5.5 HYDROLOGY AND WATER QUALITY

SUMMARY

The proposed stormwater drainage system would consist of a series of conveyance lines throughout the project site, two swales in the eastern portion of The Master's College campus and one swale south of the future 54-condominium unit development, two detention basins within the western portion of The Master's College campus and one detention basin adjacent to Newhall Creek within the western portion of the project site. Implementation of the proposed drainage system would effectively regulate flow, velocity, and quality of stormwater runoff from the site. As a result, impacts related to drainage patterns, watercourses, erosion, and water quality would be less than significant.

INTRODUCTION

Portions of the impact analysis contained in this section are based on the following studies that were prepared for the proposed project. Refer to **Appendix 5.5** for the following reports

- Pacific Advanced Civil Engineering, Inc., Technical Memorandum, 2008.
- Pacific Advanced Civil Engineering, Inc., Master's College Water Quality Technical Memo Addendum, 2007.
- Pacific Advanced Civil Engineering, Inc., Technical Memorandum, Master's College, 2007.

EXISTING CONDITIONS

The watershed subareas for the existing and developed conditions were delineated based on the existing topography, proposed grading, and entry points into the proposed and existing drainage system. See **Figure 5.5-1, Existing Drainage Conditions,** and **Figure 5.5-2, Proposed Drainage Conditions,** for delineation of the both existing and proposed watershed(s).

Regional Setting

The proposed project site is located in the Eastern Subarea of the Upper Santa Clara River Hydrologic Area in the Santa Clarita Valley.[1] The Santa Clarita Valley lies near the center of the Transverse Range geomorphic province, and drains a watershed area of approximately 500 square miles. The Eastern Subarea is the largest and most developed groundwater basin in the Santa Clara River Hydrologic Area. The near surface geology of the basin consists of Holocene alluvium, Pleistocene terrace deposits, and the

1 California Department of Water Resources (DWR), (1993).

plio-Pleistocene Saugus Formation. Locally, groundwater for beneficial use is withdrawn from the Saugus Formation. In addition to groundwater in the Saugus Formation, groundwater is present in the alluvial soils beneath Placerita Canyon.

The Santa Clarita Valley experiences a Mediterranean climate. The annual precipitation in the region can range from less than 10 inches during drought conditions to near 40 inches in a heavy rainfall year. Approximately 90 percent of the annual rainfall in the Santa Clarita Valley occurs in the winter months from November through March. Occasional summer rainstorms account for the remaining rainfall.

There are no perennial surface water bodies in the proposed project area.

Site Conditions

The project site is located within Placerita Canyon and lies within two large regional watersheds, the Placerita Creek watershed and the Newhall Creek watershed. Newhall Creek runs in a north-south direction generally along the southern portion of the project site. Stormwater runoff in the project area drains into Newhall Creek via surface streets on the campus and adjacent areas between Placerita Canyon Road on the north and Newhall Avenue on the south. The rural character of Placerita Canyon, that is the lack of impermeable surfaces, allows for considerable absorption of rainfall and surface water. Low development intensity and soil conditions consisting primarily of river gravel contribute to this high absorption rate. Due to the rural character of the area, stormwater is conveyed through creeks, streambeds and the rural roadways through the canyon.

The majority of The Master's College site (44.8 acres) lies within the Placerita Creek watershed, while the remainder of the site (29.2 acres) lies within the south watershed and is tributary to Newhall Creek. The developed portion of the project site is hydrologically characterized as institutional.

The portion of the project site between Placerita Canyon Road and Newhall Creek consists of moderately steep rolling hillsides with a non-linear, but rough east/west trending ridgeline. Elevations within this area of the campus range from approximately 1,455 feet above mean sea level (msl) at the ridgeline to about 1,275 feet above msl at Newhall Creek. Slope gradients are primarily 2:1 (horizontal to vertical) or less. Areas on this part of the campus that are south of the existing buildings along Placerita Canyon Road have slope gradients that are typically steeper than 15 percent.

The portions of the campus north of Placerita Canyon road are generally flat with a slight gradient down to the west. Elevations in this area range from about 1,300 feet above msl near the northeast property corner to 1,285 feet above msl near the western edge of the property.

The entire developed portion of the site lies within the north watershed and is tributary to Placerita Creek. The existing condition percentage imperviousness for the north watershed is 46 percent. In the existing condition, the entire south watershed tributary to Newhall Creek is undeveloped. Existing drainage areas for the proposed project area are shown in **Figure 5.5-1, Existing Drainage Conditions.**

Hillside areas above the creekbed have highly erodible soils and may be subject to washing from the hillside.

REGULATORY SETTING

The proposed project must comply with Standard Urban Runoff Management Plan (SUSMP) requirements for Los Angeles County and requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit for LA County under Section 402 of the Clean Water Act, Section 6217 of the Coastal Zone Act Reauthorization Amendments, and the California Water Code. The Clean Water Act amendments of 1987 established a framework for regulating stormwater discharges from municipal, industrial, and construction activities under the NPDES program. The primary objective of the program requirements are to

- effectively prohibit non-stormwater discharges, and
- reduce the discharge of pollutants from stormwater conveyance systems to the Maximum Extent Practicable (MEP) statutory standard.

National Pollutant Discharge Elimination System

Clean Water Act regulations require a National Pollutant Discharge Elimination System (NPDES) permit for discharge of stormwater associated with construction activity that will either discharge directly to surface waters or indirectly through municipal storm sewers. In California, these regulations are implemented through the Statewide General Permit No. CAS000001 regulated by the State Water Resources Control Board (SWRCB). Phase I of the NPDES Storm Water Program addresses discharges from large construction activities disturbing 1 acre or more of land. Phase II covers additional, smaller, construction activities.

In addition, a municipal storm water NPDES permit was issued to Los Angeles County and 85 cities within the County by the Los Angeles Regional Water Quality Control Board (RWQCB) on June 15, 1996, that requires the development of a SUSMP to address storm water pollution from new development and redevelopment by the private sector. The SUSMP for Los Angeles County and Cities in Los Angeles County (March 2000) contains minimum required Best Management Practices (BMPs) that must be used

for designated projects. Therefore, the proposed project must comply with this SUSMP and incorporate its minimum BMPs into project plans.

PROJECT IMPACTS

Significance Threshold Criteria

According to the City of Santa Clarita Environmental Guidelines, a project would have a significant effect on the environment if it would

- violate any water quality standards or waste discharge requirements;
- 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;
- 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 which would result in flooding on or off site;
- create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- result in changes in the rate of flow, currents, or the course and direction of surface water and/or groundwater;
- result in other modifications of a wash, channel creek or river; and/or
- impact stormwater management in any of the following ways:

  (i) Impact stormwater runoff during project construction or post-construction

  (ii) Significant and adverse increase in flow velocity or volume of storm water runoff

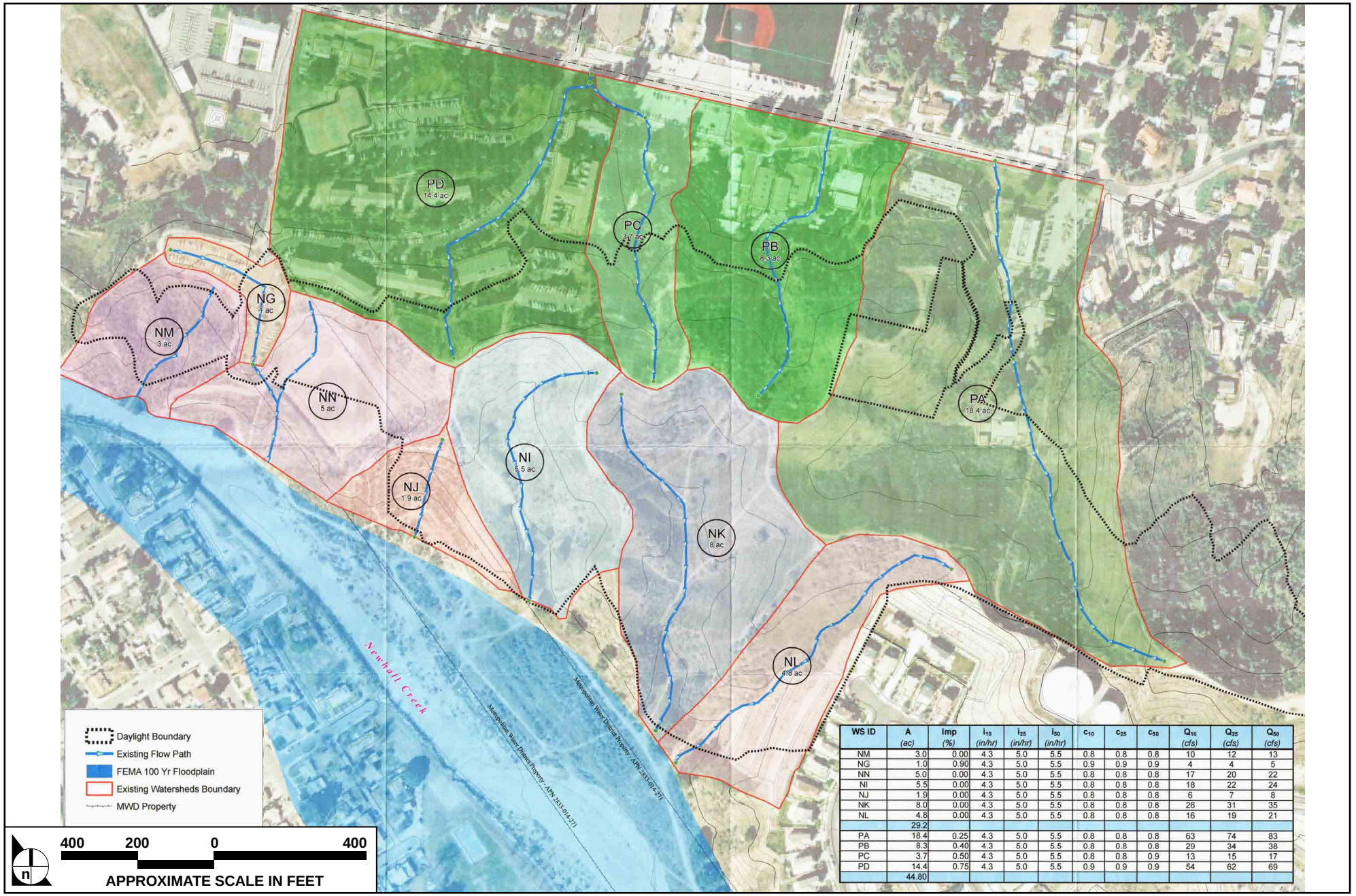
  (iii) Result in stormwater discharges that would significantly impair or contribute to the impairment of the beneficial uses of receiving waters or areas that provide water quality benefits (e.g., riparian corridors, wetlands, etc.)

  (iv) Cause harm to the biological integrity of drainage systems, watersheds, and/or water bodies

Project Conditions

Stormwater Drainage

The proposed stormwater drainage system would consist of a series of conveyance lines throughout the project site, two swales in the eastern portion of The Master's College campus and one swale south of the 54-condominium unit development, two detention basins within the western portion of The Master's

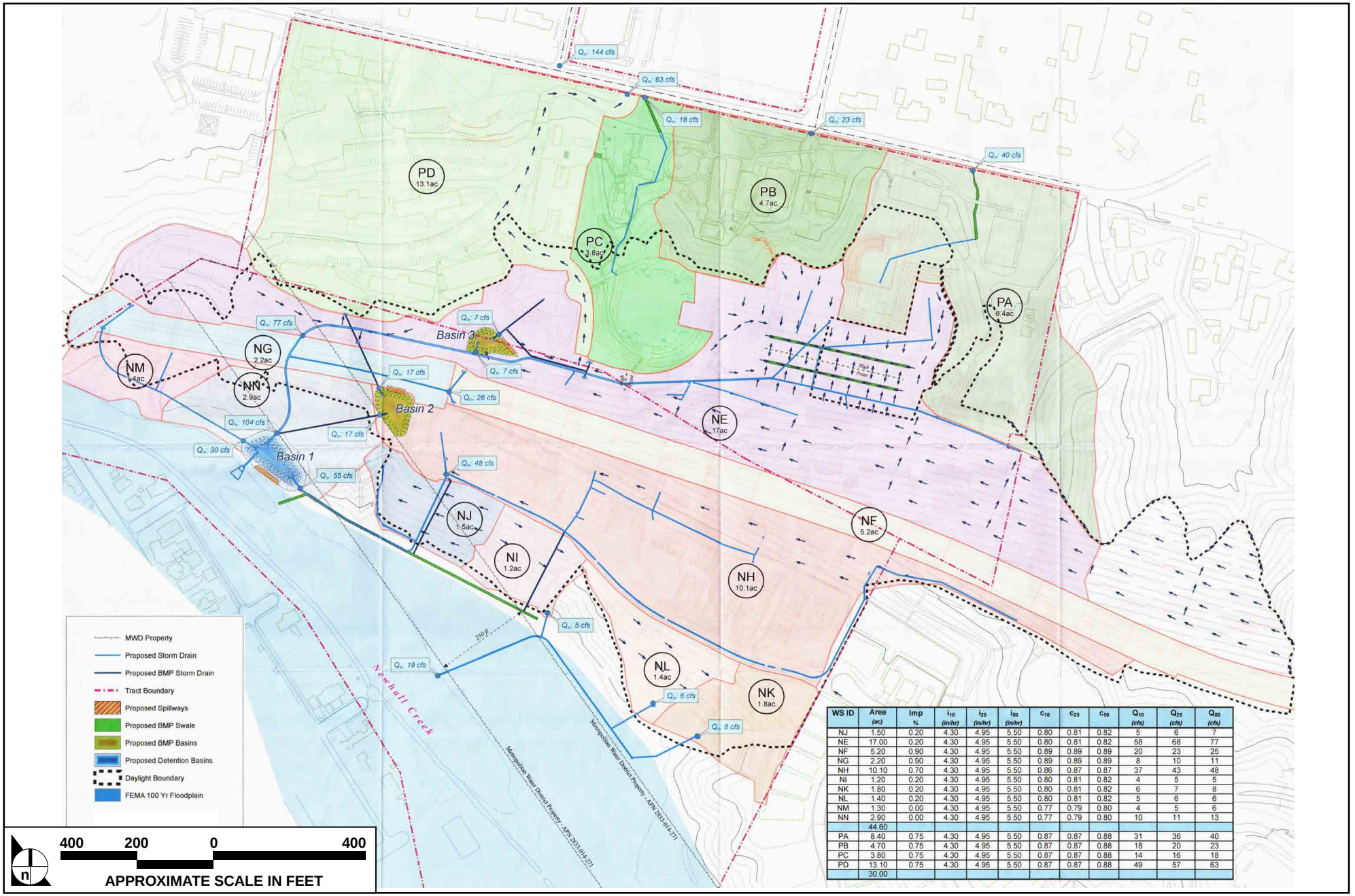


WS ID	A (ac)	Imp (%)	i_{10} (in/hr)	i_{25} (in/hr)	i_{50} (in/hr)	c_{10}	c_{25}	c_{50}	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)
NM	3.0	0.00	4.3	5.0	5.5	0.8	0.8	0.8	10	12	13
NG	1.0	0.90	4.3	5.0	5.5	0.9	0.9	0.9	4	4	5
NN	5.0	0.00	4.3	5.0	5.5	0.8	0.8	0.8	17	20	22
NI	5.5	0.00	4.3	5.0	5.5	0.8	0.8	0.8	18	22	24
NJ	1.9	0.00	4.3	5.0	5.5	0.8	0.8	0.8	6	7	8
NK	8.0	0.00	4.3	5.0	5.5	0.8	0.8	0.8	26	31	35
NL	4.8	0.00	4.3	5.0	5.5	0.8	0.8	0.8	16	19	21
	29.2										
PA	18.4	0.25	4.3	5.0	5.5	0.8	0.8	0.8	63	74	83
PB	8.3	0.40	4.3	5.0	5.5	0.8	0.8	0.8	29	34	38
PC	3.7	0.50	4.3	5.0	5.5	0.8	0.8	0.9	13	15	17
PD	14.4	0.75	4.3	5.0	5.5	0.9	0.9	0.9	54	62	69
	44.80										

SOURCE: PACE - May 2007

FIGURE **5.5-1**

Existing Drainage Conditions



WS ID	Area (ac)	Imp %	i_{10} (in/hr)	i_{25} (in/hr)	i_{50} (in/hr)	c_{10}	c_{25}	c_{50}	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)
NJ	1.50	0.20	4.30	4.95	5.50	0.80	0.81	0.82	5	6	7
NE	17.00	0.20	4.30	4.95	5.50	0.80	0.81	0.82	58	68	77
NF	5.20	0.90	4.30	4.95	5.50	0.89	0.89	0.89	20	23	25
NG	2.20	0.90	4.30	4.95	5.50	0.89	0.89	0.89	8	10	11
NH	10.10	0.70	4.30	4.95	5.50	0.86	0.87	0.87	37	43	48
NI	1.20	0.20	4.30	4.95	5.50	0.80	0.81	0.82	4	5	5
NK	1.80	0.20	4.30	4.95	5.50	0.80	0.81	0.82	6	7	8
NL	1.40	0.20	4.30	4.95	5.50	0.80	0.81	0.82	5	6	6
NM	1.30	0.00	4.30	4.95	5.50	0.77	0.79	0.80	4	5	6
NN	2.90	0.00	4.30	4.95	5.50	0.77	0.79	0.80	10	11	13
	44.60										
PA	8.40	0.75	4.30	4.95	5.50	0.87	0.87	0.88	31	36	40
PB	4.70	0.75	4.30	4.95	5.50	0.87	0.87	0.88	18	20	23
PC	3.80	0.75	4.30	4.95	5.50	0.87	0.87	0.88	14	16	18
PD	13.10	0.75	4.30	4.95	5.50	0.87	0.87	0.88	49	57	63
	30.00										

SOURCE: PACE - May 2007

FIGURE **5.5-2**

Proposed Drainage Conditions

College campus and one detention basin adjacent to Newhall Creek within the western portion of the project site. **Figure 2.0-14**, **Proposed Stormwater Conveyance System**, shows the components of the proposed system throughout the project site.

The proposed project would be implemented in phases with the installation of irrigation, drainage and landscaping to be completed in Phase 1 of master plan implementation, which would occur from June 2009 through June 2011. In the proposed condition, percentage imperviousness for the north watersheds that are tributary to Placerita Creek are 30.0 percent; the percentage impervious value for south watershed tributary to Newhall Creek is 44.8 percent.[2] As shown in **Table 5.5.-1**, **Drainage Area Imperviousness Summary,** the proposed project would increase impervious area on the project site by 0.6 percent. The proposed drainage areas analyzed are shown in **Figure 5.5.-2, Proposed Drainage Conditions**.

Table 5.5-1
Drainage Area Imperviousness Summary

	Existing Conditions		Proposed Conditions	
Drainage Area	**Area (ac)**	**% Impervious**	**Area (ac)**	**% Impervious**
		North Watersheds		
NE	NA	NA	17.0	0.20
NF	NA	NA	5.2	0.20
NG	1.0	0.90	2.2	0.90
NH	NA	NA	10.1	0.70
NI	5.5	0.00	1.2	0.20
NJ	1.9	0.00	1.5	0.20
NK	8.0	0.00	1.8	0.20
NL	4.8	0.00	1.4	0.20
NM	3.0	0.00	1.3	0.00
NN	5.0	0.00	2.9	0.00
Subtotal	**29.2**		**44.6**	
		South Watersheds		
PA	18.4	0.25	8.4	0.75
PB	8.3	0.40	4.7	0.75
PC	3.7	0.50	3.8	0.75
PD	14.4	0.75	13.1	0.75
Subtotal	**44.8**		**30.0**	
Total	**74.0**		**74.6**	

Source: PACE, May 2007, Tables 1 and 2.
The analysis includes portions of the project site which would be modified from a drainage perspective.

2 Pacific Advantage Civil Engineering (PACE), Inc., "Technical Memorandum Master's College," May 2007, 2.

The results of the hydrologic calculations for proposed condition are summarized in **Table 5.5-2, Hydrology Conditions for 10-, 25-, and 50-Year Storm Events**. As shown, the stormwater runoff from the project site will increase during the various events; these increase range from 13 cubic feet per second (cfs) to 15 cfs for the total project site.

The project proposes to manage the increases in stormwater runoff by installing three detention basins on the project site (see **Figure 5.5-2**). These basins will detain flow from the drainage areas proximate to the extension of Dockweiler Drive. **Table 5.5-3, Detention Basin Storage Volume**, provides the detention basin volume requirement for the proposed project condition. With the implementation of these basins, stormwater flows would be reduced to acceptable levels.

Table 5.5-2
Hydrology Conditions for 10-, 25-, and 50-Year Storm Events

	Existing Conditions				Proposed Conditions			
Drainage Area	**Area (ac)**	**Q_{10} (cfs)**	**Q_{25} (cfs)**	**Q_{50} (cfs)**	**Area (ac)**	**Q_{10} (cfs)**	**Q_{25} (cfs)**	**Q_{50} (cfs)**
NE	NA	NA	NA	NA	17.0	58	68	77
NF	NA	NA	NA	NA	5.2	20	23	25
NG	1.0	4	4	5	2.2	8	10	11
NH	NA	NA	NA	NA	10.1	37	43	48
NI	5.5	18	22	24	1.2	4	5	5
NJ	1.9	6	7	8	1.5	5	6	7
NK	8.0	26	31	35	1.8	6	7	8
NL	4.8	16	19	21	1.4	5	6	6
NM	3.0	10	12	13	1.3	4	5	6
NN	5.0	17	20	22	2.9	10	11	13
Subtotal	**29.2**	**97**	**115**	**128**	**44.6**	**157**	**184**	**206**
PA	18.4	63	74	83	8.4	31	36	40
PB	8.3	29	34	38	4.7	18	20	23
PC	3.7	13	15	17	3.8	14	16	18
PD	14.4	54	62	69	13.1	49	57	63
Subtotal	**44.8**	**159**	**185**	**207**	**30.0**	**112**	**129**	**144**
Total	**74.0**	**256**	**300**	**335**	**74.6**	**269**	**313**	**350**

Sources, PACE, May 2007, Figures 1 and 2.

Table 5.5-3
Detention Basin Storage Volume

Area (ac)	Existing condition Q_{50} (cfs)	Proposed condition Q_{50} (cfs)	Assumed Time of Concentration (min)	Detention Volume Required (ac ft)
44.6	129	206	5	0.53

Source: PACE, May 2007, Table 5.

The proposed detention basins would receive flow from the mainline storm drain system via a low-flow diversion system. The low-flow diversion was designed for the two-year storm event; however, it also limits the peak flowrate delivered to the diversion system. The two-year storm event is a storm with a return period of two years and is used a standard design parameter in stormwater management facilities. The two-year storm volume captured in the basin would be drained from the basin over a 48-hour period providing sufficient settling and treatment time without providing sufficient time for vector growth. An emergency overflow spillway is only activated in the event that the calculated two-year storm volume is exceeded and/or the low-level outlet facilities are clogged.

Water Quality

The SUSMP was developed as part of the municipal stormwater program to address stormwater pollution from new development and redevelopment by the private sector. The SUSMP contains a list of the minimum required BMPs that must be used for a designated project. The proposed water quality BMPs associated with the site development plan meets the minimum requirements of the SUSMP and NPDES as shown in **Table 5.5-4, Proposed BMP Calculations**.

Vegetated detention basins appear to have greater pollutant removal than concrete basins; therefore, the slopes of the proposed detention basins will be vegetated.

Dry Extended Detention Basin BMP Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for a minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage. Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate.

Table 5.5-4
Proposed BMP Calculations

Drainage Area	Area (ac)	Water Quality Flows (in/hr)	Water Quality Volume (in)	Imperviousness	Flow (Q) (cfs)	BMP Volume (ac ft)	BMP Feature
NG	2.2	0.2	0.75	0.9		0.2	Basin 1
NF	5.3	0.2	0.75	0.9		0.4	Basin 2
NE-3	3.0	0.2	0.75	0.8		0.2	Basin 2
NE-2	1.5	0.2	0.75	0.8		0.1	Basin 3
NE-1	4.6	0.2	0.75	0.8	0.7		Swale NE
NH	10.1	0.2	0.75	0.7	1.4		Swale NH
PA	8.4	0.2	0.75	0.8	1.4		Swale PA
PC	3.8	0.2	0.75	0.9	0.7		Swale PC

Source: PACE, May 2007, Table 6.

Extended detention basins can provide substantial capture of sediment and the toxics associated with particulates. Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

Vegetated Swale BMP Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems. If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

In order to increase the effectiveness of vegetated swales, check dams have been incorporated into the design when slopes exceed 2 percent at approximately 50-foot increments along their length. These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

The vegetated swales have been incorporated into the roadside areas and into the front yard area of individual lots where it was not possible to direct runoff from these areas to an extended detention basin due to site topography and grading limitations. In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5 percent.

Project Impacts

As shown in **Table 5.5-1**, the impervious areas for the project site would increase after project buildout. Additionally, as shown in **Table 5.5-2**, the volume of surface water runoff during the 10-, 25-, and 50-year storm events would also increase. Although the project would increase the amount of impervious area on the project site, the project provides for the use of on-site detention basins to capture increased stormwater and surface water flow that would result from increased impervious areas. These detention basins would reduce the velocities of stormwater flow and retain excess stormwater on site. Therefore, impacts related to stormwater runoff would be less than significant.

The proposed project would not substantially alter the existing drainage pattern of the site or area. Drainage pattern changes would be restricted to the project site and would not change the course of Newhall Creek. While the project involves the movement of 1.2 million cubic yards of soil, graded areas would be paved or landscaped and, therefore, the proposed project would not result in modifications to existing landforms that would result in substantial erosion or siltation on or off site. Additionally, the project applicant would be required to secure an NPDES permit in accordance with the provision set forth in the California Statewide General Permit No. CAS000001 and regulated by the State Water Quality Control Board (SWQCB). The project applicant would also be required to develop and implement a SUSMP under the provisions set forth by the Los Angeles RWQCB. Impacts related to drainage patterns and erosion would be less than significant.

The proposed project would not substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site. The proposed project, after completion, would result in an increase in impervious area and surface water runoff. However, as previously discussed, the project would construct three detention basins on site that would reduce the velocities and flows to acceptable levels. Therefore, impacts would be less than significant.

The proposed project would not create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. As previously discussed, the project would result in increased surface water flows. However, as shown in **Tables 5.5-1** and **5.5-2**, these flows would be incremental. With the construction of the proposed

detention basins, these flows would be reduced to acceptable levels. Therefore, impacts would be less than significant.

As previous discussed, the proposed project would not result in changes in the rate of flow, currents, or the course and direction of surface water and/or groundwater. The project site is located in Placerita Canyon and along Newhall Creek, and is tributary to the Eastern Subarea of the Santa Clara River Hydrologic Area, within the Santa Clarita Valley. The proposed project does not include any features that would result in changing the course or direction of Newhall Creek. Therefore, impacts would be less than significant.

Stormwater from the proposed project would be managed in accordance with the requirements established by the City and the Los Angeles County Flood Control District (LACFCD). During construction, the applicant will be required to obtain a NPDES permit and prepare a SUSMP to manage surface water flows and reduce impacts. BMPs set forth by the most recent version of the SUSMP for Los Angeles County and Cities in Los Angeles County would be implemented. The project would not result in significant and adverse increase in flow velocity or volume of storm water runoff. As shown previously, the project would result in increased surface water flows. However, these would incrementally increase (less than 15 cfs during the 50-year event) and would be controlled through the use of on-site features including detention basins and swales. Therefore, impacts would be less than significant.

The proposed project is upstream for areas within Placerita Canyon that currently extract groundwater for beneficial use. The proposed project includes features, as illustrated in the water quality discussion above, that would reduce and/or eliminate potential contaminants from surface water flows (such as grease and oils from street and parking areas) from entering the groundwater system. While the proposed project would result in increased development north of Newhall Creek, the project would not result in impacts to the creek that would impair water quality or cause harm to the biological integrity of drainage systems, watersheds, and/or water bodies. Therefore, impacts would be less than significant.

MITIGATION MEASURES ALREADY INCORPORATED INTO THE PROJECT

Compliance with Required Permits

The proposed project would be required to obtain a NPDES permit in accordance with the requirements of the California Statewide General Permit No. CAS000001, as regulated by the SWRCB.

The project would be required to develop and implement a SUSMP in accordance with the practices set forth by the Los Angeles RWQCB and provided in the SUSMP for Los Angeles County and Cities in Los Angeles County (March 2000).

Operation and Maintenance

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation management to ensure that the basin dewaters completely in 48 to 72 hours is sufficient to prevent creating mosquito and other vector habitats.

Mowing would be done at least quarterly to avoid establishment of woody vegetation and for aesthetic considerations.

Typical maintenance activities and frequencies would include the following:

- Semi-annual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
- Removal of accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be increased to meet specific site conditions, but semiannual is the minimum recommended frequency. Removed debris must be properly disposed of at facilities appropriate for processing of disposal materials.
- Trimming of vegetation at the beginning and end of the wet season and on a quarterly basis combined with monthly inspections to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Removal of accumulated sediment and regarding of the basin bottom when accumulated sediment volume exceeds 2 percent of the basin volume. Inspect the basin each year for accumulated sediment volume. Removed sediments must be properly disposed of at facilities appropriate for handling and processing of disposal materials. Disposal of soils may require permits from jurisdictional agencies.
- Inspect facility after first large storm to determine whether the desired residence time has been achieved. The outlet orifice should be included in the inspection routine. Inspector should verify that flow through additional openings, such as bolt holes, does not occur.

The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities would include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris

and blockages. Cuttings would be removed from the channel and disposed of in a local composting facility. Accumulated sediment would also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal. Additionally, the project would implement the following considerations:

- Damaged areas within a channel should be repaired. If the channel develops ruts or holes, it shall be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover shall be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed of to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed of in accordance with local or state requirements. Typical maintenance of grass swales is summarized below:

  - Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale shall be checked for debris and litter, and areas of sediment accumulation.

  - Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.

  - Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.

  - Sediment accumulating near culverts and in channels shall be removed when it builds up to 75 millimeters (3 inches) at any spot, or covers vegetation.

  - Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g., debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

The Master's College shall be responsible for those drainage features located on the college campus site. The City of Santa Clarita shall maintain the surface drainage devices (i.e., terraces, drainages, and swales) located on parcels dedicated for City use. The stormdrain systems and detention basins will be designed to LACFCD standards and owned and maintained by LACFCD at completion of construction.

MITIGATION MEASURES RECOMMENDED BY THIS EIR

The proposed project would not result in significant hydrology and water quality impacts; consequently, no mitigation measures are recommended by this EIR.

CUMULATIVE IMPACTS

Impacts resulting from cumulative development within the Eastern Subarea of the Santa Clara River Hydrologic Area would include increased runoff from development. As such, increased surface water flows into the Santa Clara River would result. However, all projects would be required to implement measures to reduce flows and impacts. All projects would be required to comply with the Statewide General NPDES Permit. Depending upon size (larger or smaller than 1 acre), the specific requirements of either Phase I or Phase II would apply. Additionally, projects in Los Angeles County would be required to develop and implement a SUSMP in accordance with the County's 2000 SUSMP manual. With the implementation of these measures, cumulative impacts would be less than significant.

CUMULATIVE MITIGATION MEASURES

No significant cumulative impacts to hydrology and water quality would result from buildout, which would include the proposed project; consequently, no mitigation measures are recommended by this EIR.

UNAVOIDABLE SIGNIFICANT IMPACTS

Project-Specific Impacts

No significant project-specific impacts to hydrology and water quality would occur with project implementation.

Cumulative Impacts

No significant cumulative impacts to hydrology and water quality would result from Valley buildout, which would include the proposed project.