2. CARLSBAD WATERSHED DESCRIPTION

This chapter provides a brief description of the Carlsbad Watershed and presents relevant watershed data, including the required submittal of a watershed MS4 map and facility inventories. For purposes of this document, and to be consistent with the Municipal Permit, the Carlsbad Watershed is defined as the Carlsbad Hydrologic Unit (Hydrologic Unit No. 904) as classified by the California Department of Water Resources. Much of the information utilized in this chapter was obtained form the Carlsbad Watershed Management Plan, February 2002: A Management Plan for Carlsbad Watershed Network by KTU+A through the Resource Conservation District for the SWRCB.

2.a. Regional Setting

The Carlsbad Hydrologic Unit (CHU) is approximately 211 square miles and is formed by a group of six individual watersheds in northern San Diego County. The CHU is bordered by the San Luis Rey River Watershed to the north and by the San Dieguito River Watershed to the south. It reaches inland nearly 24 miles to just northeast of Lake Wohlford. The maximum elevation of the CHU is approximately 2,400 feet and it extends to sea level at the Pacific Ocean.

The CHU is comprised of six Hydrologic Areas (watersheds): Loma Alta, Buena Vista Creek, Agua Hedionda, Encinas, San Marcos Creek, and Escondido Creek. Cottonwood Creek is another important sub-basin located in the CHU, however, it is not recognized by the Municipal Permit and is not called out separately in the program. The CHU contains four major coastal lagoons: Buena Vista, Agua Hedionda, Batiquitos, and San Elijo as shown on Figure 2-1. The CHU includes the entire Cities of Carlsbad, San Marcos and Encinitas and portions of the cities of Oceanside, Vista, Escondido, Solana Beach, and San Diego County unincorporated areas. The jurisdictional breakdown (by land area) for each of the six Hydrologic Areas (watersheds) is indicated in Table 2-1 and shown in Figure 2-2.

Table 2-1 Jurisdictional Breakdown of Carlsbad Watershed (by area)

WATERSHED	RECEIVING WATERBODY	SIZE (sq.mi.)	PERCENT (%)	Jurisdictional Breakdown (%)							
				CARLSBAD	ENCINITAS	ESCONDIDO	OCEANSIDE	SAN DIEGO CO.	SAN MARCOS	SOLANA BEACH	VISTA
Carlsbad Hydrologic Unit (904)		**211.5**	**100**	**18**	**9**	**13**	**8**	**32**	**11**	**1**	**8**
Loma Alta (904.10)	Loma Alta Slough	9.8	5				97				3
Buena Vista Creek (904.20)	Buena Vista Lagoon	22.6	11	19			26	11			45
Aqua Hedionda (904.30)	Aqua Hedionda Lagoon	29.4	14	41			6	24	5		24
Encinas (904.40)	Pacific Ocean	5.4	3	100							
San Marcos (904.50)	Batiquitos Lagoon	59.7	28	29	15	5		19	33		
Escondido Creek (904.60)	San Elijo Lagoon	84.6	40		11	29		55	4	1	

Figure 2-1 Watersheds within the Carlsbad Hydrologic Unit

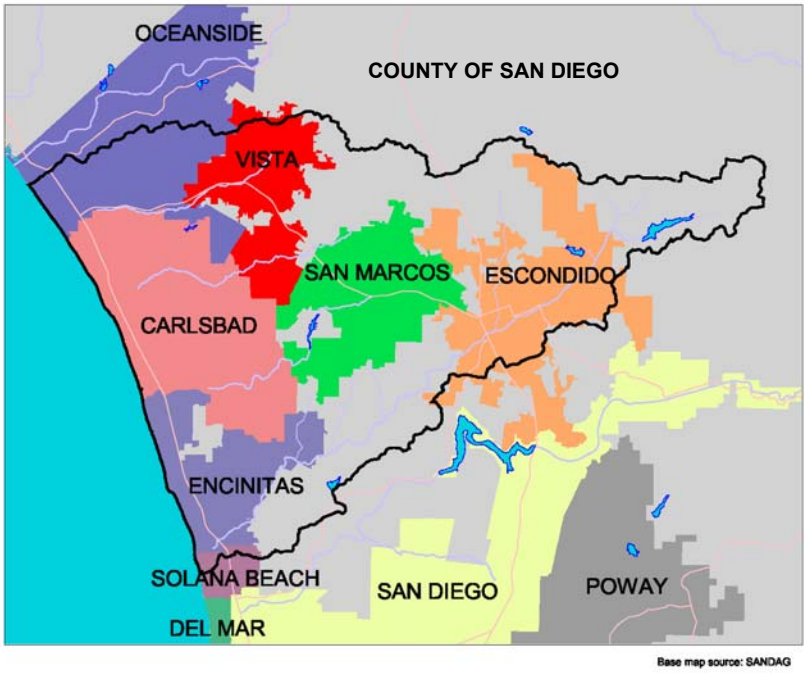

Figure 2-2 Jurisdictions within the Carlsbad Watershed

Land uses within the watersheds are diverse, including urban and suburban development, industrial, commercial, intense agriculture, floriculture, confined animal operations, open space,

and recreational. Approximately 48% of the CHU is urbanized. The dominant land uses are residential (29%), freeways and roads (12%), agricultural (12%), commercial/industrial (6%), and vacant/underdeveloped (32%). The population of the CHU is approximately 500,000 residents making it the third most densely populated in San Diego County behind San Dieguito and Los Penasquitos HUs. A high percentage of the underdeveloped land is private ownership and the population of the CHU is projected to increase to over 700,000 residents by 2015. The area is also responsible for the agricultural production of various agricultural crops including avocados, citrus and dairy, but horticultural production is the primary agricultural use.

Federal, state and local agencies have jurisdiction over various issues pertaining to the watersheds located within the CHU. The County of San Diego is a participant in the Multiple Species Conservation Plan (MSCP), and the remaining jurisdictions are participants in the Multiple Habitat Conservation Plan (MHCP).

The cities of Carlsbad, Encinitas, Escondido, Oceanside, and San Marcos currently have draft MHCP Subarea Plans that outline land use regulations that comply with both the Natural Community Conservation Planning (NCCP) Act and California Environmental Quality Act (CEQA). Final MHCP Subarea Plans would be expected to be included in the permitting processes. A draft MHCP Subarea Plan is being prepared for the City of Vista; and the County of San Diego is gathering data for the preparation of their draft MSCP North County Subarea Plan. Therefore, land use regulations within these jurisdictions would comply with MHCP and MSCP guidelines, respectively. The City of Solana Beach will not be preparing a Subarea Plan because a majority of the land located within its jurisdiction is developed or is designated as biological open space. Land use regulations within this jurisdiction would comply with MHCP guidelines.

Once the Subarea Plans are adopted by the cities respective councils and by the County Board of Supervisors and Implementing Agreements have been signed by cities, County, United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG), sensitive species issues within the CHU will fall under the jurisdiction of both the CDFG for state listed species and the USFWS for federal listed species. Wetland issues will fall under the jurisdiction of the following: (1) United States Army Corps of Engineers (USACOE) for placement of dredged or fill material within waters of the U.S. pursuant to the Clean Water Act (CWA), Section 404 (2) Regional Water Quality Control Board (RWQCB) for any action that may result in degradation of waters of the State pursuant to the CWA Section 401, and (3) CDFG for alteration of a streambed pursuant to the California Fish and Game Code, Section 1603. In addition, the California Coastal Commission (CCC) regulates land and water uses located in the coastal zone consistent with the policies of the California Coastal Act (CCA).

2.b. Watershed Description

The following description is an excerpt from Chapter 4 of the Carlsbad Watershed Management Plan, February 2002: A Management Plan for Coastal Watershed Network by KTU+A through the Resource Conservation District for the SWRCB.

2.b.1 Geologic and Geomorphic Setting

The CHU is typical of the regional geologic and geomorphic setting of the San Diego coastal region. The drainage basins are, for the most part, relatively small features situated on low-lying coastal terraces and bounded on the east by foothill features of the coastal mountain ranges. The CHU is composed of a number of small drainage basins that are punctuated by

larger drainage basins (San Luis Rey and San Dieguito) that wrap around them and extend well inland to the mountain regions.

2.b.2 Soils

The soils within the CHU range from excessively drained gravelly sands to well drained clays, and include areas of rough broken land, terrace escarpments, and steep gullied land. However, many of the CHU soil series have characteristics that can have a significant effect on water quality related issues. There are many properties and qualities that affect soil erodibility. Factors include slope, surface layer texture, restricted permeability, and the grade of structure in the surface layer. Since severely erodible soils comprise 90% of the CHU, caution must be used when developing land use plans and implementing grading ordinances. Probable development areas, built on highly erodible soil, pose a potential threat to the water quality and sediment management of the hydrologic unit.

Other important soil characteristics include infiltration rate (the rate at which soil absorbs precipitation), and shrink-swell factor (the amount of water a soil can hold and how quickly water can be released). Both of these characteristics affect how quickly precipitation is transformed into surface runoff and how long subsurface flows will continue into the dry season. Soils that have a slow infiltration rate and a high shrink-swell factor are likely to generate surface runoff sooner, but also continue to discharge subsurface flows longer than a soil with a fast infiltration rate and a low shrink-swell factor.

2.b.3 Vegetation Communities

Historically, the CHU was comprised of narrow corridors of riparian forest, woodlands and scrub along the primary drainages, with grasslands along the valley bottoms and gently sloping hills transitioning into coastal sage and chaparral scrubs in the upland areas and groves of oak woodlands within areas of more mesic conditions. Currently, native habitats comprise approximately 39% of the CHU, with non-native constituting the remaining 61%. Native habitats primarily include upland vegetation consisting of Coastal Sage and Chaparral Scrubs, and smaller areas of Oak Woodlands, Native Grasslands, Riparian Forests/Woodlands, Riparian Scrubs, Marsh/Wetlands, and open water areas; non-native habitats include non-native grasslands and disturbed, agricultural and developed areas.

2.b.4 Climate

The climate variations within the CHU are primarily the result of the degree of coastal influence and elevation. The average minimum temperatures within the CHU range from approximately 39°F to 47°F in the winter and from 51°F to 63°F during the summer months. The average maximum temperatures within the CHU range from approximately 65°F to 69°F in the winter and from 70°F to 91°F during the summer months. The annual average precipitation ranges from approximately 10 inches within the coastal areas to 17 inches within the more mountainous inland areas. Most of the precipitation falls as rain during the months from December to April. Snow is a very rare occurrence in the upper elevations of the CHU.

2.b.5 Existing Land Use

Land use patterns within the CHU are complex and diverse. Most commercial and industrial development is focused around the original town centers or along the two primary traffic routes (Interstate 5 and State Route 78). Residential land uses are by far the most extensive and

represent approximately 35% of the land area within the CHU in 1999. Vacant and open space lands represent approximately 40% of the land area within the CHU in 1999, with another 11% of the land area in agricultural use. Most of the non-developed land within the CHU occurs only in the headwater areas of many of the watersheds. San Marcos Creek and Escondido Creek both have a significant amount of non-developed lands within their central reaches.

2.b.6 Population And Suburban Growth

The population of the CHU, as estimated in the Carlsbad Watershed Management Plan, was nearly 500,000 in 2000. San Diego County's growth rate has been increasing dramatically over the past decades. According the San Diego Association of Governments, San Diego County's population is expected to increase by approximately one million within the next twenty years. This growth will require more than 400,000 new housing units. A significant portion of that growth will take place in northern San Diego County. An example of that growth can be seen now in the City of San Marcos, which lies within the CHU. It is currently the fastest-growing city in the county. This trend is further reinforced based on the population trends for the seven cities within the CHU from 1980 through the year 2020.

2.c. Description of Hydrologic Areas (Watersheds)

The CHU is comprised of six Hydrologic Areas or watersheds; Loma Alta Creek, Buena Vista Creek, Agua Hedionda Creek, Encinas Creek, San Marcos Creek, and Escondido Creek. Below is a brief description of each of these watersheds from north to south.

2.c.1 Loma Alta Creek

The Loma Alta Creek watershed is the northernmost watershed of the CHU. It is approximately 6,300 acres in area, comprising 5% of the CHU. The watershed extends inland about 7.3 miles and the highest elevation within the drainage area is 460 feet above mean sea level. The primary receiving waters in the watershed are Loma Alta Creek which drains into the Loma Alta Slough and the Pacific Ocean. The watershed is located almost entirely inside the City of Oceanside with less than 5% in the City of Vista. Within the CHU, only the Encinas watersheds are smaller in area than the Loma Alta Creek watershed.

2.c.2 Buena Vista Creek

The Buena Vista Creek Watershed is the fourth largest system within the CHU. The watershed extends approximately 10.6 miles inland from the coast and totals approximately 14,400 acres in area, comprising 11% of the CHU. Buena Vista Creek originates on the western slopes of the San Marcos Mountains and discharges into the Pacific Ocean via Buena Vista Lagoon. The primary receiving waters in the watershed are Buena Vista Creek, the Buena Vista Lagoon, and the Pacific Ocean. The largest portion of the watershed is in the City of Vista (45%), with the remaining in Oceanside, Carlsbad, and San Diego County.

2.c.3 Agua Hedionda Creek

Agua Hedionda Creekis the third largest watershed within the CHU. The watershed, dominated by Agua Hedionda Creek, extends approximately 10.6 miles inland from the coast and is about 18,800 acres in area, comprising 14% of the CHU. Agua Hedionda Creek originates on the southwestern slopes of the San Marcos Mountains in west central San Diego County and

discharges into the Pacific Ocean via Agua Hedionda Lagoon. The primary water bodies in the watershed include Aqua Hedionda Creek, Buena Creek, Letterbox Canyon, Agua Hedionda Lagoon and the Pacific Ocean. Most of the watershed is in the City of Carlsbad (41%); the remainder is in Vista (24%) and San Diego County (24%) and small amounts in Oceanside and San Marcos.

2.c.4 Encinas Creek

The Encinas Creek watershed is 3,400 acres in size, making it the second smallest watershed within the CHU. The watershed extends inland from the coast 2.4 miles and the highest elevation within the drainage is approximately 430 feet above mean sea level. The watershed begins as a small drainage behind an industrial area where it is immediately channelized. The Encinas Creek continues down through industrial and office parks associated with Palomar Airport until it reaches the lower valley area. It then makes its way to the Pacific Ocean after crossing Interstate 5 and Pacific Coast Highway. The Encinas watershed is entirely within the city of Carlsbad and the only significant receiving water body is the Pacific Ocean.

2.c.5 San Marcos Creek

The San Marcos Creek watershed is the second largest watershed within the CHU. The watershed, dominated by San Marcos Creek, extends approximately 14.1 miles inland from the coast and is about 36,000 acres in area, comprising 28% of the CHU. San Marcos Creek originates on the western slopes of the Merriam Mountains in west central San Diego County and discharges in to the Pacific Ocean via Batiquitos Lagoon. Encinitas Creek is one of the major tributaries in the watershed. It originates in the hills southwest of Questhaven Road and parallels El Camino Real before it confluence with San Marcos Creek at the southeastern corner of Batiquitos Lagoon. The highest elevation within the watershed is approximately 1,540 feet above mean sea level. Lake San Marcos is the largest impoundment within the watershed. There are also a number of small farm ponds on various tributaries in the lower basin. The major receiving water-bodies within the watershed are San Marcos Creek, Encinitas Creek, Batiquitos Lagoon, and the Pacific Ocean. The Cottonwood Creek sub-basin is also located in this watershed which drains a portion of Encinitas directly into the Pacific Ocean. The San Marcos Creek watershed is primarily located in San Marcos, Carlsbad, Encinitas, and the County of San Diego, with a small portion in Escondido.

2.c.6 ***Escondido Creek***

The Escondido Creek watershed is the largest and most complex system within the CHU. The watershed extends approximately 24.6 miles inland from the coast and totals 54,100 acres in the area, comprising 40% of the CHU. Escondido Creek watershed originates in Bear Valley in north central San Diego County and discharges into the Pacific Ocean via San Elijo Lagoon. Elevations within the watershed range from sea level to 2,420 feet on the ridges above Bear Valley. There are three main reservoirs within the watershed: Lake Wohlford, Dixon Lake and San Dieguito Reservoir. Another major impoundment, Olivenhain Reservoir is currently under construction. Most of the watershed is in unincorporated areas of the County (55%). The remaining is in the cities of Escondido and Encinitas, with a small portion in San Marcos and Solana Beach. The primary receiving waters are Escondido Creek, Lake Wohlford, Lake Dixon, Reidy Canyon, San Elijo Lagoon, and the Pacific Ocean.

2.d. MS4 Map

As part of the requirements under the Municipal Permit, the watershed Copermittees are required to develop and submit a map of the watershed, including all the jurisdiction's MS4s or storm drain conveyance systems. This task was accomplished with assistance from SANDAG, who has regional GIS mapping capabilities and data. Electronic MS4 data was obtained from each jurisdiction that had data. Some of the jurisdictions have not yet digitized their MS4. The MS4 Map for the Carlsbad Watershed is provided as **Plate 1**.

The Regional Water Quality Control Board has requested that those jurisdictions that have not yet completed converting their MS4 into a digital format provide a description of their plan to accomplish this task. Below is a description, by jurisdiction, of these plans.

2.d.1 Carlsbad

The City of Carlsbad has completed approximately 75 percent of the inventory and GIS mapping of the MS4. Completion is expected by March, 2003

2.d.2 Encinitas - Complete

2.d.3 Escondido- Complete

2.d.4 Oceanside

The City of Oceanside is currently contracting with consulting firm Berryman & Henigar to complete the digitization of a jurisdictional MS4 map, depicting all pipes greater than 18 inches. Projected completion date of the map, provided no unforeseen delays, is April 2003.

2.d.5 San Marcos

The City of San Marcos has submitted MS4 data in digital form in compliance with the Municipal Permit, and will continue to work towards obtaining necessary funding needed in order to convert the MS4 data from out current digital version into the preferred GIS format.

2.d.6 Solana Beach

The City of Solana Beach is currently in the midst of developing its Drainage Master Plan. An aerial topography map is complete, which will be used to develop the Request for Proposals that will be announced during the month of December. The Drainage Master Plan will include a GIS-formatted map of the City's MS4 system.

2.d.7 Vista

The City of Vista began the process of mapping the City's MS4 system as part of a hydraulic study conducted in 1999. The MS4 shown on Plate 1 represents that current effort. However, this mapping only includes those drainage facilities that are 36-inch and greater in size and includes major open channels (both earthen and concrete). The City intends to map the entire MS4 system over the next two years using available GIS technology. This more comprehensive

map will then be useful for maintenance activities, hydraulic analyses, infrastructure upgrades prioritization and certainly integrated watershed activities.

2.d.8 San Diego County - Complete

2.e. Watershed Land Use Inventory

Section J.2.a of the Municipal Permit states in part that each Copermittee provide an accurate map that inventories commercial, construction, municipal and industrial facilities. The Copermittees have discussed this issue with representative from the SDRWQCB, who agreed that a work plan that addresses this task for all the 20 Copermittees be prepared and completed in the Unified Watershed URMP.

For this document, a Land Use Map of the watershed, which represents an inventory of commercial, municipal, and industrial areas, is provided on Plate 2.