ONE-PAGE PLACE ASSESSMENT: MADRID, NEW MEXICO

LOCATED IN THE GALISTEO RIVER SUBWATERSHED WITHIN THE RIO GRANDE WATERSHED

CLIMATE ⚐1

AVERAGE HIGH & LOW TEMPERATURES[1]

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F HIGH	43	48	56	64	74	83	85	83	77	66	53	43	65
°F LOW	17	21	26	32	41	49	54	54	46	35	25	17	35
°C HIGH	6.1	8.9	13.3	17.8	23.3	28.3	29.4	28.3	25.0	18.9	11.7	6.1	18.3
°C LOW	-8.3	-6.1	-3.3	0.0	5.0	9.4	12.2	12.2	7.8	1.7	-3.9	-8.3	1.7

RECORD HIGH[1]: 101° F | 38.3° C | *June 1971*

RECORD LOW[1]: -30° F | -34.4° C | *January 1971*

SUN ⚐2

LATITUDE: 35.4°

ELEVATION: 6,026 FT / 1,837 m

	MAR 21	JUN 21	SEP 21	DEC 21
DEGREES N or S of DUE EAST THE SUN RISES[2]	0°	29°N	0°	28°S
DEGREES N or S of DUE WEST THE SUN SETS[2]	0°	29°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 : 1.65 ...AND AZIMUTH[c]: 0°

9AM & 3PM WINTER-SOLSTICE SHADOW RATIO[b,2]: 1 : 3.05 ...AND AZIMUTH[c,2]: 43.0°

WIND ⚐3

PREVAILING WIND DIRECTION[d,4] & AVERAGE SPEED[5]

MAX SPEED[5]: 0 (MPH / kmph)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
DIRECTION													
MPH	11.9	17.1	6.1	20.9	23.2	9.9	13.2	14.5	11.2	17.5	19.1	22.5	15.6
kmph	19	28	10	34	37	16	21	23	18	28	31	36	25.1

WATER ⚐4

AVERAGE RAINFALL (GAIN)[1]

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
INCHES	0.49	0.35	0.68	0.61	0.99	1.63	2.23	2.52	1.62	1.40	0.60	0.65	13.77
mm	12.4	8.9	17.3	15.5	25.1	41.4	56.6	64.0	41.1	35.6	15.2	16.5	349.8

AVERAGE PAN EVAPORATION (POTENTIAL LOSS)[e,6]

INCHES													56
mm													1,422

WETTEST YEAR'S RAIN[7]: 0.0 INCHES | 0 mm | *year*

DRIEST YEAR'S RAIN[7]: 0.0 INCHES | 0 mm | *year*

LONGEST PERIOD WITH NO MEASURABLE PRECIPITATION[8]: # of DAYS: *range of dates*

RAINFALL INCOME[f]: 4,499 GPCD / 17,031 lpcd

AREA[g,9]: 1.4 SQ MILES / 4 km²

POPULATION[g,10]: 204 / *2010*

UTILITY-WATER USE[h,11]: 212 GPCD / 801 lpcd

DEPTH TO GROUNDWATER[i,12]: 0 FT | 0.0 m | *year*

CURRENT GROUNDWATER EXTRACTION: > or <

NATURAL GROUNDWATER RECHARGE[j,13]: 0 FT | 0.0 m | *year*

WATERGY ⚐5

of AVG NM HOMES THAT COULD BE POWERED w/ENERGY USED TO PUMP MADRID'S WATER[k,11,14,15]: 3.3

TOTEM SPECIES ⚐6

PLANT: Santa Fe Cholla *(Opuntia viridiflora)*

MAMMAL: Black Bear *(Ursus americanus amblyceps)*

BIRD: Osprey *(Pandion haliaetus)*

BIRD: Flathead Chub *(Platygobio gracilis)*

AMPHIBIAN: Northern Leopard Frog *(Rana pipiens)*

REPTILE: Western Diamondback Rattlesnake *(Crotalus atrox)*

Species selected by Jan-Willem Jansens.[16] More species online.[17]

Available online at HarvestingRainwater.com/one-page-place-assessments

FOR MORE INFORMATION & HOW TO APPLY IT

⚐**1.** For more CLIMATE information, see the introduction and chapters 1, 2, & 4 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.

MADRID 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. The direction of a prevailing wind is the direction from which the wind blows.

e. 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. "Evaporation from a Class A pan ranges from near 56 inches in the north-central mountains [of New Mexico] to more than 110 inches in southeastern valleys. During the warm months, May–October, evaporation ranges from near 41 inches in the N-central to 73 inches in the SE portions of [NM].[7]

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

g. Town (CDP) proper

h. This is a maximum total gpcd calculated with 48.38 AF (acre-feet) of water allowed to be diverted per year from well RG-26824 by Madrid Water Co-op[11] x 325,851.429 gallons/AF ÷ 365 days/year ÷ 204 Madrid residents = 211.7 gpcd. A 2003 document, *Jemez y Sangre Regional Water Plan, Volume 1: Report,*[18] produced for the Jemez y Sangre Water Planning Council, provides an estimated regional gpcd of 134. This appears to include municipal, industrial, commercial, & domestic uses, but not Although not perfect, the 212 gpcd figure was computed with current, more specific data, so it is listed in the chart proper.

i.

j.

k. This is an approximate calculation using annual groundwater diversion of 15,764,692 gallons (48.38 AF/yr[11] x 325,851.429 gal/AF) x 0.0016 kWh/gal (low-end energy cost of pumping water of (0.004 kWh/gal to lift water 1,000 ft[14]) x (400 ft (mid-point of Madrid well)/1000 ft) = 25,223.5 kWh/year to pump Madrid's water. The average NM household uses 7,584 kWh of electricity per year (632 kWh/month[15] x 12 months/yr). 25,223.5 kWh/yr ÷ 7,584 kWh/yr/household = 3.3 households.

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

MADRID PLACE-ASSESSMENT REFERENCES

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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)

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