as Other Waters of the U.S., including wetlands, which are located within and adjacent to the project area. Removal of vegetation may expose soils to wind and water erosion. Exposed surfaces and soil stockpiles created during grading and construction activities could increase the potential for sedimentation in downstream waters. During the rainy season, generally November to April for the City of Anderson, grading could impact stormwater quality by increasing the load of organic debris, silt and clay-sized particles in runoff.

Fuels, lubricants, and other toxic materials used during construction may potentially enter surface waters during construction activities. Operation, refueling, and parking of construction equipment and other vehicles on-site may result in spills of fuel, oil, grease, or related pollutants that may discharge into on-site drainages. Improper handling, storage, or disposal of fuels and materials, or improper maintenance of machinery, may cause water quality degradation.

Grading activities in excess of one acre in size are subject to a NPDES permit from the RWQCB. The purpose of the permit is to protect water quality from erosion and pollutants associated with grading and earthmoving activities. During construction of the project, the project applicant (and/or their construction contractor) must eliminate non-stormwater discharges to stormwater systems, develop and implement a Stormwater Pollution Prevention Plan (SWPPP), and perform monitoring of discharges to stormwater systems. The Construction Stormwater General Permit adopted by the State Water Resources Control Board requires the project applicant and/or contractor to develop and implement a SWPPP. This plan must specify best management practices that would prevent all construction pollutants from contacting stormwater, with the intent of keeping all products of erosion from moving off site and into receiving waters. The permit also requires elimination or reduction of non-stormwater discharges to receiving waters and regular monitoring of all best management practices. The project applicant is responsible for identifying the appropriate best management practices (BMPs) in coordination with the City of Anderson and the RWQCB.

State law requires compliance with a number of provisions that will further reduce the potential for erosion. These include:

- A Stormwater Pollution Prevention Plan (SWPPP) is required with a SWRCB construction permit for compliance with the Clean Water Act (CWA) 402(B) for all associated construction activities on site. This plan addresses erosion potential during construction and includes best management practices (BMPs) to reduce soil erosion.

- A National Pollution Discharge Elimination System Permit (NPDES) is required from SWRCB for development of the lots. Similar to the SWPPP, the NPDES establishes erosion control methods.

Impacts to water quality as a result of soil erosion caused by construction during the wet season could result in an impact to water quality that is considered **potentially significant**.

Mitigation Measures

MM 4.7.1a Prior to construction during each phase of development , the developer will obtain approval of a SWPPP and NPDES permit from the RWQCB and will comply with all permit requirements pertaining to site grading and erosion control.

Timing/Implementation: Prior to and during construction activities.

Enforcement/Monitoring: Central Valley RWQCB, City of Anderson Public Works Department.

Implementation of **MM 4.7.1a**, along with mitigation included in Section 4.8, Geology and Soils, will ensure that the impact on water quality as a result of project construction would be **less than significant**.

Operational Water Quality Impacts

Implementation of the project would result in currently vacant lands being developed with residential, commercial, institutional, agricultural and recreational land uses. This would result in substantial alteration of the existing site conditions and would introduce urban and agricultural sources of pollutants. Urban runoff would typically contain oil, grease, fuel, antifreeze, byproducts of combustion (such as lead, cadmium, nickel, and other metals), and other

household pollutants. Agricultural pollutants may include fertilizers, pesticides, and fuels. Agricultural pollutants are discussed further in Section 4.3, Hazards**,** of this document. Precipitation events during the initial on-set of the wet season displace these pollutants and flush them into the stormwater runoff, resulting in high pollutant concentrations in the initial wet weather runoff. This initial runoff, containing peak pollutant levels, is referred to as the "first flush". It is estimated that during the rainy season, the first flush of pollutants, including heavy metals and hydrocarbons, would occur during the first five inches of seasonal rainfall.

The amount and type of runoff generated by the project would be greater than that under existing conditions due to the increase in impervious surfaces such as rooftops, roadways, parking areas, driveways and trails. Runoff from these impervious surfaces, agricultural uses and individual residential landscapes could contain oils, fuels, grease pesticides and nitrates from fertilizers as a result of their operations. Nitrates could increase the nutrient loading in surface waters, encouraging algal blooms and disturbing the nutrient cycling process, which could have detrimental effects on aquatic life in water bodies within the project vicinity.

The Shasta County Agricultural Department regulates and enforces the California Department of Pesticide Regulations Pesticide Use Enforcement Program. Specific Plan Policy 7.4.3 states, "Agriculture shall be conducted on a sustainable basis utilizing organic materials to the maximum extent possible, while also controlling agricultural pests and diseases." Although the project will implement sustainable and organic practices to the maximum extent possible, there is still the potential for agricultural pollutants to impact water quality through the leaching of pollutants into groundwater resources or the transport of pollutants to surface water resources during storm events or irrigation activities.

As discussed in the Specific Plan, best management practices (BMPs), energy dissipation measures, stabilization measures, and proposed on-site detention basins will be incorporated into the proposed site development to limit the concentrations of polluted runoff that could be discharged into downstream facilities. Specific Plan Policy 5.4.2 states, "Discharge of storm drainage from the ridgetop development characteristic of the Specific Plan will be conveyed to the natural drainage channels contained within the common areas defined on the land use plan. The conveyance system will consist of underground piping and energy dissipaters at the discharge points, which shall be located at channel bottoms." Specific Plan Policy 5.4.3 states, "Special design considerations for this component of the system (energy dissipaters, trench collars, etc.) will be necessary to reduce the potential for increased erosion within the meandering natural channels that traverse the common area." Further, Specific Plan Policy 7.2.30 requires that educational/interpretive signs be installed to inform future residents of the Specific Plan area of the importance of the preservation of wetlands and hydrologic systems. Policy 7.2.27 will also be effective in alleviating operational impacts to water quality. This policy establishes buffers consisting of native and existing vegetation around all preserved wetlands and seasonal drainages. Buffer widths will vary but, at a minimum, buffers of 25 feet from top of the banks of all drainages and 50 feet from the ordinary high water mark on all wetlands will be utilized.

Although implementation of the above policies would reduce impacts to water quality as a result of proposed land uses, the project could still result in an impact to water quality that is considered **potentially significant**.

Mitigation Measures

MM 4.7.1b A master drainage plan will be submitted as part of the improvement plans for each phase of the project. The project applicant shall submit a master

drainage plan of improvements and details for review by the City of Anderson Department of Public Works and the Central Valley Regional Water Quality Control Board. The report shall be prepared by a qualified professional and shall, at a minimum, include the following:

- The drainage details shall address storm drainage management during construction and thereafter, and shall propose best management practices (BMPs) to reduce erosion, water quality degradation, etc., for both urban and agricultural land uses. Permanent water quality control features shall demonstrate that the water quality controls would ensure that stormwater discharges would not result in pollutant levels or concentrations that would have a detrimental effect to aquatic life in the creeks, intermittent steams, vernal swales and vernal pools, and all other "waters of the U.S." located throughout the Specific Plan area. Stormwater discharges shall be in compliance with all current requirements of the Central Valley Regional Water Quality Board.

- Storm drainage from on-site impervious surfaces shall be collected and treated to protect existing water quality. The maintenance of facilities shall be the responsibility of the project applicant. Upon final map approval, it will become the City's obligation to provide facility maintenance, unless the facilities are located on property owned by a Home Owners Association (HOA). Where facilities are the responsibility of the City, easements for access to and maintenance of these facilities shall be created and offered for dedication to the City. When the facilities are located on property owned by an HOA, then it shall be the HOA's obligation to provide facility maintenance.

- A written text addressing existing conditions, the effects of project improvements, all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protect downstream uses and property and drainage easements to accommodate downstream flows from this project. Project drainage features shall be designed to ensure no change in downstream flow conditions that would result in new or increased severity of flooding for each phase of development.

- Conformance with applicable City of Anderson drainage requirements shall be demonstrated.

- All related underground and surface drainage systems must be addressed in order to ensure full integration of areas that would generate runoff. These areas would include rooftops, sidewalks, cut/fill slopes, patio areas, streets, parking lots, up gradient off site source areas, and impervious landscaping areas. Seepage from underground sources must also be addressed.

- The report shall show that post-project flows will not exceed pre-project flows and the associated drainage improvements required to meet these standards.

Timing/Implementation: Prior to approval of the first final map for each phase of the project.

Enforcement/Monitoring: City of Anderson Department of Public Works, and the Central Valley Regional Water Quality Control Board.

MM 4.7.1c Prior to the issuance of permits for the agricultural operations, a Chemical Application Management Plan (CHAMP) shall be submitted to and approved by the City of Anderson and the Central Valley Regional Water Quality Control Board (RWQCB). The City will require that future agricultural areas be properly designed and operated to reduce the threat to surrounding Waters of the U.S.

The proposed agricultural areas shall utilize appropriate chemical management objectives via direct application of procedures that ensure water quality objectives are met as defined by the RWQCB and the State Water Resources Control Board Policy for Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Specific water quality objectives for agricultural uses shall ensure that biostimulatory substances, floating materials, oil and grease, pesticides, and sediment shall not be in sufficient concentrations to cause a nuisance or adversely affect the beneficial uses of on-site surface waters or runoff.

The CHAMP, or a similar management plan, shall incorporate the following:

- A description of agricultural area design features that prevent direct discharges of surface runoff into stream channels without water quality controls (e.g., engineered wetland features);
- A description of chemicals authorized for use and approved within the State of California, along with guidelines for their application. Guidelines shall include restrictions on their use near drainage systems. Chemicals include fertilizers, herbicides, fungicides, insecticides and rodenticides;
- Guidelines on the application of fertilizers and soil amendments that take into consideration the physical characteristics and nutrient content of the soil on the agricultural site;
- Guidelines for the irrigation of the agricultural lands that take into consideration the field capacity of soil types and the timing with chemical applications;
- A water quality monitoring program that includes sampling would be timed with the application of soil amendments or on a regularly scheduled basis; and
- Chemical storage requirements and chemical spill response and chemical inventory response plans would be prepared and implemented.

Pesticide concentrations shall not be allowed to accumulate in bottom sediments or aquatic life, nor can chlorinated hydrocarbon pesticides be found in concentrations exceeding water quality standards described in this mitigation

measure. Maximum Concentration Levels (MCL), per the Water Quality Goals for California Inland Surface Water for Human Health and Freshwater Aquatic Life Protection, shall be met for surface water bodies including streams and drainages. Also, groundwaters shall not contain any chemical contaminants derived from operations in excess of the MCLs specified for domestic drinking water supplies in the CCR, Title 22, Division 4.

Agricultural maintenance programs for agricultural areas will be administrated by staff that are licensed as "Pest Control Advisors" by the California Department of Agriculture. Primary responsibilities of the advisor will be to ensure compliance with state and federal pesticide regulations.

To ensure that the quality of surface and groundwaters are in compliance with regulations, a water quality monitoring system and program will be developed and implemented. All permanent surface water features shall be sampled on a quarterly sampling interval and include analyses for non-volatile synthetic organic chemicals (and their breakdown products as pesticides), total dissolved solids, chloride, sulfate, total phosphorus, boron, nitrogen as nitrate, total nitrogen, total kjeldhal nitrogen, and iron. This monitoring program shall also be implemented with consideration of the RWQCB water quality objectives. The CHAMP shall contain procedures for corrective actions for identified water quality issues as a result of sampling. This will include notification to the RWQCB and City regarding the water quality issue and corrective actions implemented to ensure protection of surface water and groundwater quality.

Timing/Implementation: Prior to the issuance of operational permits for the agricultural area.

Enforcement/Monitoring: City of Anderson Public Works and the Central Valley Regional Water Quality Control Board.

Implementation of **MM 4.7.1b** and **MM 4.7.1c**, mitigation included in Section 4.8, Geology and Soils, of this EIR, as well as compliance with applicable state and federal laws, would ensure that the project's operational impacts to water quality as a result of proposed land uses are **less than significant**.

Drainage – Erosion and Siltation

Impact 4.7.2 Development of the proposed project may substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river in a manner resulting in substantial erosion or siltation on- or off-site. This impact is considered **potentially significant**.

Please see Impact 4.7.1 for a discussion of water quality impacts including those associated with erosion and siltation. Grading activities associated with construction and alteration of natural swales within the project site could increase erosion and sedimentation during periods of wet weather and surface water flow. The drainage pattern of the site would be minimally impacted by the project with the exception of the construction of stormwater detention basins. These basins would attenuate stormwater flows as well as provide sediment catchment, which in turn would aid in the reduction of sediments reaching major drainages, creeks and the Sacramento River.

Implementation of Specific Plan Policy 5.4.5 would result in approximately 50-foot wide conservation easements being established along the natural stream courses within common areas. However, Specific Plan Policy 5.4.4 indicates that a few road crossings, utilities and embankments for detention facilities would be developed within these drainages. Further, the Land Use Plan (see **Figure 3.0-3**) and the Vesting Phase 2 Tentative Map (see **Figure 3.0-7**) indicate development of roadways and utilities within the drainage features.

Any disturbance of natural streambeds will be required to meet U.S. Army Corps of Engineers, RWQCB, and CDFG requirements, which will entail obtaining permits. Prior to issuance of these permits, the applicant would be required to address water quality concerns that are raised as a result of developing within and adjacent to intermittent drainages and other "Waters of the U.S.".

Implementation of **MM 4.7.1a** and **MM 4.7.1b**, as well as state and federal agency requirements, would reduce project impacts related to erosion and siltation to a level that is considered **less than significant**.

Mitigation Measures

Implement **MM 4.7.1a** and **MM 4.7.1b**.

Drainage - Flooding

Impact 4.7.3 Development of the proposed project may substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff, in a manner that would result in flooding on- or off-site. This impact is considered **less than significant**.

The infiltration and runoff process is altered when a site is developed with urban uses. Houses, buildings, roads, and parking lots introduce asphalt, concrete, and roofing materials to the landscape. These materials are relatively impervious, which means that they generally absorb less water than a natural undeveloped landscape. As impervious surfaces are added to the ground conditions and surface drainage becomes more efficient, the natural infiltration of water and the capabilities of soil storage are reduced. As a result, the volume and rate of stormwater runoff increases. The increased volumes and rates of stormwater runoff may result in increased downstream flows if not properly mitigated.

Development of the project would involve several improvements, including new roadways, pedestrian trails, residential development, schools, a community center and other uses that will likely include impervious surfaces, which could impact drainage conditions both on and off-site. Drainage would be accommodated on-site through stormwater infrastructure, such as curb and gutter, underground stormwater pipes, culverts, and open channels.

Detention basins are proposed as the method of mitigation of peak discharges for the runoff from the developed site. According to the Specific Plan, storm drainage detention facilities will most likely consist of an earthen embankment across an existing drainage channel with piping and other control features at the headworks. Embankment heights could reach a maximum of 25 feet above the existing flow line elevations for the drainage channels. The bottom width of each embankment would vary from 20 feet to 180 feet, depending on the height of the proposed embankment. In many cases, the embankments will be created by the fill generated from the construction of roadways. Specific Plan Policy 5.4.10 states that detention facilities must

meet the criteria established in the City of Anderson Standards and will be designed to minimize erosion. Specific Plan Policy 5.4.8 states that the intent of the stormwater detention facilities design will be to detain stormwater for the period of time necessary to ensure that flow rates will not exceed the pre-development flows and result in flooding on- or off-site. This impact is considered **less than significant**.

Mitigation Measures

None required.

Stormwater Runoff

Impact 4.7.4 Development of the proposed project would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff. This impact is considered **potentially significant**.

As discussed in Impact 4.7.2 above, buildout of the Specific Plan would result in an increase in the amount and timing of stormwater runoff due to the increase in impervious surfaces. However, Policy 5.4.11 of the Vineyards at Anderson Specific Plan states that the project shall construct sufficient stormwater detention to ensure that post-construction peak flow rates do not exceed pre-construction rates. Further, General Plan Implementation Measure FHI-6 requires that projects utilize control measures to eliminate or mitigate runoff to acceptable levels (i.e., no net increase). Further, implementation of **MM 4.7.1a** through **MM 4.7.1c**, and compliance with state and federal permitting requirements, would reduce project impacts to the stormwater drainage system and water quality to a level that is considered **less than significant**.

Mitigation Measures

Implement **MM 4.7.1a** through **MM 4.7.1c**.

Flooding - Housing

Impact 4.7.5 The proposed project may place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary, Flood Insurance Rate Map or other flood hazard delineation map. This impact is considered **less than significant.**

As indicated in the NOP/Initial Study prepared for the project, and in the Specific Plan, the FEMA Flood Insurance Rate Maps indicate that the vast majority of the project area is outside of the 100-year floodplain (**Figure 4.7.2)**. However, stretches along Anderson and Olinda Creeks have recognized 100-year floodplains. While much of this area would be designated for agriculture or other open space uses, approximately four residential lots are possible on property located adjacent to Anderson Creek. These residential lots would be located on approximately 20 acres that are proposed to be designated Very Low Density Residential (i.e., five-acre minimum lot sizes). In order to address this impact, the Vineyards Planned Development Ordinance requires that any new construction within the 100-year floodplain have the lowest floor, including basement, elevated at least one-foot above the base flood elevation. As a result, this impact is considered **less than significant**.

Mitigation Measures

None required.

Flooding – Impediments to Flows

Impact 4.7.6 Development of the proposed project may place structures within a 100-year flood hazard area that would impede or redirect flood flows. This impact is considered **potentially significant**.

A small portion of the project area is located within the 100-year floodplain in areas adjacent to Anderson and Olinda Creeks (FEMA, 1992, FEMA 1995 and FEMA 2006). Within the Olinda Creek floodplain only agricultural uses are proposed. Within the Anderson Creek floodplain, the project proposes to designate approximately 20 acres adjacent to Anderson Creek for Very Low Density residential use (as discussed in Impact 4.7.5 above). This could result in the development of approximately four residences and subordinate structures. The project also proposes a partial realignment of West Anderson Drive within the Anderson Creek 100-year floodplain as well as a road crossing over Anderson Creek during development of Anderson Hills Parkway. Lastly, the project proposes to develop approximately 20,000 square feet of limited commercial on roughly 22 acres, 22.9 acres of parkland, and an elementary school within the Anderson Creek floodplain. Some of these improvements have the potential to redirect and impact flood flows. As a result, this impact is considered **potentially significant**.

Mitigation Measures

MM 4.7.6 Hydrologic modeling shall be completed by a registered professional for all structures proposed within the 100-year flood zone. If hydrologic modeling indicates that a proposed structure, including bridges and roadways, will redirect flood flows, the structure shall be redesigned and/or relocated. However, if appropriate, a Letter of Map Revision may be completed pursuant to FEMA requirements, which would place the proposed structure outside of the 100-year floodplain.

Timing/Implementation: Prior to approval of improvement plans, including building permits, for any structure located within the 100-year flood zone.

Enforcement/Monitoring: City of Anderson Public Works Department.

Implementation of **MM 4.7.6** would ensure that potential impacts, such as impeding or redirecting flood flows, resulting from structural improvements within the 100-year floodplain would be **less than significant**.

Flooding – Dam Failure

Impact 4.7.7 Development of the proposed project would not expose people or property to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. **No impact**.

As discussed above, the United States Bureau of Reclamation conducted modeling studies in 1994 concerning the potential effects associated with structural failure of Shasta Dam, which is located on the Sacramento River approximately 26 miles upstream of the project area, and

Whiskeytown Dam, which is located on Clear Creek approximately 17 miles northwest of the project area. A major failure of Shasta Dam would result in most of the City of Redding being inundated in less than an hour and many of the low lying areas within the City of Anderson being inundated within two hours. Failure of Whiskeytown Dam, while less catastrophic, would result in similar flooding. However, given the elevation of the Specific Plan area and its distance from the Sacramento River, the project area would not be inundated. Thus, there would be **no impact**.

Mitigation Measures

None required.

Flooding – Seiche, Tsunami, or Mudflow

Impact 4.7.8 Development of the proposed project would not result in inundation by seiche, tsunami or mudflow. This impact is considered **less than significant**.

The project area is located inland and away from large impoundments of water. Thus, there is no risk of inundation by a tsunami and little to no risk of inundation by a seiche. Although a seiche could result in failure of either Shasta or Whiskeytown Dams, this would not result in inundation of the project area due to the elevated nature of the Specific Plan area as discussed above. With regard to mudflows, development within the project area has been proposed primarily along ridgetops at elevations between 440 and 690 feet. Further, given the lack of any geologic features in the vicinity of the project area that are prone to mudflows, such as volcanoes or destabilized slopes, mudflows are an extremely unlikely occurrence. Additionally, with the implementation of **MM 4.8.2a** and **MM 4.8.2b,** (see Section 4.8, Geology and Soils), a final geotechnical subsurface investigation report for each phase of the project would be provided to the City prior to approval of improvement plans. That report would identify any geologic hazards within the project area, including landslide hazards. Project impacts associated with inundation as a result of seiche, tsunami or mudflow are thus considered **less than significant**.

Mitigation Measures

None required.

PROJECT LEVEL (PHASE 2) IMPACTS AND MITIGATION MEASURES

Water Quality

Impact 4.7.9 Implementation of Phase 2 may impact water quality and may violate water quality standards or waste discharge requirements or otherwise substantially degrade water quality. This impact is considered **potentially significant**.

The majority of Phase 2 drains northward to the Anderson Creek watershed via two unnamed seasonal drainages. A smaller portion of Phase 2, which includes the proposed Anderson Hills Parkway, drains southward to the Cottonwood Creek watershed. All drainages within Phase 2 are intermittent drainages that primarily flow as a result of precipitation events, including for a short period of time after the rainy season. In a few instances, these drainages also contain vernal and seasonal wetland habitat. Wetlands and impacts to wetlands are discussed in Section 4.9, Biological Resources.

Construction Water Quality Impacts

Vegetation removal and earth-moving activities associated with development of Phase 2 may adversely impact surface water quality within the Anderson Creek and Cottonwood Creek drainages. As described under Impact 4.7.1, grading and the removal of vegetation during construction activities could expose soils to rainsplash, sheetflow and gullying erosion prior to successful revegetation. Exposed soil surfaces and soil stockpiles created during grading and earthmoving activities associated with construction could create sedimentation in downstream waters. Fuels, lubricants, and other toxic materials used during construction could also potentially enter surface waters. This impact is considered to be **potentially significant**.

Mitigation Measures

Implementation of **MM 4.7.1a**, through **MM 4.7.1c** would require the use of BMPs and riparian setbacks which would ensure that Phase 2 of the project would have a **less than significant** impact on water quality.

Operational Water Quality Impacts

Phase 2 of the proposed project includes many of the potential operational water quality impacts addressed in the program level analysis provided herein above, including the development of residential uses, agricultural uses, private and public recreation centers, roadways, trails and utilities to serve the project. As described under Impact 4.7.1, the project would result in substantial alteration in the existing site conditions and the introduction of urban and agricultural pollutant sources.

Urban runoff would typically contain oils, grease, fuel, antifreeze, byproducts of combustion (such as lead, cadmium, nickel and other metals) and other household pollutants. Agricultural pollutants may include fertilizers, pesticides and fuels. Agricultural pollutants are discussed further in Section 4.3, Hazards, of this document. Precipitation events during the initial on-set of the wet season displace these pollutants and flush them into the stormwater runoff, resulting in high pollutant concentrations in the initial wet weather runoff. This initial runoff, containing peak pollutant levels, is referred to as the "first flush". It is estimated that during the rainy season, the first flush of pollutants, including heavy metals and hydrocarbons, would occur during the first five inches of seasonal rainfall.

The amount and type of runoff generated by Phase 2 development would be greater than that under existing conditions due to the increase in impervious surfaces such as rooftops, roadways, driveways, parking areas and trails. Runoff from these surfaces, agricultural uses and individual residential landscapes could contain pesticides and nitrates from fertilizers as a result of their operations. The nitrates could increase the nutrient loading in surface waters, encouraging algal blooms and disturbing the nutrient cycling process, which could have detrimental effects on aquatic life in water bodies within the project vicinity.

The Shasta County Agricultural Department regulates and enforces the California Department of Pesticide Regulations Pesticide Use Enforcement Program. Specific Plan Policy 7.4.3 states that agriculture shall be conducted on a sustainable basis utilizing organic materials to the maximum extent possible while also controlling agricultural pests and diseases. Although the project will implement sustainable and organic practices to the maximum extent possible, there is still the potential for agricultural pollutants to impact water quality through the leaching of pollutants into groundwater resources or the transport of pollutants to surface water resources during storm events or irrigation activities.

As discussed in the Specific Plan, best management practices (BMPs), energy dissipation measures, stabilization measures, and proposed on-site detention basins will be incorporated into the proposed site development to limit the concentrations of polluted runoff that could be discharged into downstream facilities. Specific Plan Policy 5.4.2 states, "Discharge of storm drainage from the ridgetop development characteristic of the Specific Plan will be conveyed to the natural drainage channels contained within the common areas defined on the land use plan. The conveyance system will consist of underground piping and energy dissipaters at the discharge points, which shall be located at channel bottoms." Specific Plan Policy 5.4.3 states, "Special design considerations for this component of the system (energy dissipaters, trench collars, etc.) will be necessary to reduce the potential for increased erosion within the meandering natural channels that traverse the common area." Further, Specific Plan Policy 7.2.30 requires that educational/interpretive signs be installed to inform future residents of the Specific Plan area of the importance of the preservation of wetlands and hydrologic systems. Policy 7.2.27 will also be effective in alleviating operational impacts to water quality. This policy establishes buffers consisting of native and existing vegetation around all preserved wetlands and seasonal drainages. Buffer widths will vary but, at a minimum, buffers of 25 feet from top of the banks of all drainages and 50 feet from the ordinary high water mark on all wetlands will be utilized.

Although implementation the above policies would reduce impacts to water quality as a result of proposed land uses within Phase 2, implementation of Phase 2 could still result in a potentially significant impact to water quality. However, Implementation of **MM 4.7.1b** and **MM 4.7.1c**, and mitigation included in Section 4.8, Geology and Soils, of this document, as well as compliance with applicable state and federal laws would ensure that Phase 2 of the project would have a **less than significant** impact on water quality during operation.

Mitigation Measures

Implement **MM 4.7.1b** and **MM 4.7.1c**.

Drainage – Erosion and Siltation

Impact 4.7.10 Implementation of Phase 2 may substantially alter the existing drainage pattern of the site, including through the alteration of the course of a stream or river, in a manner resulting in substantial erosion or siltation on- or off-site. This impact is considered **potentially significant**.

Development of Phase 2 would involve several improvements, including 722 residential units, a 9.2-acre public park, a 3.3-acre private recreation center, 20,000 square feet of commercial development, a fire station, approximately 2.75 miles of trails, and roadways, sidewalks and associated infrastructure that would contribute to the increase in impervious surfaces on-site. The addition of all these impervious surfaces could impact drainage conditions both on- and off-site. Drainage would be accommodated on-site through stormwater infrastructure, such as storm drain pipes, culverts, and open channels. Four detention basins would be located within the Phase 2 project area and would be situated within existing drainage swales and intermittent drainages. The embankments established to create detention basins would be constructed of fill generated from excavations on-site, which may be necessary for construction of roadways and/or building pads.

Implementation of Specific Plan Policy 5.4.5 would result in approximately 50-foot wide conservation easements being established along the natural stream courses within common areas. However, Specific Plan Policy 5.4.4 indicates that a few road crossings, utilities and

embankments for detention facilities would be developed within these drainages. The Vesting Phase 2 Tentative Map (see **Figure 3.0-7**) indicates development of roadways and utilities within the drainage features.

Any disturbance of natural streambeds will be required to meet U.S. Army Corps of Engineers, RWQCB, and CDFG requirements, which will entail obtaining permits. Prior to issuance of these permits, the applicant would be required to address water quality concerns that are raised as a result of developing within and adjacent to intermittent drainages and other "Waters of the U.S.".

Implementation of **MM 4.7.1a** and **MM 4.7.1c**, as well as state and federal agency requirements, would reduce project impacts related to erosion and siltation to a level that is considered **less than significant**.

Mitigation Measures

Implement **MM 4.7.1a** and **MM 4.7.1c**.

Drainage – Flooding

Impact 4.7.11 Implementation of Phase 2 may substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site. This impact is considered **potentially significant**.

As discussed in Impact 4.7.10 above, development of Phase 2 would involve several improvements that would increase in the number of impervious surfaces on-site. The addition of all these impervious surfaces could potentially affect both the volume and velocity of stormwater runoff, as well as the timing of runoff following a storm event. Drainage from the project area would be accommodated on-site through stormwater infrastructure, such as curb and gutter, underground stormwater pipes, culverts, open channels, and detention basins.

According to the Specific Plan, storm drainage detention facilities would most likely consist of an earthen embankment across an affected stream channel with piping and other control features at the headworks. Embankment heights could reach a maximum of 25 feet above the existing channel flow line elevations for the stream channels. The bottom width of each embankment would vary from 20 feet to 180 feet, depending on the height of the proposed embankment.

Specific Plan Policy 5.4.10 states that detention facilities must meet the criteria established in the City of Anderson Standards and that they will be designed to minimize erosion. Four detention basins would be located within the Phase 2 project area as illustrated in **Figure 3.0-7**. Total detention capacity of the four basins is 13.5 acre-feet (**Table 4.7-3**).

TABLE 4.7-3
PHASE 2 DETENTION BASINS

Basin	Detention Area
Basin A	2.4 Acre-feet
Basin B	1.7 Acre-feet
Basin C	8.0 Acre-feet
Basin D	1.4 Acre-feet
Total Detention	**13.5 Acre-feet**

Although Specific Plan Policy 5.4.8 states that the intent of the design of the stormwater detention facilities will be to detain stormwater for the period of time necessary to ensure that flow rates will not exceed the pre-development flows, design calculations for total stormwater runoff from the project site, following build-out, have not yet been completed. Calculations for stormwater runoff will be completed at the improvement plan stage of the project, and if necessary, detention facilities will need to be increased in size to accommodate stormwater. This impact is considered to be **potentially significant**.

Mitigation Measures

Phase 2 will need to comply with mitigation measure **MM 4.7.1b**, which is applicable to all phases of the project (except Phase 1 which has already been approved by the City). A master drainage plan will be submitted as part of the submittal of improvement plans with the final map for Phase 2. The project applicant shall submit a master drainage plan with improvements identified and details for review by the City of Anderson Department of Public Works, the City of Anderson City Engineer and the Central Valley Regional Water Quality Control Board.

In addition, the following mitigation measure is proposed specifically for Phase 2:

MM 4.7.11 The Vineyards at Anderson Phase 2 drainage plan shall include adequate provisions for erosion control at points of discharge for runoff generated within the Phase 2 development area. Provisions shall include energy dissipaters and other stabilization measures. Additional detention areas may need to be incorporated within neighborhood parks or common open space areas in the form of formal water features or dual use recreation areas. These detention ponds will have restricted outlets that will cause the majority of storm events that produce sufficient runoff rates and velocities to transport sediments to create a temporary "pool" having minimal velocity on the upstream side of the restricted outlets. This will provide for settlement of sediments.

Timing/Implementation: Prior to approval of Improvement Plans.

Enforcement/Monitoring: City of Anderson Public Works Department.

Implementation of **MM 4.7.1b**, as it applies to Phase 2, and implementation **MM 4.7.11** would require that drainage improvement plans and a drainage master plan be completed prior to construction of Phase 2 of the project. As a result, this impact is considered **less than significant**.

Stormwater Runoff

Impact 4.7.12 Implementation of Phase 2 could create or contribute runoff water that could exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. This impact is considered to be **potentially significant**.

As addressed in Impact 4.7.11, buildout of Phase 2 of the project will result in an increase in the amount and timing of stormwater runoff due to the increase in impervious surfaces.

As discussed under Impact 4.7.9, there is a potential for water quality to be impacted by the project. The project will have an impact that is considered to be **potentially significant** on existing stormwater drainage systems and runoff water quality.

Mitigation Measures

Mitigation measures included in this Draft EIR, including **MM 4.7.1a** though **MM 4.7.1c**, and **MM 4.7.11** will ensure that post-project peak stormwater runoff rates related to Phase 2 do not exceed pre-project rates. These mitigation measures will reduce impacts to a level that is considered to be **less than significant**.

Flooding - Housing

Impact 4.7.13 Construction and buildout of Phase 2 of the proposed project would not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. **No impact**.

Phase 2 of the proposed project is not located within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. Please see **Figure 4.7.2,** FEMA Flood Map. Thus, there would be **no impact**.

Mitigation Measures

None required.

Flooding – Impediments to Flows

Impact 4.7.14 Construction and buildout of Phase 2 of the proposed project would not place within a 100-year flood hazard area structures, which would impede or redirect flood flows. **No impact**.

No development associated with Phase 2 would be located within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. **No impact**.

Mitigation Measures

None required.

Flooding – Dam Failure

Impact 4.7.15 Construction and buildout of Phase 2 of the proposed project would not expose people or property to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. **No impact**.

As discussed above, the United States Bureau of Reclamation conducted modeling studies in 1994 concerning the potential effects associated with structural failure of Shasta Dam, which is located on the Sacramento River approximately 26 miles upstream of the project area, and Whiskeytown Dam, which is located on Clear Creek approximately 17 miles northwest of the project area. A major failure of Shasta Dam would result in most of the City of Redding being inundated in less than an hour and many of the low lying areas within the City of Anderson being inundated within two hours. Failure of Whiskeytown Dam, while less catastrophic, would result in similar flooding. However, given the elevation of Phase 2 and its distance from the Sacramento River, Phase 2 of the project area would not be inundated. Thus, there would be **no impact**.

Mitigation Measures

None required.

Flooding – Seiche, Tsunami, or Mudflow

Impact 4.7.16 Construction and buildout of Phase 2 of the proposed project would not cause inundation by seiche, tsunami or mudflow. This impact is considered to be **less than significant**.

Phase 2 of the proposed project is located inland and away from large impoundments of water. Thus, there is no risk of inundation by a tsunami and little to no risk of inundation by a seiche. Although a seiche could result in failure of either Shasta or Whiskeytown Dams, this would not result in inundation of the project area due to the elevated nature of the Specific Plan area as discussed above. With regard to mudflows, development associated with Phase 2 has been proposed primarily along ridgetops at elevations between 620 and 690 feet. Further, given the lack of any geologic features in the vicinity of the project area that are prone to mudflows, such as volcanoes or destabilized slopes, mudflows are an extremely unlikely occurrence. Additionally, with the implementation of **MM 4.8.2a** and **MM 4.8.2b,** (see Section 4.8, Geology and Soils), a final geotechnical subsurface investigation report for each phase of the project would be provided to the City prior to approval of improvement plans. That report would identify any geologic hazards within Phase 2 of the project area, including landslide hazards. Project impacts associated with inundation as a result of seiche, tsunami or mudflow are thus considered **less than significant**.

Mitigation Measures

None required.

4.7.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The cumulative setting for impacts related to hydrology and water quality includes the Sacramento River Hydrologic Region. This drainage basin is approximately 27,200 square miles in size. The Sacramento River Hydrologic Region includes Basin No. 2000 and Basin No. 2500 of the Anderson Drainage Study that will be affected by the proposed project. These drainage basins are approximately 735 acres and 953 acres in size, respectively. In addition to the proposed project, several other residential developments have been approved, are planned, or are proposed in the City of Anderson and the vicinity in Shasta County, which could cumulatively affect hydrologic conditions and water quality. Development potential in the project area is addressed in Section 4.0, which includes a list of cumulatively considered projects.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Drainage and Flooding

Impact 4.7.17 The proposed project, in combination with planned and proposed development in and near the City of Anderson, could alter drainage conditions and rates which could result in potential flooding impacts. These cumulative impacts are considered **potentially significant**.

As discussed in the setting, most of the Specific Plan area is dominated by terrain not prone to flooding, except for small stretches near Anderson and Olinda Creeks. Although flooding is of no great concern for the existing site in its undeveloped state, implementation of the Specific Plan would result in the compaction of soils and the conversion of the project site to urban uses which will increase the amount of impervious surfaces through the development of roads, parking areas and rooftops. These conversions would result in an increase in the amount and timing of stormwater runoff.

All surface flows generated as a result of the proposed project would be contained on-site before affecting downstream water quality and flood control facilities. Detention ponds, sediment and grease traps, and an underground storm drainage system would be implemented to mitigate potential impacts. Further, implementation of **MM 4.7.1a**, **MM 4.7.1b**, **MM 4.7.1c**, **MM 4.7.5**, and **MM 4.7.11** described herein would ensure that the project's contribution to cumulative increases to drainage and flooding would be **less than significant**.

Mitigation Measures

Implement **MM 4.7.1a, MM 4.7.1b, MM 4.7.1c, MM 4.7.5,** and **MM 4.7.11**.

Cumulative Water Quality Impacts

Impact 4.7.18 The proposed project in combination with planned and proposed development in and near the City of Anderson could contribute to potential impacts to surface and groundwater quality as a result of construction activities and proposed land uses. These cumulative impacts are considered **potentially significant.**

Slope and soil disturbance associated with construction activities and proposed land uses within the project area may contribute to water quality impacts when considered under cumulative

conditions in the City of Anderson and the region. Runoff may contain oils, grease, fuel, antifreeze, byproducts of combustion (such as lead, cadmium, nickel, and other metals), nutrients and sediment. Any surface runoff associated with the implementation of the proposed project would also be contained before impacting downstream water quality and flood control facilities. Detention ponds, sediment and grease traps, and an underground storm drainage system would be incorporated into the project to mitigate these potential impacts. Further, implementation of mitigation measures **MM 4.7.1a**, **MM 4.7.1b**, **MM 4.7.1c**, **MM 4.7.5**, and **MM 4.7.11** and compliance with applicable regional, state and federal water quality standards would reduce the project's contribution to cumulative water quality impacts to level that is **less than significant**.

Mitigation Measures

Implement **MM 4.7.1a**, **MM 4.7.1b**, **MM 4.7.1c**, **MM 4.7.5**, and **MM 4.7.11**.

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