

# ONE-PAGE PLACE ASSESSMENT: ENCINITAS, CALIFORNIA

LOCATED IN THE SAN LUIS REY-ESCONDIDO SUBWATERSHED WITHIN THE CALIFORNIA WATERSHED

CLIMATE		AVERAGE HIGH & LOW TEMPERATURES <sup>1</sup>											1909 – 2013
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
° F HIGH	63.4	62.9	63.4	64.7	66.2	68.3	71.9	73.6	73.1	71.0	67.9	64.5	67.6
° F LOW	44.2	45.4	47.5	50.5	54.7	58.3	62.2	63.0	60.8	55.6	48.6	44.4	52.9
° C HIGH	17.4	17.2	17.4	18.2	19.0	20.2	22.2	23.1	22.8	21.7	19.9	18.1	19.8
° C LOW	6.8	7.4	8.6	10.3	12.6	14.6	16.8	17.2	16.0	13.1	9.2	6.9	11.6

RECORD HIGH<sup>1</sup> 108° F 42.2° C September 26, 1963 RECORD LOW<sup>1</sup> 22° F -5.6° C January 28, 1948

SUN		MAR 21 JUN 21 SEP 21 DEC 21					
LATITUDE	33.0°	DEGREES N or S of DUE EAST THE SUN RISES <sup>2</sup>		0°	29°N	0°	28°S
ELEVATION	82 FT 25 m	DEGREES N or S of DUE WEST THE SUN SETS <sup>2</sup>		0°	29°N	0°	28°S
		SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON) <sup>a,2,3</sup>		57°	80°	57°	34°
		SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO <sup>b</sup>		1 : 1.51	...AND AZIMUTH <sup>c</sup>		0°
		9AM & 3PM WINTER-SOLSTICE SHADOW RATIO <sup>b,2</sup>		1 : 2.88	...AND AZIMUTH <sup>c,2</sup>		43°

WIND		PREVAILING WIND DIRECTION (FROM WHERE) & AVERAGE SPEED <sup>4</sup>											MAX SPEED <sup>5</sup>		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	MPH	km/h
	ENE	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	ENE		58	93
MPH	3.9	4.7	4.5	5.1	5.0	4.5	3.9	3.6	3.4	3.5	3.5	3.9	4.1		
km/h	6.3	7.6	7.2	8.2	8.0	7.2	6.3	5.8	5.5	5.6	5.6	6.3	6.6		

WATER		AVERAGE RAINFALL (GAIN) <sup>1</sup>											1909 – 2013
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	2.16	2.11	1.64	0.91	0.23	0.08	0.03	0.09	0.22	0.45	1.04	1.57	10.53
mm	54.9	53.6	41.7	23.1	5.8	2.0	0.8	2.3	5.6	11.4	26.4	39.9	267.5

AVERAGE PAN EVAPORATION (POTENTIAL LOSS) <sup>d,6</sup>		1948 – 2005											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	2.81	3.45	5.03	6.06	6.76	6.96	7.63	7.48	6.21	5.02	3.58	2.78	63.77
mm	71.4	87.6	127.8	153.9	171.7	176.8	193.8	190.0	157.7	127.5	90.9	70.6	1,619.8

WETTEST YEAR'S RAIN<sup>1</sup> 21.89 INCHES 556 mm 1983 DRIEST YEAR'S RAIN<sup>1</sup> 2.82 INCHES 72 mm 1953

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION<sup>7</sup> 218 DAYS: April 13 – November 17, 1999 RAINFALL INCOME<sup>e</sup> 153 GPCD  
580 lpcd

AREA<sup>f,8</sup> 18.81 SQ MILES 48.7 km<sup>2</sup> POPULATION<sup>f,8</sup> 61,588 2013 est. UTILITY-WATER USE<sup>g,9,10,11,12</sup> 119–194 GPCD  
450–734 lpcd

HISTORICAL DEPTH TO GROUNDWATER<sup>h,13</sup> CURRENT CURRENT GROUNDWATER EXTRACTION > NATURAL GROUNDWATER RECHARGE<sup>i,13</sup>

WATERGY	% of CALIFORNIA'S ENERGY USED FOR WATER-RELATED PURPOSES <sup>j,14</sup>	20%
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TOTEM SPECIES	PLANT:	MAMMAL:
FISH:	BIRD:	REPTILE:
AMPHIBIAN:	MEGAFUNA:	

## FOR MORE INFORMATION & HOW TO APPLY IT

1. For more CLIMATE information, see the introduction, chapters 1, 2, & 4, and appendix 5 of *Rainwater Harvesting for Drylands and Beyond (RWHDB), Volume 1, 2nd Edition*
2. For more SUN information, see chapters 2 & 4 and appendices 5 & 7
3. For more WIND information, see chapters 2 & 4 and appendices 5 & 9
4. For more WATER information, see the introduction, chapters 1–4, and appendices 1–5
5. For more WATERGY information, see chapters 2 & 4 and appendix 9
6. For more TOTEM SPECIES information: the ethics, principles, and strategies throughout *RWHDB* help us shift from a negative to a positive impact on these species and their habitats and ecosystems, on which our quality of life also depends.

## ENCINITAS PLACE-ASSESSMENT NOTES

- a. The solar-noon altitude angle (a.k.a., solar-noon elevation angle) refers to the number of degrees the sun is located above the equator-facing horizon at solar noon on the given date. In the northern hemisphere, the equator-facing horizon is to the south. In the southern hemisphere, the equator-facing horizon is to the north.
- b. The solar-noon winter-solstice shadow ratio is the object's height : length of object's shadow cast on December 21 at noon (the longest noontime shadow of the year). The ratio is 1 : x, where  $x = 1 \div \tan(90 - (\text{latitude} + 23.44))$ .
- c. Azimuth is the angle formed between a reference direction (here, due south) to the point on the horizon directly below a given object. Solar noon is the time on any day when the sun's azimuth is 0°. The 9 am & 3 pm winter-solstice azimuth indicates the sun's deviation, in degrees, east/west of due south at those times (-/+ 3 hours from solar noon) on December 21.
- d. An evaporation pan holds water whose depth is measured daily as water evaporates. These data allow us to determine evaporation rates at a given location. Compare average rainfall (water gain) to potential water loss via evaporation by looking up pan-evaporation rates for your area. According to one definition, if pan-evaporation rates exceed rainfall rates, you are in a dryland environment. Another definition states that drylands are "land areas where the mean annual precipitation is less than two thirds of potential evapotranspiration (potential evaporation from soil plus transpiration by plants), excluding polar regions and some high mountain areas which meet this criterion but have completely different ecological characteristics" (Greenfacts.org). The higher the ratio of potential evaporation to rainfall, the more important evaporation-reducing strategies such as mulch, windbreaks, shading, and covered water storage become.
- e. Calculated in situ w/ average rainfall, area, & population
- f. City proper
- g. Residential-only gpcd for San Dieguito Water District for November 2014 was 119 (ref. 9). All-inclusive SDWD gpcd for 2013 was reported as 163 (ref. 10). Parts of Encinitas are served by a second entity, Olivenhain MWD, whose residential-only gpcd was 194 for November 2014 (ref. 11), while their all-inclusive gpcd for 2013 was reported as 269 (ref. 12). Note that properties in Olivenhain's jurisdiction tend to much larger (~10 acres) than those served by San Dieguito (ref. 11).
- h. "Apart from the region in the northeast, most of the wells in San Diego County show mild declines or no significant trend from 1949 to 2009. It's possible that groundwater extraction along the coast is balanced by seawater intrusion. Future studies can address this by examining groundwater quality, especially chloride concentration in coastal aquifers" (ref. 12, pp. 8–9).
- i. While the given resource weakly suggests that declines in groundwater levels in San Diego County are due to groundwater extraction, it does not explicitly state that current extraction exceeds natural recharge.
- j. Water-related energy use in California consumes ~20% of the state's electricity & ~30% of the state's non-power plant natural gas.

**CREDITS: Brad Lancaster**, Resource concept | **Megan Hartman**, Resource creation, research

## ENCINITAS PLACE-ASSESSMENT REFERENCES

1. Oceanside Marina station (#046377), [wrcc.dri.edu](http://wrcc.dri.edu), accessed 12/23/2014. Closest good coastal station 14 miles north of Encinitas.
2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or [esrl.noaa.gov/gmd/grad/solcalc](http://esrl.noaa.gov/gmd/grad/solcalc), accessed 12/23/2014
3. RWHDB Vol 1, or Mar 21 = 90–latitude, Jun 21 = 90–(latitude–23.44), Sep 21 = 90–latitude, Dec 21 = 90–(latitude+23.44)
4. Custom Wind Rose Plots, Carlsbad/Palomar (CRQ), [mesonet.agron.iastate.edu](http://mesonet.agron.iastate.edu), accessed 12/23/2014
5. Almanac: Historical Information, [www.myforecast.com/bin/climate.m?city=11720](http://www.myforecast.com/bin/climate.m?city=11720), accessed 12/23/2014
6. Average Monthly Pan Evaporation, Chula Vista (CA), [www.wrcc.dri.edu/htmlfiles/westevap.final.html](http://www.wrcc.dri.edu/htmlfiles/westevap.final.html), accessed 12/23/2014
7. At Oceanside Marina (see ref. 1 above). Michelle Breckner, Service Climatologist, WRCC, via phone 1/5/2015
8. [Census.gov](http://Census.gov), accessed 12/23/2014
9. Felice Tackill, Water Conservation Specialist, San Dieguito Water District (SDWD), via telephone, 1/5/2015.
10. Agenda Report, March 19, 2014, SDWD, [archive.ci.encinitas.ca.us/weblink8/DocView.aspx?id=713188](http://archive.ci.encinitas.ca.us/weblink8/DocView.aspx?id=713188), accessed 1/2/2015
11. Teresa Chase, Conservation/Education Coordinator, Olivenhain MWD, via telephone, 1/6/2015
12. Water Rate Study in Board Meeting Minutes, [www.olivenhain.com/files/docs/Board/board\\_meetings/2014/101514.pdf](http://www.olivenhain.com/files/docs/Board/board_meetings/2014/101514.pdf), accessed 1/5/2015
13. San Diego County: Assessment of water resources, green infrastructure, & utility rates (2014), [water.columbia.edu/files/2014/04/San\\_Diego\\_Final.pdf](http://water.columbia.edu/files/2014/04/San_Diego_Final.pdf), accessed 1/4/2015
14. Managing an Uncertain Future, State of California Department of Water Resources (2008), Climate Change Adaptation Strategies for California's Water, [www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf](http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf), accessed 1/6/2015
- 15.