Water Use in Santa Fe

A survey of residential and commercial water use in the Santa Fe urban area.

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Planning & Land Use Department
City of Santa Fe, New Mexico

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INTRODUCTION

Santa Fe and the surrounding area experienced very dry years during 1996 and 2000. As a result, in 1996 and again in 2000, the City of Santa Fe instituted emergency water conservation measures that included among other provisions restrictions on outdoor watering and the posting of advertisements announcing the emergency in local businesses to inform residents and visitors.

The City of Santa Fe Planning & Land Use Department, assisted by the city's Public Utilities Department and the Sangre de Cristo Water Company, surveyed a sample of water use records for homes and businesses. The survey's purpose is to determine, on average, how much water is consumed by type of home and business in Santa Fe. The survey is not scientific in its sampling procedure but is extensive nonetheless and can be a useful planning tool. More than 1,500 water use records were reviewed and used in compiling this study.

METHODOLOGY

Water use records showing a minimum of 12 months of consumption were collected primarily for 1998 and 1999, though some records from 2000 were obtained for individual homes and businesses. The years of consumption are important in that while water use during those years probably retain some residual effects of the 1996 water shortage, neither 1998 nor 1999 were water shortage years. Water use information from 2000 covers only the first few months of the year and does not reflect the water use restrictions put into effect at the end of June 2000.

Water use figures for individual addresses were used in the sample only when twelve reliable months with designated "actual" meter readings appeared on an individual record. If the water use records contained highly inconsistent water use figures from one month to the next, or where water use figures appeared inconsistent over a period of months the record was not included in the sample. Water use records used in this survey were chosen in an attempt to provide a representative sample of residential areas and businesses. "Acre Feet" figures are rounded to the nearest decimal point provided. "Gallons per Month" figures are rounded to the nearest 100 gallons.

A water use table summarizing the results of the survey is included at the end of this report.

LAND USE CATEGORIES

Water use records were obtained for residential and business locations within the Santa Fe area by type of land use category. The categories differ in one important way from those used by the city for water billing and account purposes. The city's water billing system includes apartment and condominium complexes as a commercial account, whereas traditional land use planning categories include these complexes as a residential land use.[1]

Land use categories used in this survey include the following:

RESIDENTIAL
Single Family Homes (on subdivided lots)
Apartments / Condominiums
Mobile Homes (in mobile home parks)
Guest Houses (added to a single family lot)
Senior Residential Complexes

COMMERCIAL
Office/Research
Tourist Lodgings
Retail Stores
Neighborhood Center
Grocery Stores
Restaurants
Gasoline service Stations
Car Washes
Wholesale, Warehouses (water use figures are estimated)
Manufacturing (water consumption varies based on the manufacturing process)
Parks
Churches
Schools

1 City-wide water consumption figures indicate that residential "account" use is 52% and commercial "account" use is 48% of overall consumption. However, when multi-family residential use is switched to the residential category, residential water use is 60% and commercial water use is 40% of overall water system consumption.

RESIDENTIAL

The following residential developments were surveyed to determine average annual water use by residential type.

Single Family Homes (on subdivided lots)

This residential land use classification includes attached and detached single family homes on "fee simple," or subdivided lots. The survey included 767 homes in subdivisions throughout various sections of the city. The subdivisions surveyed include the following: (note: some of the subdivisions contain homes that have been constructed with low flow water plumbing fixtures. Approximate dates of subdivision construction have been provided.)

Development	Homes Existing *	Homes in survey	Average Annual Water Use** Per Home
Bellamah (1960s-70s)	873	178	.24
Via Caballero (1980s)	380	124	.25
Las Acequias (1980s-90s)	420	113	.23
Nava Ade (1990s)	196	20	.20
Vista Primera (1980s-90s)	280	65	.26
Tierra Contenta (1990s)	596	150	.20
Sol y Lomas (1960s-70s)	150	40	.32
Northeast Santa Fe (varies)	500	77	.32
Totals	**3,395**	**767**	**.25 average annual use** (6800 gallons/month)

* Figures represent an estimate.
** acre feet

Conclusion - Average water use per home in the survey, and for the city as a whole, is .25 acre feet per year. Average water use per home in newer subdivisions with smaller lot sizes (i.e. Nava Ade and Tierra Contenta) is only .20 acre feet per year. Average annual water use for homes on lots over one quarter acre in size (i.e. Sol y Lomas, Northeast Santa Fe) is .32 acre feet.

It is unknown if the homes in newer subdivisions with smaller lots will continue to use water at the current lower rates or if increased landscaping around new homes, in the future, will push current water use rates higher. However, new homes on smaller lots (i.e. less than 6,000 square feet) with low flow plumbing fixtures and minimal landscaping should continue to account for lower water use figures than the current city-wide average of .25 acre feet per home.

Apartments / Condominiums

The survey included 14 multi-family apartment and condominium complexes in Santa Fe, some of which have been constructed within the past ten years. The survey sample included approximately 2,500 dwelling units of an estimated total of 4,200 multi-family dwelling units connected to the water system. Most of these complexes have "master meters" that measure water consumption for the entire residential complex including outdoor irrigation. As a result, The "per unit" figures involve dividing the total amount of water used, including outdoor irrigation, by the total number of units. The apartment and condominium complexes surveyed include the following:

Development	Dwelling Units	Total Annual Water Use*	Annual Water Use* Per Unit
Coronado Condos	188	34.3	.18
Dos Santos	176	40.0	.23
Enclave	204	29.1	.14
Paseo del Sol	80	20.0	.25
Rancho Viscaya	212	43.5	.21
Rustic Ridge	96	14.7	.15
San Mateo de Santa Fe	160	45.4	.28
San Raphael	285	63.2	.22
Shadow Ridge	260	62.8	.24
Talavera	296	56.7	.19
Tierra de Zia	137	16.8	.12
Villa Apartments	32	7.3	.23
Villa Real	120	30.1	.25
Zia Vista	199	38.0	.19
Totals	**2,445**	**501.9**	**.21** **avg. annual use** (5,700 gallons/month)

* acre feet

Conclusion - Based on the 14 apartment and condominium complexes surveyed a typical apartment or condominium unit uses .21 afy of water per year (approximately 5,700 gallons of water each month).

Mobile Homes (in mobile home parks)

The survey included four mobile home parks that are connected to the city's water system. All four mobile home parks have individually metered homes. Only those homes with consistent water consumption data were used in the survey. The mobile home parks surveyed include the following:

Development	Total Mobile Homes	Surveyed Mobile Homes	Annual Water Use* Per Home
Atocha MHP	100	92	.17
Cottonwood MHP	485	246	.20
Rancho Zia MHP	108	97	.19
Sierra Vista MHP	240	185	.22
Totals	**933**	**620**	**.20** **average annual use** (5,400 gallons/month)

* acre feet

Conclusion - Based on the four mobile home parks surveyed, including 620 individual mobile home water use records, a typical mobile home uses .20 afy of water per year (approximately 5,400 gallons each month).

Guest Houses

Guest houses were not surveyed. This report assumes that water use in a guest house is generally half of that consumed by the main single-family residence, or .12 acre feet per guest house, annually.

Senior Residential Complexes

Three senior residential complexes (retirement facilities) were surveyed for annual water consumption figures. All three complexes contain full-service dining facilities and on-site laundry facilities. One of the complexes has a swimming pool and a small health center. The senior complexes surveyed include:

Development	Living Units	Total Annual Water Use*	Annual Water Use* Per Unit
El Castillo	150	16.0	.11
Kingston Residence	94	14.1	.15
Ponce de Leon	144	22.3	.15
Totals	**388**	**52.4**	**.14** **average annual use** (3,800 gallons/month)

* acre feet

Conclusion - Based on the three senior complexes surveyed, a typical retirement complex will average .14 acre feet of water use per year for each living unit.

COMMERCIAL

The following commercial developments were surveyed to determine average annual water use by business type.

Office / Research

This category includes most types of offices and research facilities. The category is divided between non-medical offices (primarily government) and medical or analytical laboratory offices.

Office, non-medical - This category includes government offices with substantial non-native landscaping (above) and government offices with very limited landscaping (below). The Manuel Lujan and Joseph Montoya state office building grounds contain significant amounts of non-native grass. City Hall contains limited amounts of grass, but receives significant public visitation.

Development	Total Square Feet	Total Annual Water Use*	Annual Water Use* Per 10,000 sq.ft.
City Hall	43,000	4.2	1.0
Manuel Lujan State Bldg	76,262	7.9	1.0
Joseph Montoya Bldg.	133,000	13.3	1.0
Totals	**252,262**	**25.4**	**1.0** **avg. annual use** (27,200 gallons/month)
Piñon Office Bldg.	62,000	4.6	0.7
Aspen Plaza	24,000	1.0	0.4
San Mateo Plaza	24,000	0.7	0.3
Totals	**110,000**	**6.3**	**0.6** **avg. annual use** (16,300 gallons/month)

* acre feet

Office, medical / analytical lab - This category of office use includes medical and dental offices as well as medical research laboratories.

Genzyme Genetics	55,000	9.0	1.6
Calle Medico (4 bldgs.)	30,000	4.1	1.4
Totals	**85,000**	**13.1**	**1.5** **avg. annual use** (41,800 gallons/month)

Conclusion - Water use in office buildings can vary depending on the type of office operation, amount of public visitation and the amount of outdoor landscaping. Medical offices use more water per square foot, especially dental offices.

Tourist Lodgings

This category is separated into two types of accommodations — "Hotels, full service" and "Motels, limited service." Average annual water use per room is determined by comparing the total water use of the hotel or motel and dividing it by the total number of rooms.

Hotels, full service - Three downtown hotels were surveyed. All three contain swimming pools, saunas, restaurants, and cocktail bars. The hotels surveyed include:

Development	Total Rooms	Total Annual Water Use*	Annual Water Use* Per Room
Eldorado	219	89.1	.41
Hilton	157	31.5	.20
La Fonda	153	49.9	.33
Totals	**529**	**170.5**	**.32** **avg. annual use** (8,700 gallons/month)

* acre feet

Motels, limited service - Five motels offering limited service and located along Cerrillos Road were surveyed:

Development	Total Rooms	Total Annual Water Use*	Annual Water Use* Per Room
Comfort Inn	84	13.2	.16
Holiday Inn Express	79	13.1	.17
Motel 6	121	20.0	.17
Super 8	96	11.7	.12
Best Western	97	12.3	.13
Totals	**477**	**70.3**	**.15** **avg. annual use** (4,100 gallons/month)

* acre feet

Conclusion - Based on the hotels and motels surveyed, a typical full service hotel will use .32 acre feet of water per room, annually, and a typical limited service motel will use .15 acre feet of water per room, annually.

Retail Stores

A variety of retail locations were surveyed. Annual water use figures are stated in terms of an amount per square foot of gross floor area within the store. Retail store locations surveyed include the following:

Development	Total Square Feet	Total Annual Water Use*	Annual Water Use* Per 10,000 sq. ft.
Premium Outlets	125,000	8.6	.7
Villa Linda Mall	565,000	29.0	.5
Wal-Mart	142,000	11.2	.8
K-Mart	92,000	3.6	.4
Totals	**924,000**	**52.4**	**.6 avg. annual use**

* acre feet (16,300 gallons/month)

Neighborhood Center **-** Rodeo Plaza and the Agora in Eldorado were surveyed as prototype neighborhood centers envisioned for the future by the city general plan in terms of their size and mix of commercial uses. The centers include several restaurants, and each center contains a small grocery store among other retail and office tenants.

Development	Total Square Feet	Total Annual Water Use*	Annual Water Use* Per 10,000 sq. ft.
Rodeo Plaza	50,000	8.3	1.7
Agora (in Eldorado)	32,000	3.9	1.2
Totals	**82,000**	**12.2**	**1.5 avg. annual use**

* acre feet (40,700 gallons/month)

Grocery Store - Four grocery store locations were surveyed with the following results:

Development	Total Square Feet	Total Annual Water Use*	Annual Water Use* Per 10,000 sq. ft.
Furr's (Plaza del Sol)	55,000	2.9	.5
Albertson's (Zafarano)	50,000	5.3	1.1
Albertson's (La Entrada)	53,000	4.6	.9
Wild Oats (St. Francis)	20,000	6.4	3.2
Totals	**178,000**	**19.2**	**1.1 avg. annual use**

* acre feet (29,900 gallons/month)

Restaurants

This category is separated into two types of food service providers — Restaurant, full service and Restaurant, limited service (fast food type). Water use figures are simply calculated for each restaurant site.

Restaurant, full service **-** This type of restaurant includes at-table service and involves considerable dishwashing in its daily operations. The restaurants surveyed include the following:

Development	Annual Water Use* Per Site	
Austin's Steakhouse	4.5	
Blue Corn Cafe	4.4	
Carrow's	4.0	
Peppers Cantina	5.7	
Plaza Café	6.0	
Village Inn	10.7	
	5.9	**average annual use**
* acre feet		(160,200 gallons/month)

Restaurant, limited service **-** This type of restaurant includes counter service and generally represents "fast food" chains. Water use figures were surveyed for each location of a fast food company and then the total water use for each company was divided by the number of locations. The following limited service (fast food) restaurants were surveyed:

Development	Number of Sites	Total Annual Water Use*	Annual Water Use* Per Site	
McDonald's	4	11.4	2.9	(average of all locations)
Burger King	3	9.1	3.0	" "
Blake's	5	9.3	1.9	" "
Totals	**12**	**29.8**	**2.5**	**average annual use**
* acre feet				(67,900 gallons/month)

Conclusion - Based on the six full service restaurants surveyed, an average annual amount of water use that can be expected from this type of restaurant is 5.9 acre feet, whereas the typical limited service, fast food restaurant uses 2.5 acre feet per year.

Gasoline Service Stations

This category is separated into two types of gasoline service stations — Gasoline

Service Stations with car wash facilities and Gasoline Service Stations without car wash facilities on site. Annual water use is analyzed for each site rather than per square foot. Water use was surveyed for the following gasoline service stations:

Gasoline Service Stations (with car wash facilities) **-** This type of gasoline station not only contains limited food and drink, but also contains an automated conveyor car wash facility on site. Gas stations surveyed include:

Development	Annual Water Use* Per Site
Shell (St. Michael's)	12.5
Conoco (Sawmill)	5.7
Conoco (St. Francis)	5.3
	7.8 **average annual use**
* acre feet	(211,800 gallons/month)

Gasoline Service Stations (without car wash facilities) **-** This type of gasoline station contains only standard limited food and beverage and reflects a "gas-mart" without car wash facilities. Gas stations surveyed include:

Development	Annual Water Use* Per Site
Chevron (St. Michael's)	.4
Giant (St. Michael's)	.3
Allsup's (Cerrillos)	.8
Texaco Amigo-Mart	.5
Giant (Cerrillos)	.6
	.5 **average annual use**
* acre feet	(13,600 gallons/month)

Conclusion **-** The above tables indicate the significant difference in water use between gasoline station sites with and without car wash facilities. Adding an automated conveyor (tunnel-type) car wash to a gasoline station site can account, according to one survey location, for an additional 12.0 acre feet of water use per year beyond what the gasoline station would normally use.

Car Washes

As previously indicated, automated car wash facilities added to gasoline stations can account for 12.0 acre feet of water use per year. This report also surveyed water use

records of car wash businesses that are the primary business on the site rather than just an added feature to a gasoline station. Two types of car wash businesses were surveyed — full service, automated car washes and self service, manual car washes. The car wash businesses surveyed include:

Car Wash, full service - This type of car wash includes automated conveyors to wash cars and usually includes personnel on site to help wash and dry cars. The three full service car washes surveyed are located along Cerrillos Road.

Development	**Annual Water Use* Per Site**
Santa Fe Car Wash	8.6 (one automated tunnel & 7 wash bays)
Squeaky Clean	8.7
Squeaky Clean	5.3
* acre feet	**7.5 average annual use** (203,700 gallons/month)

Car Wash, limited service - This type of car wash includes wash bays with manual spray wands used by customers.

Development	**Annual Water Use* Per Site**
Cordova Power Wash (Cordova Road)	3.0 (seven wash bays; 0.4 acre feet per wash bay)
Quik Stop (Rodeo Road)	4.0 (four wash bays; 1.0 acre foot per wash bay)
	3.5 average annual use (95,000 gallons/month)
* acre feet	**(average of 0.6 acre feet per wash bay)**

Conclusion - Based on the businesses surveyed, full service car wash facilities use an average of 7.5 acre feet of water per year and limited car wash facilities use an average of 3.5 acre feet of water per year. Greater use of recycled water at car washes will reduce demand for potable water for car washing.

Parks

City parks were surveyed to better understand the amount of water used annually to keep parks in adequate condition. Parks surveyed include those that contain large

amounts of non-native grass traditionally preferred for use in public parks. City park water use is based on a per acre comparison. Figures for Salvador Perez and Fort Marcy Parks do not include water used for gymnasiums and swimming pools. The city parks surveyed include:

Park	Total Acres	Annual Water Use*	Annual Water Use* Per Acre
Franklin Miles	27.0	54.1	2.0
Salvador Perez	16.2	37.7	2.3
Fort Marcy	28.0	37.6	1.3
Herb Martinez	6.8	16.4	2.4
Patrick Smith	4.5	4.7	1.0
Totals	**82.5**	**150.5**	**1.8** **average annual use**

* acre feet (48,900 gallons/month)

Churches

Churches were surveyed to determine how much water is used annually. Two categories have been created — churches that provide on-site day care or schools during the weekday and those churches that do not provide these on-site services.

Churches (with on-site day care or schools) - Three churches providing on-site day care and/or schools were surveyed to determine annual water use. The churches surveyed include:

Development	Annual Water Use* Per Site
Capital Christian	1.3
Immanuel Lutheran	1.2
St. John's United Methodist	1.4
	1.3 **average annual use**

* acre feet (35,300 gallons/month)

Churches (no weekday on-site day care or schools) - Four churches that do not provide regular day care or schools during the weekday were surveyed to determine annual water use. The churches surveyed include:

Development	Annual Water Use* Per Site

Rodeo Road Baptist	.15
Santa Maria de la Paz	1.2
St. Bede's Episcopal	.23
Unitarian Universalist (Barcelona)	1.0
	.6 **average annual use**

* acre feet (16,300 gallons/month)

Schools

Public and private schools were surveyed to determine how much water is used annually. Three categories of schools have been created — elementary schools, middle or junior high schools and senior high schools.

Elementary Schools - Five elementary schools were surveyed for annual water use. The schools surveyed include:

Development	Annual Water Use* Per Site	Number of Students	Water Use* Per 100 Students
Cesar Chavez	4.6	507	.9
E J Martinez	3.5	423	.8
Nava	2.6	229	1.1
Piñon	2.8	610	.5
Sweeney	5.6	677	.8
Totals	**19.1**	**2,446**	**.8** average annual use

* acre feet (21,700 gallons/month)

Middle / Junior High Schools **-** Four schools were surveyed for annual water use. The schools surveyed include:

Development	Annual Water Use* Per Site	Number of Students	Water Use* Per 100 Students
Alameda	13.7	484	2.8
Capshaw	19.3	512	3.8
De Vargas	18.1	535	3.4
Ortiz	17.0	581	2.9
Totals	**68.1**	**2,112**	**3.2** average annual use

* acre feet (86,900 gallons/month)

Senior High Schools - Three high schools were surveyed for annual water use. The schools surveyed include:

	Annual	Number	Water Use*

Development	Water Use* Per Site	of Students	Per 100 Students
Capital H.S.	21.6	1,320	1.6
Santa Fe H.S.	68.8	1,983	3.4
St. Michael's	20.9	750	2.8
Totals	**111.3**	**4,053**	**2.7** average annual use (73,300 gallons/month)

* acre feet

WATER USE TABLE

Acre Feet **Single Family Home**

RESIDENTIAL	Per Year	Equivalency
Single Family Dwelling Unit, citywide average	**.25 / d.u.**	**1.0**
- Lot size, less than 6,000 square feet	.20 / d.u.	
- Lot size 6,000-10,890 square feet	.25 / d.u.	
- Lot size, larger than 10,890 sq. ft. (1/4 ac.)	32 / d.u.	
Apartment/Condominium	**.21 / d.u.**	**.8**
Mobile Home (in mobile home parks)	**.20 / d.u.**	**.8**
Guest House (added to single-family lot)	**.12 / d.u.**	**.5**
Senior Complex (w/ dining, pool, laundry)	**.14 / living unit**	**.6**
COMMERCIAL		
Office, non-medical (Govt. Ctr. w/ Landscaping)	**1.0 / 10,000 s.f.**	**4.0**
Office, non-medical (Xeriscape / Ltd. landscaping)	**.6 / 10,000 s.f.**	**2.4**
Office, medical / analytical lab	**1.5 / 10,000 s.f.**	**6.0**
Tourist Lodging, Hotel - full service	**.32 / room**	**1.3**
Tourist Lodging, Motel - limited service	**.15 / room**	**.6**
Retail Store	**.6 / 10,000 s.f.**	**2.4**
Neighborhood Center (w/grocery, restaurant)	**1.5 / 10,000 s.f.**	**6.0**
Grocery Store	**1.1 / 10,000 s.f.**	**4.4**
Restaurant, full service	**5.9 / site**	**23.6**
Restaurant, limited service	**2.5 / site**	**10.0**
Gasoline Service Station, with car wash	**7.8 / site**	**31.2**
Gasoline Service Station, without car wash	**.5 / site**	**2.0**
Car Wash, full service (automated conveyor)	**7.5 / site**	**30.0**
Car Wash, self service (manual spray)	**3.5 / site** (0.6 per wash bay)	**14.0**
Wholesale, Warehouse	**.4 / 10,000 s.f.**	**1.6**
Manufacturing	**varies by type of process.**	
Park, with irrigated turf	**1.8 / acre**	**7.2**
Church, w/ Day Care or school	**1.3 / site**	**5.2**
Church, without Day Care or school	**.6 / site**	**2.4**
Schools, Elementary	**.8 / 100 students**	**3.2**
Schools, Middle or Junior High	**3.2 / 100 students**	**12.8**
Schools, Senior High	**2.7 / 100 students**	**10.8**

d.u. = dwelling unit.
s.f. = square feet of gross floor area.
Acre Feet (of water); 1.0 acre foot equals 325,851 gallons.
Single family home conversion factor; .25 acre feet per year = approximately 6,800 gallons per month.