4.10 Hydrology and Water Quality

This section describes the existing hydrology and water conditions on the UCR campus and throughout the region and analyzes the potential for the proposed 2021 LRDP to affect water quality, including resulting in substantial siltation or erosion, cause flooding due to the alteration of drainage patterns, or to deplete groundwater supplies or interfere with groundwater recharge. Potential effects related to overall water supply or the potential need for construction of new or expanded stormwater infrastructure are discussed in Section 4.17, *Utilities and Service Systems*.

4.10.1 Environmental Setting

Surface Water

Hydrologic Units and Watersheds

A hydrologic unit is a drainage area in a multi-level drainage system with boundaries that are defined by hydrographic and topographic criteria specifying an area of land upstream from a specific point on a river, stream, or other surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas and indirectly from associated surface areas such as remnant, non-contributing, and diversions to form a drainage area with single or multiple outlet points. A watershed is an area of land where all of the water that originates or falls in it or drains off of it collects into the same surface body of water (i.e., river, lake, ocean). Hydrologic units are only synonymous with watersheds when the boundaries include all the source area contributing surface water to a single defined outlet point (USDA 2020).

The UCR campus is located in the Santa Ana River Hydrologic Unit in the South Coast Hydrologic Region, in the management area of the Santa Ana Regional Water Quality Control Board (RWQCB) and subject to the management direction of the Basin Plan for the Santa Ana Region (Santa Ana RWQCB 2019). The Santa Ana River flows over 100 miles from the San Bernardino Mountains to the Pacific Ocean. The Santa Ana River is the receiving water for over 2,700 square miles covering portions of San Bernardino, Riverside, and Orange Counties. The Santa Ana RWQCB governs basin planning and water quality in the Santa Ana River Hydrologic Unit. The UCR Campus is in the Middle Santa Ana River Watershed, which lies within the Santa Ana River Hydrologic Unit.

MIDDLE SANTA ANA RIVER WATERSHED

Reach 3 of the Santa Ana River is the receiving water for the majority of the City of Riverside (City), including the UCR campus (City of Riverside 2007). The Santa Ana River and its watershed are shown in Figure 4.10-1. Surface waters start in the upper zone of the Santa Ana River Watershed, primarily the San Bernardino, Santa Ana, and San Jacinto Mountains. Flows consist mainly of snowmelt from the surrounding mountains and stormwater from watershed. Tributaries to the Middle Santa Ana River (Reaches 3 and 4) include: Temescal Creek (Reaches 1-6), Tequesquite Arroyo (Sycamore Creek), Day Creek, and San Sevaine Creek. Cities in the Middle Santa Ana River Watershed include Corona, Eastvale, Jurupa Valley, Moreno Valley, Norco, and Riverside (Riverside County Flood Control and Conservation District [RCFCWCD] 2017).

Records show that average annual rainfall is approximately 8.4 inches, with monthly averages ranging from 0 to 1.9 inches. Most rainfall typically occurs from November through April (Jurupa Community Services District [JCSD] 2016).

Figure 4.10-1 Santa Ana River Watershed Boundary and Santa Ana River Reaches

Imagery provided by Google and its licensors © 2018.

UCR is further part of two sub-watersheds in the Middle Santa Ana River Watershed. The northern portion of East Campus drains to the Tequesquite Arroyo Watershed, while the southern portion of East Campus and most of West Campus drains to the East Etiwanda Creek-Santa Ana River Watershed. The Tequesquite Arroyo Watershed (Hydrologic Unit Code 180702030802) is 19,030 acres. The East Etiwanda Creek-Santa Ana River watershed (Hydrologic Unit Code 180702030804) is 138,519 acres. Both watersheds drain to Middle Santa Ana River.

TEQUESQUITE ARROYO SUB-WATERSHED

The 30-square-mile Tequesquite Arroyo Sub-watershed stretches from the Santa Ana River to the west to the western edge of Moreno Valley in the east. The northern edge of this sub-watershed overlays most of the Academic Center and the southwestern portions of East Campus as well as the southern portion of West Campus (UC Davis 2021a).

EAST ETIWANDA CREEK-SANTA ANA RIVER SUB-WATERSHED

The 216.6-square-mile triangular-shaped East Etiwanda Creek-Santa Ana River Sub-watershed covers the middle portion of the Santa Ana River, the northern area of the City, and southern San Bernardino County. The southern edge of this sub-watershed overlays the northern and eastern portions of the UCR campus, including the UCR Botanic Gardens, areas east and north of the Academic Center in East Campus, and the northern portion of West Campus south of University Avenue (UC Davis 2021b).

Drainages and Drainage Patterns

Several arroyos, or dry creeks that experience flows in direct response to precipitation events in the City are tributaries to the Santa Ana River; portions are in their natural state, disturbed by human activities, and piped under urbanized areas before they reach the Santa Ana River. The major arroyos include Springbrook Wash, Tequesquite Arroyo, Alessandro Arroyo, Prenda Arroyo, Woodcrest Arroyo, and Mockingbird Canyon (City of Riverside 2007).

The general flow of runoff on the UCR campus is in a northwesterly direction (2021 LRDP). As such, the majority of runoff entering the UCR campus does so from the east. The existing storm drain network serving the UCR campus is comprised of UCR, City, and county drainage facilities. On-site and off-site stormwater is collected and discharged through overland flow, underground storm drains, and natural arroyos that ultimately discharge to open channel arroyos and large-diameter county drainage infrastructure.

Two major lines provide stormwater drainage on the UCR campus. The main line, known as the University Arroyo system, conveys the majority of stormwater runoff that flows toward and through campus from the east. Surface water runoff is collected by an inlet structure located near Valencia Hill Drive and Big Springs Road and is conveyed by the University Arroyo system in an east-west alignment through campus between Valencia Hill Drive and Canyon Crest Drive. The University Arroyo system discharges runoff to the Gage Detention Basin north of University Avenue at Canyon Crest Drive. Discharge is conveyed through aboveground swales, a 72-inch pipe, and finally a seven-foot-diameter box culvert (UCR 2016a). Surfaces in the University Arroyo system consist of both impermeable materials, such as concrete and asphalt that are used to construct the inlet and culvert facilities, as well as permeable materials, such as soils and vegetation that form the natural channel base. The composition of impermeable versus permeable materials present in the University Arroyo system has been shaped by previous and ongoing development.

Lateral lines drain the north, south, and east areas of East Campus. A second major storm drain on campus is in West Campus, east of Chicago Avenue and south of Martin Luther King Boulevard, known as the Box Springs Arroyo system. It handles runoff that accumulates from the foothills near the freeway and from the Agricultural Operations area south of Martin Luther King Boulevard. The Agricultural Operations area consists of mainly unpaved permeable areas, with no subsurface storm drains or catch basins (UCR 2015). No agricultural research irrigation runoff enters into the Box Springs Arroyo conveyance. The agricultural research lands include efficient irrigation system including drainage lines that capture any runoff for recirculation via a salvage and earthen reservoir system. Surface water resources and drainages on and near the UCR campus are shown in Figure 4.10-2 and described below.

UNIVERSITY ARROYO SYSTEM

The majority of East Campus is located in the 2,294-acre University Arroyo system, generally defined by the Box Springs Mountains and the campus hills on the east and south, the I-215/SR 60 freeway on the west, and a line that follows West Linden Street, Valencia Hill Drive (north of the railroad), and the local foothills in the vicinity of Mount Vernon Drive on the north. Steep canyon tributaries from the mountains discharge surface runoff onto broad alluvial fans toward a confluence at Islander Park east of Watkins Drive. Surface runoff then flows westward towards UCR along Big Springs Road (UCR 2005).

The University Arroyo traverses along Big Springs Road, North Campus Drive, and University Avenue. Portions of this drainage have been channelized and are diverted underground via culverts. The University Arroyo has three on-campus tributaries: an unnamed arroyo, which enters the campus west of Valencia Hill Drive and traverses between the Pentland Hills and Lothian Residence Halls, the UCR Botanic Gardens Arroyo, which has two minor tributary channels and traverses the UCR Botanic Gardens and then traverses northwest towards East Campus Drive, and a small unnamed arroyo, which parallels East Campus Drive into the UCR Botanic Gardens tributary just east of Parking Lot 10 (UCR 2011). The western end of University Arroyo, north of University Avenue and west of Canyon Crest Drive is referred to as Gage Basin.

The unnamed northern tributary to the University Arroyo daylights from underground piping from Valencia Hill Drive northeast of the campus and traverses between Pentland Hills Residence Hall and Lothian Residence Hall to the glade at the northeast corner of Aberdeen Drive and North Campus Drive. Near Valencia Hill Drive, the arroyo has been stabilized as part of the Glen Mor 2 Arroyo Improvements Project. Gabion Walls have been added to stabilize and restore the meandering stream without restricting its flow. It is now a restored natural plant community and wildlife habitat (UCR 2020a). Figure 4.10-3 shows an aerial photo of the restored area.

Figure 4.10-2 Water Resources and Drainages On and Proximate to UCR Campus

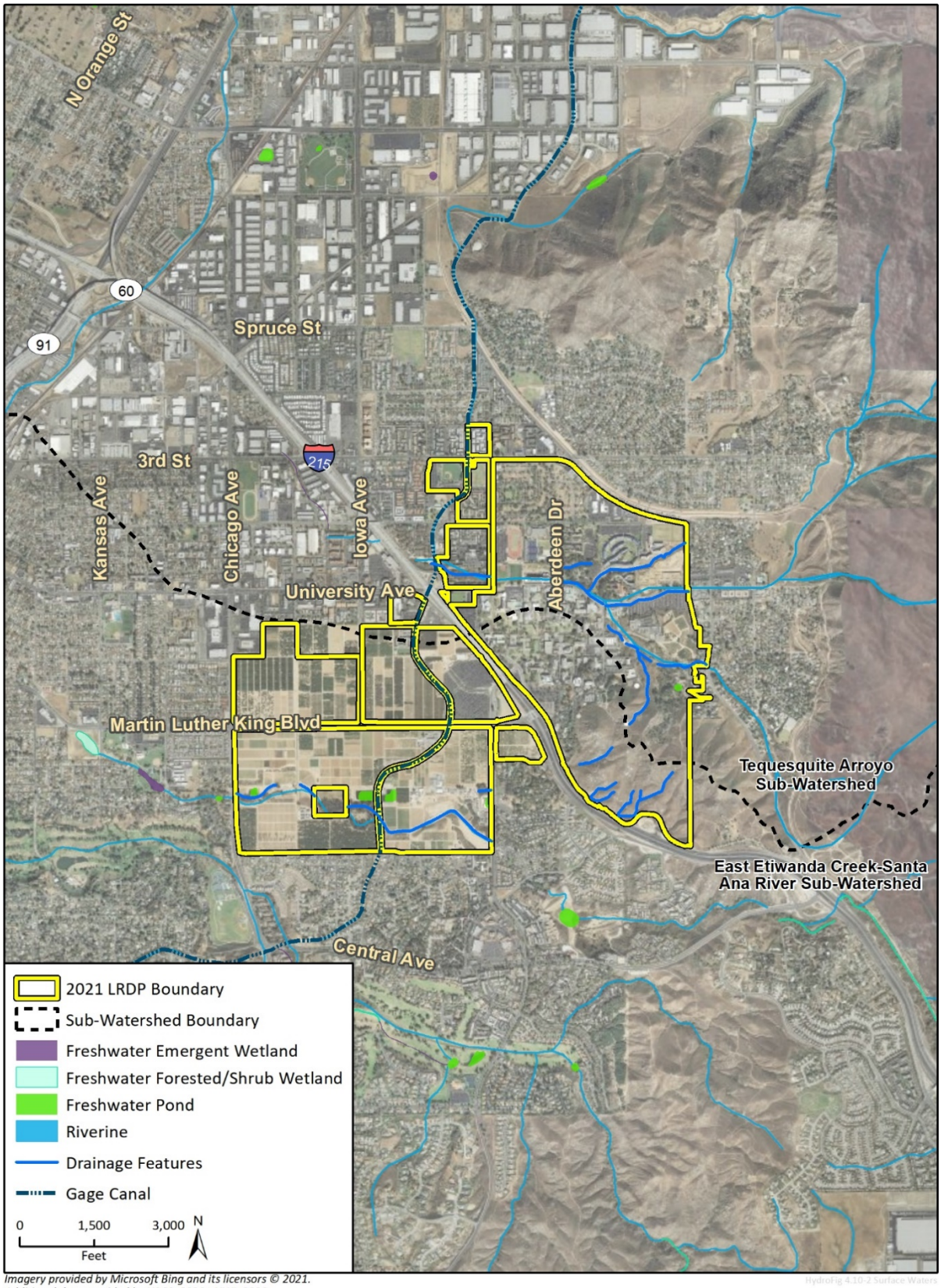


Figure 4.10-3 University Arroyo Tributary Looking Southwest

Photo credit: Stephanie Tang

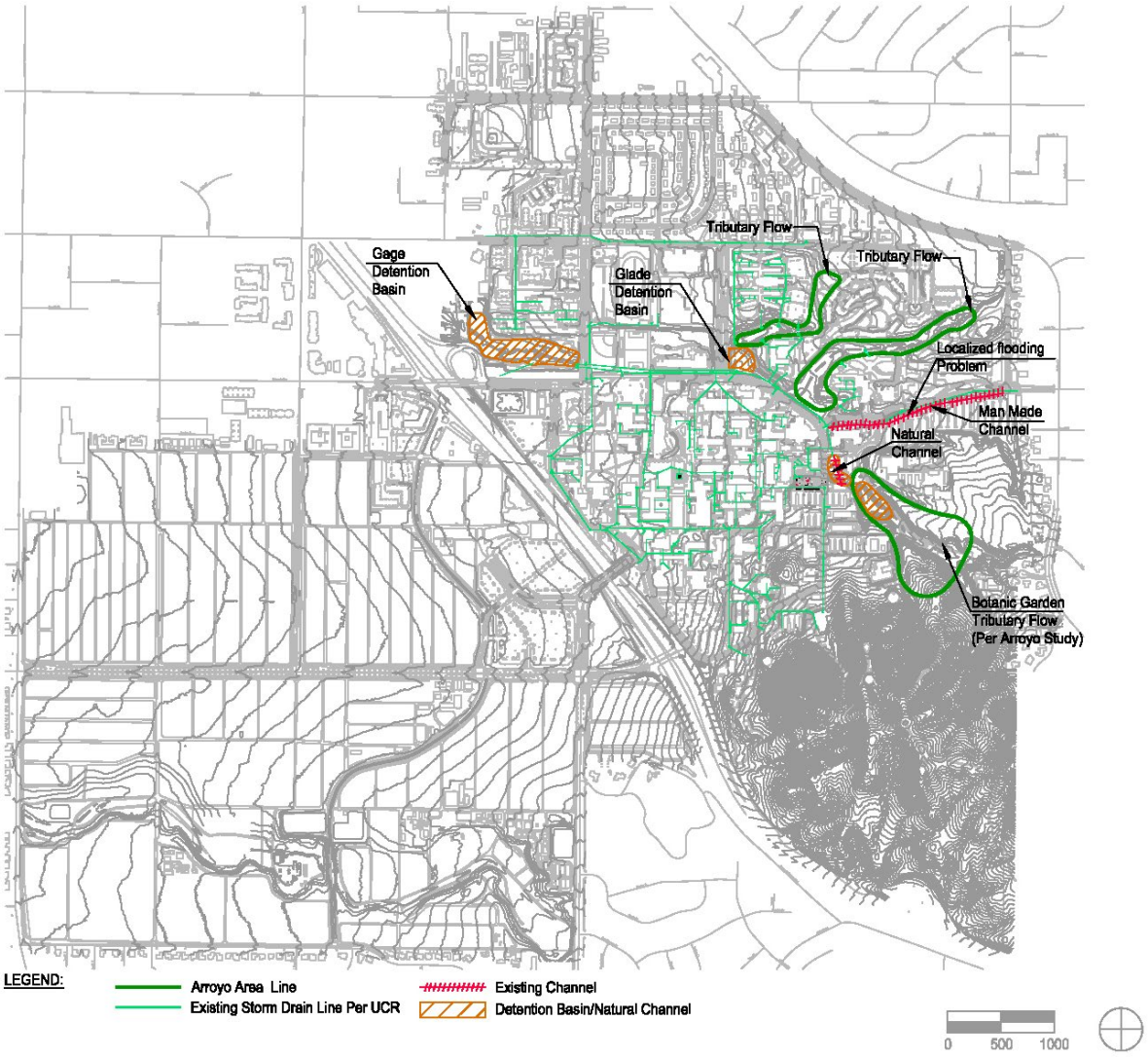
Between 2006 and 2010, UCR implemented the University Arroyo Flood Control and Enhancement System, which included a series of above and belowground improvements to the existing University Arroyo system, in order to provide the necessary capacity to convey stormwater flows associated with the 100-year storm event and not exceed the capacity of the municipal storm drain system. These improvements occurred in the University Arroyo as the arroyo flows from the eastern boundary of the campus at Valencia Hill Drive and Big Springs Road and the western edge of Parking Lots 10 and 13, as well as the athletic fields. Improvements included:

- Aboveground channel enlargements and enhancements in the form of bioswales placed along the southern edge of Big Springs Road and western edge of Parking Lot 10
- Enlargement of the junction area (north of North Campus Drive between Big Springs Road and Veitch Drive) detention capacity
- Creation of a detention basin downstream of the UCR Botanic Gardens parking lot
- Installation of a seven-foot-wide by seven-foot-tall underground culvert extending from the intersection of Big Springs Road and East Campus Drive to the Gage Basin at University Avenue and Canyon Crest Drive (UCOP 2006)

These improvements, collectively implemented as the University Arroyo Flood Control and Enhancement System, adapted the previous University Arroyo system to have sufficient flow conveyance capacity to accommodate the increased flows associated with buildout on the UCR campus. As improved, the current drainage system accepts surface runoff flows at the campus

boundary, moderates peak flows, and conveys both off-site flows and campus discharges to the downstream terminus at the Gage Basin. From the Gage Basin, discharges pass through the municipal storm drain system and ultimately the Santa Ana River (UCR 2011). Figure 4.10-4 shows the locations of the University Arroyo drainage channels, Gage Detention Basin, and Glade Detention Basin, the man-made channel along Big Springs Road, and existing storm drain lines.

Figure 4.10-4 East Campus Existing Drainage Conditions



Source: Psomas 2016

BOX SPRINGS ARROYO SYSTEM

Flows in the Box Springs Arroyo are controlled by the Box Springs Dam south of El Cerrito Drive, which is an earth-filled flood control dam located east of campus that controls runoff from approximately 2,500 acres of upstream area. Flow in the Box Springs Arroyo is conveyed under Canyon Crest Drive in a culvert for discharge into the natural channel, which is comprised of a flat, broad, ephemeral wash, meaning that it typically only contains flows in response to a storm event, or a release from the Box Springs Dam. As the arroyo continues westward, it has been subjected to

substantial modification, and is currently characterized as a shallow grassy swale. Continuing farther west, the arroyo is characterized as an incised channel bordered by eucalyptus trees, which conveys flows into a 54-inch pipe for conveyance under Chicago Avenue (UCR 2005). The transitioning of flows from a shallow grassy swale to an incised channel and ultimately to a 54-inch pipe results in higher flows being retained in the incised channel upstream. The Box Springs Arroyo is crossed by the channelized Gage Canal at the southern central portion of West Campus.

GAGE CANAL

The 20.13-miles-long Gage Canal carries water from the Santa Ana River and local aquifers that are fed by the San Bernardino Mountains. The canal has historically been the source of agricultural water for local citrus ranches and the groves of California Citrus State Historic Park (California Department of Parks and Recreation [CDPR] 2020). The canal provides irrigation water service to Riverside Public Utility (RPU) customers (including UCR). About 80 percent of canal water is sourced from wells, pipelines, and treatment plants that meet drinking water standards (RPU n.d.)[1]. The canal delivers 36,000-39,000 acre-feet of water to the Arlington Heights area of the city. Fifty-five percent of the water is delivered to citrus areas with the remaining 45 percent delivered to the City reservoir (Riverside-Corona Resource Conservation District [RCRCD] 2020). The UCR East and West Campuses are irrigated with water from the canal, which generally traverses north-south west of campus (UCR 2020a). The Gage Canal runs underground in certain areas of campus, including the UCR Baseball Complex, where it is aligned belowground south of Martin Luther King Boulevard then turns west and continues southward towards the center of West Campus. The canal continues underground near Le Conte Drive. Figure 4.10-5 shows the aboveground portion of the channelized canal in West Campus.

Figure 4.10-5 Gage Canal Looking East in West Campus

Photo credit: UCR

[1] The RPU service area can be found at https://cityofriverside.maps.arcgis.com/apps/webappviewer/index.html?id=ba09fd6a633d4f4390e66928b1000fab.

STORM DRAIN FACILITIES

The City municipal storm drain system receives runoff from the UCR campus and ultimately discharges to the Santa Ana River. The UCR campus is located in the Riverside County Flood Control and Water Conservation District (RCFCWCD) Master Drainage Plan areas for the Box Springs and University areas. The West Campus drains into the Box Springs Storm Drain system, with an east-west storm drain line along Martin Luther King Boulevard and a north-south storm drain line in the center of the western portion of West Campus. Existing RCFCWCD storm drain facilities in and proximate to the UCR campus are shown on Figure 4.10-6.

Flood Hazard Zones

Campus arroyos and major storm drainages are located in areas subject to flooding in response to the 100-year storm event; this is the magnitude storm that has potential to occur once every 100 years, or has a 1 percent chance of occurring during any given year. The Federal Emergency Management Agency (FEMA) identifies the majority of the UCR campus as Zone X, which refers to an Area of Minimal Flood Hazard. There is also a FEMA-designated Zone AE, which refers to areas subject to inundation by the 100-year storm event, surrounding University Wash and bisecting the UCR campus. This flood zone designation is shown on FEMA's Flood Insurance Rate Maps 06065C0727G and 06065C0726G, including Letter of Map Revision 10-09-0680P (FEMA 2008). FEMA flood zones on and near the UCR campus are shown in Figure 4.10-7.

Groundwater

Groundwater Basins

UPPER SANTA ANA VALLEY GROUNDWATER BASIN

The City is mostly underlain by the 92-square mile Upper Santa Ana Valley Groundwater Basin. The Upper Santa Ana Valley Groundwater Basin includes nine subbasins defined by the California Department of Water Resources (DWR): Bunker Hill, Cajon, Rialto-Colton, Chino, Cucamonga, Yucaipa, San Timoteo, Riverside-Arlington, and Temescal; however, as discussed below under "Riverside-Arlington Groundwater Subbasin," some of the aforementioned subbasins are managed under different naming conventions. Aquifers of the Upper Santa Ana Valley Groundwater Basin are generally unconfined and comprise several subbasins filled with alluvial deposits eroded from the surrounding mountains. The thickness of these deposits ranges from less than 200 feet to more than 1,000 feet. Faults play an important role in the groundwater flow system here. The San Andreas Fault, which lies along the base of the San Bernardino Mountains, and other faults, which lie along the base of the San Gabriel Mountains and Chino Hills, bound the valley flow system on three sides. Other faults, such as the San Jacinto Fault, divide the Upper Santa Ana Valley Groundwater Basin into its subbasins. These interior faults locally restrict groundwater flow and control the location of groundwater discharge (USGS 2009). In general, groundwater in the basin flows the same direction as surface waters from the mountains in the east/north to the Pacific Ocean in the west (Santa Ana Watershed Project Authority [SAWPA] 2014).

Figure 4.10-6 RCFCWCD Stormwater Drainage Facilities On and Proximate to UCR Campus

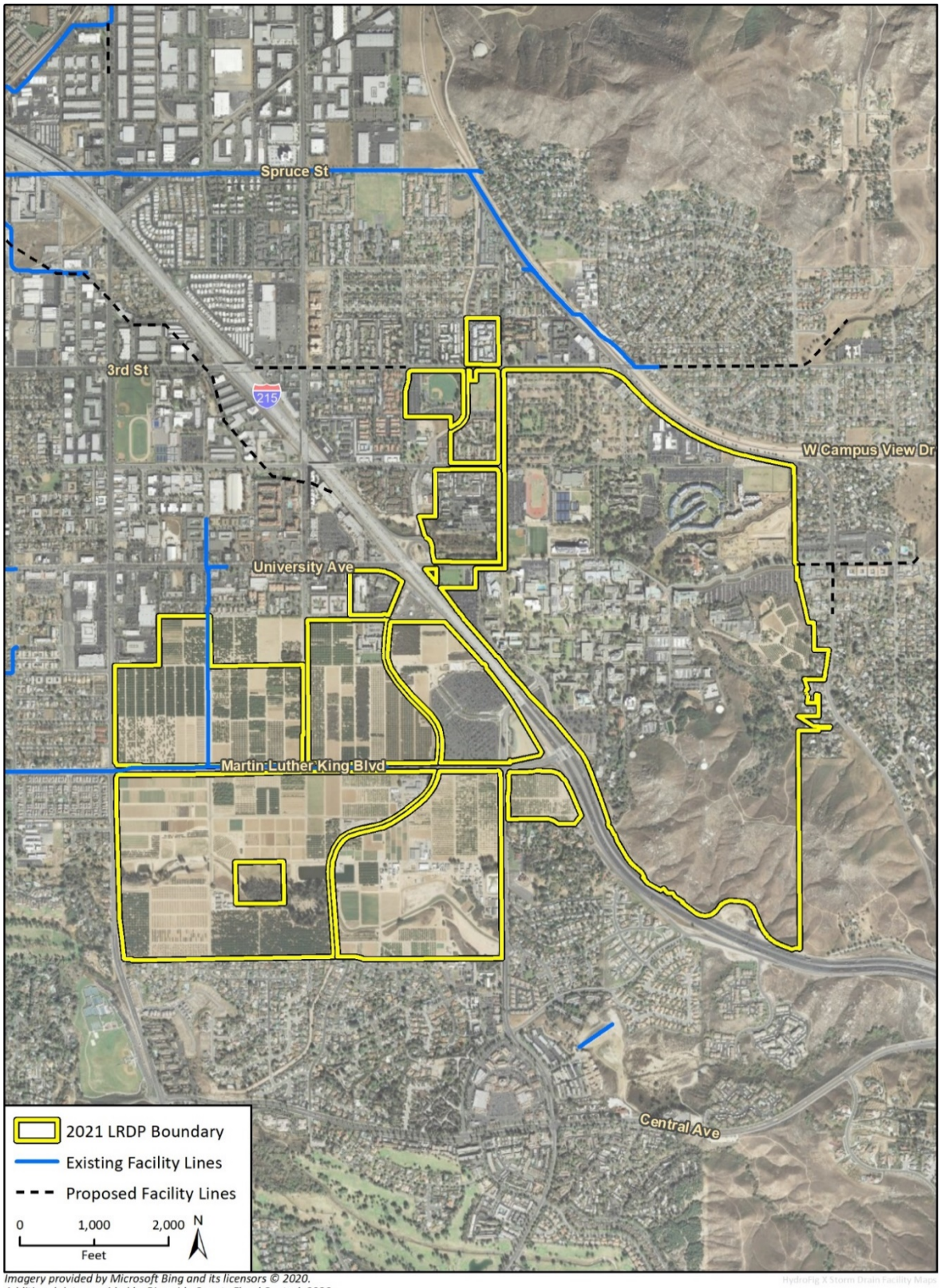
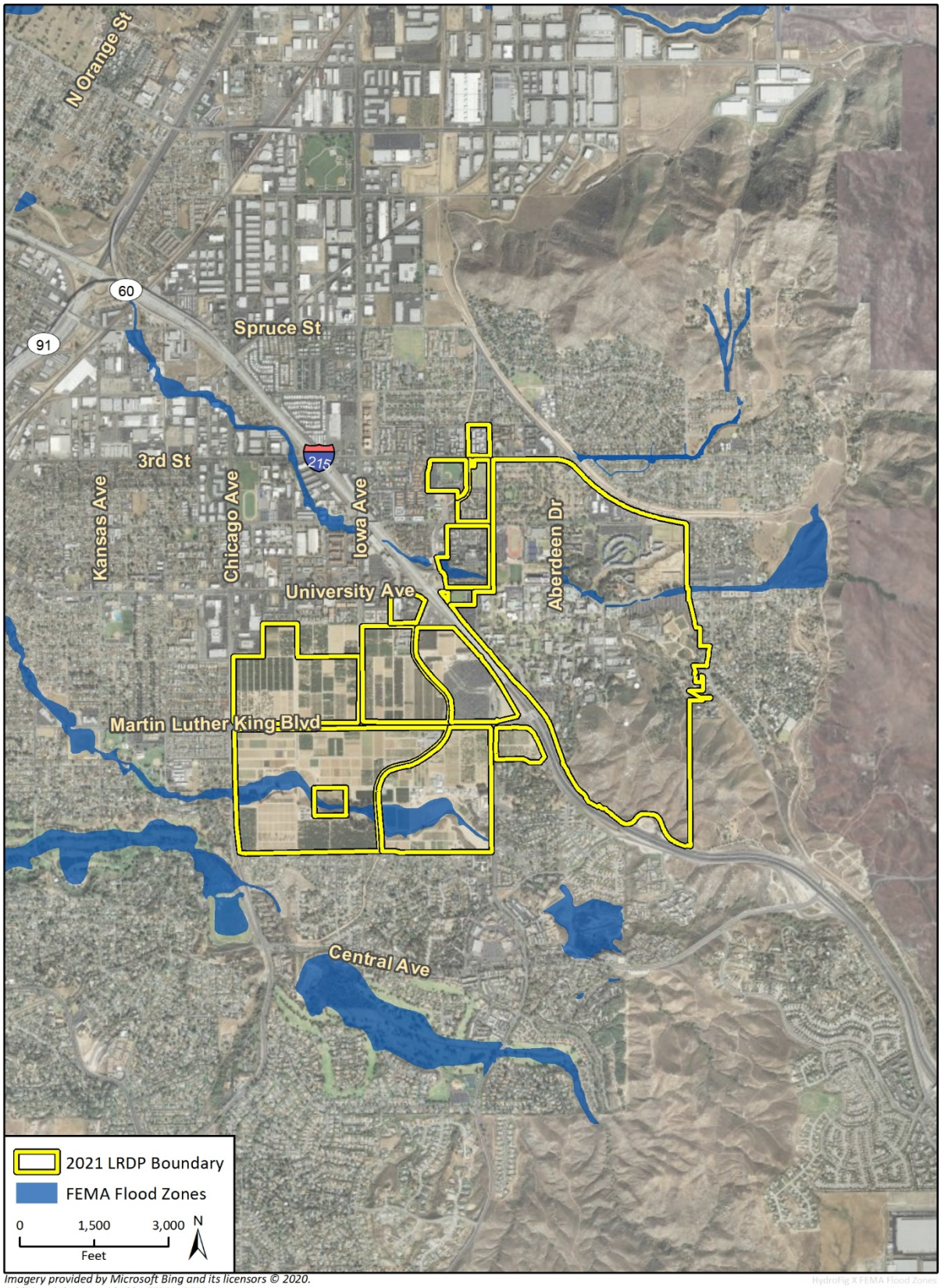


Figure 4.10-7 Flood Hazard Zones On and Proximate to UCR Campus



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Additional data provided by FEMA, 2020.

RIVERSIDE-ARLINGTON GROUNDWATER SUBBASIN

The Riverside-Arlington Groundwater Subbasin (Groundwater Basin Number 8-2.03), as shown in Figure 4.10-8, underlays northwest Riverside County and southwest San Bernardino County. Groundwater in this Subbasin is stored primarily in clay, silt, and gravel alluvium deposited by the Santa Ana River and its tributaries (RPU 2016).

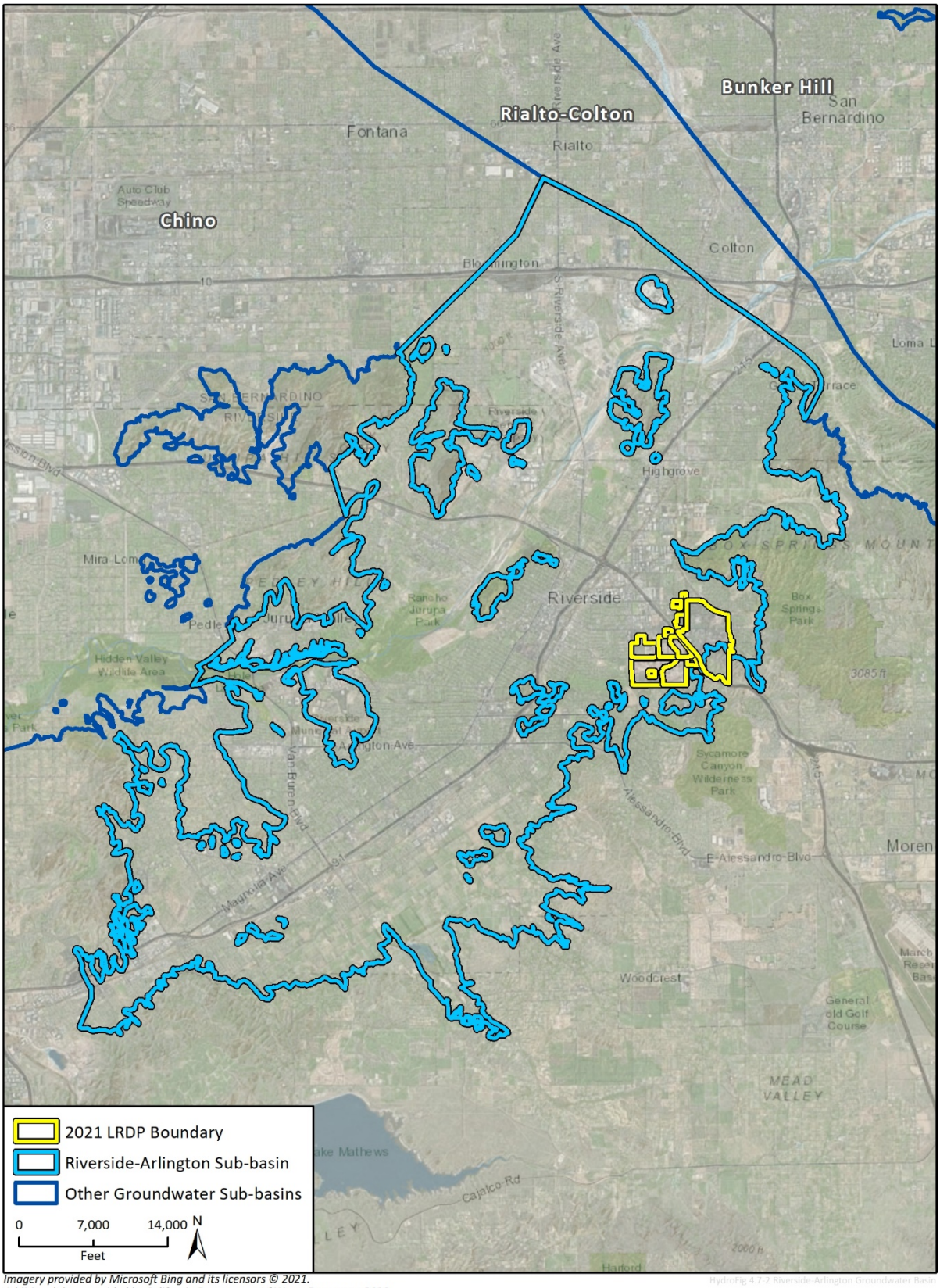
The Riverside-Arlington Groundwater Subbasin is bounded on the northwest by impermeable plutonic rocks of the Pedley Hills and Jurupa Hills, on the northeast boundary by the Rialto-Colton fault, on the southeast by impermeable rocks of the Box Springs Mountains, on the south by Arlington Mountain, and on the west by the La Sierra Hills and the adjoining Temescal Subbasin, which is separated from the Riverside-Arlington Groundwater Subbasin by a narrow bedrock constriction. The Santa Ana River flows over the northern portion of the Riverside-Arlington Groundwater Subbasin. A groundwater divide in the alluvium separates the Riverside portion from the Arlington portion of the Subbasin (DWR 2016). The Riverside-Arlington Groundwater Subbasin is replenished by infiltration from Santa Ana River flow, underflow past the Rialto-Colton fault, intermittent underflow from the Chino subbasin, return irrigation flow, wastewater discharge, and deep percolation of precipitation (Upper Santa Ana Water Resources Association [USAWRA 2015]).

While identified as a single subbasin by DWR, a litigious history has resulted in unique management-based delineations in the area, including as related to the Riverside-Arlington Groundwater Subbasin. The 1969 Western-San Bernardino Judgment ("Adjudication Judgment") (*Western Municipal Water District [WMWD] of Riverside County et al. v. East San Bernardino County Water District et al.*, Case No. 78426) settled extraction rights throughout the Upper Santa Ana River watershed to meet flow obligations to lower reaches of the river. A copy of the Adjudication Judgment is included as Appendix I to the 2015 Riverside Public Utilities Urban Water Management Plan. The Adjudication Judgment resulted in adjudication of a portion of the subbasin (the Riverside portion), with the remainder of the subbasin (the Arlington portion) remaining non-adjudicated. The basin area of the Riverside-Arlington Groundwater Subbasin is 56,563 acres. The adjudicated portion is 37,217 acres, or 65.8 percent, while the non-adjudicated portion is 19,346 acres, or 34.2 percent. The DWR has computed the groundwater volume for the non-adjudicated portion of this subbasin as 7,778 acre-feet (DWR 2019). Two watermasters, one appointed by the San Bernardino Valley Municipal Water District and one appointed by WMWD, oversee groundwater extractions in the adjudicated portions of the basin and ensure compliance with the judgment (RPU 2016).

The Western-San Bernardino Judgment addresses groundwater management in the Rialto-Colton Subbasin, Riverside-Arlington Subbasin, and the San Bernardino Basin Area (SBBA), which contains the Bunker Hill and Lytle Creek Subbasins (RPU 2016). The Adjudication Judgment provides a determination of the safe yield for the SBBA, establishes specific amounts of water that can be extracted from the SBBA by parties in Riverside County, and identifies the following requirements towards the purpose of maintaining sustainable groundwater conditions (USAWRA 2015):

- Valley District must provide replenishment for extractions from the SBBA by nonplaintiffs (entities in the Valley District service area) in aggregate exceeding 72.05 percent of the safe yield, which is 167,228 acre-feet per year (AFY)
- WMWD must replenish the Rialto-Colton and Riverside-Arlington basins if extractions for use in Riverside County in aggregate exceed certain specific amounts
- Valley District must replenish the Rialto-Colton and Riverside-Arlington Subbasins if water levels are lower than certain specific water level elevations in specified wells

Figure 4.10-8 Riverside-Arlington Groundwater Subbasin Boundary



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Additional data provided by California Department of Water Resources, 2020.

HydroFig 4.7-2 Riverside-Arlington Groundwater Basin

As listed above, the Adjudication Judgment identifies parties responsible for replenishing groundwater extractions that result in overdraft or exceeding the identified safe yield of the affected basin or subbasin. For the Riverside-Arlington Subbasin, the requirement for replenishment is determined by groundwater levels in specified wells which are indicative of safe yield in the area.

UCR Campus Groundwater Conditions

The UCR campus is located in the Upper Santa Ana Valley Groundwater Basin and is mostly underlain by the adjudicated portion of the Riverside-Arlington Groundwater Subbasin. The southeastern portion of the UCR campus is not located in a designated groundwater subbasin. The campus is not designated as a groundwater recharge area, nor does the campus serve as a primary source of groundwater recharge in the subbasin. The soils underlying the East Campus are designated as Class D, the least-permeable soil type, and the soils underlying the West Campus are Class C, which has intermediate permeability (UCR 2005). Groundwater may also be contained in isolated perched water tables that are separated from the regional aquifer by unsaturated rock. Table 4.10-1 presents recorded depths to groundwater at wells near the UCR campus. As described in the California DWR's Bulletin 118 for the Upper Santa Ana Valley Groundwater Basin, groundwater flow direction is defined by local fault presence and generally flows in a northwest direction near Arlington, then flows southwest to Arlington Gap, through which it flows into the Temescal Subbasin (DWR 2004). Based on historical well data in the vicinity, it is estimated that groundwater depths near campus vary from approximately 73 feet below the ground surface to 175 feet below ground surface.

Table 4.10-1 Depth to Groundwater

Site	Local Well ID	Distance from UCR Campus	Depth to Groundwater (bgs)[1]	Date of Measurement[2]
Well Site Code: 339840N1173750W001	Fox Metro (inactive)	1.7 miles northwest of West Campus	73.5	March 8, 2016
Well Site Code: 339690N1173590W001	Clearwater (inactive)	0.6 mile east of West Campus	142.4	April 20, 2020
Well Site Code: 340180N1173300W001	Highgrove 3 (inactive)	2.3 miles north of East Campus	175.2	April 27, 2020

[1] bgs = below ground surface (in feet)

[2] The most recent available groundwater level measurement available was used. Where measurement was recorded as "questionable data," the most recently available non-questionable data point was used.

Source: DWR 2020

Groundwater Management

Groundwater management activities are undertaken in cooperation with local agencies including RPU, WMWD, Valley District, SAWPA, and the San Bernardino Valley Water Conservation District. The Western-San Bernardino Watermaster manages and reports on the conditions of the local groundwater basins and administers the Adjudication Judgement for the adjudicated area. Annually, Valley District publishes an engineering report to determine the replenishment requirements for the Bunker Hill Subbasin in the ensuing water year. The Integrated Regional Water Management Plan (IRWMP) for the Upper Santa Ana River Watershed focuses on long-term management of water resources in the Bunker Hill and Rialto-Colton Subbasins and the reduction of reliance on imported water (USAWRA 2015). The Valley District, which is the lead agency for the IRWMP, has established target ranges for groundwater level management within Bunker Hill Subbasin and is obligated under

the Western-San Bernardino Judgment to maintain water levels in the Rialto-Colton and Riverside North Subbasins (RPU 2016).

As discussed above under "Riverside-Arlington Groundwater Subbasin", groundwater management for approximately 65 percent of this subbasin occurs through administration of an Adjudication Judgement by the Western-San Bernardino Watermaster. The portion of the Riverside-Arlington Groundwater Subbasin that is not adjudicated is identified by the DWR as a Low-Priority groundwater basin. Basins that are designated as High Priority are subject to the Sustainable Groundwater Management Act (SGMA) of 2014, and a Groundwater Sustainability Plan is required to be developed and implemented by a DWR-approved Groundwater Sustainability Agency, toward the purpose of achieving and maintaining sustainable groundwater conditions. DWR's prioritization of the Riverside-Arlington Groundwater Subbasin has changed over recent years, as described below:

- 2014: Basin prioritization – High. Water quality degradation issues known in several public supply wells.
- 2016: Riverside-Arlington Groundwater Subbasin boundaries modified along with the boundaries of Yucaipa Subbasin 8-002.07, Bunker Hill Subbasin 8-002.06, and Rialto-Colton Subbasin 8-002.04 to align with adjudicated areas.
- 2018: Draft Basin Prioritization – High. Hydrographs generally show increasing water levels starting around 1960 and stabilizing or declining somewhat after the 1980s.
- 2018: Final Basin Prioritization – Very Low.
- 2019: DWR released the *Sustainable Groundwater Management Act 2018 Basin Prioritization* report, which outlined the process involved with reassessing the priority of the groundwater basins in California following the 2016 basin boundary modifications; through this process, the Arlington Basin was designated as very low-priority, and therefore not requiring a GSP (WMWD 2021).

The Groundwater Sustainability Plan for the Riverside-Arlington Groundwater Subbasin is scheduled for completion in early 2022 (CNRA 2015).

RIVERSIDE PUBLIC UTILITIES

RPU has facilities that extract groundwater from five groundwater subbasins: Bunker Hill, Rialto-Colton, Riverside North, Riverside South, and Arlington Subbasins, described below. As discussed above, portions of the Santa Ana Valley Groundwater Basin are adjudicated, including the aforementioned subbasins; although the 1969 Adjudication Judgement refers to the subbasins below as "management areas", for the purposes of this analysis, the term "subbasin" is used for consistency with DWR Bulletin 118 and RPU Water Division's current (2015) Urban Water Management Plan (UWMP) for Riverside (RPU 2016).

- **Bunker Hill Subbasin:** The Bunker Hill Subbasin is a valley-fill aquifer comprised of six confining and water-bearing hydrogeologic units. The Bunker Hill Subbasin lies between the San Andreas and San Jacinto Faults. The primary source of recharge for the Bunker Hill Subbasin is runoff from precipitation in the San Bernardino Mountains to the north and San Gabriel Mountains to the northwest. The Santa Ana River, Mill Creek, Lytle Creek, and smaller tributaries contribute most of the total recharge to the groundwater system. The subbasin is also replenished by deep percolation of water from precipitation and resulting runoff, percolation from delivered water,

and water spread in streambeds and spreading grounds (USARWA 2015). RPU's extraction rights from the Bunker Hill Subbasin are 55,263 AFY (RPU 2016).

- **Rialto-Colton Subbasin:** The Rialto-Colton Subbasin is bounded by the San Jacinto fault to the northeast, Rialto-Colton fault to the southwest, the San Gabriel Mountains to the northwest, and Badlands to the southeast. This subbasin is about 10 miles long and varies in width from about 3.5 miles in the northwestern part to about 1.5 miles in the southeastern part. The principal recharge areas are Lytle Creek, Reche Canyon, and the Santa Ana River. Artificial recharge is also used to maintain basin levels. The Rialto-Colton Basin consists of four hydrostratigraphic units with the water-bearing units expressing unconfined to partly confined properties. RPU's extraction rights from the Rialto-Colton Subbasin are 2,728 AFY (RPU 2016).
- **Riverside (North and South) Subbasins:** The Riverside Subbasin is bounded by the Rialto-Colton fault to the north, Arlington Subbasin to the south, Box Spring Mountains to the east, and Chino Basin to the west. The Riverside Subbasin is an alluvial fill, unconfined basin. The Western-San Bernardino Judgment divides the Riverside Subbasin into two areas, based on jurisdictional boundaries: the portion of the Riverside Subbasin in San Bernardino County (Riverside North Subbasin) and the portion of the Riverside Subbasin in Riverside County (Riverside South Subbasin). RPU's extraction rights from Riverside North Subbasin are 10,902 AFY, and RPU's extraction rights from Riverside South are 16,880 AFY (RPU 2016).
- **Arlington Subbasin:** The Arlington Subbasin consists of alluvial deposits and is located between the Riverside South Subbasin and the Temescal Subbasin. The Arlington Subbasin is not currently used by RPU due to the high levels of total dissolved solids and nitrates. RPU may use the Arlington Subbasin as a source of water supply in the future if the costs for alternative new supplies make treatment of water from this source cost-effective. The Arlington Subbasin is not adjudicated (RPU 2016).

In addition to the subbasin areas summarized above, the IRWMP also discusses regional groundwater supplies in terms of the SBBA, which is comprised of the Bunker Hill and Lytle Creek Subbasins, and contributes a major source of water supply for agencies in San Bernardino and Riverside Counties (USAWRA 2015). The IRWMP reports that the SBBA, including the Bunker Hill and Lytle Creek Subbasins, is affected by overdraft conditions, but there are sufficient supplies to meet replenishment obligations (USAWRA 2015). In addition, the RPU Water Division's 2015 UWMP for Riverside reports that a 2011 Groundwater Management Plan (GWMP) was developed by RPU in collaboration with WMWD, the Valley District, SAWPA, and other local water purveyors, and identified that Riverside North Subbasin is currently overdrafted, and both Riverside North and Riverside South Subbasins are projected to be overdrafted (RPU 2016). The Arlington Subbasin is also affected by overdraft conditions and will be managed by WMWD pursuant to the Arlington Basin GWMP.

The Valley District is obligated per the Western-San Bernardino Judgment to maintain water levels in the Bunker Hill and Rialto-Colton Subbasins and in the Riverside North Subbasin. In addition, WMWD is required to replenish excess extractions above the base period extractions in Rialto-Colton, Riverside North, and Riverside South Subbasins as specified in the Western-San Bernardino Judgment. Furthermore, RPU contributes to efforts to monitor and manage the surrounding groundwater basins and participates in independent groundwater level and quality monitoring in Bunker Hill, Riverside, and Arlington Subbasins. All groundwater production in Riverside is metered and extractions are reported to the Western-San Bernardino Watermaster (RPU 2016).

RPU operates a total of 201 wells, of which 50 are potable wells, 14 are non-potable wells, 85 are monitoring wells, 50 are not active (i.e., standby, out of service, abandoned, destroyed or unknown), and two are not categorized. RPU met all the water supply demand in its service area in 2019 by utilizing groundwater sources, among other water sources (RPU 2019). In 2020, RPU supplies included approximately 88,773 AFY of groundwater resources, 6,430 AFY of recycled water, and 21,700 AFY of purchased or imported water. Therefore, groundwater constitutes nearly 80 percent of the RPU current potable and non-potable water supply. Approximately 60 percent of groundwater supplies originate from the Bunker Hill Subbasin, which is adjudicated. RPU water rights are based on the long-term safe yield from the Bunker Hill Subbasin, which includes wet, dry, and normal periods. RPU wells are generally located in the section of the basin with the greatest thickness of water bearing layers. Thus, RPU water supply from the Bunker Hill Subbasin is considered reliable during single and multi-year dry periods (RPU 2016). Additional information on water supply, including reliability and quality, is available in the RPU Urban Water Management Plan, which is incorporated by reference.

WESTERN MUNICIPAL WATER DISTRICT

Several local water purveyors in western Riverside County, including the cities of Norco and Corona, Box Springs Mutual Water Company, Western Retail, Eagle Valley Mutual Water Company, Elsinore Valley Municipal Water District, Temescal Valley Water District, and Rancho California Water District, purchase water from WMWD. Additionally, WMWD retail service includes unincorporated areas around Lake Mathews, Murrieta, and unincorporated Riverside County south of Temecula (WMWD 2016). Groundwater comprised 21 percent of WMWD's total supply in 2015. Groundwater from four subbasins constitute primary source of groundwater supply for WMWD: the Riverside-Arlington Groundwater Subbasin, the Temecula-Murrieta Subbasin, the San Bernardino Subbasin, and the Chino Subbasin. None of these basins or subbasins are considered critically overdrafted, and adjudicated basins are closely monitored and annually assessed for adequate groundwater pumping and recharge (WMWD 2016).

Water Quality

There are two major classes of water pollutants: point source and non-point source. Point-source pollutants can be traced to their original source and are discharged directly from pipes or spills. Raw sewage discharging directly into a stream is an example of a point-source water pollutant. Non-point-source pollutants cannot be traced to a specific original source. Non-point-source pollution is caused by precipitation runoff collecting natural and human-made pollutants before depositing them into various watersheds, including lakes, rivers, wetlands, coastal waters, and groundwater (United States Environmental Protection Agency [US EPA] 2018).

The primary sources of surface and groundwater pollution enter the water system via stormwater runoff from paved areas. As water travels over the surface of land or through the ground, it dissolves naturally occurring minerals, and in some cases radioactive materials, and can pick up substances resulting from the presence of animals or human activity. Bunker Hill and Riverside Groundwater Subbasins are considered most vulnerable to historical contamination from industrial and agricultural operations. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife

- Inorganic contaminants, such as salts and metals that can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming
- Pesticides and Herbicides, which may come from a variety of sources, such as agriculture, urban stormwater runoff, and residential uses
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities

Surface Water Quality

The Santa Ana RWQCB develops water quality standards for the Santa Ana River to fulfill designated beneficial uses of the river. Water bodies that fail to meet these standards are listed as impaired, and a total maximum daily load (TMDL) limit may be required to allocate the maximum pollutant load the water body may receive and still meet its water quality standards. Reaches 3, 4, and 6 of the Santa Ana River are listed on the 2014/2016 California Clean Water Act (CWA) section 303(d) List as impaired with an Integrated Report category of 5, indicating water quality standards are not met and requiring a TMDL. A TMDL is required but has not yet been completed for at least one of the pollutants listed for the segment (State Water Resources Control Board [SWRCB] 2018). Designated beneficial uses and impairments for all reaches of the Santa Ana River and downstream reaches are summarized in Table 4.10-2.

Table 4.10-2 Santa Ana River Surface Water Pollutants and Contamination Categories

Water Body	Designated Beneficial Uses	Impairments	Integrated Report Category
Santa Ana River – Reach 6	Municipal, Agriculture, Groundwater Recharge, Recreational 1, Recreational 2, Power, Wildlife Habitat, Spawning	Cadmium, Copper, Lead (TMDL Required)	Category 5[1]
Santa Ana River – Reach 5	Warm Freshwater Habitat	Alachlor, Atrazine, Azinphos-methyl (Guthion), Carbaryl, Carbofuran, Chloride, Chlorpyrifos, DDE (Dichlorodiphenyldichloroethylene), Diazinon, Dieldrin, Disulfoton, Malathion, Methyl Parathion, Molinate, Simazine, Sulfates, Thiobencarb/Bolero, Toxicity	Category 2[2]
Santa Ana River – Reach 4	Groundwater Recharge, Water Contact Recreation, Non-Contact Water Recreation, Warm Freshwater Habitat, Wildlife Habitat, Rare, Threatened or Endangered Species, Spawning, Reproduction and Development	Indicator Bacteria (TMDL Required)	Category 5

Water Body	Designated Beneficial Uses	Impairments	Integrated Report Category
Santa Ana River – Reach 3	Agricultural Supply, Groundwater Recharge, Water Contact Recreation, Non-Contact Water Recreation, Warm Freshwater Habitat, Wildlife Habitat, Rare, Threatened or Endangered Species, Spawning, Reproduction and Development	Copper (TMDL Required) Lead (TMDL Required) Indicator Bacteria (TMDL Approved)	Category 5
Santa Ana River – Reach 2	Agricultural Supply, Groundwater Recharge, Water Contact Recreation, Non-Contact Water Recreation, Warm Freshwater Habitat, Wildlife Habitat, Rare, Threatened or Endangered Species	Not Impaired	Category 1[3]
Santa Ana River – Reach 1	Water Contact Recreation, Non-Contact Water Recreation, Warm Freshwater Habitat (intermittent), Wildlife Habitat (intermittent)	Not Impaired	Category 1

TMDL = Total Maximum Daily Load

[1] Category 5 Criteria: A water segment where standards are not met and a TMDL is required, but not yet completed, for at least one of the pollutants being listed for this segment.

[2] Category 2 Criteria: A water segment with water quality information that is insufficient to determine an appropriate decision recommendation, for reasons such as: monitoring data have poor quality assurance, not enough samples in a dataset, no existing numerical objective or evaluation guideline, the information alone cannot support an assessment, etc.

[3] Category 1 Criteria : A water that fully supports at least one of its California beneficial uses, has other uses that are not assessed or lack sufficient information to be assessed, and for which no assessed uses are not supported.

Note: Pursuant to the Clean Water Act section 303(d), each State is required to submit to the US EPA a list identifying water bodies not meeting water quality standards. The water bodies listed in this table are on California's 2014/2016 303(d) list for the pollutants indicated.

Source: SWRCB 2017

As shown in Table 4.10-2, Reach 6 of the Santa Ana River is impaired for cadmium, copper, and lead and Reach 3 of the Santa Ana River is impaired for indicator bacteria, copper, and lead, and Reach 4 is impaired for indicator bacteria. The decomposition of excess organic waste may cause increased growth of undesirable organisms, such as bacteria, in the water. Pathogenic microorganisms (including bacteria, viruses, and protozoans) are associated with fecal waste and can cause a variety of diseases either through the consumption of contaminated shellfish or ingestion of tainted water (US EPA 2006). Metals of concern, including copper and lead, can be toxic to aquatic and human life. Humans can be impacted from contaminated groundwater resources and bioaccumulation of metals in fish and shellfish. Primary sources of metal pollution in stormwater are typically commercially-available metals and metal products. Along with brake pads and tires from cars, the exposure of building materials such as architectural copper to rain, can pollute stormwater runoff. Other potential metals sources include soil erosion, household chemicals, and pesticides (Wright Water Engineers, Inc. 2011).

Groundwater Water Quality

Groundwater extracted by RPU is blended and chlorinated prior to distribution, reducing vulnerability to contamination at individual wells (RPU 2016). In 2019, RPU collected approximately 27,600 water samples to test for a variety of potential contaminants. Samples were collected at water sources, along transmission pipelines, throughout the distribution system, including

reservoirs and booster stations, and treatment plants (RPU 2019). Table 4.10-3 shows the contamination levels found during the water sample. None of the average contamination levels in RPU groundwater supply sources were greater than the State maximum contaminant level.

Table 4.10-3 RPU System Groundwater Contamination Levels (Regulated Chemicals)

Contaminant Category	Contaminant	State Maximum Contaminant Level	State Public Health Goal	RPU Average	RPU Range	Sources in Drinking Water
Microbiological	Coliform	>5%	0 (MCLG)	0.18%	0 - 1%	Naturally present in environment
Clarity	Turbidity	Treatment Technique[1]	No standard	0.1 Nephelometric Turbidity Units (Highest)	100% Meeting turbidity limits	Soil runoff
Regulated Organic	Total Trihalomethanes	80 ppb	No standard	6.8 ppb	1.2-10 ppb	By-product of drinking water disinfection
Regulated Inorganic	Arsenic	10 ppb	4 ppt	0.3 µg/L	0-2.6 µg/L	Erosion of natural deposits
Regulated Inorganic	Fluoride	2 ppm	1 ppm	0.46 mg/L	0.40-0.54 mg/L	Naturally present in environment
Regulated Inorganic	Nitrate (as nitrogen)	10 ppm	10 ppm	5.5 mg/L	4.7-7 mg/L	Naturally present in environment
Regulated Inorganic	Perchlorate	6 ppb	1 ppb	Not detected at the detection limit for reporting.	Not detected at the detection limit for reporting.	Inorganic chemical used in variety of industrial operatives
Radiological	Gross Alpha	15 pCi/L	0 pCi/L	0.34 pCi/L	ND-4.6 pCi/L	Erosion of natural deposits
Radiological	Uranium	20 pCi/L	0.43 pCi/L	6.9 pCi/L	4.7-11 pCi/L	Erosion of natural deposits
Lead/Copper	Copper	1300 ppb	300 ppb	440 ppb	ND-840 ppb	Internal corrosion of home plumbing

[1]A required process intended to reduce the level of a contaminant in drinking water.

MCLG=Maximum Contaminant Level Goal (The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the US EPA).

RPU = Riverside Public Utilities, Ppb = parts per billion, Ppm = parts per million, µg/L = micrograms per liter, mg/L = milligrams per liter, pCi/L = Picocuries per liter

Source: RPU 2019

4.10.2 Regulatory Setting

Federal

Clean Water Act

Congress enacted the Clean Water Act (CWA), formally the Federal Water Pollution Control Act of 1972, with the intent of restoring and maintaining the chemical, physical, and biological integrity of the Waters of the United States (U.S.). The act established the basic structure for regulating discharges of pollutants into the waters of the U.S. and requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and non-point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). At the State and regional levels in California, the SWRCB and its nine RWQCBs administer NPDES permitting authority and enforce the CWA. The UCR campus is under the jurisdiction of the Santa Ana RWQCB (Region 8).

SECTION 303 (WATER QUALITY STANDARDS AND TOTAL MAXIMUM DAILY LOADS)

Section 303(d) of the CWA (CWA, 33 USC 1250, et seq., at 1313(d)) requires states to identify "impaired" water bodies as those which do not meet water quality standards. States are required to compile this information in a list and submit the list to the US EPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, states must prioritize waters and watersheds for future development of TMDLs. TMDLs are estimates of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards. Once established, the TMDL is allocated among current and future pollutant sources to the water body. The SWRCB and RWQCBs enact ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and to develop TMDL requirements.

SECTION 311 (SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN)

Section 311 of the CWA requires any person in charge of a vessel, an onshore facility, or an offshore facility, as soon as she/he has knowledge of any discharge of oil or a hazardous substance that may be harmful, to notify immediately the appropriate federal agency of the discharge. The regulation requires that all regulated facilities fully prepare and implement a Spill Prevention, Control, and Countermeasures (SPCC) Plan. A SPCC Plan is a detailed, facility-specific, written description of how a facility's operations comply with the prevention guidelines in the Oil Pollution Prevention regulation. These guidelines include measures such as secondary containment, facility drainage, dikes or barriers, sump and collection systems, retention ponds, curbing, tank corrosion protection systems (TCPS), and liquid devices. A registered professional engineer must certify each SPCC Plan, unless the owner/operator is able to, and chooses to, self-certify the plan.

The regulation applies to non-transportation-related facilities with a total aggregate above ground (i.e., not completely buried) oil storage capacity of greater than 1,320 gallons or total underground (i.e., buried) oil storage capacity greater than 42,000 gallons. This regulation applies specifically to a facility's storage capacity (regardless of whether the tank[s] are filled). In addition to the storage capacity criteria, a reasonable expectation must exist that the facility, due to its location, could discharge oil into navigable waters of the U.S. or adjoining shorelines, or certain other areas.

SECTION 401 (WATER QUALITY CERTIFICATION)

Under Section 401 of the CWA, the RWQCBs have regulatory authority over actions in Waters of the U.S. and/or the State of California through the issuance of water quality certifications, which are issued in conjunction with any federal permit (e.g., permits issued by the U.S. Army Corps of Engineers under Section 404 of the CWA, described below). Section 401 of the CWA requires that the RWQCB certify any activity that may result in discharges into a state water body. This certification indicates the proposed activity does not violate federal and/or State water quality standards, including those protecting beneficial uses and water quality. The limits of non-tidal waters extend to the Ordinary High Water Mark, defined as the line on the shore established by the fluctuation of water and indicated by physical characteristics, such as natural line impressed on the bank, changes in the character of the soil, and presence of debris. The U.S. Army Corps of Engineers (USACE) may issue either individual, site-specific permits or general, nationwide permits for discharge into Waters of the U.S.

SECTION 402 (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT)

Section 402 of the CWA regulates point-source (e.g., pipe, ditch, or channel) discharges to surface waters (other than dredge or fill material), requiring permission under the NPDES permitting system, administered by the US EPA. All NPDES permits are written to ensure that the surface water receiving discharges will achieve specified water quality standards. In California, the NPDES permit program is administered by the SWRCB through the RWQCBs and requires municipalities to obtain permits that outline programs and activities to control wastewater and stormwater pollution. The SWRCB establishes requirements prescribing the quality of point sources of discharge and water quality objectives, which are based on the designated beneficial uses (e.g., water supply, recreation, and habitat) for a particular surface water body. The NPDES permits are issued to point source dischargers of pollutants to surface waters pursuant to Water Code Chapter 5.5, which implements the federal CWA. Examples include, but are not limited to, public wastewater treatment facilities, industries, power plants, and groundwater cleanup programs discharging to surface waters (SWRCB, Title 23, Chapter 9, Section 2200). The RWQCB establishes and regulates discharge limits under the NPDES permits.

SECTION 404 (DISCHARGE OF DREDGE AND FILL OF WATERS OF THE UNITED STATES PERMIT)

Section 404 of the CWA allows the discharge of fill material into Waters of the U.S., including wetlands, lakes, streams, and rivers, as permitted under approval by the USACE and US EPA. To discharge dredged or fill material into Waters of the U.S., including wetlands, Section 404 requires projects to receive authorization from the Secretary of the Army, acting through the USACE.

The USACE identifies wetlands using a multi-parameter approach, which requires positive wetland indicators in three distinct environmental categories: hydrology, soils, and vegetation. According to the *Corps of Engineers Wetlands Delineation Manual* (1987), except in certain situations, all three parameters must be satisfied for an area to be considered a jurisdictional wetland. The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008) is also used when conducting jurisdictional wetland determinations in areas identified in the boundaries of the arid west, such as the Coachella Valley.

When an application for a Section 404 permit is made, the Applicant must show it has:

- Taken steps to avoid impacts to wetlands or Waters of the U.S. where practicable
- Minimized unavoidable impacts on Waters of the U.S. and wetlands
- Provided mitigation for unavoidable impacts

Floodplain Management Executive Order 11988

Floodplain Management Executive Order 11988 (May 24, 1977) directs all federal agencies to evaluate potential effects of any actions it may take in the floodplain, to avoid long- and short-term adverse impacts of occupancy and modification of floodplains and to avoid supporting development in a floodplain either directly or indirectly wherever there is a practicable alternative. Title 23 of the Code of Federal Regulations 650, Subpart A, "Location and Hydraulic Design of Encroachment on Floodplains" specifies applicable floodplain regulations, including to avoid encroachment into the 100-year floodplain whenever there is a practicable alternative and to restore and preserve the natural and beneficial values served by the floodplains.

National Flood Insurance Program

The FEMA oversees floodplain management and runs the National Flood Insurance Program (NFIP) adopted under the National Flood Insurance Act of 1968. FEMA prepares Flood Insurance Rate Maps that delineate the regulatory floodplain to assist local governments with land use and floodplain management decisions to meet the requirements of the NFIP. In general, the NFIP mandates that new development is not to proceed in the 100-year regulatory floodplain, if the development is expected to increase flood elevation by one foot or more. Very limited development is allowed in designated 100-year floodways (i.e., flood flow channels and areas with sufficient directional flow velocity of 100-year floodwaters).

National Pollutant Discharge Elimination Program

NPDES CONSTRUCTION GENERAL PERMIT

The SWRCB adopted an NPDES Construction General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit; "CGP") (Order 2009-0009,[2] as amended by Orders 2010-0014-DWQ[3] and 2012-006-DWQ[4]). Projects that disturb 1 or more acres of soil, or projects that disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres are required to comply with the NPDES Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ and the NPDES CGP. Activities subject to the CGP include clearing, grading, and disturbances to the ground, such as grubbing or excavation. This permit also covers linear underground and overhead projects such as pipeline installations.

The CGP requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map which shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project site. The purpose of the SWPPP is: (1) to help identify the sources of sediment and other pollutants that

[2] More details on SWRCB Order 2009-0009 are available online at:
https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf
[3] More details on SWRCB Order 2010-0014-DWQ are available online at:
https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2010/wqo2010_0014dwq.pdf
[4] More details on SWRCB Order 2012-006-DWQ are available online at:
https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2012/wqo2012_0006_dwq.pdf

could affect the quality of stormwater discharges, and (2) to describe and ensure the implementation of best management practices (BMPs) to reduce or eliminate sediment and other pollutants in stormwater as well as non-stormwater discharges resulting from construction activity. General Permit includes a menu of BMPs to be selected and implemented based on the phase of construction and the weather conditions to effectively control erosion, sediment, and other construction-related pollutants to meet the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology standards. Erosion-control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap sediment once it has been mobilized. Such BMPs include:

- Silt fences and/or fiber rolls installed along limits of work and/or the project construction site
- Stockpile containment and exposed soil stabilization structures (e.g., visqueen, fiber rolls, gravel bags, and/or hydroseed)
- Runoff control devices (e.g., fiber rolls, gravel bag barriers/chevrons) used during construction phases conducted during the rainy season
- Wind erosion (dust) controls
- Tracking controls at the site entrance, including regular street sweeping and tire washes for equipment
- Prevention of fluid leaks (inspections and drip pans) from construction vehicles
- Materials pollution management
- Proper waste/trash management
- Regular inspections and maintenance of BMPs

Additionally, the SWPPP must contain a visual monitoring program, a chemical monitoring program for "non-visible" pollutants, and a sediment monitoring plan if the site discharges directly to a water body listed on the US EPA 303(d) list for sediment.

The SWPPP must be prepared by a Qualified SWPPP Developer and submitted to the SWRCB via the online SMARTS system. A Qualified SWPPP Practitioner (QSP) is required during construction activities to monitor the construction site and ensure that the recommendations and requirements outlined in the SWPPP are implemented correctly. The QSP is responsible for protecting the owner's interests during construction; a contractor-provided QSP could result in a conflict of interest if the QSP determines the contractor needs to provide additional services beyond what is identified in the project SWPPPs.

The CGP uses a risk-based permitting approach and mandates certain requirements based on the project risk level (Level 1, Level 2, or Level 3). The project risk level is based on the risk of sediment discharge and the receiving water risk. The sediment discharge risk depends on project location and timing (such as wet season versus dry season activities). The receiving water risk depends on whether the project would discharge to sediment-sensitive receiving water. The determination of the project risk level would be made by UCR when the Notice of Intent is filed (and more details of the ultimate timing of the construction activity are confirmed).

NPDES MS4 PERMITS

The Santa Ana RWQCB has issued Order No. R8-2010-0033 (adopted January 29, 2010) and adopted NPDES Permit No. CAS 618033 for municipal stormwater and urban runoff discharges in the RCFCWCD, the County of Riverside, and the incorporated cities of Riverside County within the Santa

Ana Region. In compliance with the permit, the Santa Ana Region has implemented a Water Quality Management Plan (WQMP) and a Drainage Area Management Plan (DAMP) with the ultimate goal of accomplishing the requirements of the permit and reducing the amount of pollutants in stormwater and urban runoff.

NPDES Phase I Provision C.3 addresses post-construction stormwater management requirements for new development and redevelopment projects that add and/or replace 10,000 square feet or more of impervious area. NPDES Provision C.3 requires the incorporation of site design, source control, and stormwater treatment measures into development projects to minimize the discharge of pollutants in stormwater runoff and non-stormwater discharges and to prevent increases in runoff flows. Site design requirements for new developments and redevelopments include stipulations to minimize the area of new roofs and paving and treat runoff, and in some cases, control the rates and durations of site runoff. Where feasible, pervious surfaces should be used instead of paving so that runoff can infiltrate to the underlying soil. Runoff should be dispersed to landscaping where possible. Remaining runoff from impervious areas must be treated using bioretention. In some developments, the rates and durations of site runoff must also be controlled.

The NPDES Phase I Provision C.3 requirements are separate from, and in addition to, requirements for erosion and sediment control and for pollution prevention measures during construction. In addition, UCR must execute agreements to allow verification that stormwater treatment and flow-control facilities that are approved as part of new development are maintained in perpetuity. Low-impact development (LID) methods are the primary mechanism for implementing such controls. The NPDES Permit provision requires five Control Design Criteria to be implemented: range of flows to control, goodness of fit criteria, allowable low-flow rate, standard hydromodification modeling, and alternate hydromodification modeling and design.

NPDES Phase II addresses Small Municipal Separate Stormwater Sewer System (MS4)s. On April 30, 2003, as part of Phase II, the SWRCB issued a General Permit for the Discharge of Stormwater from Small MS4s (WQ Order No. 2003-0005-DWQ) to provide permit coverage for smaller municipalities (population less than 100,000), including non-traditional small MS4s covering facilities such as military bases, public campuses, prisons, and hospital complexes. UCR is not subject to the NPDES Phase I MS4 permit, rather is designated a non-traditional permittee under the Phase II Small MS4 General Permit. The Phase II Small MS4 General Permit covers Phase II Permittees statewide. On February 5, 2013 the Phase II Small MS4 General Permit was adopted and became effective on July 1, 2013 (WQ Order No. 2013-0001-DWQ).[5] UCR was approved for coverage under the Phase II MS4 permit program (NPDES No. CAS000004) and is required to comply with the requirements of the MS4 permit, including implementation of a stormwater quality management program with the goal of accomplishing the requirements of the permit and reducing the amount of pollutants in stormwater and urban runoff.

Under the NPDES Phase II NPDES MS4 General Permit, UCR is required to visually monitor open channels, detention basins and other drainage structures for debris at least once per year and identify/prioritize problem areas and inspect all operations and management BMPs quarterly. UCR has been implementing a landscape design and maintenance program that reduces the amount of pesticides, herbicides and fertilizers used on new or decorative landscapes. UCR employs a Post-Construction Stormwater Management Requirements and Checklist to ensure projects adequately implement BMPs as required under the Phase II Small MS4 General Permit.

[5] WQ Order No. 2013-0001-DWQ Available at:
https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2013/wqo2013_0001dwq.pdf

Additionally, the NPDES permit provides for alternative compliance measures and encourages participation in multiple-benefit projects that may be applied at various scales, including project site, municipal, or sub-watershed level. The Phase I MS4 permit for Riverside County in the Santa Ana region has a draft Watershed Action Plan that describes how potential project proponents may participate in a watershed-based approach.

UCR requirements under the MS4 permit include:

- Public education and outreach
- Staff training to prevent and eliminate illicit discharges and pollution
- Illicit discharge detection and elimination
- Construction site stormwater runoff control and pollution prevention
- Post-construction site stormwater runoff control program for new development and redevelopment
- Facilities mapping, inventory, and assessment for pollution prevention
- SWPPPs for high-priority facilities
- Inspections, visual monitoring, and remedial action
- Storm drain system assessment, prioritization, and maintenance
- Assessment of operations and maintenance activities to reduce runoff and pollution
- Stormwater program modifications
- Reporting and documentation

National Toxics Rule and California Toxics Rule

In 1992, the US EPA promulgated the National Toxics Rule under the CWA to establish numeric criteria for priority toxic pollutants for 14 states to bring all states into compliance with the requirements of CWA Section 303(c)(2)(B). The National Toxics Rule established water quality standards for 42 pollutants not covered under California's statewide water quality regulations at that time. As a result of the court-ordered revocation of California's statewide basin plans in September 1994, the US EPA initiated efforts to promulgate additional federal water quality standards for California. In May 2000, the US EPA issued the California Toxics Rule, which includes all the priority pollutants for which the US EPA has issued numeric criteria not included in the National Toxics Rule.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) is the primary statute covering the quality of waters in California. Under the act, the SWRCB has the ultimate authority over the State's water quality policy. The SWRCB administers water rights, water pollution control, and water quality functions throughout the State, while the nine RWQCBs conduct planning, permitting, and enforcement activities. The RWQCBs also regulate water quality under this act through the regulatory standards and objectives established in Water Quality Control Plans (also referred to as Basin Plans) prepared for each region.

Section 13260(a) of the Porter-Cologne Water Quality Control Act requires any person discharging waste or proposing to discharge waste, other than to a community sewer system, in any region that

could affect the quality of the Waters of the State (all surface and subsurface waters) to file a report of waste discharge. The discharge of dredged or fill material may constitute a discharge of waste that could affect the quality of Waters of the State.

Historically, California relied on its authority under Section 401 of the CWA to regulate discharges of dredged or fill material to Waters of the U.S. That section requires UCR to obtain "water quality certification" from the State Water Board through its RWQCBs to ensure compliance with State water quality standards before certain federal licenses or permits may be issued. The permits subject to Section 401 include permits for the discharge of dredged or fill materials (CWA § 404 permits) issued by the USACE. The RWQCB's typically waived waste discharge requirements under the Porter-Cologne Water Quality Control Act for projects or plans that also required Section 401 certification. Following the U.S. Supreme Court's decision, *Rapanos v. United States*, 547 U.S. 715 (2006), which limited the jurisdiction of wetlands under the CWA, the RWQCBs generally rely on the report of waste discharge process to regulate discharges into Waters of the State. The UCR campus is not considered a point source for regulatory purposes and is not subject to Waste Discharge Requirements.

California Toxics Rule and State Implementation Policy

The California Toxics Rule, presented in 2000 in response to requirements of US EPA's National Toxics Rule, establishes numeric water quality criteria for approximately 130 priority pollutant trace metals and organic compounds. The California Toxics Rule criteria are regulatory criteria adopted for inland surface waters, enclosed bays, and estuaries in California that are on the CWA Section 303(c) list for contaminants. The California Toxics Rule includes criteria for the protection of aquatic life and human health. Human health criteria (water- and organism-based) apply to all waters with a Municipal and Domestic Water Supply beneficial use designation as indicated in the basin plans. The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, also known as the State Implementation Policy, was adopted by the State Water Board in 2000. It establishes provisions for translating the California Toxics Rule criteria, National Toxics Rule criteria, and basin plan water quality objectives for toxic pollutants into:

- NPDES permit effluent limits
- Effluent compliance determinations
- Monitoring for 2,3,7,8-tcdd (dioxin) and its toxic equivalents
- Chronic (long-term) toxicity control provisions
- Site-specific water quality objectives
- Granting of effluent compliance exceptions

The goal of the State Implementation Plan is to establish a standardized approach for permitting discharges of toxic effluent to inland surface waters, enclosed bays, and estuaries throughout the state.

Sustainable Groundwater Management Act

In September 2014, Governor Brown signed legislation signed a three-bill package known as the Sustainable Groundwater Management Act (SGMA) into law, establishing a framework for local groundwater management and requiring local agencies to bring overdrafted basins into balanced levels of pumping and recharge. The SGMA gives local agencies the power to sustainably manage groundwater and requires groundwater sustainability plans to be developed for medium- and high-

priority groundwater basins, as defined by DWR. DWR released the *Sustainable Groundwater Management Act 2018 Basin Prioritization* report, which outlined the process involved with reassessing the priority of the groundwater basins in California following the 2016 basin boundary modifications. This process designated the Arlington Basin as very low-priority and does not require a groundwater sustainability plan (WMWD 2021).

Article IX of the California Constitution

The Regents of the University of California is a Constitutional Corporation, organized under Article IX, Section 9 of the California Constitution, with full authority over governance and management of University operations. Under this authority, UCR has legal authority to prevent illicit discharges into its system, including control of inflow and infiltration sources such as stormwater, chemical dumping, or debris.

South Coast Air Quality Management District Fugitive Dust Rule

Rule 403 – Fugitive Dust: This rule is intended to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (human-made) fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Rule 403 applies to any activity or human-made condition capable of generating fugitive dust and identifies measures to reduce fugitive dust. This includes soil treatment for exposed soil areas. Treatment shall include, but not necessarily be limited to, periodic watering, application of environmentally safe, non-toxic soil stabilization materials, and/or roll compaction as appropriate. However, during times of drought SCAQMD's limits potable water dust suppression by "increasing reliance on non-toxic chemical dust suppressants to stabilize soils." (SCAQMD 2014)

University of California

UC Policy on Sustainable Practices

The UC established the UC Policy on Sustainable Practices, with the most recent update made in July 2020, which applies to all campuses and has the following goals related to hydrology and water quality:

- UC campuses will reduce growth-adjusted potable water consumption 20 percent by 2020, and 36 percent by 2025, when compared to a 3-year average baseline of FY2005/06, FY2006/07, and FY2007/08. UCR has achieved that goal.
- Each location will develop and maintain a Water Action Plan that identifies long term strategies for achieving sustainable water systems. Campuses will include in this update quantification of total square feet of used turf and under-used turf areas on campus as well as a plan for phasing out un-used turf irrigated with potable water.
- Each location shall identify existing single-pass cooling systems and constant flow sterilizers and autoclaves in laboratories and develop a plan for replacement.
- New equipment requiring liquid cooling shall be connected to an existing recirculated building cooling water system, new local chiller vented to building exhaust or outdoors, or to the campus chilled water system through an intervening heat exchange system if available.
    - Once-through or single-pass cooling systems shall not be allowed for soft-plumbed systems using flexible tubing and quick connect fittings for short term research settings.

- If no alternative to single-pass cooling exists, water flow must be automated and controlled to avoid water waste.

University of California, Riverside

UCR CleanWater Stormwater Management Program

The UCR campus is a non-traditional permittee under the Phase II Small MS4 Statewide General Stormwater Permit, as described above. UCR Environmental Health & Safety administers the UCR CleanWater Stormwater Management Program to ensure compliance with all Phase II Small MS4 Statewide General Stormwater Permit requirements.

Spill Prevention, Control, and Countermeasures Plan

UCR has prepared a SPCC Plan in accordance with Section 311 of the CWA, which has been developed in accordance with 40 CFR Part 112 general requirements for SPCC Plans. The SPCC plan was created to address potential spills from oil storage containers and bulk storage containers at the UCR campus. The SPCC plan was last updated in 2018.

Sewer System Management Plan

The UCR Sanitary Sewer Management Plan was developed by UCR to comply with SWRCB Order No. 2006-0003-DWQ and directs appropriate management of the sanitary sewer system to prevent sanitary sewer overflows, prohibits any sanitary sewer overflow that results in a discharge of untreated or partially treated wastewater to Waters of the U.S., and prohibits any sanitary sewer overflow that results in a discharge of untreated or partially treated wastewater that creates a nuisance as defined in California Water Code Section 13050(m).

Regional and Local (Binding)

Santa Ana River Basin Water Quality Control Plan (Basin Plan)

The Santa Ana RWQCB (Region 8) provides permits for projects that may affect surface waters and groundwater locally and is responsible for the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The Basin Plan designates beneficial uses of water in the region and establishes narrative and numerical water quality objectives. Water quality objectives, as defined by the CWA Section 13050(h), are the "limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses or the prevention of nuisance within a specific area." The State has developed TMDLs, which are a calculation of the maximum amount of a pollutant that a waterbody can have and still meet water quality objectives established by the region. The Basin Plan serves as the basis for the Santa Ana RWQCB's regulatory programs and incorporates an implementation plan to ensure water quality objectives are met. Basin Plans undergo a triennial review process, with the Santa Ana RWQCB's Basin Plan most recently updated in February 2016 (Santa Ana RWQCB 2019).

Resolution R8-2005-0001 amended the Basin Plan to incorporate Bacterial Indicator TMDLs for Middle Santa Ana River Watershed Waterbodies. At its Board meeting held on January 29, 2010, the RWQCB adopted Order RB8-2010-0033 approving a revised MS4 permit for Riverside County. This permit includes requirements for Comprehensive Bacteria Reduction Plans (CBRPs) to address excessive levels of bacteria in impaired Middle Santa Ana River waterbodies. CBRPs were approved by the Regional Board for Riverside County at the Board meeting held on February 10, 2012 as

Resolution R8-2012-0015. UCR discharges into the Santa Ana River Reach 3 which has an approved TMDL for pathogens.

Adopted December 19, 2017, WQ-Order 2017-XXXX-DWQ amended Order 2013-001-DWQ-0001 requires Phase II MS4 permittees to comply with applicable TMDL based requirements. For UCR, TMDL specific requirements include watershed-wide attainment monitoring and facility-specific bacterial indicator monitoring program and bacterial indicator reduction plans.

Municipal Regional Stormwater NPDES Permit

On January 29, 2010, the RWQCB adopted Order R8-2010-0033, as amended by Order R8-2013-0024 (NPDES Permit and Waste Discharge Requirements for the RCFCWCD, the County of Riverside, and the incorporated cities of Riverside County in the Santa Ana Region) otherwise known as the MS4 permit. The City is a co-permittee under the Riverside County MS4 permit. One component of the Phase I MS4 permit requires the development of site-specific WQMPs for new development and significant redevelopment projects. WQMPs include site design, source control, and treatment elements to reduce stormwater pollution from urban runoff (Santa Ana RWQCB 2010). UCR is not subject to the NPDES Phase I MS4 permit, rather is designated a non-traditional permittee under the Phase II Small MS4 General Permit, as noted above. The Phase II Small MS4 also requires site design, source control, and treatment elements to reduce stormwater pollution from urban runoff.

On April 7, 2015, the Santa Ana RWQCB adopted statewide trash provisions to address impacts of trash on surface waters in the region. The trash provisions outline additional requirements for all MS4 permittees, including either installation of full capture systems for all storm drains capturing runoff from priority land uses, or a combination of full capture systems, multi-benefit projects, treatment controls, and/or institutional controls to reduce trash accumulation in surface waters (SWRCB 2021). UCR is bound by the Statewide trash provisions; UCR received a Water Code Section 13383 Order in June 2017 to comply with specific initial requirements.

Regional and Local (Non-Binding)

As noted in Section 4, "University of California Autonomy," UCR, a constitutionally-created State entity, is not subject to municipal regulations of surrounding local governments for uses on property owned or controlled by UCR that are in furtherance of the university's educational purposes. However, UCR may consider, for coordination purposes, aspects of local plans and policies of the communities surrounding the campus when it is appropriate and feasible, but is not bound by those plans and policies in its planning efforts.

Riverside County Drainage Area Management Plan

The Riverside County DAMP, developed by the RCFCWCD and other co-permittees to the MS4 Permit, outlines programs and policies to manage urban runoff. The DAMP includes development review procedures for co-permittees, required construction BMPs and inspection frequency, annual reporting and evaluation framework, and TMDL implementation strategies. The DAMP is the primary document outlining compliance procedures for co-permittees to adhere to the requirements of the MS4 Permit in Riverside County. The DAMP for the Santa Ana Region was last updated in 2017 (RCFCWCD 2017).

Riverside County Watershed Action Plan

The Riverside County Watershed Action Plan is intended to enable co-permittees under the Riverside County MS4 Permit to address watershed-level water quality impacts associated with urbanization (County of Riverside 2017). The Watershed Action Plan describes the Santa Ana Watershed, applicable MS4 programs (e.g., the DAMP, WQMPs), and the development review process for new development and redevelopment projects.

RCFCWCD Low Impact Development Best Management Practices

Developed in 2011 by the RCFCWCD, the Design Handbook for Low Impact Development Best Management Practices describes LID guidelines for projects to reduce downstream erosion by more closely mimicking pre-project hydrology and minimizing pollutant runoff. The handbook details strategies for selecting appropriate LID BMPs, design capture volume requirements for BMPs, and sizing calculation methodology for BMP implementation in specific watersheds in the County.

City of Riverside General Plan

The City adopted the General Plan 2025 in November 2007 to outline a 20-year vision for Riverside. The Public Safety, Open Space and Conservation, and Public Facilities and Infrastructure Elements each contain policies relevant to hydrology and water quality. The Public Safety Element contains policies to reduce flood risks and exposure, encourage appropriate flood control infrastructure, and create and maintain evacuation routes for areas that could be affected by flooding or dam failure, with special emphasis on critical and emergency facilities. The Open Space and Conservation Element contains policies to minimize impacts to groundwater and surface water resources, coordinate public and private entities which affect the consumption and quality of water resources in Riverside, enforce RWQCB and NPDES regulations regarding urban runoff and water quality standards, and protect aquifer recharge features. The Public Facilities and Infrastructure Element contains policies to protect local groundwater resources from localized and regional contamination, reduce stormwater flows into the wastewater system and the Santa Ana River, cooperate in regional programs to implement the NPDES program, and routinely monitor and evaluate the effectiveness of the storm drain system.

City of Riverside Municipal Code

The City of Riverside Municipal Code contains several requirements and ordinances relevant to hydrology and water resources.

TITLE 14, CHAPTER 14.12 (WASTE DISCHARGE TO SEWERS AND STORM DRAINS)

Title 14, Chapter 14.12 regulates the discharge of wastes to the public sewer and pollutants into the storm drain systems. Section 14.12.315 prohibits the discharge of pollutants to the storm drainage system or any waterway, whether carrying water or not. Section 14.12.316 requires the preparation of a WQMP and installation of BMPs for new development and redevelopment projects in the City, and Section 14.12.319 outlines inspection and enforcement for post-construction requirements detailed in the project's WQMP.

TITLE 16, CHAPTER 18 (DEVELOPMENT IN FLOOD HAZARD AREAS)

Title 16, Chapter 18 contains regulations pertaining to flood hazard areas in the City and implements the NFIP. Specifically, the ordinance outlines the process for development permit review by the Floodplain Administrator or designee as well as floodplain construction materials and standards.

TITLE 17 (EROSION AND RUNOFF FROM GRADING)

Title 17 describes regulations pertaining to grading, including those intended to minimize erosion and runoff. Section 17.16.010 outlines grading permit application requirements, including noticing requirements to the SWRCB for coverage under the statewide CGP and preparation of a SWPPP.

TITLE 19 (WATER EFFICIENT LANDSCAPING AND IRRIGATION ORDINANCE)

Title 19, Chapter 19.570 contains the City's Water Efficient Landscaping and Irrigation Ordinance, which is intended to promote quality landscaping as well as efficient use of water in the City. The ordinance requires preparation and implementation of a planting plan that identifies the Maximum Applied Water Allowance and the Estimated Annual Water Use of the project's landscaping, as well as irrigation design and soil management plans.

4.10.3 Environmental Impacts and Mitigation Measures

Significance Criteria

UCR utilizes the following 2020 CEQA Guidelines Appendix G significance criteria questions related to Hydrology and Water Quality.

Would the proposed 2021 LRDP:

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
    i. Result in substantial erosion or siltation on- or off-site?
    ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
    iii. 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?
    iv. Impede or redirect flood flows?
d) Risk release of pollutants due to project inundation in flood hazard, tsunami, or seiche zones?
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Issues Not Evaluated Further

Risk of Pollutants Release Due to Inundation (Criterion d)

The Initial Study for the proposed 2021 LRDP (Appendix A) concluded that the UCR campus is not in a tsunami or seiche zone and, therefore, is not subject to inundation by either activity. FEMA identifies UCR's main campus as an Area of Minimal Flood Hazard and University Wash, which bisects the campus, is shown on FEMA's Flood Insurance Rate Maps. The proposed 2021 LRDP

would not involve the storage or processing of pollutants such that they may be spilled or released due to inundation, should a flood hazard event occur. Implementation of the proposed 2021 LRDP would occur in compliance with the UCR MS4 permit, and, as such, the potential for campus project activities to result in pollutant release would be minimized or avoided, representing a less-than-significant impact. No further evaluation is required.

Analysis Methodology

Impacts related to hydrology and water quality were determined by reviewing information regarding regional and local hydrology, climate, topography, and geology contained in the City's General Plan and General Plan EIR, Santa Ana River Basin Water Quality Control Plan, the RPU Urban Water Management Plan (2015), FEMA Flood Insurance Rate Maps, the 2016 UCR Physical Master Plan Study (2016 Master Plan Study), and environmental documentation prepared for projects located in the City and on the UCR campus. Evaluation of impacts is based on comparison of existing conditions to the proposed 2021 LRDP buildout condition, such as changes in impervious area and facilities located in flood zones. Specifically, the impact evaluation focuses on effects on surface and groundwater quality, groundwater supply, and drainage (in terms of erosion, siltation, flooding, stormwater system exceedance, and polluted runoff). Water quality conditions are compared with water quality standards by identifying potential contaminants and pollution pathways, amount of impervious area, and runoff treatment requirements. Finally, as part of the analysis, flooding on the UCR campus is assessed by reviewing potential flooding zone elevations relative to the final grade elevations of proposed 2021 LRDP facilities and features.

2021 LRDP Objectives and Policies

The proposed 2021 LRDP contains objectives and policies relevant to hydrology and water quality including the following:

Open Space (OS)

- Objective OS5: Demonstrate an increased commitment to preservation and enhancement of the natural environment through the design and placement of future campus landscapes.
  - Policy: Consider the ecological and potential stormwater management functions of proposed landscapes. Utilize climate-appropriate, native/drought-tolerant, and/or low-maintenance landscape materials outside of signature campus open spaces.

Infrastructure and Sustainability (IS)

- Potable Water and Wastewater and Irrigation (W) Objective IS W1: Commit to a multi-prong approach to conserving potable water use.
  - Policy: Reduce potable water use in existing building in the Academic Center by 20 percent.
  - Policy: Reduce potable water use in student residential buildings by 30 percent.
  - Policy: Reduce potable water use in new facilities by exceeding applicable codes by a minimum of 20 percent.
  - Policy: Retrofit existing urinals, toilets, showerheads, and faucets for existing buildings with higher water efficiency rated equipment.
- Objective IS W2: Explore options to shift away from potable water use where feasible.
  - Policy: Design new building irrigation and efficient toilet flushing systems for use with future non-potable water sources.

- Policy: Achieve a further 20 percent reduction of potable water use for irrigation by extending Gage Canal water to also irrigate the UCR Botanic Gardens and reducing turf on campus and replacing it with lower water use landscaping.

Stormwater (SW)

- Objective IS SW1: Transition the campus lands to manage stormwater in a manner that replicates natural drainage patterns and allow plants to filter pollutants out of runoff and promote infiltration over flowing into waterways, thus meeting regulatory requirements through innovative, attractive, and cost-efficient solutions.
  - Policy: Prepare and maintain a Stormwater Management Program (SWMP) to account for the additional runoff from the projected new development to meet the requirements of the State of California's mandated Phase II Small MS4 Section F.5.g. (Post-Construction SWMP), including Section F.5.g.3. (Alternative Post-Construction SWMP) consistent with the Maximum Extent Practicable (MEP) standard.
  - Policy: To the extent feasible, integrate stormwater infrastructure within the open space framework of campus such that developable campus lands are minimally lost. The SWMP will include planning and design strategies to restore, enhance, and maintain hydrological function on campus and in the regional hydrological system in response to the projected development.

Impact Analysis

Impact HWQ-1 VIOLATE ANY WASTE DISCHARGE REQUIREMENTS THAT WOULD SUBSTANTIALLY DEGRADE SURFACE OR GROUNDWATER QUALITY.

CONSTRUCTION AND OPERATION OF THE PROPOSED 2021 LRDP WOULD OCCUR IN COMPLIANCE WITH APPLICABLE WATER QUALITY STANDARDS AND WASTE DISCHARGE REQUIREMENTS. IN ACCORDANCE WITH REGULATIONS AND POLICIES, A SWPPP WOULD BE IMPLEMENTED DURING CONSTRUCTION ACTIVITIES AND A SWMP WOULD BE IMPLEMENTED DURING OPERATIONS, TO PROVIDE ON-SITE CONSTRUCTION AND POST-CONSTRUCTION PREVENTION, CAPTURE, AND TREATMENT OF STORMWATER RUNOFF, SUCH THAT POTENTIAL WATER QUALITY IMPACTS WOULD BE LESS THAN SIGNIFICANT. NO MITIGATION IS REQUIRED.

Construction

Pollutants associated with construction activities in general include soils, debris, other materials generated during demolition and clearing, fuels and other fluids associated with the equipment used for construction, paints, other hazardous materials, concrete slurries, and asphalt materials. During construction, materials such as aggregate-base rock for roadway and parking area subgrade, sand bedding and backfill for utility lines, and crushed rock for building foundations would be brought to development areas. Without regulatory compliance, construction activities also have the potential to cause spills of fuel, oils, paint, or other materials from construction equipment or activities if not properly contained. Additionally, removal of vegetation, excavation, grading, and stockpiling of soils for new facilities, building foundations, roads and driveways, and utility trenching in general have the potential to result in soil disturbance that can accelerate erosion, especially during storm events.

Also discussed in the regulatory setting above and in Section 4.9, *Hazards & Hazardous Materials*, the UCR campus is a permittee under the Phase II MS4 Small Statewide General Stormwater Permit, which requires UCR to prevent construction site discharges of pollutants through the installation,

implementation, and maintenance of BMPs and ensure compliance with CGP (State Water Resources Control Board Order 2009-0009-DWQ, as amended). All construction projects under the proposed 2021 LRDP would be required to comply with the provisions of the NPDES Statewide General Construction Activity Stormwater Permit that specifies the implementation of BMPs through a SWPPP, which typically includes both source-control and treatment-control BMPs to reduce water quality impacts including, but not limited to:

- Proper storage, use, and disposal of construction materials
- Watering exposed soils
- Installing sandbags to minimize off-site runoff
- Creating temporary desilting basins
- Containing construction vehicle maintenance in staging areas to avoid leaks or spills of fuels, motor oil, coolant, and other hazardous materials
- Installation of silt fences and erosion control blankets
- Timing grading to avoid the rainy season (November through April)
- Stabilizing cleared or graded slopes
- Protecting or stabilizing stockpiled soils
- Continual inspection and maintenance of all specified BMPs through the duration of construction

General Construction Stormwater Permit requirements also require inspection, monitoring, and reporting. Corrective action within 72 hours is also required for any issue of non-compliance identified during monitoring and inspections. Finally, projects developed under the proposed 2021 LRDP would be required to comply with applicable provisions of the most current CBC and CalGreen Code, which require the reduction of erosion and sedimentation and would further reduce construction-related water quality impacts. With the continued implementation of construction-period BMPs to address potential discharges of polluted runoff, water quality impacts would be minimized to avoid violation of water quality standards and waste discharge requirements. Therefore, construction-period water quality impacts would be **less than significant**.

Operation

Land uses associated with the implementation of the proposed 2021 LRDP would be similar in category to existing land uses and also include some new land use categories (see Section 2, *Project Description*). Operation of the new land use categories would not introduce different pollutants.

As currently envisioned, development under the proposed 2021 LRDP would occur primarily in previously disturbed areas, adjacent to previously developed areas, surface parking areas, generally along North/South/East/West Campus Drive, and generally along University Avenue, Canyon Crest Drive, Big Springs Road, Aberdeen Drive, and West Linden Street. Additionally, development under the 2021 LRDP would primarily be infill development or expansion of already developed areas. Some of the new facility development may be located on currently undeveloped and unpaved areas of campus, such as in land use areas designated as Agricultural/Campus Research, Student Neighborhood, Campus Support, and University Avenue Gateway designations, as well as the potential for an interpretive center in the UCR Botanic Gardens. The southeastern foothills have been largely untouched by development, which has preserved the natural drainages. The proposed 2021 LRDP would designate 154.8 acres of Open Space Reserve in this area and would maintain relatively intact natural habitat and pathways for stormwater.

As discussed in the 2016 Master Plan Study, the arroyos and detention basins currently provide sufficient conveyance capacity to accommodate flows associated with the 100-year storm event. This conveyance capacity would be maintained under the proposed 2021 LRDP. Future project sites would incorporate pre-treatment systems before discharging surface flows into the treatment areas and ultimately to the Gage Basin (UCR 2016a, 2016b). Future malls and internal pathways included as part of future development plans, as well as future and existing storm drains, would be used to pre-treat and transport runoff to the identified treatment areas (UCR 2016a). In addition, individual projects implemented under the 2021 LRDP would include storm drain infrastructure to provide appropriate conveyance through and around the development areas, such that the development would not overwhelm the capacity of the existing UCR storm drain system. Future 2021 LRDP projects would also adhere to State requirements under the NPDES Permit as well as the proposed UCR policies related to post-construction site stormwater runoff control program for new development and redevelopment. This would include development and implementation of a SWMP to address the additional runoff from the projected new development to meet the requirements of the Phase II Small MS4 permit, Section F.5.g. (Post-Construction SWMP), including Section F.5.g.3. (Alternative Post-Construction SWMP) consistent with the MEP standard.

Under the UCR SWMP, the proposed 2021 LRDP facilities would incorporate site design, source control, and treatment BMPs to prevent pollutants from reaching receiving waters. Site design BMPs, including LID measures, would reduce runoff or pollutants at the source. Source control BMPs would minimize or avoid post-project runoff and control sources of pollutants. Treatment BMPs utilize treatment mechanisms with performance standards to remove targeted pollutants that have entered stormwater runoff. Storm drain infrastructure for the proposed 2021 LRDP development may include area drains, roof drain connections, and/or piped conveyance of stormwater to water quality treatment basins/devices and connections to the existing storm drain system. Water quality treatment may consist of biofiltration basins, proprietary treatment devices, and/or underground storage vaults, which would slow the velocity of water and allow sediment and debris to settle out of the water column and minimize the potential for downstream flooding, erosion/siltation, or exceedances of stormwater drainage system capacity. Pre-treatment and biofiltration prior to entering the storm sewer system would reduce adverse water quality impacts to groundwater and downstream water bodies. Specific details related to these regional stormwater BMPs would be developed during required project-level design evaluations, and such BMPs would minimize downstream flooding, erosion/siltation, or exceedances of stormwater drainage system capacity such that operation and maintenance of the proposed 2021 LRDP would not violate water quality standards or otherwise substantially degrade surface water or groundwater quality.

With the continued implementation of operation-period BMPs and SWMP requirements, which include LID measures, runoff reduction measures, and site design, source control, and treatment BMPs, water quality impacts associated with changes in stormwater runoff would be minimized to avoid violation of water quality standards and waste discharge requirements. Therefore, operational impacts related to water quality would be **less than significant**.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Impact HWQ-2 SUBSTANTIALLY DECREASE GROUNDWATER SUPPLIES OR INTERFERE SUBSTANTIALLY WITH GROUNDWATER RECHARGE, IMPEDING SUSTAINABLE GROUNDWATER MANAGEMENT OF THE BASIN.

POTENTIAL IMPACTS TO GROUNDWATER SUPPLIES AND RECHARGE WOULD BE LESS THAN SIGNIFICANT. NO MITIGATION IS REQUIRED.

The IRWMP for the Upper Santa Ana River Watershed focuses on long-term management of water resources and reducing reliance on imported water supplies, and is informed by the RPU Water Division's UWMP, among other sources. The current UWMP (2015) for Riverside reports that the SBBA (consisting of the Bunker Hill and Lytle Creek Subbasins) and the Rialto-Colton Subbasin are affected by overdraft conditions, but there are sufficient supplies to meet replenishment obligations. This sufficiency of groundwater supplies is provided through continued implementation of the 1969 Western-San Bernardino Judgment, as administered by two Watermasters appointed to oversee groundwater extractions (RPU 2016).

As reported in the IRWMP and required by the Adjudication Judgment, if groundwater pumping in the SBBA exceeds the safe yield of the SBBA (i.e., if water is overdrafted), then water is imported to offset the amount exceeding the safe yield (i.e. the amount of the overdraft) (USAWRA 2015). Similarly, as stipulated in the Adjudication Judgment, WMWD must replenish the Rialto-Colton Subbasin if extractions for use in Riverside County in aggregate exceed certain specific amounts, and Valley District must replenish the Rialto-Colton Subbasin if water levels are lower than certain specific water level elevations in specified wells. Therefore, although the SBBA and Rialto-Colton Subbasin are identified as being affected by overdraft, such conditions are actively managed by specified agencies with legal obligations to replenish supplies extracted under overdraft, as determined by the aforementioned thresholds of safe yield, aggregate uses, and water levels in specified wells.

In addition to the SBBA and Rialto-Colton Subbasin, the Riverside North Subbasin is identified in the 2015 UWMP as currently affected by overdraft conditions, and both Riverside North and Riverside South Subbasins are projected to be overdrafted. The Adjudication Judgment further obligates specified agencies to maintain sustainable groundwater levels in affected basins and subbasins, including as follows: Valley District is required to maintain sustainable groundwater levels in the SBBA and the Riverside North Subbasin. WMWD is required to replenish excess extractions above the base period extractions in both Riverside North and Riverside South Subbasin, as well as the Arlington Subbasin. RPU also contributes to efforts to monitor and manage the surrounding groundwater basins and participates in independent groundwater level and quality monitoring in Bunker Hill, Riverside, and Arlington Subbasins. Also, in accordance with the Adjudication Judgment, all groundwater production is metered and recorded, and groundwater extraction amounts, as well as depth to groundwater in extraction and monitoring wells, are reported to the Watermaster, who is responsible for administering the Adjudication Judgment. As mentioned above regarding the SBBA, the determination that sufficient groundwater supplies are available to meet replenishment obligations despite local basins and subbasins being affected by overdraft is provided through continued implementation of the Adjudication Judgment.

Construction and operation of the proposed 2021 LRDP would introduce temporary and long-term water demands in the area, and all water demands associated with the 2021 LRDP would be met with supplies provided by the RPU. Approximately 80 percent of supplies delivered by the RPU are sourced from local groundwater supplies that are actively managed in accordance with the Adjudication Judgement. As discussed above, the Adjudication Judgment specifies sustainable water use rates for all approved producers, including the RPU, and legally obligates specified water

management agencies to replenish supplies extracted under overdraft conditions, as determined by thresholds including safe yield, aggregate uses, and water levels in specified wells, depending upon the specific subbasin affected by such withdrawals. Due to continued implementation and compliance with the Adjudication Judgement, which was specifically developed to avoid future overdraft and to maintain sustainable groundwater conditions, the proposed 2021 LRDP would not substantially decrease groundwater supplies or impede sustainable groundwater management of the basins and subbasins in the area. Furthermore, although the proposed 2021 LRDP would introduce some new impervious surfaces, existing drainages and recharge areas would be maintained such that groundwater recharge rates and patterns would not be substantially affected.

The availability and reliability of water supplies in the project area for the proposed 2021 LRDP are addressed in detail in Section 4.17, *Utilities and Service Systems*. As discussed therein, sufficient water supplies are available to meet the demands of the proposed 2021 LRDP, including with consideration to the current characteristics of local groundwater subbasins, as discussed above, and the continued implementation of and compliance with the Adjudication Judgment.

Construction

During construction of individual projects under the proposed 2021 LRDP, temporary water supply would be required, primarily for dust suppression during grading and grubbing activities, as well as during equipment wheel washing, and concrete mixing and casting. Pursuant to the requirements of the South Coast Air Quality Management District (SCAQMD) Rule 403, which is discussed in detail in Section 4.3, *Air Quality*, all surfaces disturbed within the UCR campus during construction activities would be watered appropriately to reduce fugitive dust generation and the associated air quality impacts. However, during times of drought, SCAQMD's Drought Management and Water Conservation Plan limits potable water dust suppression by increasing reliance on non-toxic chemical dust suppressants to stabilize soils, paving unpaved roadways and using vacuum sweepers instead of water to remove dust from paved areas and increasing use of physical/mechanical barriers to contain or limit transport of fugitive dust. Furthermore, water demand for dust suppression is highly dependent on site-specific variables including soil properties, antecedent moisture conditions, and other climatic factors. In addition, the disturbance area requiring watering for dust control would vary depending on the nature of projects and the number of projects occurring simultaneously, as construction water demand would occur at various times over the approximately 15-year buildout by 2035 period. Additionally, where redevelopment of Campus facilities would replace existing structures, construction water use would be significantly less than operational demand, which would generally halt during construction activities (e.g. landscaping water demands for these areas would halt).

UCR would not directly extract groundwater supplies, as water supply would be delivered to the UCR campus by the RPU. The RPU, in turn, would extract groundwater in accordance with the Adjudication Judgement, thereby ensuring that 2021 LRDP-related water uses would not cause or exacerbate overdraft conditions affecting underlying groundwater basins and subbasins. As discussed in Section 4.17, *Utilities and Service Systems,* the RPU may purchase supplemental water supplies in times of peak demand or drought conditions from Metropolitan via the WMWD, to ensure sufficient supply availability for construction of projects under the proposed 2021 LRDP. In addition, construction activities conducted under the proposed 2021 LRDP are not anticipated to directly encounter local groundwater as groundwater depths near campus vary from approximately 73 feet below the ground surface to 175 feet below ground surface, as shown in Table 4.10-1. However, should perched groundwater be unexpectedly encountered during construction activities, standard construction dewatering methods would be implemented to prevent the perched water

from leaving the construction site. In accordance with appropriate dewatering methods for the given site and activity, the captured water may be applied to a detention basin for infiltration to the subsurface, or used elsewhere on campus, such as, but not limited to, for landscaping support.

Due to the temporary nature of construction water demands, compliance with the Adjudication Judgement, availability of supplemental water supplies, and implementation of standard construction BMPs including as applicable to dewatering practices, construction of the proposed 2021 LRDP would not substantially decrease groundwater supplies, impede sustainable groundwater management, or interfere substantially with groundwater recharge. Potential impacts would be **less than significant**.

Operation

The UCR campus is presently characterized by large areas of impervious surfaces, such as paving for streets, pathways, structures, and buildings, and there are existing stormwater drainage systems in place to convey surface flows across these impermeable areas to permeable areas such as arroyos and vegetated swales, where the water is allowed to infiltrate to the subsurface. Infiltration and percolation of precipitation occurs in permeable areas such as open space areas in East Campus and research fields located in West Campus (Figure 4.10-4). As currently envisioned, development under the proposed 2021 LRDP would occur primarily within previously disturbed areas, adjacent to previously developed areas, surface parking areas, generally along North/South/East/West Campus Drive, and generally along University Avenue, Canyon Crest Drive, Big Springs Road, Aberdeen Drive, and West Linden Street. Additionally, development under the 2021 LRDP would primarily be infill development or expansion of already developed areas. Some of the new facility development may be located on currently undeveloped and unpaved areas of campus, such as in land use areas designated as Agricultural/Campus Research, Student Neighborhood, Campus Support, and University Avenue Gateway, and an interpretative center in the UCR Botanic Gardens. Although the proposed 2021 LRDP would introduce new impervious areas through development of new buildings/facilities, such development would be implemented with site-specific appropriate drainage features to convey surface flows across and around impermeable areas to those areas where flows may infiltrate to the subsurface. This would be achieved through implementation of LID methods including Control Design Criteria for compliance with the NPDES program and the Phase II MS4 Permit.

The MS4 Permit requires all regulated projects – defined as projects creating and/or replacing 5,000 square feet or more of impervious area – to implement an SWMP that incorporates LID measures, including stormwater retention and treatment features. The requirement for an SWMP is also provided under the 2021 LRDP Objective IS-SW1, discussed above under "2021 LRDP Objectives and Policies." Such stormwater retention features must capture runoff from the 85th percentile, 24-hour storm event, 80 percent of the annual runoff, or flow from either 0.2 inch per hour rainfall intensity or twice the 85th percentile hourly rainfall intensity as determined by local rainfall records. As such, the proposed 2021 LRDP directs UCR to develop an SWMP in planning and design strategies to restore, enhance, and maintain hydrological function on campus and in the regional hydrological system, which would minimize or avoid potentially adverse impacts associated with introducing new impervious areas on groundwater recharge rates and patterns. Redevelopment sites which do not currently meet these standards would benefit from long-term post-construction stormwater controls in comparison to baseline conditions.

Through compliance with MS4 Permit requirements, implementation of LID methods, and implementation of an SWMP during operation of the proposed 2021 LRDP, potential impacts of new

impervious surfaces of groundwater recharge rates and patterns would be less than significant. In addition, the 2021 LRDP would not impede the creation or implementation of a groundwater sustainability plan and would occur in compliance with existing groundwater sustainability plans. As such, the proposed 2021 LRDP would not substantially decrease groundwater supplies or substantially interfere with groundwater recharge and potential impacts are **less than significant**.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Impact HWQ-3 ALTERATION OF DRAINAGE PATTERNS IN A MANNER WHICH WOULD RESULT IN SUBSTANTIAL EROSION, INCREASED RUNOFF RESULTING IN FLOODING, CREATION OR CONTRIBUTION OF RUNOFF WATER WHICH WOULD EXCEED THE CAPACITY OF A STORMWATER DRAINAGE SYSTEM, OR IMPEDE OR REDIRECT FLOOD FLOWS.

CONSTRUCTION AND OPERATION OF THE PROPOSED 2021 LRDP WOULD NOT ALTER THE COURSE OF A STREAM OR RIVER AND WOULD NOT ALTER REGIONAL STORMWATER DRAINAGE PATTERNS. COMPLIANCE WITH APPLICABLE REGULATIONS AND POLICIES, INCLUDING IMPLEMENTATION OF A SWPPP DURING CONSTRUCTION AND A SWMP DURING OPERATION, WOULD PROVIDE SUFFICIENT ON-SITE CONSTRUCTION AND POST-CONSTRUCTION PREVENTION, CAPTURE, AND TREATMENT OF STORMWATER RUNOFF, AND WOULD MINIMIZE OR AVOID POTENTIALLY ADVERSE IMPACTS SUCH THAT THEY WOULD BE LESS THAN SIGNIFICANT. NO MITIGATION IS REQUIRED.

The proposed 2021 LRDP would not alter the course of a stream or river. However, full buildout of the proposed 2021 LRDP may result in site-specific alterations to the local drainage patterns, which are the footprint of travel of unabsorbed rainwater in a given area (generally moving from areas of higher elevation to lower elevation). Hydromodification, or changes in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow, and groundwater flow), is caused by land disturbance activities such as vegetation removal or grading, and other land use changes that result in drainage pattern modifications. Hydromodification generally increases surface runoff rates and decreases infiltration rates, or the rate at which surface runoff infiltrates to the subsurface. Additional development can increase surface runoff rates by creating more impervious surfaces that do not allow percolation of the water down into the soil. Water is instead conveyed directly into storm drain systems or streams.

Construction

As discussed under Impact HWQ-1, removal of vegetation, excavation, grading, and stockpiling of soils may accelerate erosion and siltation, if disturbed soils are not secured. The portion of campus that would see the most intense development under the proposed 2021 LRDP include the Academic Center and the northern half of East Campus around Canyon Crest Drive and West Linden Street. These areas would potentially experience the greatest extent of hydromodification. However, construction activities under the proposed 2021 LRDP would be implemented in accordance with a site-specific SWPPP as part of CGP requirements, and the SWPPP would detail BMPs to avoid or minimize erosion, siltation, and flooding associated with drainage pattern alternations. Therefore, the construction impacts related to alteration of drainage patterns resulting in erosion, siltation, or flooding would be less than significant.

Construction projects under the proposed 2021 LRDP would be implemented with site-specific drainage features that direct and convey surface runoff into the UCR campus' existing drainage system and infiltration facilities which have sufficient capacity to accommodate buildout of the proposed LRDP. Implementation of the proposed 2021 LRDP would not disrupt regional drainage patterns and would not impede or redirect regional flood flows. Localized drainage pattern alterations would be addressed through site-specific drainage and flood control features, in accordance with the NPDES General Stormwater Permit for Small MS4s requirements. The implementation of a SWPPP during construction would minimize or avoid potential water quality related impacts from drainage pattern alterations. With the continued implementation of UCR policies and regulatory requirements, which include the implementation of construction-period BMPs, construction impacts related to generating polluted runoff, resulting in drainage pattern alternations, or exceeding storm drainage system capacity would be **less than significant**.

Operation

Implementation of the proposed 2021 LRDP would increase impervious surfaces compared to existing conditions. The net increase in impervious surfaces with 2021 LRDP implementation has not been quantified, as it will depend upon the design specifications of individual projects, as well as the projects' baseline conditions at the time of project implementation. A hydrology report was conducted for the 2016 Master Plan Study, which provided guidance to future campus development in support of the Strategic Plan's academic vision and the proposed 2021 LRDP. The 2016 Master Plan Study computed peak discharges for 21 identified UCR sub-drainage areas in East Campus for existing and future conditions using guidelines and methodology developed by the RCFCWCD. A comparison of the existing and future conditions reveals that the 2-year and 25-year peak flows are anticipated to generate on-site runoff increase for the East Campus by nearly 10 percent (UCR 2016a).

Storm drain infrastructure for development under the proposed 2021 LRDP would adhere to federal, State, and UCR requirements under the NPDES Program, including a post-construction stormwater runoff control program for new development and redevelopment. In addition, the proposed 2021 LRDP directs UCR to implement a SWMP to address additional runoff from the projected new development to meet the requirements of the Stormwater General Small MS4s Permit, Section F.5.g. (Post-Construction Stormwater Management Program), including Section F.5.g.3. (Alternative Post-Construction Stormwater Management Program) consistent with the MEP standard. Redevelopment of older UCR buildings with long-term post-construction stormwater controls would also improve operational stormwater drainage and treatment. UCR Planning, Design & Construction staff would review and approve project plans to ensure compliance with federal, State, and UCR regulatory requirements and that stormwater management and utility infrastructure is appropriately considered. The primary objective of these post-construction requirements is to ensure that the projects reduce pollutant discharges to the maximum extent practicable and prevent stormwater discharges from causing or contributing to a violation of water quality standards. Therefore, operational impacts related to alteration of drainage pattern resulting in erosion, siltation, or flooding would be less than significant.

The UCR campus storm drain system connects to the RCFCWCD storm drain network, as shown in Figure 4.10-6. As shown in Figure 4.10-7, FEMA Flood Zones are located in and around these arroyos and the bioswales located south of Big Springs Road in East Campus, including the area north of University Avenue and west of Canyon Crest Drive known as Gage Basin. To comply with FEMA requirements, development under the proposed 2021 LRDP would be located outside of the 100-year flood plain, and the proposed development under the 2021 LRDP would not impede or redirect

flood flows in a 100-year flood hazard area. The proposed 2021 LRDP would also protect and enhance the natural arroyo system on campus, thereby minimizing future flood hazards and avoiding adverse impacts of LRDP development of flood patterns.

The arroyos and detention basins currently serve to convey and contain the 100-year flood storm generated by the campus and upstream properties and would be maintained under the proposed 2021 LRDP. Future development project sites would need to incorporate pre-treatment systems before discharging into the treatment areas. Future and existing streets and malls included as part of future development under the proposed 2021 LRDP would provide opportunities for centralized stormwater treatment. Future and existing storm drains would be used to pre-treat and transport runoff to treatment areas. For instance, the Great Glen Basin at the northeast intersection of East Campus Road and Big Springs Road currently receives flows from a natural arroyo which serves a portion of the campus as well as an off-site residential area to the northeast, approximately 100 acres in total. The 85th percentile treatment storm from development in the East Campus around East Campus Drive would be collected and conveyed by various drainage systems, including underground storm drains and surface conveyance through the proposed Science Walk extension pedestrian mall. Stormwater runoff which exceeds the treatment flow would overflow to future and existing storm drain conveyance systems that serve the existing sites and maintain existing drainage patterns. The volume from the upstream development sites would increase the stormwater volume held on the Great Glen Basin (UCR 2016a).

Similarly, the Glade Basin at the northeastern corner of North Campus Drive and Aberdeen Drive currently accepts flows from a 40-acre portion of the campus to its north. The 85th percentile treatment storm from development near Aberdeen Drive and north of North Campus Drive would be collected in underground storm drains and conveyed by a vegetated swale along Aberdeen Drive to the existing detention basin. Stormwater runoff which exceeds the treatment flow would overflow to future and existing storm drain conveyance systems which would serve the existing sites and maintain existing drainage patterns. Although not proposed under the 2021 LRDP, the capacity of the Great Glen Basin and Glade Basin may be increased by increasing the depth of storage area, widening the edges, or a combination of both. Subsurface storage such as a gravel storage area at the bottom of the basins would also aid in increasing capacity with minimal land disturbance. Should UCR choose to pursue such modifications to the existing basins, they would be subject to CEQA review and applicable regulatory agency permitting requirements (UCR 2016a).

According to the 2016 Master Plan Study, an existing area of narrow parking separating the I-215/SR 60 freeway and West Campus Drive south of University Avenue could be replaced with a 40- to 50-foot-wide buffer consisting of trees, a multi-use area, and an area designated for stormwater treatment (UCR 2016b). The 85th percentile treatment storm from development in the Academic Center would be collected and conveyed through various landscape spaces, pedestrian malls, and underground storm drains. The stormwater treatment buffer would be designed to treat stormwater in a similar fashion to a vegetated swale while conveying it from south to north, to a future stormwater management infrastructure located south of Parking Lot 1. The 2016 Master Plan Study also proposes a Canyon Crest Drive Linear Treatment System to modify the existing Canyon Crest Drive to include an area for stormwater treatment as part of its cross-section. The 85th percentile treatment storm from development east of Canyon Crest Drive would be collected and conveyed through landscape spaces, pedestrian malls, and underground storm drains. The stormwater treatment strip would be designed to treat stormwater, similar to a vegetated swale, while conveying it from north to south, to the existing Gage Basin (UCR 2016a).

Development under the proposed 2021 LRDP would not substantially alter existing drainage patterns through the addition of impervious surfaces or otherwise result in hydromodification such that flooding would occur, the stormwater drainage system capacity would be exceeded, or flood flows would be impeded or redirected. Therefore, operational impacts related to flooding, exceedance of storm drainage capacity, or impedance or redirection of flood flows would be **less than significant**.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Impact HWQ-4 Conflict with a Water Quality Control Plan or Sustainable Groundwater Management Plan.

The proposed 2021 LRDP would implement water quality BMPs in accordance with applicable requirements, reducing potential downstream water quality impacts to ensure that the proposed 2021 LRDP would not conflict with or obstruct implementation of the Water Quality Control Plan or a sustainable groundwater management plan. This impact would be less than significant. No mitigation is required.

The Basin Plan for the Santa Ana Region is addressed in Section 4.10.2, *Regulatory Setting*, under the "Regional and Local" subheading for the Santa Ana River Basin Water Quality Control Plan (Basin Plan). The Basin Plan, as developed and implemented by the Santa Ana RWQCB in accordance with the federal CWA, designates beneficial uses for surface waters in the Santa Ana Region and associated water quality objectives to fulfill such uses. The proposed 2021 LRDP would result in increased water demand due to the development and redevelopment of UCR facilities and the accommodation of additional students and faculty/staff. Implementation of the proposed 2021 LRDP may expand impervious surfaces on the UCR campus, and BMPs would be implemented to avoid conflicting with a water quality control plan or sustainable groundwater management plan.

As discussed under Impact HWQ-1, construction and operation of the proposed 2021 LRDP would be conducted in compliance with applicable regulatory requirements related to stormwater runoff to minimize the potential for pollutants to enter receiving waters. The proposed 2021 LRDP activities would also comply with the provisions of the Statewide General Construction Activity Stormwater Permit that specifies the implementation of BMPs as well as the NPDES Stormwater General Permit for Small MS4s. This would include implementation of a project-specific SWPPP during construction activities as well as a SWMP during operation and maintenance activities. Under the SWMP, facilities would incorporate site design, source control, and treatment BMPs to prevent pollutants from reaching receiving waters. Storm drain infrastructure for the proposed 2021 LRDP would also adhere to UCR requirements, including a post-construction site stormwater runoff control program for new development and redevelopment. With incorporation of operational BMPs, the proposed 2021 LRDP would not impair existing or potential beneficial uses of nearby or downstream water bodies and would not conflict with or obstruct implementation of the Basin Plan.

As discussed under Impact HWQ-2, neither construction nor operation and maintenance of the proposed 2021 LRDP would adversely impact groundwater supplies or supply reliability, and the 2021 LRDP would not interfere with management of the local groundwater basins in accordance

with the Adjudication Judgement. In addition, the proposed 2021 LRDP would not impede the creation or implementation of a future groundwater sustainability plan for a groundwater subbasin. Given that adequate groundwater supplies are anticipated to be available in year 2035 for the projected 2035 population across Riverside County, and existing regulatory measures prevent over-drafting of the groundwater subbasin that underlies the UCR campus, water consumption would not substantially decrease groundwater supplies. Potential impacts related to water quality control and groundwater management plan consistency would be **less than significant**.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.10.4 Cumulative Impacts

The geographic scope of cumulative analysis for hydrology and water quality impacts is defined by Tequesquite Arroyo and East Etiwanda Creek, the Santa Ana River Sub-Watersheds, and Riverside-Arlington Groundwater Subbasin, as defined above in Section 4.10.1, *Environmental Setting*. As such, this cumulative analysis assesses development on and proximate to the UCR campus and includes buildout of the cities of Riverside and Moreno Valley, the closest of which is 1.9 miles northeast of the East Campus boundary as described in Table 4-1.

Surface Water Quality and Groundwater Quality

The violation of any water quality standards or waste discharge requirements could result in water quality degradation and impacts to surface water quality or groundwater quality. However, the UCR campus is a permittee under the Phase II MS4 Small Statewide General Stormwater Permit, which requires UCR to prevent construction site discharges of pollutants through the installation, implementation, and maintenance of BMPs and ensure compliance with CGP (State Water Resources Control Board Order 2009-0009-DWQ, as amended). All construction projects under the proposed 2021 LRDP would comply with the provisions of the NPDES Statewide General Construction Activity Stormwater Permit, including through the implementation of a SWPPP with BMPs to address both source control and treatment control to reduce or avoid water quality impacts. In addition, projects under the proposed 2021 LRDP would also implement a SWMP, as required by the MS4 permit and included in objectives of the 2021 LRDP. As such, projects under the 2021 LRDP would comply with water quality standards and waste discharge requirements, and potential water quality impacts would have minimal potential to combine with similar impacts of other projects in the cumulative scenario. Furthermore, cumulative projects within the region would also be obligated to comply with regulatory requirements for water quality protection. Potential cumulative impact related to surface water and groundwater quality (Impact HWQ-1) would be less than significant, and the proposed 2021 LRDP's **contribution would not be cumulatively considerable**.

Groundwater Recharge and Sustainability

Continued development throughout the cumulative analysis area in the absence of regulations could alter groundwater recharge rates and patterns such that underlying groundwater supplies could be affected. However, such effects from the proposed 2021 LRDP and cumulative

development would be minimized or avoided through implementation of LID methods and compliance with the SWMP, which would collectively minimize drainage pattern alterations that could affect groundwater recharge. As such, potential groundwater recharge impacts of the proposed 2021 LRDP would have minimal potential to combine with similar impacts of other projects in the cumulative scenario. Cumulative projects within the region would have to comply with similar regulatory requirements for both construction and operation BMPs. In many instances, where cumulative project's redevelop existing sites which do not currently meet stormwater standards, there would benefit from long-term post-construction stormwater controls in comparison to baseline conditions. Cumulative impacts would not be significant, and the proposed 2021 LRDP's **contribution would not be cumulatively considerable**.

Furthermore, although the proposed 2021 LRDP would result in an increased water use, this increase in water demands is accounted for in the current UWMP, which also accounts for other projects in the cumulative scope of analysis, and there are sufficient water supplies available to meet the regional water demands in a sustainable manner.

It is likely that a portion of the new campus population would reside in jurisdictions outside the City. Both the RPU and WMWD, which supplies water to several water retailers in western Riverside County, have indicated that the supply source groundwater basins are stable during the lifespan of the proposed 2021 LRDP, and that new recharge projects and regulation of adjudicated basins will prevent them from being overdrafted. The proposed 2021 LRDP does not propose any new wells. Additionally, the proposed 2021 LRDP includes policies to decrease potable water use, such as extending Gage Canal water to also irrigate the UCR Botanic Gardens and reducing turf on campus and replacing with lower-use landscaping. Potential cumulative impact related to groundwater recharge and sustainability (Impact HWQ-2) would be less than significant, and the proposed 2021 LRDP's **contribution would not be cumulatively considerable**.

Surface Drainage Patterns and Erosion

Construction of projects on the UCR campus and other projects considered in the cumulative analysis would involve grading and other earthmoving activities that could result in temporary and short-term localized soil erosion in the absence of proper regulations. Urban development in the Tequesquite Arroyo and East Etiwanda Creek Santa Ana River Sub-Watersheds and associated hydromodification in general have the potential to result in flooding, drainage systems capacity issues, and erosion and sedimentation problems throughout the sub-watershed areas. However, construction-related impacts from individual projects under the proposed 2021 LRDP and those considered in the cumulative analysis would be temporary and short term, and each project's construction activities would be localized. Furthermore, cumulative future development projects in these areas would be subject to the same NPDES/SWPP stormwater permit requirements as UCR, including minimizing the area of impervious surfaces, implementing LID measures, and reducing runoff from project sites through stormwater capture, so that increases in peak flows and flow durations would be minimized. In many instances, where cumulative project's redevelop existing sites which do not currently meet stormwater standards, there would benefit from long-term post-construction stormwater controls in comparison to baseline conditions. The 2021 LRDP area is largely built out and urbanized, with defined stormwater drainage systems and facilities present throughout the UCR campus to convey flood flows. These existing systems and facilities would be maintained and protected in place with the implementation of development under the proposed 2021 LRDP. In addition, although projects under the proposed 2021 LRDP would introduce new impervious surfaces, such features would continue to direct flood flows to the existing stormwater conveyance systems and facilities, and would be implemented with project-specific drainage

improvements as necessary to avoid adverse impacts to existing systems. Thus, potential cumulative impact related to drainage patterns and erosion (Impact HWQ-3) would be less than significant and the proposed 2021 LRDP's **contribution would not be cumulative considerable**.

Water Quality Control Plan and Sustainable Groundwater Management Plans

Potential water quality impacts of the proposed 2021 LRDP and other projects in the cumulative scenario are fully captured in the discussion under "Surface Water Quality and Groundwater Quality," above. As discussed therein, the proposed project and cumulative projects would be subject to the same water quality regulations and requirements, including the Phase II MS4 Small Statewide General Stormwater Permit, to which the UCR campus is a permittee. Similarly, potential groundwater impacts of the proposed 2021 LRDP and other projects within the cumulative scenario are fully captured in the discussion under "Groundwater Recharge and Sustainability," above. As discussed therein, the proposed project and cumulative projects would be subject to the same groundwater management standards and regulations, including the 1969 Western-San Bernardino Adjudication Judgment, which provides for groundwater supply sustainability despite overdraft conditions; this is accomplished through conjunctive use management efforts such as the replenishment of any groundwater extracted under overdraft conditions with imported surface water supplies to avoid adverse effects associated with overdraft. Therefore, impacts of the proposed 2021 LRDP would have minimal potential to combine with similar impacts of other projects, and potential cumulative impacts related to water quality control plans and sustainable groundwater management plans (Impact HWQ-4) would be less than significant, and the proposed 2021 LRDP's **contribution would not be cumulative considerable**.

4.10.5 References

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