SECTION 3.7
HYDROLOGY AND WATER QUALITY

3.7 HYDROLOGY AND WATER QUALITY

3.7.1 INTRODUCTION

This section analyzes the potential impacts of the proposed project on hydrology and water quality, and is based on the Hydrology and Water Quality Technical Report prepared by Dudek (May 2007). The technical report is presented in its entirety in **Appendix H** of this EIR.

3.7.2 METHODOLOGY

The analysis is based on data regarding hydrology and water quality relating to the proposed project site obtained through a review of pertinent literature (detailing the relevant aquifer characteristics, stream flow, and channel characteristics of the proposed project area and its surrounding vicinity), proposed site plans, and the Federal Emergency Management Agency's ("FEMA") Flood Insurance Rate Maps ("FIRM"). This data was evaluated for the purpose of identifying existing drainage basins and flow characteristics. Procedures from the San Diego County Hydrology Manual were used to determine peak flows on a conceptual level. Additionally, the City of San Diego Stormwater Standards Manual ("SWS Manual") was reviewed to determine compliance requirements and Best Management Practices ("BMPs") for stormwater quality.

3.7.3 EXISTING CONDITIONS

3.7.3.1 General Environmental Setting

The proposed project site is located in the southwestern portion of San Diego County in the San Diego metropolitan area. Located atop a mesa terrace on the coastal plain, the area is composed of a network of large canyon drainages on the north, east, and west sides feeding into the San Diego River System. The coastal plain is surrounded by foothills and mountains.

The climate of San Diego County is characterized by warm, dry summers and mild, wet winters. The average rainfall is about 10-13 inches per year, most of which falls between November and February. The average mean temperature for the area is approximately 65 degrees in the coastal zone and 57 degrees in the surrounding foothills.

The elevation of the area surrounding the site varies from approximately 100 to 400 feet above mean sea level ("ft amsl"). The topography generally undulates with higher elevations on mesa tops and lower elevations in the canyons.

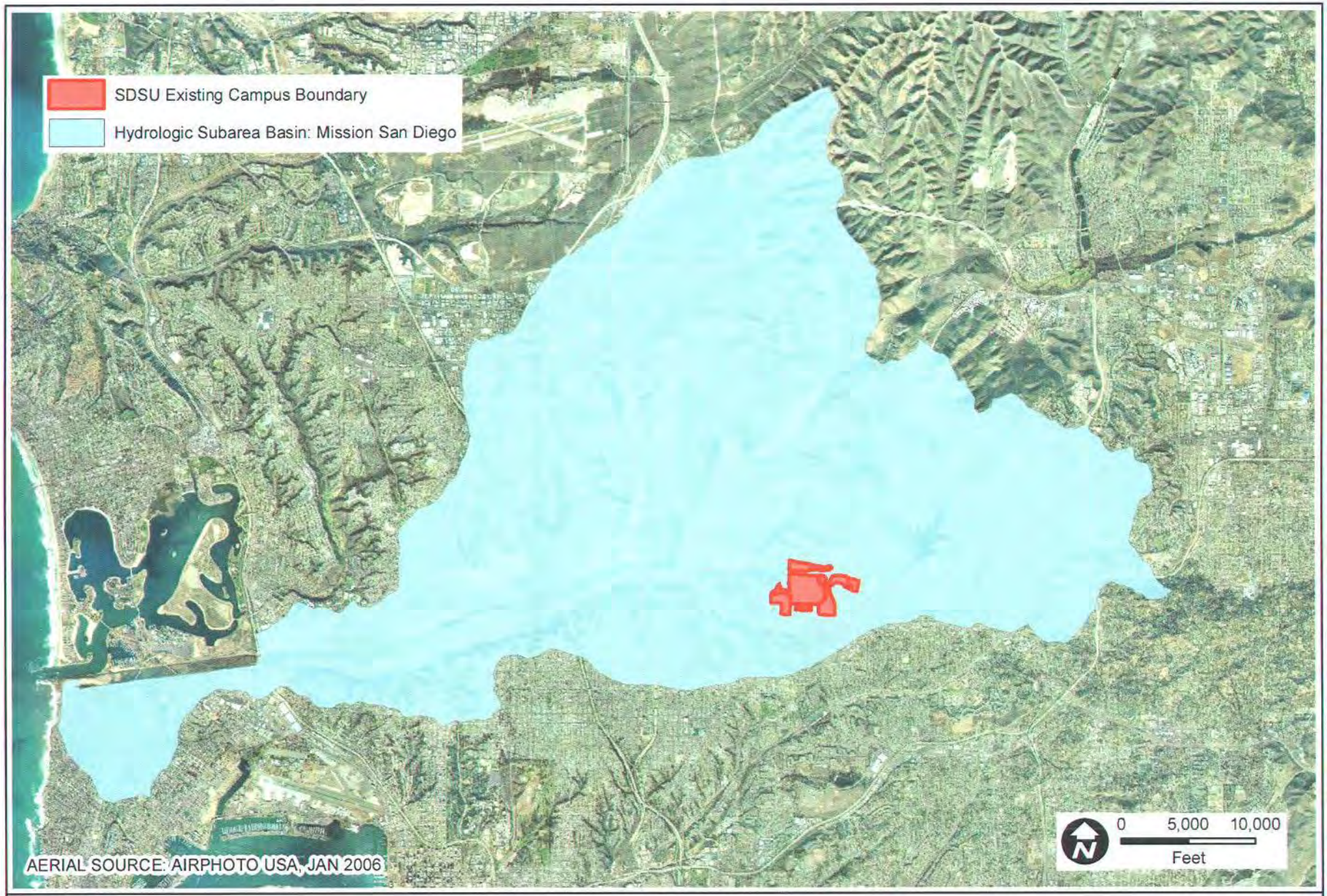
3.7.3.2 General Hydrologic Setting

Surface Water. The SDSU campus site is located in the San Diego River Watershed, which encompasses approximately 440 square miles and is the second largest hydrologic unit in San Diego County. (*See* **Figure 3.7-1, San Diego Watershed Map.**) The university specifically lies within the San Diego Hydrologic Unit (907.00), Lower San Diego Hydrologic Area (907.10), Mission San Diego Hydrologic Sub-area (907.11). All runoff from existing and proposed SDSU development will enter the San Diego River *via* Alvarado Creek or other unnamed tributaries.

Groundwater. The proposed project also lies within and adjacent to the 6.28 square mile Mission Valley Groundwater Basin. (*See* **Figure 3.7-2, Mission Valley Groundwater Basin Map.**) Drained by the San Diego River, the Mission Valley Groundwater Basin underlies an east-west trending valley and is bound by the lower permeability San Diego, Poway, and Lindavista Formations. The most probable sources of groundwater within the project vicinity are infiltration of landscape irrigation water, and precipitation. Additionally, the principal water bearing deposit is alluvium, a medium to coarse-grained sand and gravel with an average thickness of 80 feet.

Alluvium underlies the Alvarado Creek drainage course and groundwater is reported to occur within alluvium near the Adobe Falls Faculty/Staff Housing, Alvarado Campus, Alvarado Hotel, and Villa Alvarado Residence Hall Expansion proposed project components. These northern portions of the proposed project are also underlain by a hard metavolcanic unit, which allows for permeability and overall westward flow of groundwater toward the Mission Valley Basin.

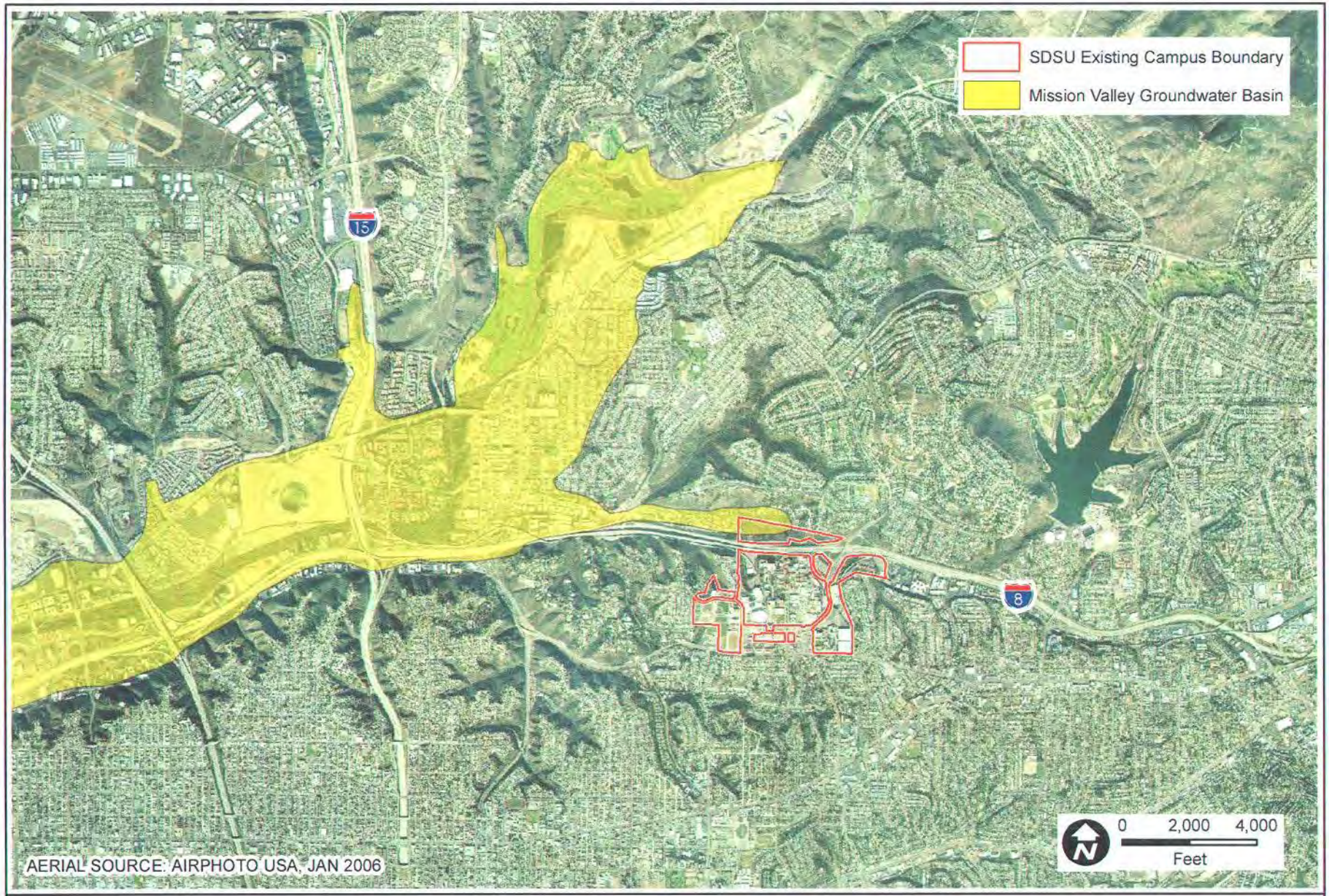
The project components located on the main campus (*i.e.*, the Campus Conference Center; Student Union Expansion; Student Housing) are underlain by Stadium Conglomerate, the Linda Vista Formation, and the Mission Valley Formation. The regional groundwater table is anticipated to be several hundred feet deep in the metavolcanic unit and atop the mesas at the main campus. That said, non-porous sand and clay materials are mixed amongst these volcanic layers and can create groundwater "lenses," or isolated pockets of groundwater. Sporadic groundwater lenses may also be located in formations adjacent to the Alvarado Creek alluvium and slopewash.



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3-7-1
San Diego Watershed Map



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-2
Mission Valley Groundwater Basin Map

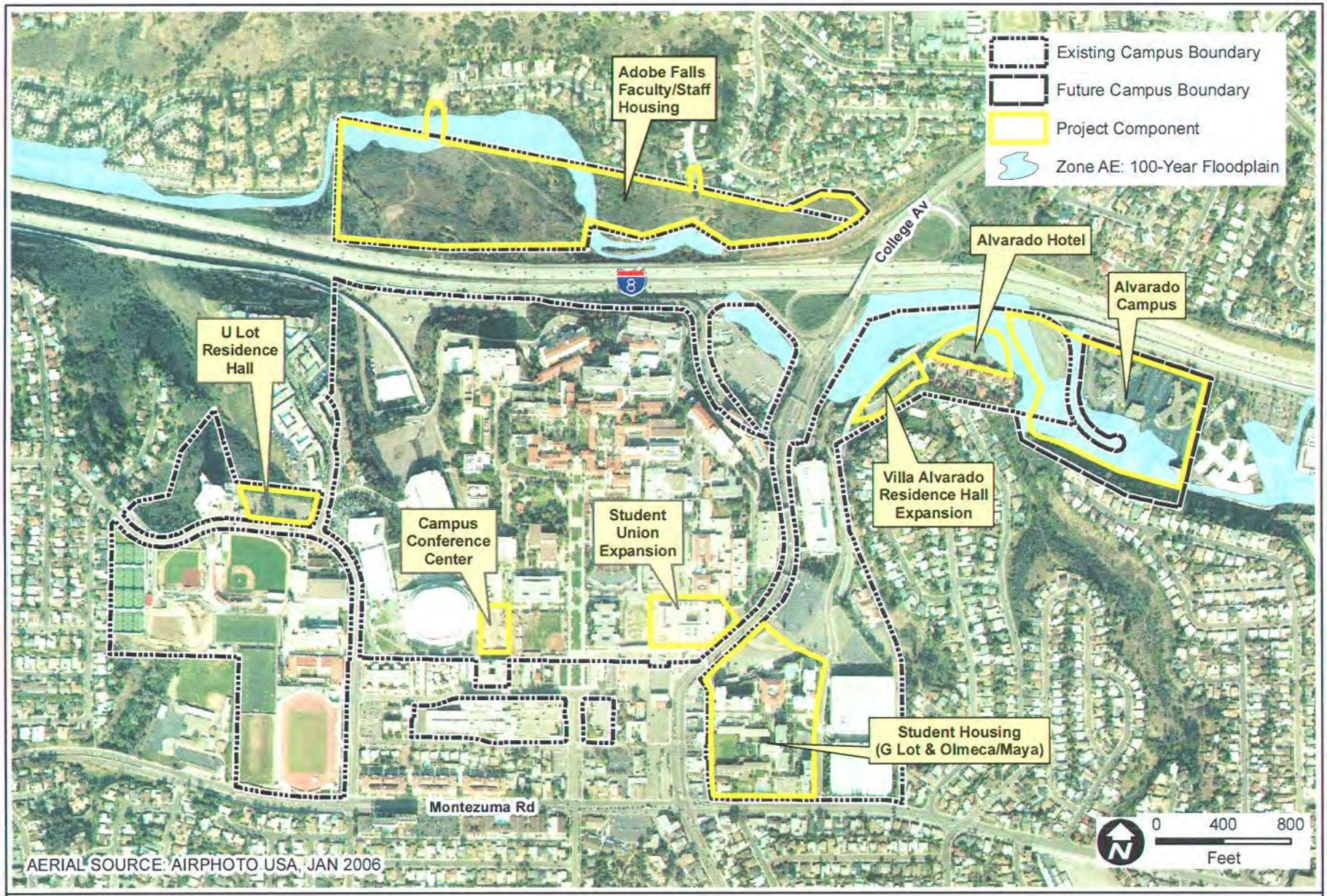
Floodplain. FEMA's Fire Insurance Rate Maps reveal that four of the proposed project components are within or adjacent to the 100-year flood/plain. (*See* **Figure 3.7-3, Hydrologic Features Map**.) The maps identify portions of the Alvarado Hotel, Alvarado Campus, and Villa Alvarado Residence Hall Expansion sites as lying within or adjacent to the 100-year flood/plain. (*See* **Figure 3.7-4, Drainage Area Map - Alvarado Campus, Alvarado Hotel & Villa Alvarado Residence Hall Expansion.**) Additionally, portions of the Adobe Falls Faculty/Staff Housing site abut the 100-year flood plain. (*See* **Figure 3.7-5, Drainage Area Map - Adobe Falls Faculty/Staff Housing.**)

3.7.3.3 Water Quality Regulations

Federal Water Pollution Control Act ("Clean Water Act" or "CWA"). The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 303(d) of the CWA requires states to develop a list of waters that do not meet water quality standards, and to designate such waters as "water quality limited segments." States must establish priority rankings and develop Total Maximum Daily Loads ("TMDLs") to improve the water quality of these impaired segments. The 2006 CWA 303(d) List of Water Quality Limited Segments classifies the Lower San Diego River, Pacific Shoreline, and San Diego River Mouth (aka, Dog Beach) as impaired water bodies.

Additionally, Section 402(p) of the CWA establishes the National Pollutant Discharge Elimination System ("NPDES") stormwater permit program. Pursuant to this regulatory scheme, SDSU must prepare a Stormwater Management Plan ("SWMP"). SDSU completed its SWMP in February 2005; however, the Regional Board has not yet reviewed the plan. Therefore, the analysis provided in this section relies upon the City of San Diego's Storm Water Standards ("SWS") Manual for guidance in selecting, designing, and incorporating BMPs.

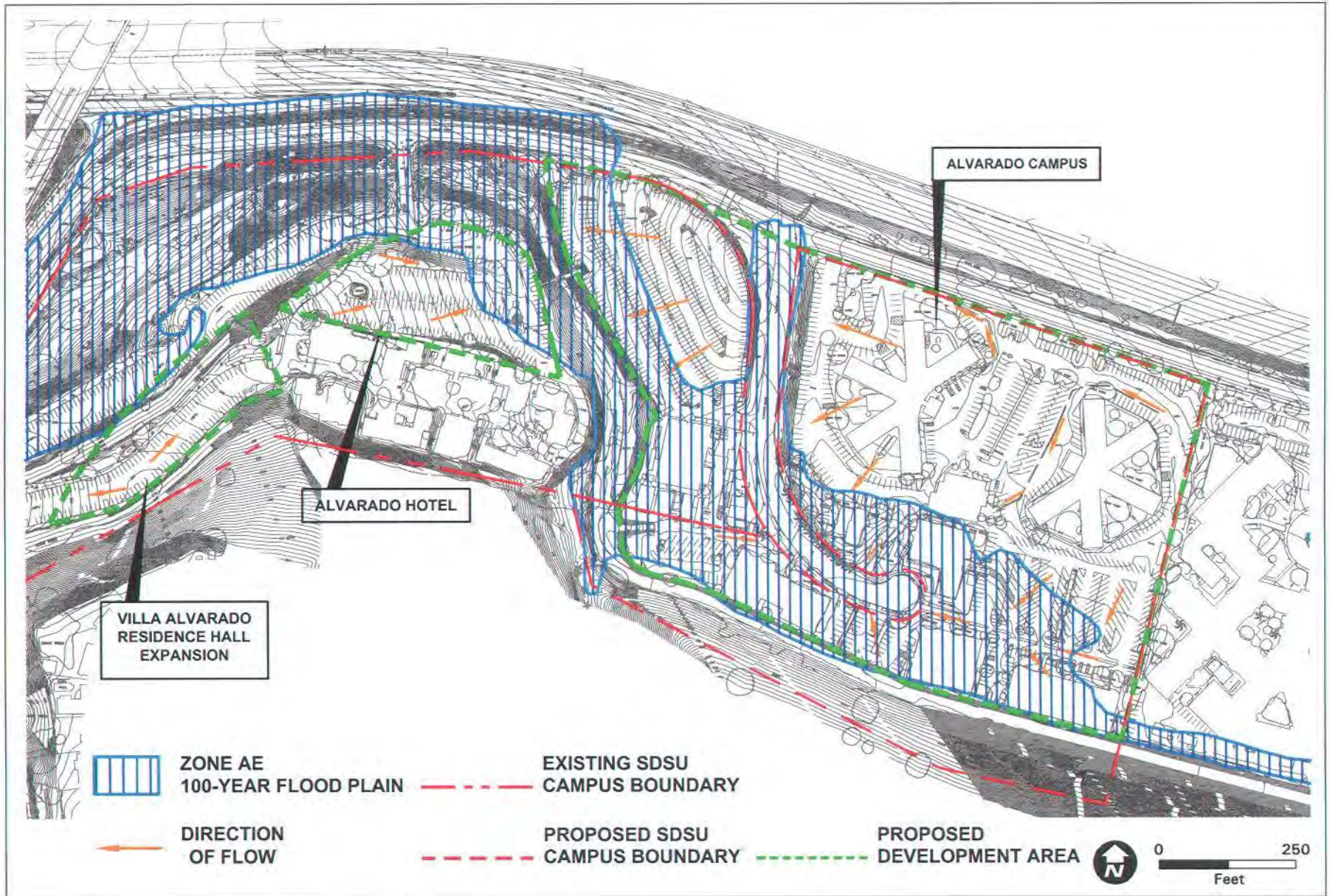
California Water Code ("CWC"). The California Water Code is comprised of 31 divisions that regulate waters in the State of California. The Porter-Cologne Water Quality Control Act is found in Division 7 of the CWC, and it establishes the State Water Resources Control Board ("SWRCB") and nine regional boards as the responsible state agencies for preserving water quality. Each regional board is required to prepare and adopt a Water Quality Control Plan ("Basin Plan") to designate beneficial uses and it establish water quality objectives for the region. San Diego's Basin Plan was approved by the SWRCB in 1994, with amendments adopted most recently in February 2005.



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

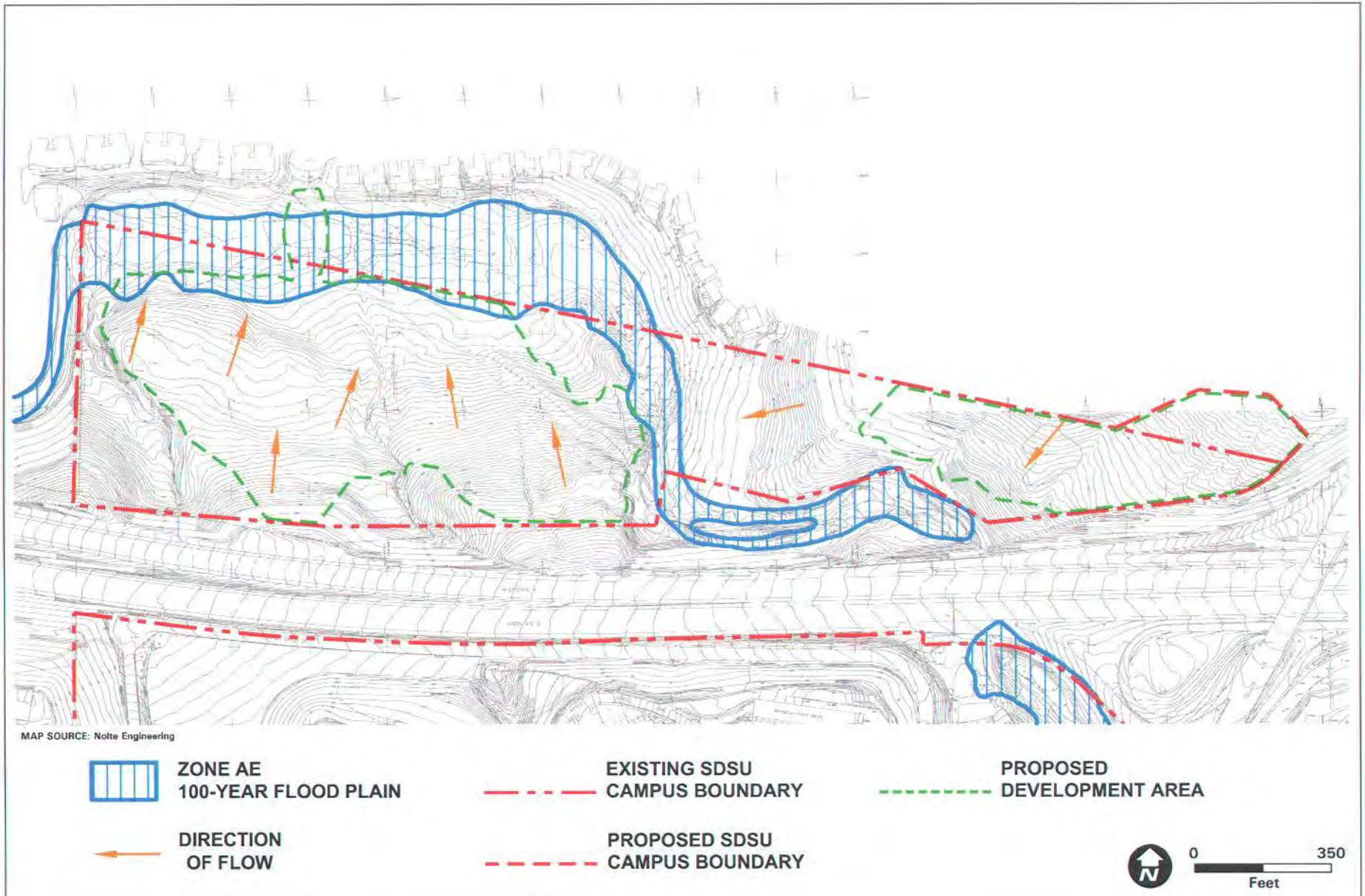
Figure 3.7-3
Hydrologic Features Map



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-4
Drainage Area Map - Alvarado Campus, Alvarado Hotel & Villa Alvarado Residence Hall Expansion



2007Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-5
Drainage Area Map
Adobe Falls Faculty/Staff Housing

SDSU surface runoff flows into the San Diego River *via* Alvarado Creek and an unnamed tributary. The beneficial uses for these waters (*e.g.*, municipal, agricultural, recreational) are set forth in **Table 3.7-1, Beneficial Uses of Inland Surface Water**. As previously discussed, SDSU is also located within the San Diego Hydrologic Unit, Lower San Diego Hydrologic Area, Mission San Diego Hydrologic Sub-Area. Beneficial uses have only been identified for the Mission San Diego Hydrologic Sub-Area, as shown in **Table 3.7-2, Beneficial Uses of Groundwater**. A description of the beneficial uses identified in these tables can be found in **Appendix H** of this EIR.

Table 3.7-1
Beneficial Uses of Inland Surface Water

Inland Surface Waters	Basin Number	Beneficial Uses								
		MUN	AGR	IND	REC 1	REC 2	WARM	COLD	WILD	RARE
San Diego River	907.11	+	X	X	X	X	X	X	X	X
Unnamed Tributary	907.11	+	X	X	X	X	X	X	X	X
Alvarado Creek	907.11	+	X	X	X	X	X	X	X	

\+ Excepted from MUN (State Board Resolution No. 88-63, *Sources of Drinking Water Policy*).
X Existing Beneficial Use

Table 3.7-2
Beneficial Uses of Groundwater

Groundwater	Basin Number	Beneficial Uses			
		MUN	AGR	IND	PROC
San Diego HU	907.00				
Lower San Diego HA	907.10				
Mission San Diego HSA[1]	907.11	O	X	X	X

These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Intestate Highway 5 and this area is excepted from the sources of drinking water policy.
O Potential Beneficial Use
X Existing Beneficial Use

3.7.3.4 Project Components Hydrologic Setting

Adobe Falls Faculty/Staff Housing. The proposed site is an undeveloped, undulating area situated near, or in some cases at, the bottom of a canyon. Alvarado Creek flows through this project component, generally from east to west, entering the site *via* a culvert at the southeastern end, and exiting at the northwest end *via* a manmade concrete channel. Alvarado Creek turns to the north approximately at the midpoint of the site and flows along the northern boundary of the site to the east. There are no additional water courses on the site; although, because Alvarado Creek lies in a canyon, there are adjacent gullies that feed the creek during storm events. The eastern portion of the on-site runoff sheet flows southwesterly to Alvarado Creek, and the western portion of the on-site runoff sheet flows northerly to Alvarado Creek. The slope throughout the site varies from less than 1% at some parts of the Alvarado Creek flow line to over 25% at some of the upland areas, with elevations ranging from 121 to 430 ft amsl. Finally, as discussed previously, a portion of the northern edge of the proposed project site is located within the Alvarado Creek 100-year flood plain. (See **Figure 3.7-5, Drainage Area Map - Adobe Falls Faculty/Staff Housing.**)

Alvarado Campus. This proposed project site consists of an existing parking lot and an existing complex of medical offices and research facilities. The existing buildings are surrounded by surface parking spaces, and landscaped areas consist of parking lot islands, edge treatments, and building entryways. Throughout the two areas, the slope varies from less than 1% to over 25%, with elevations ranging from 333 to 349 ft amsl.

Alvarado Creek runs along the south and west boundary of the site. The runoff from the western portion of the site flows southwesterly to Alvarado Creek. The runoff from the eastern portion of the site is conveyed by valley gutters on the driveways of the surrounding parking lots prior to discharging to a curb inlet located at Alvarado Court. A portion of the site, including the area where the present Alvarado Medical Center buildings lie, is located within the 100-year flood plain. (See **Figure 3.7-4,Drainage Area Map - Alvarado Campus, Alvarado Hotel & Villa Alvarado Residence Hall Expansion.**)

Alvarado Hotel. The site of the proposed Alvarado Hotel is existing C Lot, to which the Alvarado Creek forms the eastern and northern boundaries. Runoff from this site generally flows northeasterly to Alvarado Creek. One grate inlet and one pipe drop inlet are found on the end of the central parking driveway. Two valley gutters convey stormwater from southern and northern parking driveways to Alvarado Creek. The typical slope is approximately 5%, with

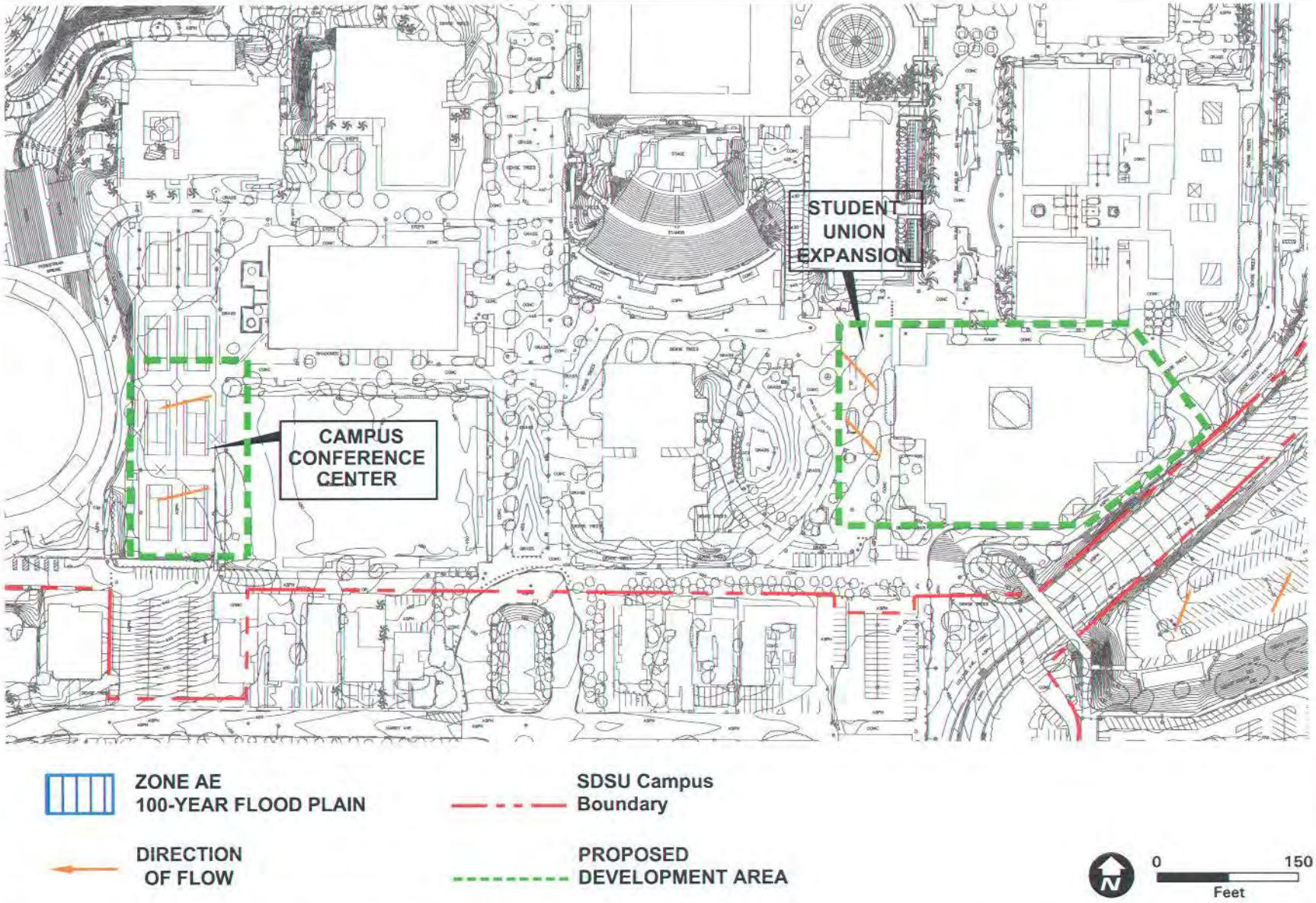
elevations ranging from 333 to 351 ft amsl. The northeastern portion of the site is located in the 100-year flood plain. (See **Figure 3.7-4, Drainage Area Map - Alvarado Campus, Alvarado Hotel & Villa Alvarado Residence Hall Expansion.**)

Campus Conference Center. The proposed site is the former tennis courts located just east of Cox Arena. The runoff from the site sheet flows westerly towards Cox Arena. The site has flat topography with elevations ranging from 445 to 447 ft amsl. (*See* **Figure 3.7-6, Drainage Area Map - Student Union Expansion and Campus Conference Center.**)

Student Union Expansion and Renovation. The site of the proposed Student Union Expansion and Renovation is the existing Student Union, commonly referred to as the "Aztec Center," located just west of College Avenue along the southern border of the campus. The runoff from the site flows southeasterly towards College Avenue. The site has flat topography with elevations ranging from 447 to 455 ft amsl. (*See* **Figure 3.7-6, Drainage Area Map - Student Union Expansion and Campus Conference Center.**)

Villa Alvarado Residence Hall Expansion. The site proposed for the Villa Alvarado Residence Hall Expansion is existing C Lot, which is just south of Alvarado Road. The present site use is predominantly existing paved parking areas. The runoff from the eastern portion of the site flows westerly towards East Campus Drive. The runoff from the western portion of the site flows northeasterly towards the proposed Alvarado Hotel. The site includes flat topography along C Lot, with elevations ranging from 360 to 364 ft amsl, and steeper topography along the slope north of C Lot, with elevations ranging from 429 to 360 ft amsl. The northern portion of the site is adjacent to the 100-year flood plain.

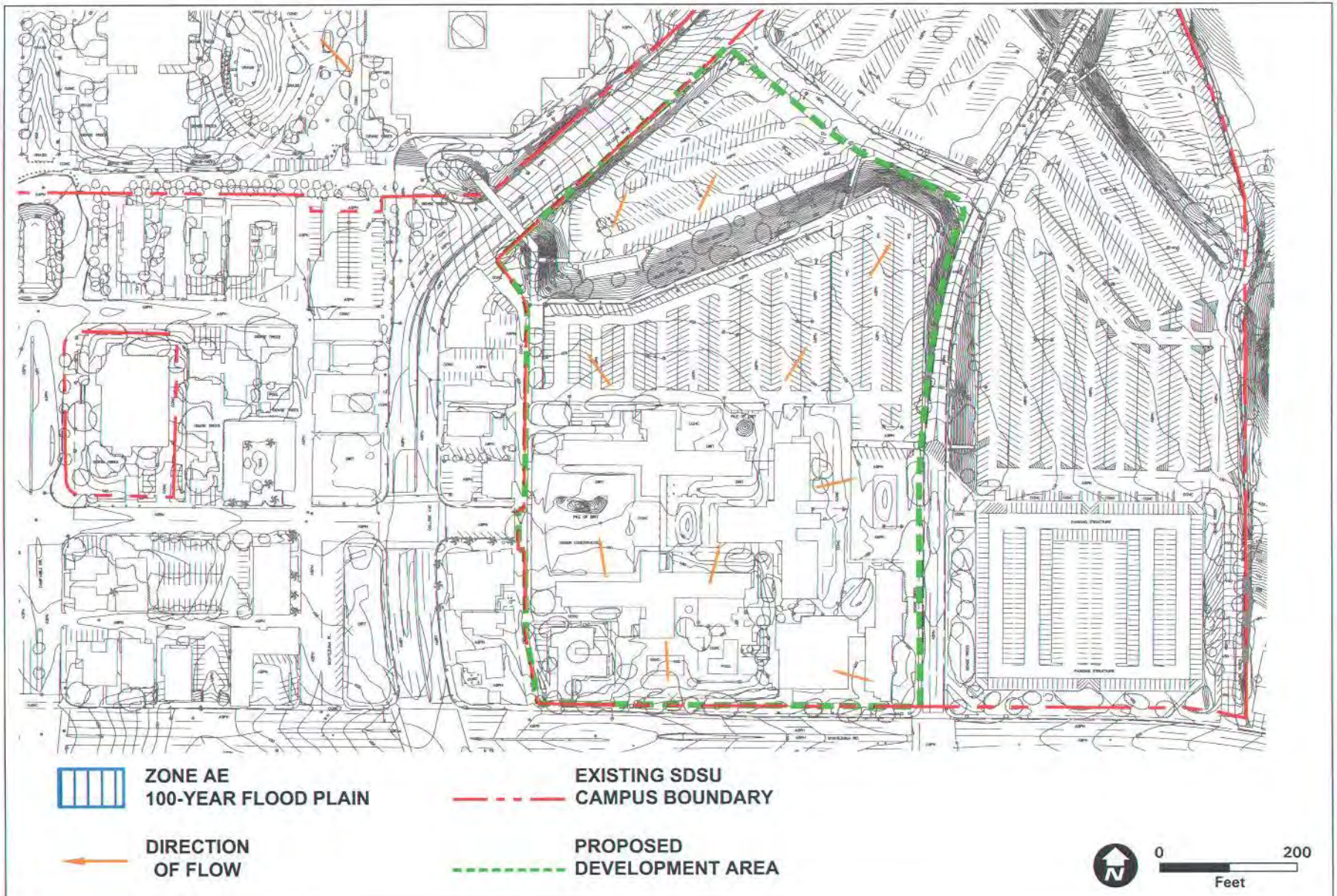
Student Housing – G Lot & Olmeca/Maya. The site of the proposed G Lot and Olmeca/Maya Residence Halls is existing student housing bordered by College Avenue to the west, G Lot to the north, East Campus Drive to the east, and Montezuma Road to the south. The existing buildings are surrounded by landscaped courtyards and footpaths. The runoff from the site flows outward from the center of the site, and northeasterly towards Zura Way. The site has flat topography with elevations ranging from 450 to 455 ft amsl. (*See* **Figure 3.7-7, Drainage Area Map - Student Housing (G Lot & Olmeca/Maya).**)



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-6
Drainage Area Map - Student Union Expansion and Campus Conference Center



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-7
Drainage Area Map
Student Housing (G Lot & Olmeca/Maya)

U Lot Residence Hall. The site of the proposed U Lot Residence Hall is existing U Lot, a parking lot located just north of Remington Road. The runoff from the site sheet flows northerly off campus into a canyon with vegetated steep slopes. The site has flat topography with elevations ranging from 423 to 425 ft amsl. (*See* **Figure 3.7-8, Drainage Area Map - U Lot Residence Hall.**)

3.7.4 SIGNIFICANCE THRESHOLDS

Appendix G of the CEQA Guidelines provides that a proposed project may have a potentially significant impact on hydrology and water quality if the project would:

(a) Violate any water quality standard or waste discharge requirement;

(b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;

(c) 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 which would result in substantial erosion or siltation on or off site, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site;

(d) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

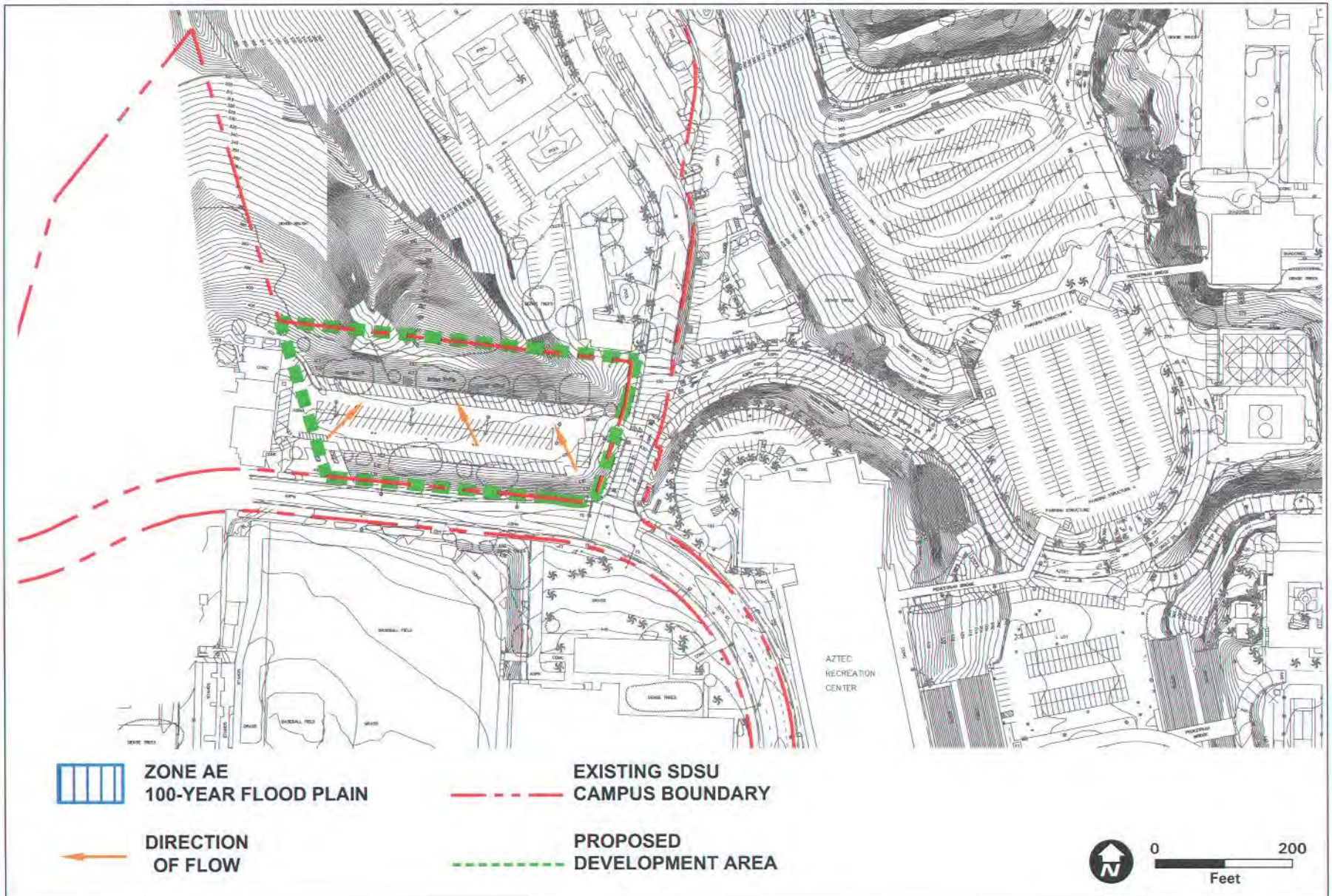
(e) Substantially degrade water quality;

(f) Place housing within a 100-year flood hazard area as mapped on a FIRM or other flood hazard delineation map;

(g) Place within a 100-year flood hazard area structures which would impede or redirect flood flows;

(h) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or

(i) Result in inundation by seiche, tsunami, or mudflow.



2007 Campus Master Plan Revision EIR

SAN DIEGO STATE UNIVERSITY

Figure 3.7-8

Drainage Area Map - U Lot Residence Hall

As previously discussed, SDSU's SWMP, completed in February 2005, has neither been reviewed nor approved by the San Diego Regional Water Quality Control Board. Therefore, potential project impacts and mitigations measures were assessed pursuant to the SWS Manual, the goal of which is to effectively prohibit non-storm water discharges and reduce discharge of pollutants from stormwater conveyance systems to the maximum extent practicable during construction and use of the developed sites.

3.7.5 PROJECT IMPACTS

The potential impacts to surface water, groundwater, and, flooding, for each proposed project component are discussed separately below. Peak flow rates for surface runoff were calculated based on the rational method outlined in the County of San Diego Hydrology Manual.

3.7.5.1 Adobe Falls Faculty/Staff Housing

- **Surface Water Impacts.** Development of the Adobe Falls site will reduce infiltration as a result of an increase in impervious surfaces in presently undeveloped areas that either drain to Alvarado Creek or naturally percolate into the soil. As shown in **Table 3.7.3, Peak Flow Summary**, the peak flow rates of Alvarado Creek at the point where the creek leaves the Adobe Falls site would be increased by 2.5 cubic feet per second ("cfs") for an 85th percentile storm event (an 85th percentile storm event represents a "first flush" rain event), 4.38 cfs for a 2-year storm event, 7.13 cfs for a 10-year storm event, and 10.14 cfs for a 100-year storm event. This is a significant increase in runoff volumes for each storm event and represents a potentially significant impact.

- **Groundwater Impacts.** Near-surface groundwater is typically encountered in low-lying areas, such as the bottoms of canyons and tributary drainages. Alvarado Creek drainage crosses or is adjacent to the Adobe Falls Faculty/Staff Housing site. Due to creek proximity, this project component could potentially impact groundwater. Further, due to the mixture of subsurface material in this project component area, the potential to encounter a groundwater lens in non-alluvial/slopewash material exists. If a groundwater lens were to be impacted, the structural integrity of the buildings and water quality would be impacted.

  Additionally, the project's introduction of impervious surfaces may prevent future percolation into groundwater lenses, should they exist. However, these lenses do

not form substantive components of the regional groundwater resource present in Mission Valley. Therefore, impacts to groundwater quality and quantity would not be significant.

Because groundwater may be encountered during construction of this project component, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of appropriately.

- **Floodplain Impacts.** The northern edge of the Adobe Falls Faculty/Staff Housing site is located within the limits of the 100-year flood plain of Alvarado Creek. This area and other steep slope areas along the western and southern property boundary will be preserved as open space. Further, the proposed housing structures and associated development will be constructed outside the limits of the 100-year floodplain and, therefore, would not affect the base flood elevation. However, it is anticipated that the proposed project will affect the base flood elevation of the 100-year flood plain of Alvarado Creek due to increased run-off as a result of increased impervious surfaces at this site. This impact could potentially be significant.

3.7.5.2 Alvarado Campus.

- **Surface Water Impacts.** The Alvarado Campus component would be located within an existing developed area. Infiltration, flow frequency, duration, and peak flow rates will not change as a result of the development. However, due to the intensification of uses, this project component may result in an increase in pollutant load (such as trash, pesticides and car pollutants) to stormwater run-off; therefore, a potentially significant impact to water quality could occur.

- **Groundwater Impacts**. Similar to the Adobe Falls Faculty/Staff Housing area, subsurface materials vary at the Alvarado Campus location and may contain groundwater or isolated groundwater lenses. Further, due to the mixture of subsurface material in all project component areas, the potential to hit a groundwater lens in non-alluvial/slopewash material exists. Even if a boring program was implemented, small lenses may not be detected and the structural integrity of each building and water quality may be impacted.

Table 3.7-3
Peak Flow Summary

Project Component	Storm Event	Existing Q (Cfs)	Proposed Q (Cfs)	Change In Q (Cfs)
Adobe Falls Faculty/Staff Housing	85th Percentile	5.14	7.64	+2.5
Alvarado Campus		23.70	23.70	0.00
Alvarado Hotel		2.68	2.68	0.00
Campus Conference Center		2.21	1.55	-0.66
Student Union Expansion		4.23	4.23	0.00
Villa Alvarado Residence Hall Expansion		1.98	1.98	0.00
Student Housing – G Lot & Olmeca/Maya		19.33	19.33	0.00
U Lot Residence Hall		3.25	3.25	0.00
Adobe Falls Faculty/Staff Housing	2-Year	9.02	13.40	+4.38
Alvarado Campus		41.57	41.57	0.00
Alvarado Hotel		4.70	4.70	0.00
Campus Conference Center		2.21	2.72	+0.51
Student Union Expansion		7.42	7.42	0.00
Villa Alvarado Residence Hall Expansion		3.46	3.46	0.00
Student Housing – G Lot & Olmeca/Maya		33.90	33.90	00.00
U Lot Residence Hall		5.69	5.69	0.00
Adobe Falls Faculty/Staff Housing	10-Year	14.69	21.82	+7.13
Alvarado Campus		67.72	67.72	0.00
Alvarado Hotel		7.66	7.66	0.00
Campus Conference Center		3.60	4.43	+0.83
Student Union Expansion		12.09	12.09	0.00
Villa Alvarado Residence Hall Expansion		5.64	5.64	0.00
Student Housing – G Lot & Olmeca/Maya		55.23	55.23	0.00
U Lot Residence Hall		9.27	9.27	0.00
Adobe Falls Faculty/Staff Housing	100-Year	20.89	31.03	+10.14
Alvarado Campus		96.32	96.32	0.00
Alvarado Hotel		10.89	10.89	0.00
Campus Conference Center		5.12	6.31	+1.19
Student Union Expansion		17.20	17.20	0.00
Villa Alvarado Residence Hall Expansion		8.03	8.03	0.00
Student Housing – G Lot & Olmeca/Maya		78.54	78.54	0.00
U Lot Residence Hall		13.19	13.19	0.00

- The Alvarado Campus area currently blocks percolation of surface water into groundwater lenses, assuming they occur. Therefore, percolation rates would remain unchanged because this project component would not increase the amount of impervious surface.

  During construction of this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of correctly. In order to ensure that groundwater is disposed of properly, mitigation is provided.

- **Floodplain Impacts.** A portion of the Alvarado Campus site is within the limits of the 100-year flood plain of Alvarado Creek. Because the proposed project improvements would simply result in redevelopment of existing urban uses and not entail further encroachment into the floodplain, this existing floodplain impact would remain. Nonetheless, this impact is significant.

3.7.5.3 Alvarado Hotel

- **Surface Water Impacts.** The Alvarado Hotel project component is located on an existing developed site. Therefore, an increase in impervious cover would not occur. The runoff coefficient and time of concentration, which determine rainfall intensity, will be unchanged from existing condition. Therefore, infiltration, flow frequencies, duration and peak flow rates will not change as a result of the proposed hotel development. Due to intensification of use, this project element may result in an increase in pollutant load (such as trash, pesticides and car pollutants) to stormwater run-off; therefore, a potentially significant impact to water quality would occur.

- **Groundwater Impacts.** The Alvarado Creek drainage is adjacent to the proposed Alvarado Hotel site. Due to creek proximity, this project component could potentially impact groundwater. Further, the potential to hit a groundwater lens in non-alluvial/slopewash material exists. If a groundwater lens were to be impacted, the structural integrity of each building and groundwater quality would be impacted.

Subsurface materials vary and therefore may contain groundwater or isolated groundwater lenses. However, because this area currently blocks percolation of surface water into groundwater lenses, assuming they occur, percolation rates would remain unchanged because this project component would not increase the amount of impervious surface. It should be noted that due to the absence of a major groundwater basin in the SDSU area, percolation, or lack thereof, into isolated lenses would not have an impact on regional groundwater resources.

During construction of this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of properly.

- **Floodplain Impacts.** A portion of the Alvarado Hotel site is within the limits of the 100-year flood plain of Alvarado Creek. Even though the runoff will not increase because the proposed project improvements would simply result in redevelopment of existing urban uses, the proposed building may impede flood flows. This impact is significant

3.7.5.4 Campus Conference Center

- **Surface Water Impacts.** The Campus Conference Center would entail construction of a new building in a largely developed area. Extensive retaining walls would be expected to replace the existing vegetated steep slope. Therefore, infiltration would be reduced due to the increase of impervious cover, which would result in an increase in peak flow rates. As shown on Table 3.7-3, the rates would increase by 0.29 cfs for an 85th percentile storm event, 0.51 cfs for a 2-year storm event, 0.83 cfs for a 10-year storm event, and 1.19 cfs for a 100-year storm event. This is a potentially significant impact. Additionally, due to the intensification of uses, this project element may also result in an increase in pollutant load (such as trash, pesticides and car pollutants) of storm water run-off; therefore, a potentially significant impact to water quality could occur.

- **Groundwater Impacts.** The Campus Conference Center site would result in a slight, but minimal (due to the unchanged amount of impervious surfaces) increase in groundwater percolation. This impact is not significant. However,

the potential to encounter localized groundwater exists and therefore groundwater may be impacted by this project component. Due to the mixture of subsurface material in all project component areas, the potential to hit a groundwater lens in non-alluvial/slopewash material exists. If a groundwater lens were to be impacted, impacts to the structural integrity of each building and quality of groundwater may be significant.

During construction of the project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of properly.

- **Floodplain Impacts.** This project component is not located within a floodplain area; therefore impacts related to flood hazards would not occur.

3.7.5.5 Student Union Expansion

- **Surface Water Impacts.** The Student Union Expansion would be located in a currently developed urban area. Runoff coefficients and time of concentration will not change; infiltration, flow frequencies, duration and peak flow rates will not change. Therefore, a significant impact would not occur. However, this project component may result in an increase in pollutant load to storm water run-off, which could potentially result in a significant impact to water quality.

- **Groundwater Impacts.** The potential to encounter localized groundwater and/or a groundwater lens in non-alluvial/slopewash material exists, even if a boring program were implemented. If a ground water lens were to be affected, impacts to the structural integrity of the proposed buildings and groundwater quality may be significant.

  Similar to the other project components, subsurface materials vary and isolated groundwater lenses may be present. However, because this project component blocks percolation of surface water into groundwater lenses, assuming they occur, percolation rates would remain unchanged as this project component would not increase the amount of impervious surfaces.

During construction of this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of properly.

- **Floodplain Impacts.** This project component is not located within a floodplain area; therefore, impacts related to flooding would not occur.

3.7.5.6 Villa Alvarado Residence Hall Expansion

- **Surface Water Impacts.** The Villa Alvarado Residence Hall Expansion project component would be located on an existing developed site. Therefore, an increase in impervious cover would not occur. The runoff coefficient and time of concentration, which determine rainfall intensity, will be unchanged from the existing condition. Therefore, infiltration, flow frequencies, duration and peak flow rates will not change as a result of the proposed residence hall expansion.

  Due to an intensification of the existing uses, this project component may result in an increase in pollutant load (such as trash, pesticides and car pollutants) to stormwater run-off. This potential impact is significant.

- **Groundwater Impacts.** Due to the proximity of Alvarado Creek to the Villa Alvarado site, this project component could potentially impact groundwater. Further, due to the mixture of subsurface material in all project component areas, the potential to hit a groundwater lens in non-alluvial/slopewash material exists. If a groundwater lens were impacted, the effect on the structural integrity of each building and overall groundwater quality may be significant.

  The Villa Alvarado area currently blocks percolation of surface water into groundwater lenses, assuming they exist. Percolation rates would remain unchanged because this project component would not increase the amount of impervious surfaces. It should be noted that due to the absence of a major groundwater basin in the SDSU area, percolation, or lack thereof, into isolated lenses would not have an impact on regional groundwater resources.

During construction this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of properly.

- **Floodplain Impacts.** A portion of this site is within the limits of the 100-year flood plain of Alvarado Creek. Even though the runoff will not increase because the proposed project improvements would simply result in redevelopment of existing urban uses, the proposed building may impede flood flows. This impact is significant.

3.7.5.7 Student Housing - G Lot and Olmeca/Maya Residence Halls

- **Surface Water Impacts.** This project component would be located in a currently developed urban area. Runoff coefficients and time of concentration will not change; infiltration, flow frequencies, duration and peak flow rates will not change, and therefore a significant impact would not occur. However, this project element may result in an increase in pollutant load to storm water run-off. An increase in the pollutant load would be a significant impact.

- **Groundwater Impacts.** Due to the mixture of subsurface material in this project component area, the potential to hit a groundwater lens in non-alluvial/slope wash material exists. If a groundwater lens were to be affected, impacts to the structural integrity of the proposed buildings and groundwater quality may be significant.

  Similar to the other project components, subsurface materials vary and isolated groundwater lenses may be present. However, since the G Lot & Olmeca/Maya Residence Halls project site currently blocks percolation of surface water into groundwater lenses, assuming they exist, percolation rates would remain unchanged because this project component would not increase the amount of impervious surfaces.

  During construction of this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of properly.

- **Floodplain Impacts.** This project component is not located within a floodplain area; therefore, impacts related to flooding would not occur.

3.7.5.8 U Lot Residence Hall

- **Surface Water Impacts.** The U Lot Residence Hall would be located in a currently developed urban area. Runoff coefficients and time of concentration would not change; infiltration, flow frequencies, duration and peak flow rates will not change and therefore a significant impact would not occur. However, this project element may result in an increase in pollutant load to storm water run-off. Therefore, a potentially significant impact to water quality would occur.

- **Groundwater Impacts.** Due to the mixture of subsurface material in the U Lot Residence Hall area, the potential to hit a groundwater lens in non-alluvial/slope wash material exists. If a groundwater lens were encountered, the structural integrity of the proposed buildings and groundwater quality may be significantly impacted.

  As with the other project components, subsurface materials vary and isolated groundwater lenses may be present on the U Lot Residence Hall site. However, because the U Lot Residence Hall site currently blocks percolation of surface water into groundwater lenses, assuming they occur, percolation rates would remain unchanged because this project component would not increase the amount of impervious surface.

  During construction of this project component, groundwater may be encountered. In order to allow for proper construction and site work, dewatering may be required. Potential water quality impacts would occur if this pumped groundwater is not disposed of correctly.

- **Floodplain Impacts.** This project component is not located within a floodplain area; therefore, impacts related to flooding would not occur.

3.7.5.9 Summary of Water Quality Impacts for All Project Components

The proposed project components would not generate significant amounts of non-visible pollutants. However, the following pollutant constituents are commonly found in stormwater runoff from similar type development projects and, therefore, such pollutants may be found in the project stormwater runoff.

- Sediments - Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

- Nutrients - Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

- Metals - Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary sources of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

- Organic Compounds - Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides,

solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also absorb levels of organic compounds that are harmful or hazardous to aquatic life.

- Trash & Debris - Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

- Oxygen-Demanding Substances - This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

- Oil and Grease - Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies is likely due to the wide use and application of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

- Bacteria and Viruses - Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

- Pesticides - Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Table 3.7-4, Anticipated and Potential Pollutants Summary, summarizes the potential pollutants that may be found in stormwater runoff generated by each of the respective project components thereby resulting in potentially significant impacts.

Table 3.7-4
Anticipated and Potential Pollutants Summary

Project Component	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Adobe Falls Faculty/Staff Housing	X	X	X		X	P	X	P	X
Alvarado Campus	P	P	X		X	P	X		P
Alvarado Hotel	X	X	X		X	X	X	X	X
Campus Conference Center	P	P			X	X	X	X	P
Student Union Expansion	P	P			X	X	X	X	P
Alvarado Residence Hall Expansion	X	X	X		X	P	X	P	X
Student Housing (G Lot & Olmeca/Maya)	X	X	X		X	P	X	P	X
U Lot Residence	X	X	X		X	P	X	P	X

X = Anticipated
P = Potential

3.7.6 CUMULATIVE IMPACTS

Due to the existing developed nature of the Alvarado Creek floodplain area proposed for development, in combination with the proposed mitigation measures, the proposed project will not contribute to a cumulative change in discharge rates of the Alvarado Creek drainage. With respect to water quality, the proposed project's adherence to applicable county/city BMPs for water quality management is consistent with the overall regional objective of improving water quality. All SDSU projects located within the Alvarado Creek drainage are or will be planned, constructed, and managed in accordance with regional BMPs and discharge requirements. Adherence with regional standards would eliminate unlawful discharge quantities or poor water quality management practices from occurring on a cumulatively considerable scale. Therefore, the proposed project will not result in significant cumulative impacts to hydrology and water quality.

3.7.7 MITIGATION MEASURES

As discussed above, the proposed project would result in potentially significant impacts to hydrology and water quality. The mitigation measures set forth below incorporate site design, source control, and treatment control BMPs, and would mitigate all project impacts to a level below significant.

3.7.7.1 Component Specific Mitigation Measures

Adobe Falls Faculty/Staff Housing

HWQ-1 During the design phase of the Adobe Falls Faculty/Staff Housing component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Reserve the Alvarado Creek and nearby steep slope areas as open space;
2. Construct community streets, sidewalks and parking lot aisles to the minimum widths necessary;
3. Incorporate landscape treatment for parking lot runoff;
4. Use unit pavers or other equivalent porous material to construct walkways, alleys and other low-traffic areas;
5. Preserve existing native trees to maximize canopy interception and water conservation;

6. Plant native trees and maximize canopy interception and water conservation;
7. Drain rooftops into adjacent landscaping prior to discharging to the storm drain;
8. Vegetate slopes with native or drought tolerant vegetation; and
9. Install energy dissipaters at the outlets of new storm drains that enter the Alvarado Creek.

HWQ-2 Prior to the preparation of final design plans for the Adobe Falls Faculty/Staff Housing Upper and Lower Villages, SDSU, or its designee, shall conduct a detailed site-specific hydrologic analysis to further assess the effects of the proposed project on the floodplain. Based on the results of such analysis, on-site detention facilities may be required.

Alvarado Campus

HWQ-3 During the design phase of the Alvarado Campus component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Use unit pavers or other equivalent porous material to construct walkways, alleys and other low-traffic areas;
2. Preserve existing native trees to maximize canopy interception and water conservation;
3. Plant native trees and maximize canopy interception and water conservation;
4. Drain rooftops into adjacent landscaping prior to discharging to the storm drain; and
5. Install energy dissipaters at the outlets of new storm drains that enter Alvarado Creek.

HWQ-4 During the design phase of the proposed Alvarado Campus buildings, SDSU, or its designee, shall, to the maximum extent feasible, locate all building footprints outside of the 100-year floodplain. If location within the floodplain is necessary, then SDSU, or its designee, shall require that the first habitable floor of the buildings that are located within the 100-year floodplain of Alvarado Creek be situated at least one foot above 100-year flood levels to

ensure safety from floodwaters. SDSU, or its designee, also shall obtain flood insurance, to the extent required by law, to protect against any damage that might occur during a flood event.

Alvarado Hotel

HWQ-5 During the design phase of the Alvarado Hotel component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Preserve existing native trees to maximize canopy interception and water conservation;
2. Construct sidewalks and parking lot aisles to the minimum widths necessary;
3. Use unit pavers or other equivalent porous material to construct walkways, alleys, and other low traffic areas;
4. Plant native trees and maximize canopy interception and water conservation;
5. Drain rooftops into adjacent landscaping prior to discharging the storm drain; and
6. Install energy dissipaters, such as riprap, at the outlets of new storm drains that enter the Alvarado Creek.

HWQ-6 During the design phase of the proposed Alvarado Hotel, SDSU, or its designee, shall, to the maximum extent feasible, locate all building footprints outside of the 100-year floodplain. If location within the floodplain is necessary, then SDSU, or its designee, shall require that the first habitable floor of the building that is located within the 100-year floodplain of Alvarado Creek be situated at least one foot above 100-year flood levels to ensure safety from floodwaters. SDSU, or its designee, also shall obtain flood insurance, to the extent required by law, to protect against any damage that might occur during a flood event.

Campus Conference Center

HWQ-7 During the design phase of the Campus Conference Center component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Use unit pavers or other equivalent porous material to construct walkways, alleys, and other low-traffic areas;
2. Plant native trees and maximize canopy interception and water conservation; and
3. Drain rooftops into adjacent landscaping prior to discharging to the storm drain.

Student Union Expansion

HWQ-8 During the design phase of the Student Union Expansion component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Use unit pavers or other equivalent porous material to construct walkways, alleys and other low-traffic areas;
2. Plant native trees and maximize canopy interception and water conservation; and
3. Drain rooftops into adjacent landscaping prior to discharging to the storm drain.

Villa Alvarado Residence Hall Expansion

HWQ-9 During the design phase of the Villa Alvarado Residence Hall Expansion component of the proposed project, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Use unit pavers or other equivalent porous material to construct walkways, alleys and other low-traffic areas;
2. Construct sidewalks and parking lot aisles to the minimum widths necessary;
3. Preserve existing native trees to maximize canopy interception and water conservation;
4. Plant native trees and maximize canopy interception and water conservation;
5. Drain rooftops into adjacent landscaping prior to discharging to the storm drain; and
6. Install energy dissipaters, such as riprap, at the outlets of new storm drains that enter the Alvarado Creek.

Student Housing (G Lot, Olmeca/Maya, and U Lot Residence Halls)

HWQ-10 During the design phase of the G Lot, Olmeca/Maya, and U Lot Residence Halls, SDSU, or its designee, shall incorporate the following best management practices into the project site design:

1. Use unit pavers or other equivalent porous material to construct walkways, alleys, and other low-traffic areas;
2. Plant native trees and maximize canopy interception and water conservation; and
3. Drain rooftops into adjacent landscaping prior to discharging to the storm drain.

3.7.6.2 General Mitigation Measures

The following mitigation measure applies to each of the proposed project components:

HWQ-11 SDSU, or its designee, to the maximum extent feasible, shall require that:

1. Any/all hazardous materials stored on the project site are stored in enclosures, such as cabinets, sheds, or similar structures, that prevent contact with rain, runoff or spillage into the storm drain. (Where not covered by the aforementioned, polyethylene cover will be used.)
2. All trash containers utilized on the project site include attached covers to reduce pollution introduction into the drainage system.
3. The following best management practices are incorporated into the project site design, to the maximum extent feasible, to ensure efficient irrigation and reduce runoff from the site:
   (a) Rainfall shutoff devices shall be used to prevent irrigation during and after precipitation;
   (b) Irrigation systems shall utilize a dripping system to eliminate nuisance runoff; and
   (c) Backflow preventer/pressure regulators shall be used.
4. Stenciling is done on all site inlets to educate students and faculty on appropriate stormwater pollution prevention practices.
5. Compliance with the following practices to limit runoff contamination from pesticides:
   (a) Pesticides are used properly on the project site and shall be used as a last line of defense in the elimination of pests; and

(b) Physical pest elimination techniques, such as weeding and trapping, shall be utilized prior to the application of any pesticides.

6. Should dewatering be necessary during construction, all discharges be in accordance with San Diego Regional Water Quality Control Board ("RWQCB") requirements, which mandate that dewatered groundwater be used onsite as dust control or tanked and hauled to a legal disposal site for treatment. Dewatering shall not occur in Alvarado Creek nor be directed toward the storm drain system or sewer system. In addition, should dewatering be necessary during construction, a National Pollution Discharge Elimination System ("NPDES") dewatering permit shall be obtained from the RWQCB.
7. Appropriate shoring devices and a periodic dewatering system, if necessary, shall be installed below or near the groundwater table to reduce the potential for caving of excavations due to groundwater seeps.
8. Project design should attempt to mimic the natural hydrologic regime, and considers the use of biofilters, pervious paving, drainage inserts, and infiltration.
9. In order to ensure the long-term effectiveness of all best management practices ("BMPs"), the following maintenance activities shall be conducted, as specified:
   (a) All BMPs incorporated into the proposed project shall be inspected:
      (i) Once a month at a minimum;
      (ii) After every large storm event; and
      (iii) Semi-annually at the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows for the wetland.
   (b) Parking lots and sidewalks shall be swept as needed.
10. Long-term water quality impacts as a result of construction are minimized by complying with federal and state regulations for groundwater discharge into surface water bodies. These regulations include subsurface and surface drains in fill areas and behind retaining walls. These systems can reduce potential adverse impacts associated with seepage conditions. Appropriate shoring and possibly the installation of a periodic dewatering system below or near the

groundwater table may reduce the potential for caving or excavations due to groundwater seeps.

3.7.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

After application of the proposed mitigation measures, any potentially significant impacts relating to hydrology and water quality that are attributable to the development and operation of the proposed project would be reduced to a level below significant. Therefore, no unavoidable significant impacts are expected to result from the implementation of the proposed project.