ONE-PAGE PLACE ASSESSMENT: ALBUQUERQUE, NM

LOCATED IN THE RIO GRANDE-ALBUQUERQUE SUBWATERSHED WITHIN THE RIO GRANDE WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1] *1914–2013*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	47.2	53.2	60.8	70.1	79.5	89.5	91.7	88.9	82.3	71.0	57.0	47.6	69.9
°F LOW	23.6	27.8	33.2	41.0	50.3	59.5	64.8	63.1	56.2	44.2	31.7	24.5	43.3
°C HIGH	8.4	11.8	16.0	21.2	26.4	31.9	33.2	31.6	27.9	21.7	13.9	8.7	21.1
°C LOW	-4.7	-2.3	0.7	5.0	10.2	15.3	18.2	17.3	13.4	6.8	-0.2	-4.2	6.3

RECORD HIGH[1]: 107° F | 41.7° C | *June 26, 1994*

RECORD LOW[1]: -17° F | -27.2° C | *January 7, 1971*

SUN ⚐2

LATITUDE: 35.1°

ELEVATION: 5,117 FT / 1,560 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	30°N	0°	28°S
DEGREES N or S of DUE WEST THE SUN SETS[2]	0°	30°N	0°	28°S
SOLAR-NOON ALTITUDE ANGLE (ABOVE HORIZON)[a,2,3]	55°	78°	55°	31°

SOLAR-NOON WINTER-SOLSTICE SHADOW RATIO[b]: 1 : 1.63 ...AND AZIMUTH[c]: 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 3.14 ...AND AZIMUTH[c,2]: 43°

WIND ⚐3

MAX SPEED[5]: 77 MPH | 124 km/h

PREVAILING WIND DIRECTION (FROM WHERE) & AVERAGE SPEED[4]

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
	NNW	NW	W	W	W	S	S	S	NNW	S	NNW	NNW	
MPH	7.1	7.9	9.0	10.6	9.5	8.6	7.0	6.2	7.0	6.5	6.5	6.1	7.7
km/h	11	13	14	17	15	14	11	10	11	10	10	10	12.4

WATER ⚐4

AVERAGE RAINFALL (GAIN)[1] *1914–2013*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	0.36	0.39	0.50	0.54	0.61	0.61	1.41	1.46	0.95	0.88	0.44	0.49	8.64
mm	9.1	9.9	12.7	13.7	15.5	15.5	35.8	37.1	24.1	22.4	11.2	12.4	219.5

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[d,6] *1923–2005*

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	1.87	2.81	5.27	7.77	9.74	10.49	10.06	8.67	6.58	4.64	2.75	2.45	73.10
mm	47.5	71.4	133.9	197.4	247.4	266.4	255.5	220.2	167.1	117.9	69.9	62.2	1,856.7

WETTEST YEAR'S RAIN[1]: 15.9 INCHES | 403 mm | *1941*

DRIEST YEAR'S RAIN[1]: 3.3 INCHES | 84 mm | *1917*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[7]: 108 DAYS: *September 24, 1917 – January 10, 1918*

RAINFALL INCOME[e]: 140 GPCD / 529 lpcd

AREA[f,8]: 187.7 SQ MILES / 486 km²

POPULATION[f,8]: 552,804 *2011 estimate*

UTILITY-WATER USE[9]: 150 GPCD / 568 lpcd

HISTORICAL DEPTH TO GROUNDWATER[g,10]: 20–30 FT | 6.1–9.1 m | *1960* — 42 FT | 12.8 m | *2013* CURRENT

CURRENT GROUNDWATER EXTRACTION > NATURAL GROUNDWATER RECHARGE[h,11]

WATERGY ⚐5

of AVG NM HOMES THAT COULD BE POWERED W/ENERGY USED TO MOVE & TREAT ABCWUA WATER[12]: 15,842

TOTEM SPECIES ⚐6

PLANT: Pecos Sunflower *(Helianthus paradoxus)*

MEGAFAUNA:

FISH: Silvery Minnow (Hybognathus amarus)

REPTILE: Mexican Garter Snake *(Thamnophis eques megalops)*

BIRD: Southwestern Willow Flycatcher *(Empidonax traillii extimus)*

MAMMAL: New Mexico Meadow Jumping Mouse *(Zapus hudsonius luteus)*[13]

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.

ALBUQUERQUE PLACE-ASSESSMENT NOTES

a. Altitude angle (a.k.a., elevation angle) refers to the number of degrees the sun is located above the horizon at a given time and date.

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 ÷ tangent (90 - (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. If pan-evaporation rates exceed rainfall rates, you are in a dryland environment, where evaporation-reducing strategies such as mulch, windbreaks, shading, and covered water storage are very important.

e. Calculated in situ w/ average rainfall, area, & population

f. City proper

g. Given groundwater levels are for Downtown Albuquerque. Levels in Albuquerque's Valley, 1926-27, before MRGCD built drains, were 0–3 feet. In the Valley, after drains were built, groundwater levels were typcially 5–10 feet, although in some areas they were less than 5 feet. The water table declined in the Valley 2-4 feet between 1927-1936, and an additional 2 feet from 1936–1960. In 2013, these levels are 29 feet. In the East Mesa, 1961 levels were 10–600 feet; in 2013, they are 705 feet. Looking at one specific well in East Mesa/Foothills, well no. 10.4.34.214, the groundwater levels ranged from 350–616 feet in 1960, and are at 700 feet in 2013.[10]

h. We are moving quickly to begin using the San Juan-Chama water because our current system, which relies entirely on pumping groundwater from an underground aquifer, is being seriously depleted. Right now, only about 50 percent of the water pumped from that aquifer is recharged, or replenished. Future project involving putting water into the aquifer, then pumping it out in times of need.[11]

CREDITS: Brad Lancaster, Resource concept, content oversight **| Leslie Buerk, Kalyx Studio,** Research **| Megan Hartman,** Research, Resource creation

ALBUQUERQUE PLACE-ASSESSMENT REFERENCES

1. Albuquerque Airport station (#290234), wrcc.dri.edu, accessed 5/8/2013

2. Rainwater Harvesting for Drylands & Beyond, Vol 1, or esrl.noaa.gov/gmd/grad/solcalc, accessed 5/8/2013

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. Western Regional Climate Center, wrcc.dri.edu, Double Eagle station data, periods of record 1992–2002 (prevailing wind direction) and 1999–2006 (average monthly wind speed), accessed 4/17/2013

5. www.myforecast.com/bin/climate.m?city=23626, accessed 5/8/2013

6. www.wrcc.dri.edu/htmlfiles/westevap.final.html, Los Lunas 3 SSW, accessed 4/17/2013

7. Michelle Breckner, Service Climatologist, WRCC, via phone 5/8/2013

8. Census.gov, accessed 4/17/2013

9. Albuquerque Bernalillo County Water Utility Authority, www.abcwua.org/content/view/342/555, accessed 4/17/2013

10. Summary of Historic groundwater (Tech report 21, 1961), nm.water.usgs.gov/projects/piezometers/piezometers.city.new, accessed 5/8/2013

11. www.abcwua.org/content/view/31/24/, accessed 5/19/2013

12. Per a May 13, 2013, email from David Montgomery, ABCWUA SCADA Manager, the water utility authority, which serves 606,780 water users in greater Albuquerque metro area, used 120,148,069 kWh in 2012 to produce & treat 32,126,000,000 gallons of water. The average NM household uses 632 kWh of energy per month (www.eia.gov/cneaf/electricity/esr/table5.html, accessed 5/13/2013), or 7,584 kWh per year. 120,148,069 kWh/year ÷ 7,584 kWh/household/year = 15,842 households.

13. All species selections provided by Leslie Buerk, Kalyx Studio, via email 5/8/2013