APPENDIX K

Water Supply Assessment

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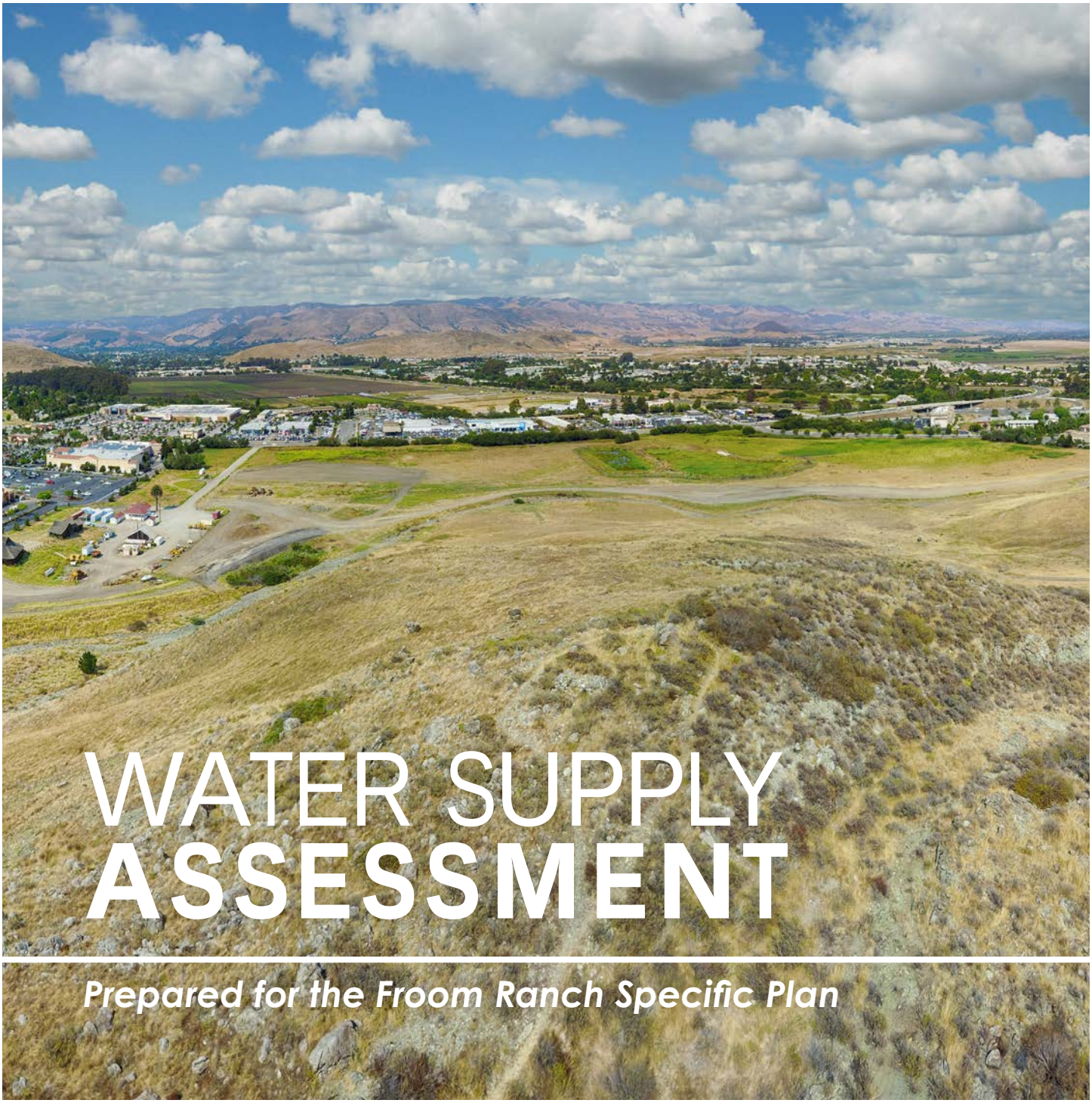

WATER SUPPLY ASSESSMENT

Prepared for the Froom Ranch Specific Plan

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Date: 02-20-2018; revised 10-31-18; revised 01-18-19; revised 10-21-19
Prepared by RRM Design Group
Prepared for John and Susan Madonna Trust and Villaggio Communities

WATER SUPPLY ASSESSMENT

Water Code §10910 et seq.

To: City of San Luis Obispo
990 Palm Street
San Luis Obispo, CA 93401

Project Title: Froom Ranch Water Supply Assessment

The following determination has been made regarding the above-described project:

- [X] The projected water demand for the project was included in the City's most recently adopted urban water management plan.
- [ ] Based on additional sources of information, a sufficient water supply is available for the project. The total water supplies available to the City during normal, single-dry, and multiple-dry years within a 20-year projection will meet the projected water demand under the project in addition to the demand of existing and other planned future uses, including, but not limited to, agricultural uses.
- [ ] A sufficient water supply is not available for the project. *[Plan for acquiring and developing sufficient supply attached. Water Code§ 10911 (a)].*

The foregoing determination is based on the following Water Supply Assessment (WSA) Information and supporting information in the San Luis Obispo General Plan Update Background Report Section 5.1, Water and 5.3 Wastewater, as well as the records of the City of San Luis Obispo. The Land Use Circulation Plan (LUCE) WSA covers the cumulative water supply impacts, and this WSA will cover the project specific impacts.

_____

Signature Date Title

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1. INTRODUCTION

This Water Supply Assessment was prepared for the proposed Froom Ranch Specific Plan project in the City of San Luis Obispo, pursuant to the requirements of Section 10910 of the State Water Code, as amended by Senate Bill No. 61O, Chapter 643 (2001).

1.1 Background

Senate Bill No. 610, effective January 1, 2002, requires a city or county, which determines that a "project" (as defined in Water Code§ 10912) is subject to the California Environmental Quality Act (CEQA), to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified water supply assessment. The assessment is required to include an identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts. The assessment must be approved by the governing body of the public water system supplying water to the project. If the projected water demand associated with the project was included as part of the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in the water supply assessment.

The bill requires the city or county, if it is not able to identify any public water system that may supply water for the project, to prepare the water supply assessment after a prescribed consultation. If the public water system concludes that water supplies are, or will be, insufficient, plans for acquiring additional water supplies are required to be submitted to the city or county. The city or county must include the water supply assessment in any environmental document prepared for the project pursuant to the act. It also requires the city or county to determine whether project water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

A "project" under Section 10912 includes the following:

a. A proposed residential development of more than 500 dwelling units.
b. A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
c. A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
d. A proposed hotel or motel, or both, having more than 500 rooms.
e. A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
f. A mixed-use project that includes one or more of the projects specified in this subdivision.
g. A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.

The Froom Ranch Specific Plan is a mixed - use project comprised of two development areas, the first is referred to as Madonna Froom Ranch, the second is referred to as the Life Plan

Community. Each of the development areas are comprised of a mix of uses and together meet the definition of a project under Section 10912. The two development areas are listed in the table 1-1 below:

Table 1-1. Froom Ranch Land Uses

Madonna Froom Ranch Specific Plan	
Land Uses	**Size**
Multi-Family Housing	130 units
Commercial	30,000 sq. ft.
Hotel	70,000 sq. ft.; 120 rooms
Trailhead Park	2.9 acres

Life Plan Community	
Land Uses	**Size**
Independent Living	366 units
Assisted Living Units	38 units
Memory Care	17 beds
Skilled Nursing	34 beds
Restaurants & Theaters	15,000 sq. ft.
Recreational Facility	11,000 sq. ft.

1.2 Project Location and Description

The proposed Froom Ranch Specific Plan project is in the City of San Luis Obispo along the north side of Highway 101, between Calle Joaquin to the south, Los Osos Valley Road to the east and the Irish Hills Plaza to the north. The site is approximately 110 acres. Approximately 59 acres of are proposed to remain as open space.

2. WATER SUPPLY

Water Code Section 10910(b) requires the identification of the public water system that may serve the project. The City of San Luis Obispo is the sole water purveyor within the city limits and will provide water to the proposed Froom Ranch Specific Plan project. The City's potable water is supplied from multiple surface water sources. In addition, recycled water and groundwater are used to supplement irrigation demands.

The Water and Wastewater Management Element of the General Plan, first adopted in 1987 and most recently updated in May of 2018, specifies that the City of San Luis Obispo utilize multiple water resources to meet its water supply needs. Having several sources of water avoids dependence on any one source that may be impacted by drought or other water supply reduction or emergency. With the update of the Water and Wastewater Management Element, the City Council reaffirmed the policy for a multi-source water supply. Consistent with the multi-source water supply concept, the City obtains water from five sources:

- Salinas Reservoir (Santa Margarita Lake) and Whale Rock Reservoir: Combined Safe Annual Yield 4,910 acre-feet (AF)/year
- Nacimiento Reservoir: 5,482 AF/year dependable yield/ contractual limit
- Recycled water from the City's Wastewater Resource Recovery Facility (WRRF): 238

AF/year 2015 Annual Usage
- Groundwater: Supplemental usage, 43 AF/year in 2018

2.1 Surface Water Supply:

The Salinas Dam was built in 1942 by the War Department to supply water to Camp San Luis Obispo and secondarily, to meet the water needs of the City of San Luis Obispo. The Salinas Reservoir (Santa Margarita Lake) captures water from a 112-square mile watershed and can store up to 23,843 AF. Since the late 1940s, the San Luis Obispo County Flood Control and Water Conservation District has operated the Salinas Reservoir under a lease from the U.S. Army Corps of Engineers. Water from the reservoir is pumped through the one-mile long Cuesta Tunnel, and then flows by gravity to the City's Water Treatment Plant on Stenner Creek Road.

The Whale Rock Reservoir is a 40,662 AF reservoir created by the construction of an earthen dam on Old Creek near the town of Cayucos. The Whale Rock Dam captures water from a 20.3 square mile watershed and water is delivered through 17.6 miles of 30-inch pipeline and by two pumping stations. The City of San Luis Obispo owns 55.05 percent of the water storage rights at the reservoir. The remaining water storage rights are divided between two State agencies, with Cal Poly owning 33.71 percent and the California Men's Colony owning 11.24 percent.

The Nacimiento Reservoir provides flood protection and is a source of supply for groundwater recharge for the Salinas Valley. It is owned and operated by the Monterey County Water Resources Agency. Since 1959, the San Luis Obispo County Flood Control and Water Conservation District has had an entitlement to 17,500 AF/year of water from the reservoir for use in San Luis Obispo County. Approximately 1,750 AF/year have been designated for uses around the lake, leaving 15,750 AF/year for allocation to other areas within the County of San Luis Obispo. The City's contractual supply is 5,482 AF.

2.2 Recycled Water Supply:

Recycled water has been envisioned as part of the City's overall water supply strategy since the 1980s. In 1994, the City began a major capital improvement project at the WRRF that included addition of tertiary treatment and other unit processes required to meet stringent effluent quality limits, set forth by the Regional Water Quality Control Board, intended to protect and enhance the receiving waters of San Luis Obispo Creek. The City completed construction of the project in 2006 and recycled water deliveries began in May that year. The main non-potable water source is the City's WRRF which has a design flow rate of 5,700 AF/year (5.1 mgd). The City is required to release 1,807 AF/year of flow to San Luis Creek for environmental enhancement. The recycled water usage for 2018 totaled 244 AF/year for construction and landscape uses.

2.3 Groundwater Supply:

The groundwater basin beneath the City is relatively small and recharges very quickly following normal rainfall periods. The groundwater basin also lowers relatively quickly during periods of below-average rainfall. Extensive use of groundwater sustained the City through most of the drought of 1986-1991. The City's two largest producing wells were shut down in 1992 and 1993 when elevated nitrate levels were detected. The City stopped utilizing the Pacific Beach well in April 2015.

The City envisions groundwater playing an important role in ensuring continued resiliency in its water supply portfolio. The Sustainable Groundwater Management Act (SGMA) is a statewide law that requires local agencies to adopt groundwater management plans that relate to the needs and

resources of their communities. In 2017, the City became a Groundwater Sustainability Agency (GSA) over the area of the San Luis Obispo Valley Groundwater Basin, designated by the California Department of Water Resources as a Medium Priority Basin, that lies beneath and within its jurisdictional boundaries. The San Luis Obispo Valley Groundwater Basin "eligible entities" (City, County, Golden State Water Company, Edna Ranch Mutual Water Company-East, Varian Ranch Mutual Water Company, and Edna Valley Growers Mutual Water Company) are all working collaboratively to comply with SGMA requirements for the entire groundwater basin. The GSA structure includes a Groundwater Sustainability Commission which is an advisory body to the City Council and the Board of Supervisors. The Commission consists of one member from the City Council, one County Supervisor and a representative of each of the identified water companies. The City, County, and eligible entities are required by SGMA to work together to create Groundwater Sustainability Plans by January 31, 2022.

Private wells are in use in the City, such as the well operated by San Luis Coastal Unified School District at San Luis Obispo High School. The City's Laguna Lake Golf Course also has two wells that meet a portion of the irrigation demand for the course. The remainder of the irrigation demand for the golf course is met using recycled water from the City's Water Resource Recovery Facility. The project contains several wells shown in Figure 2-3 (Cleath-Harris Groundwater Report 2018). The domestic well will continue to operate at its current domestic use. The artesian well and the Hollingsworth well are to remain and are not affected by project construction. The existing irrigation well is to remain and provide construction water and agricultural water during construction and after completion.

3. URBAN WATER MANAGEMENT PLAN APPLICABILITY

Water Code Section 10910(c)(1) requires a determination of whether a project was included as part of the most recently adopted Urban Water Management Plan (UWMP). The City's most recently adopted UWMP was adopted on June 14, 2016, and provides a description of the City's service area, demographics, multi-source water supply, treatment, and conveyance/distribution facilities. The UWMP also includes historical and future water demand to serve the buildout of the City consistent with the General Plan which includes the Froom Ranch Specific Plan Project.

Since 1987, the City's General Plan has included a Water and Wastewater Management Element. The water section of the Element includes policies related to present water demand and overall projected water demand. The Element also addresses water conservation, water resource availability, accounting for siltation, multi-source water supply, and recycled water.

The 2014 LUCE update included a Water Supply Assessment for the areas within the City's Urban Reserve Line (URL). This WSA was for undeveloped and developed lands to be developed pursuant to the LUCE.

4. WATER RESOURCE AVAILABILITY

As described in the Water Supply Section 2, the City of San Luis Obispo has five water resources to meet current and future City water demands: Salinas Reservoir (Santa Margarita Lake), Whale Rock Reservoir, Nacimiento Reservoir, recycled water from the City's WRRF, and groundwater. To ensure water supply reliability, the City determined the amount of water available from these water resources on an annual basis. The method to determine the available yield from each resource varies based on water right, contractual agreement, or the amount of water supplied.

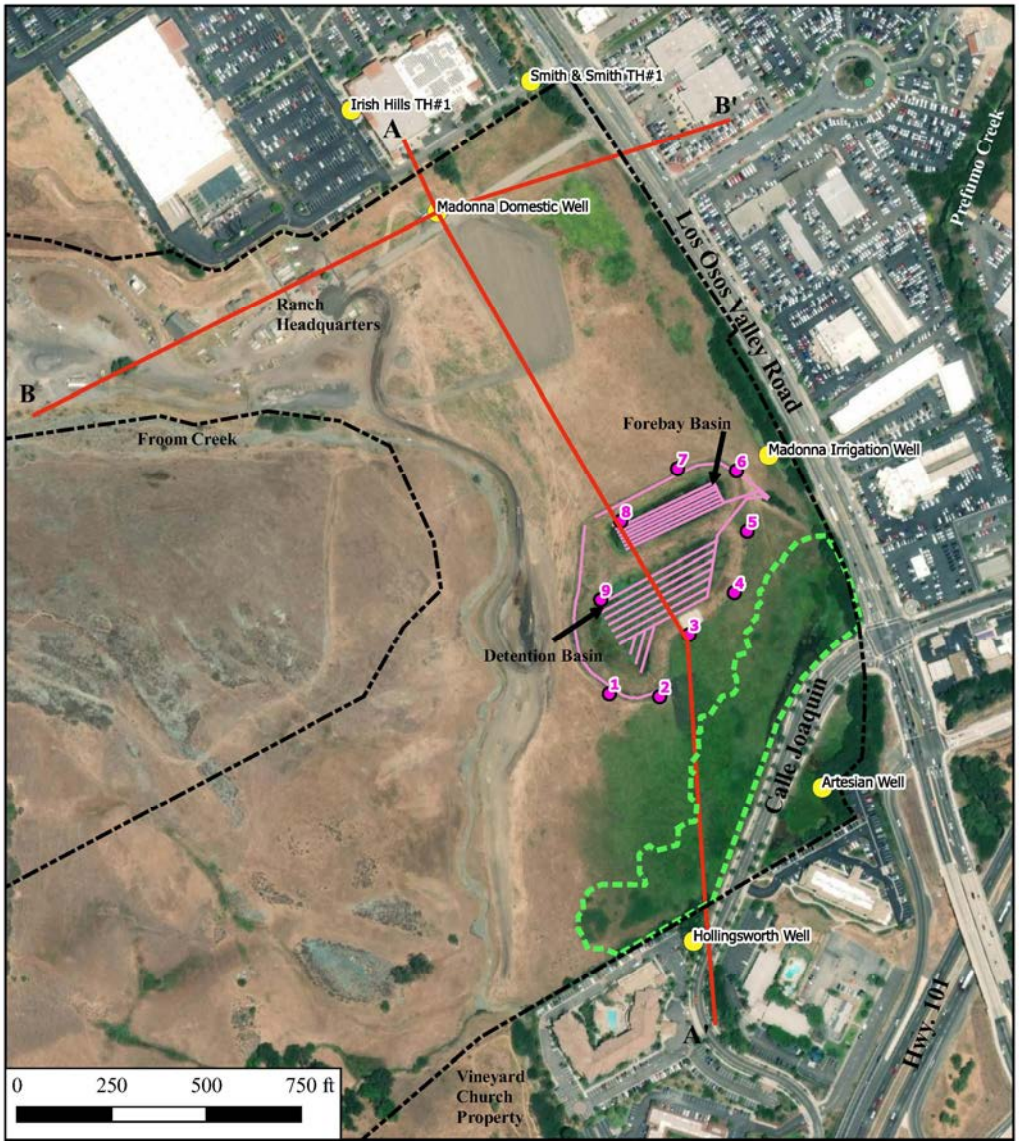

Figure 2-3. Site Map and Well Location

For Salinas and Whale Rock Reservoirs the term "safe annual yield" is used to define the annual amount of water available from these two resources. The two reservoirs are operated in a coordinated manner to increase the available water. In contrast, the "dependable yield" from Nacimiento Reservoir is the contractual amount of water to which the City has rights. Since

Nacimiento Reservoir is operated as a water supply project for Monterey County, the concept of safe annual yield is not used for the City's contractual water supply from this source. For recycled water, the annual amount delivered is counted in the water availability calculation. Though groundwater is part of the City's water portfolio, due to the limitations on its use, the City will not consider this supply in estimating available water resources to meet community needs.

Table 4-1 is a summary of the City's available water resources.

Table 4-1. City Water Resource Availability

Water Resource		2018 Annual Availability
Salinas and Whale Rock Reservoir	4,910 AF	Safe Annual Yield
Nacimiento Reservoir	5,482 AF	Contractual Limit
Siltation to 2060	(500 AF)	Policy A 4.2.2
Recycled Water Use	238 AF	2017 Annual Usage
TOTAL	10,130 AF	

*Source: 2018 Water and Wastewater Management Element of the General Plan

5. WATER SUPPLY RELIABILITY

The water supply and reliability analysis provided by the 2015 UWMP uses historical information since 1941 for evaluation of water supply availability and safe annual yield for the Salinas and Whale Rock Reservoirs. The analysis of water supply availability is based on the controlled drought period of the two reservoirs, which occurred between 1987 and 1991. Table 5-1 below summarizes the results of that analysis and indicates the City's water resources are reliable during extended drought periods. Through the coordinated operation of Salinas and Whale Rock Reservoirs and the ability to use other available water supplies (Nacimiento, recycled water, and limited groundwater), climatic conditions such as prolonged drought do not impact the City's water supply.

As required by Section 5 of the City's Water and Wastewater Management Element, the City accounts for water supplies necessary to meet three specific community needs, including primary water supply, secondary water supply, and reliability reserve, see Table 5-2. The primary water supply is defined as the amount of water needed to serve the build-out population of the city as identified in the Land Use Element of the General Plan. The quantity of water needed for the primary water supply is calculated using the maximum allowed per capita water use under Senate Bill X7-7 and the city's build-out population. The maximum allowed per capita water use is 117 gallons per capita per day (gpcd). The proposed Land Use Element build-out population is estimated to be 57,200; the primary water supply is estimated to be 7,496 AF in the 2018 Water Resources Status Report.

The reliability reserve provides a buffer for future unforeseen or unpredicted long-term impacts to the City's available water supply. The quantity of water for the reliability reserve is established using twenty percent of the ten-year average of current per capita water use and the City's current population (46,548 in 2018). The reliability reserve provides a reserve above and beyond the existing needs of the community and may not be used for future development. In 2018, the reliability reserve is 1,220AF.

The secondary water supply is the amount of water remaining from the City's available water resources above those needed to meet the primary water supply and reliability reserve. The

secondary supply is intended to meet peak water demand periods or short-term loss of City water supply sources.

Table 5-1. Water Supply Reliability

Average/Normal Water Year (acre feet)	Single Dry Water Year (acre feet)	Multiple Dry Water Years		
		Year 1	Year 2	Year 3
12,622	12,622	12,622	12,622	12,622
Percent of Average/Normal Year	100%	100%	100%	100%

**Source: 2015 Urban Water Management Plan*

Table 5-2. 2018 City Potable Water Supply Accounting

Total	2018 Actual Usage (acre feet)	Primary Water Supply (acre feet)	Reliability Reserve (acre feet)	Secondary Water Supply (acre feet)
10,130	5,225	7,496	1,220	1,414

**Source: 2018 Water Resources Status Report*

6. WATER USAGE

Water use in the city includes single-family, multi-family, commercial (including institutional and industrial), and irrigation customers. No agricultural uses are supplied by City water and the City does not sell water to other agencies. The City does not have additional water demands such as water use for saline barriers, groundwater recharge, etc. As reported in the 2018 Water Resources Status Report, the total water demand for the city in 2018 was 5,225 AF, and total demand in 2015 was 4,990 AF (during drought conditions).

The City's water use factors for the Froom Ranch Specific Plan project land use categories are listed below:

Land Use Category	Quantity	Unit	Water Use Factor (ac-ft/yr)
Madonna Froom Ranch			
Housing (R-3 attached townhomes)	130	Dwellings	0.3
Apartments (R-4 multi-family/affordable)	44	Apartments	0.18
Commercial – Retail	30,000	1,000 Square Feet	0.06
Hotel (with restaurant)	120	Rooms	0.43
Life Plan Community			
Independent Living (standalone residential units)	61	Dwellings	0.3
Garden, Village Suite and Standard Apartment Units	305	Apartments	0.1
Assisted Living Units (senior apartments)	38	Apartments	0.1
Memory Care and Skilled Nursing (beds)	51	Occupants	0.08
Commercial – Mixed-Use Occupancy	51,500	1,000 Square Feet	0.06
Maintenance Office	5,300	1,000 Square Feet	0.032
Restaurants	8,000	1,000 Square Feet	1.32
Fitness Facility with pool	13,000	1,000 Square Feet	0.26

6.1 Water Conservation Program:

Water conservation was first referenced as a part of the City's water management policy in 1973. In 1985, the City adopted the Annual Water Operational Plan policy, establishing water conservation as a means of extending water supplies during projected water shortages. Since 1985, many technological and philosophical changes have occurred which are proving water conservation to be both a short-term corrective measure for immediate water supply shortages and a long-term solution to water supply reliability.

The City developed a Water Shortage Contingency Plan to deal with water shortage conditions that could occur due to drought, earthquake, infrastructure failure, or other emergencies. The Plan provides the foundation for a staged response to worsening water shortage conditions. The City uses a water projection model to analyze current water storage at the reservoirs and to predict how long the water supplies are available to determine the necessary level of response. There are six stages of the

Plan: Monitor, Watch, Warning, Severe, Extreme, and Critical. Each stage provides different levels of response for a water shortage event ranging from a ten percent supply deficiency up to a 50 percent or greater deficiency. The Plan is also a required component of the City's UWMP which is updated *every* five years per State Water Code. The City also recognizes the importance of long-term water efficiency by supporting programs that will enhance water supply reliability and comply with any current and/or future state mandates in water use reductions.

In 2009, Senate Bill X7-7 was passed requiring water agencies to reduce per capita water use by 25 percent by the year 2020. The City's target per capita water use would be 117 gpcd. In 2013, the City already met that target with a use of 116 gpcd. In 2014, the City's use was estimated to be 95.8 gpcd. In terms of water supply reliability, the City was one of the original signatories to the Memorandum of Understanding (MOU) Regarding Urban Water Conservation and has actively pursued the implementation of the water efficiency best management practices (BMPs) prescribed in the MOU. The MOU was a negotiated agreement between water purveyors statewide and environmental organizations on how best to utilize the State's water resources by incorporating conservation into their water management practices. The BMPs have been developed *over* the years by water purveyors, environmental groups, and industry stakeholders. They represent the best available water conservation practices based on research and experience and include:

- Water conservation pricing and rate structures,
- Technical assistance for water customers,
- Incentives for indoor and outdoor water saving technologies,
- Public information and outreach, and
- Water audits.

7. ENTITLEMENTS/REGULATORY APPROVALS

Water Code Section 10910(d)(2) requires the identification of existing water supply entitlements, water rights, or water service contracts, federal, state, and local permits for construction of necessary infrastructure, and any regulatory approvals required to be able to deliver the water supply. The City's entitlements are described above in the section describing water supply.

8. FROOM RANCH SPECIFIC PLAN PROJECT

The Froom Ranch Specific Plan site is proposed to be developed into multi-family dwelling units, a Life Plan Community, commercial properties including retail, and hotel space, parks, and open space. Table 8-1 was developed to project Froom Ranch Specific Plan's water demand using the City's water use factors. Using these water demand factors shows that the total water use of Froom Ranch Specific Plan would be 207.8 AF/year.

Table 8-1. Froom Ranch Specific Plan Project Water Demand

Water Demand					
Land Use Category	**Quantity**	**Unit**	**Water Use Factor* (ac-ft/yr)**	**Total Water Demand (ac-ft/yr)**	**Indoor Water Demand (ac-ft/yr)**
Froom Ranch					
Housing (R-3 attached townhomes)	130	Dwellings	0.3	39.0	39.0
Apartments (R-4 multi-family/affordable)	44	Apartments	0.18	7.9	4.8
Commercial - Retail	30,000	1,000 Square Feet	0.06	1.8	1.3
Hotel (with restaurant)	120	Rooms	0.43	51.6	36.1
Basin planting	2.8	Acres	n/a**	n/a**	n/a**
Parks, Trails, Parkways and Open Space (including creek planting)	11.3	Acres	n/a**	n/a**	n/a**
Subtotal					**81.1**
Villaggio - Life Plan Community					
Independent Living (standalone residential units)	61	Dwellings	0.3	18.3	18.3
Garden, Village Suite and Standard Apartment Units (Senior)	305	Apartments	0.1	30.5	18.3
Assisted Living Units (senior apartments)	38	Apartments	0.1	3.8	2.3
Memory Care and Skilled Nursing (beds)	51	Occupants	0.08	4.08	2.45
Commercial - mixed use occupancy	51,500	1,000 Square Feet	0.06	3.09	2.16
Maintenance Office	5,300	1,000 Square Feet	0.032	0.17	0.12
Restaurants	8,000	1,000 Square Feet	1.32	10.56	7.39
Fitness Facility with pool	13,000	1,000 Square Feet	0.26	3.38	2.37
Common Area Landscaping	15.6	Acres	n/a**	n/a**	n/a**
Subtotal					**53.4**
Project Totals					**134.5**

* Water use factors from the 1999 City of San Luis Obispo Water Use Factors

** n/a values indicate a recycled water use separate from potable water use

Table 8-1 shows a summary of the project water demands under each land use area of the proposed site, included in Appendix 1. Appendix 1a shows the anticipated project demands as part of the LUCE Final EIR. The irrigation water use zones are mapped and shown in Appendix 2 and the irrigation recycled water demands were calculated and presented in Appendix 3 and total 62.25-acre feet. The indoor domestic demands were calculated using the City of San Luis Obispo, water use factors percentage of indoor water use to determine the domestic water use since landscape water is proposed to be irrigated with recycled water for all uses.
Table 8-2 compares the City of San Luis Obispo available potable water with the Froom Ranch Specific Plan projected use.

Table 8-2. City Water Supply Availability and Froom Ranch Water Usage

City Water Supply	City Water Usage	City Water Available	Froom Ranch Specific Plan Use (calculated by use factors)
7,496 AF/yr	4,908 AF/yr	2,588 AF/yr	134.5 AF/yr

9. CONCLUSION

The water supply demand for the Froom Ranch Specific Plan project was included in the City's Land Use and Circulation Element Update Water Supply Assessment. A sufficient water supply is available to serve the project.

Using the City's land use water factors, the Froom Ranch Specific Plan project's potable water demand is 134.5 AF/year. Based on these water demand projections, there is a sufficient supply of water to meet the project's needs.

This conclusion was determined based on this Water Supply Assessment and supporting information in the records of the City of San Luis Obispo.

10. REFERENCES

San Luis Obispo, City of. General Plan - Chapter 8 Water and Wastewater Management Element. Adopted February 24, 1987, Revised May 15, 2018.

San Luis Obispo, City of. 2015 Urban Water Management Plan. Adopted June 14, 2016.

San Luis Obispo, City of. Land Use and Circulation Element Update Water Supply Assessment. Adopted June 2014.

San Luis Obispo, City of. 2018 Water Resources Status Report.

Memorandum of Understanding Regarding Urban Water Conservation in California. Amended September 17, 2014.

City of San Luis Obispo Water Use Factors – September 1999.

APPENDIX 1: FROOM RANCH WATER DEMAND CALCULATIONS

Water Demand							
Land Use Category	**Quantity**	**Unit**	**Water Use Factor (ac-ft/yr.)**	**Total Water Demand (ac-ft/yr.)**	**Indoor Water Demand (ac-ft/yr.)**	**Total Recycled Water Demand (ac-ft/yr.)**	**Permanent Recycled Water Demand (ac-ft/yr.)**
Froom Ranch							
Housing (R-3 attached townhomes)	130	Dwellings	0.3	39.00	39.00	n/a	n/a
Apartments (R-4 multi-family/affordable)	44	Apartments	0.18	7.92	4.75	1.0	1.0
Commercial - Retail	30,000	1000 Square Feet	0.06	1.80	1.26	0.7	0.7
Hotel (with restaurant)	120	Rooms	0.43	51.60	36.12	1.2	1.2
Basin planting	2.8	Acres	n/a	n/a	n/a	7.5	3.8
Parks, Trails, Parkways and Open Space (including creek planting)	11.3	Acres	n/a	n/a	n/a	26.6	18.9
Subtotal					**81.1**	**36.9**	**25.4**
Villaggio - Life Plan Community							
Independent Living (standalone residential units)	61	Dwellings	0.3	18.30	18.30	n/a	n/a
Garden, Village Suite and Standard Apartment Units (senior apartments)	305	Apartments	0.1	30.50	18.30	n/a	n/a
Assisted Living Units (senior apartments)	38	Apartments	0.1	3.80	2.28	n/a	n/a
Memory Care and Skilled Nursing (beds)	51	Occupants	0.08	4.08	2.45	n/a	n/a
Commercial - mixed use occupancy	51,500	1000 Square Feet	0.06	3.09	2.16	n/a	n/a
Maintenance Office	5,300	1000 Square Feet	0.032	0.17	0.12	n/a	n/a
Restaurants	8,000	1000 Square Feet	1.32	10.56	7.39	n/a	n/a
Fitness Facility with pool	13,000	1000 Square Feet	0.26	3.38	2.37	n/a	n/a
Common Area Landscaping	15.6	Acres	n/a	n/a	n/a	22.0	22.0
Subtotal					**53.4**	**22.0**	**22.0**
Project Totals					**134.5**	**58.9**	**47.4**

Notes:

1. Water Use factors: City of San Luis Obsipo, September 1999

2. Total water demand shown for reference based on City water duty factors, water demand based on indoor use since landscape components utilize recycled water.

3. Housing in R-3 zone is assumed to use potable water for private landscaping.

4. Recycled water demand calculated using LandFX software (recycled water utilized for all landscape components except R-3).

5. "Basin planting" wetland enhancement areas will be temporarily irrigated to establishment (assumes 50% of total)

6. "Parks, Trails, Parkways, and Open Space" wetland enhancement areas and channel bottoms will be temporarily irrigated to establishment (assumes 29% of total)

APPENDIX 1a: FROOM RANCH WATER DEMAND CALCULATIONS BASED ON LUCE FINAL EIR

Water Demand							
Land Use Category	**Quantity**	**Unit**	**Water Use Factor (ac-ft/yr.)**	**Total Water Demand (ac-ft/yr.)**	**Indoor Water Demand (ac-ft/yr.)**	**Total Recycled Water Demand (ac-ft/yr.)**	**Permanent Recycled Water Demand (ac-ft/yr.)**
Froom Ranch							
Housing (R-3 attached townhomes)	115	Dwellings	0.3	34.5	34.5	n/a	n/a
Commercial - Retail, (Big box retail outlets)	238,000	1000 Square Feet	0.06	14.3	10.0	4.3	4.3
Commercial - mixed use occupancy	30,000	1000 Square Feet	0.06	1.8	1.3	0.5	0.5
Restaurants	8,000	1000 Square Feet	1.32	10.6	7.4	3.2	3.2
Hotel (70,000 sf includes restaurant)	120	Rooms	0.43	51.6	36.1	15.5	15.5
Basin planting	2.8	Acres	n/a	n/a	n/a	7.5	3.8
Parks, Trails, Parkways and Open Space (including creek planting)	11.3	Acres	n/a	n/a	n/a	26.6	18.9
Project Total					**89.3**	**57.4**	**46.1**

Notes:

1. Water Use factors: City of San Luis Obsipo, September 1999

2. Total water demand shown for reference based on City water duty factors, water demand based on indoor use since landscape components utilize recycled water.

3. Housing in R-3 zone is assumed to use potable water for private landscaping.

4. Recycled water demand calculated using LandEfx software (recycled water utilized for all landscape components except R-3).

MOUNTAINBROOK CHURCH

HOME DEPOT

WHOLE FOODS

Primarily Low Water Use

Primarily Moderate Water Use

Primarily High Water Use

Froom Ranch Estimated Water Use Summary

	Madonna R-3	Madonna R-4	Madonna Retail	Madonna Hotel	Madonna Park	Madonna Roads	Il Villaggio	Creek/ Trails	Basin	TOTAL PROJECT	Percent of Totals
Total Landsape Areas	136,313	32,414	22,954	40,602	97,496	30,996	679,652	396,133	120,963	1,557,524	
Low Water	122,417	28,473	20,603	36,422	87,597	27,601	551,508	205,252	60,426	1,140,298	73%
Moderate Water	13,896	3,941	2,350	4,180	9,690	3,395	108,821	80,229	15,344	241,846	16%
High Water	0	0	0	0	0	0	19324	110653	45193	175169	15%
MAWA (gallons)	2,293,930	1,438,084	948,116	1,677,117	4,027,173	1,221,031	30,153,207	17,574,698	5,366,602	64,699,958	
MAWA (units)	3,067	1,923	1,268	2,242	5,384	1,632	40,312	23,496	7,175	86,497	
ETWU (gallons)	1,131,426	308,338	213,584	378,052	906,305	285,206	7,165,172	7,452,484	2,443,662	20,284,229	31%
ETWU (units)	1,513	412	286	505	1,212	381	9,579	9,963	3,267	27,118	
Acre Feet/ Year	3.47	0.95	0.66	1.16	2.78	0.88	21.99	22.87	7.50	62.25	
Percent Temporary								29%	50%		

MAWA - Maximum Applied Water Allowance (Gallons/ Year)
ETWA - Estimated Total Water Use (Gallons/Year)

(1) Landscape Concepts

Approximate landscape areas based on conceptual site plan…

Project will use primarily-drought tolerant Mediterranean and California native species, with moderate species used as accent plants and shade tolerant species

* Water Calculations take a conservative approach to the amount of moderate water plants and higher water turf, and this is considered a worst case scenario
* Water Calculations assume the project will primarily be irrigated with recycled water, but potable water used for lots and parkways within the R3 area. Recycled water apply "Special Landscape Area" factor.
* Water Calculations include the areas of temporary irrigation, but do not include recirculating ponds or fountains.
* Water Calculations assume 20 sf per all tree bubblers

(2) Water Usage Assumptions

For Madonna R3 areas, 5% was excluded for walkways that are not shown on plans

* Shrub areas assumed 90% low water and 10% moderate water
* Tree areas assumed 65% low water and 35% moderate water
* Calculations assume potable water will be used for irrigation

For Madonna R4, Retail, Hotel, and Park areas, 5% was excluded for walkways that are not shown on plans

* Shrub areas assumed 90% low water and 10% moderate water
* Tree areas assumed 65% low water and 35% moderate water

For Madonna Roads, they project assumes primarily using recycled water but parkways in front of the R3 sites will use potable water.

* Shrub areas assumed 90% low water and 10% moderate water
* Tree areas assumed 65% low water and 35% moderate water

For Il Villaggio site, 10% was excluded for walkways, parking areas and driveways that are not shown on plans

* Shrub areas assumed 90% low water and 10% moderate water
* Tree areas assumed 65% low water and 35% moderate water

For Creek areas, project proposes setback areas, channel banks, channel bottom, and adjacent wetland enhancement areas

* Setback shrub area assumes 100% low water and utilizing drip irrigation
* Channel Bank shrub area assumes 25% high water, 50% moderate, and 25% low water. Banks will utilize spray irrigation.
* Channel Bottom and Wetland Enhancement shrub area assumes 75% high and 25% moderate water. Channel Bottom and Wetland Enhancement will utilize temporary spray irrigation.
* Creek trees assumed 50% low water and 50% moderate water

For Basin areas, assumed only graded slopes and disturbed areas will be planted

* Shrub around the basin areas assumed 100% low water, and irrigated with drip irrigation
* Shrub areas north of the basin are assumed to be wetland enhancement and are 75% high and 25% moderate water. Wetland Enhancement will utilize temporary spray irrigation.
* Tree areas assumed 50% low water and 50% moderate water
* Basin areas are assumed to be tempoarily irrigated

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna R3
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	136,313
Special Landscape	0

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	136,313	X	0.62	=	2,293,930
MAWA (SLA)	49.35	X	0.9	X	0	X	0.62	=	0

MAWA (Gallons/Year) = 2,293,930

Project Type = residential

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA	
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	121728	744903	0.85		0	876,356
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	13525	206917	0.85		0	243,432
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0	0
4	BUBBLER	L	49.35	0.62	0.2	689	4216	0.85		0	4,960
5	BUBBLER	M	49.35	0.62	0.5	371	5676	0.85		0	6,677

Total ETWU 1,131,426 Gal/Year

TOTAL LOW WATER	122417
TOTAL MODERATE WATER	13896
TOTAL HIGH WATER TURF	0
TOTAL LANDSCAPE AREAS	136313

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna R4
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	32,414
Special Landscape	32,414

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	32,414	X	0.62	=	545,480
MAWA (SLA)	49.35	X	0.9	X	32,414	X	0.62	=	892,604

MAWA (Gallons/Year) = 1,438,084

Project Type = residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna R4
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA			ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA		
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	26652.915	163100	0.85		26652.915		218,535
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	2961.435	45306	0.85		2961.435		56,262
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0		0
4	BUBBLER	L	49.35	0.62	0.2	1820	11137	0.85		1820		14,923
5	BUBBLER	M	49.35	0.62	0.5	980	14993	0.85		980		18,618

Total ETWU 308,338 Gal/Year

TOTAL LOW WATER	28472.915
TOTAL MODERATE WATER	3941.435
TOTAL HIGH WATER TURF	0
TOTAL LANDSCAPE AREAS	32414.35

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Retail
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	22,954
Special Landscape	22,954

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.45	X	22,954	X	0.62	=	316,039
MAWA (SLA)	49.35	X	0.9	X	22,954	X	0.62	=	632,077

MAWA (Gallons/Year) = 948,116

Project Type = non residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Retail
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA			ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA		
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	20460	125204	0.85		20460.15		167,759
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	2273	34779	0.85		2273.35		43,190
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0		0
4	BUBBLER	L	49.35	0.62	0.2	143	875	0.85		143		1,172
5	BUBBLER	M	49.35	0.62	0.5	77	1178	0.85		77		1,463

Total ETWU 213,584 Gal/Year

TOTAL LOW WATER	20603
TOTAL MODERATE WATER	2350
TOTAL HIGH WATER TURF	0
TOTAL LANDSCAPE AREAS	22954

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Hotel
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	40,602
Special Landscape	40,602

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.45	X	40,602	X	0.62	=	559,039
MAWA (SLA)	49.35	X	0.9	X	40,602	X	0.62	=	1,118,078

MAWA (Gallons/Year) = 1,677,117

Project Type = non residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Hotel
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA	
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	36110	220972	0.85		36110.07	296,077
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	4012	61381	0.85		4012.23	76,225
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0	0
4	BUBBLER	L	49.35	0.62	0.2	312	1909	0.85		312	2,558
5	BUBBLER	M	49.35	0.62	0.5	168	2570	0.85		168	3,192

Total ETWU 378,052 Gal/Year

TOTAL LOW WATER	36422
TOTAL MODERATE WATER	4180
TOTAL HIGH WATER TURF	0
TOTAL LANDSCAPE AREAS	40602

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Park
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	97,496
Special Landscape	97,496

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.45	X	97,496	X	0.62	=	1,342,391
MAWA (SLA)	49.35	X	0.9	X	97,496	X	0.62	=	2,684,782

MAWA (Gallons/Year) = 4,027,173

Project Type = non residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Park
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA	
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	87207	533652	0.85		87206.58	715,032
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	9690	148237	0.85		9689.62	184,086
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0	0
4	BUBBLER	L	49.35	0.62	0.2	390	2387	0.85		390	3,198
5	BUBBLER	M	49.35	0.62	0.5	210	3213	0.85		210	3,990

Total ETWU 906,305 Gal/Year

TOTAL LOW WATER	87597
TOTAL MODERATE WATER	9900
TOTAL HIGH WATER TURF	0
TOTAL LANDSCAPE AREAS	97496

DATE: April 13, 2017
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JOB NM: Froom Ranch - Madonna Roads
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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	30,996
Special Landscape	25,399

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	30,996	X	0.62	=	521,612
MAWA (SLA)	49.35	X	0.9	X	25,399	X	0.62	=	699,420

MAWA (Gallons/Year) = 1,221,031

Project Type = residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Madonna Roads
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU	
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA		
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	22139	135478	0.85		22139.1	181,525	recycled
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	2460	37633	0.85		2459.9	46,734	
3	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0	0	
4	BUBBLER	L	49.35	0.62	0.2	520	3182	0.85		520	4,264	
5	BUBBLER	M	49.35	0.62	0.5	280	4284	0.85		280	5,320	
6	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	4695	28732	0.85		0	33,803	potable
7	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	522	7981	0.85		0	9,390	
8	TURF ROTARY	H	49.35	0.62	0.8	0	0	0.85		0	0	
9	BUBBLER	L	49.35	0.62	0.2	247	1511	0.85		0	1,778	
10	BUBBLER	M	49.35	0.62	0.5	133	2035	0.85		0	2,394	

Total ETWU 285,206 Gal/Year

RECYCLED		POTABLE		TOTAL	
LOW WATER	22659	LOW WATER	4942	LOW WATER	27601
MODERATE WATER	2740	MODERATE WATER	655	MODERATE WATER	3395
HIGH WATER	0	HIGH WATER	0	HIGH WATER	0
TOTAL RECYCLED	25399	TOTAL POTABLE	5597	TOTAL LANDSCAPE AREAS	30996

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Il Villaggio
CALC BY: Debbie Jewell

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Ph: (805) 543-1794 Fax: (805).543.4609 email: www.rrmdesign.com

MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	679,652
Special Landscape	679,652

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	679,652	X	0.62	=	11,437,423
MAWA (SLA)	49.35	X	0.9	X	679,652	X	0.62	=	18,715,784

MAWA (Gallons/Year) = 30,153,207

Project Type = residential

DATE: April 13, 2017
JOB No.: April 7, 4676
JOB NM: Froom Ranch - Il Villaggio
CALC BY: Debbie Jewell

3765 South Higuera Street, Suite 102 / San Luis Obispo, CA 93401
Ph: (805) 543-1794 Fax: (805).543.4609 email: www.rrmdesign.com

ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU	
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA		
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	531418	3251956	0.85		531417.51		4,357,248
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	59046	903321	0.85		59046.39		1,121,777
3	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	15826.05	96846	0.85		15826.05		129,762
4	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	47478.15	726344	0.85		47478.15		902,001
5	TURF ROTARY	H	49.35	0.62	0.8	19324	473005	0.85		19324		575,801
6	BUBBLER	L	49.35	0.62	0.2	4264	26093	0.85		4264		34,962
7	BUBBLER	M	49.35	0.62	0.5	2296	35125	0.85		2296		43,620

Total ETWU 7,165,172 Gal/Year

TOTAL LOW WATER	551508
TOTAL MODERATE WATER	108821
TOTAL HIGH WATER TURF	19324
TOTAL LANDSCAPE AREAS	679652

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Creeks/ Trails
CALC BY: Debbie Jewell

3765 South Higuera Street, Suite 102 / San Luis Obispo, CA 93401
Ph: (805) 543-1794 Fax: (805).543.4609 email: www.rrmdesign.com

MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY			
	MAWA	=	Maximum Applied Water Allowance
	ET0	=	Reference Evapotranspiration
	0.62	=	Conversion factor (to gallons per square foot)
	ETAF	=	0.55 for Residential Projects
	ETAF	=	0.45 for Non-Residential Projects
	LA	=	Landscaped Area
	ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
	SLA	=	Portion of Landscape Area identified as Special Landscape Area
	ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	396,133
Special Landscape	396,133

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	396,133	X	0.62	=	6,666,265
MAWA (SLA)	49.35	X	0.9	X	396,133	X	0.62	=	10,908,433
							MAWA (Gallons/Year) =		17,574,698

Project Type = residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Creeks/ Trails
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

ESTIMATED TOTAL WATER USE (ETWU)

CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
PF	=	Plant Factor from WUCOLS
HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+ SLA		ETWU	
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE	SLA			
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	178297	1091071	0.85	178297		1,461,910	setbacks
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	0	0	0.85	0		0	
3	AREA FOR DRIP EMITTERS	H	49.35	0.62	0.8	0	0	0.85	0		0	
4	SPRAY	L	49.35	0.62	0.2	25770	157695	0.71	25769.75		247,876	banks
5	SPRAY	M	49.35	0.62	0.5	51540	788477	0.71	51539.5		1,162,071	
6	SPRAY	H	49.35	0.62	0.8	25770	630782	0.71	25769.75		914,195	
7	SPRAY	L	49.35	0.62	0.2	0	0	0.71	0		0	bottom
8	SPRAY	M	49.35	0.62	0.5	28294	432860	0.71	28294.25		637,956	& wetlands
9	SPRAY	H	49.35	0.62	0.8	84883	2077726	0.71	84882.75		3,011,257	
4	BUBBLER	L	49.35	0.62	0.2	1185	7251	0.85	1185		9,716	trees
5	BUBBLER	M	49.35	0.62	0.5	395	6043	0.85	395		7,504	

Total ETWU 7,452,484 Gal/Year

PERMANENT		TEMPORARY			TOTAL	
TOTAL LOW WATER	205252	TOTAL LOW WATER	0		TOTAL LOW WATER	205252
TOTAL MODERATE WATER	51935	TOTAL MODERATE WATER	28294		TOTAL MODERATE WATER	80229
TOTAL HIGH WATER	25770	TOTAL HIGH WATER	84883		TOTAL HIGH WATER	110653
TOTAL PERMANENT	282956	TOTAL TEMPORARY	113177	29%	TOTAL LANDSCAPE AREAS	396133

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Basins
CALC BY: Debbie Jewell

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MAWA - Maximum Annual Water Allowance

MAXIMUM APPLIED WATER ALLOWANCE (MAWA)

CHALLENGE: Determine the Maximum Allowable Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

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ET0	=	Reference Evapotranspiration
0.62	=	Conversion factor (to gallons per square foot)
ETAF	=	0.55 for Residential Projects
ETAF	=	0.45 for Non-Residential Projects
LA	=	Landscaped Area
ETAF for SLA	=	Additional ET Adjustment Factor for SLA (1.0 - 0.7 = 0.3)
SLA	=	Portion of Landscape Area identified as Special Landscape Area
ETAF	=	ET Adjustment Factor (ETAF)

TLA (Total Landscape Area	
Landscape Area	120,963
Special Landscape	120,963

SAMPLE FORMULA:

Calculate for MAWA

ET0 x ETAF x AREA (sf) x CONVERSION = MAWA

MAWA (LA)	49.35	X	0.55	X	120,963	X	0.62	=	2,035,608
MAWA (SLA)	49.35	X	0.9	X	120,963	X	0.62	=	3,330,994

MAWA (Gallons/Year) = 5,366,602

Project Type = residential

DATE: April 13, 2017
JOB No.: 1014012
JOB NM: Froom Ranch - Basins
CALC BY: Debbie Jewell

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ETWU: Estimated Total Water Usage

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CHALLENGE: Determine the Estimated Volume of Water (Acre Feet) used for projected site improvements

TERMINOLOGY

ETWU	=	Estimated Total Water Usage
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HA	=	Hydrozone Area
IE	=	Irrigation Efficiency
SLA	=	Portion of Landscape Area identified as Special Landscape Area

$$ETWU = \frac{ET0 \times 0.62 \ (PF \times HA)}{IE} + SLA$$

Numerator								Denominator	+	SLA		ETWU
Hydrozone	Irrigation Method	Plant Water Use Type	Ref ET	Conversion	PF	HA	Numerator	IE		SLA		
1	AREA FOR DRIP EMITTERS	L	49.35	0.62	0.2	60146	368057	0.85		60146		493,155
2	AREA FOR DRIP EMITTERS	M	49.35	0.62	0.5	0	0	0.85		0		0
3	SPRAY	L	49.35	0.62	0.2	0	0	0.71		0		0
4	SPRAY	M	49.35	0.62	0.5	15064	230460	0.71		15064.25		339,656
5	SPRAY	H	49.35	0.62	0.8	45193	1106210	0.71		45192.75		1,603,235
6	BUBBLER	L	49.35	0.62	0.2	280	1713	0.85		280		2,296
7	BUBBLER	M	49.35	0.62	0.5	280	4284	0.85		280		5,320

Total ETWU 2,443,662 Gal/Year

PERMANENT		TEMPORARY			TOTAL	
TOTAL LOW WATER	60426	TOTAL LOW WATER	0		TOTAL LOW WATER	60426
TOTAL MODERATE WATER	280	TOTAL MODERATE WATER	15064		TOTAL MODERATE WATER	15344
TOTAL HIGH WATER	0	TOTAL HIGH WATER	45193		TOTAL HIGH WATER	45193
TOTAL PERMANENT	60706	TOTAL TEMPORARY	60257	50%	TOTAL LANDSCAPE AREAS	120963