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# Water Availability Analysis



# WATER AVAILABILITY ANALYSIS FOR THE BENJAMIN RANCH WINERY 8895 CONN CREEK ROAD, NAPA COUNTY, CA APN 030-120-016

As required by Napa County Planning, Building & Environmental Services (PBES), this study outlines availability of groundwater for a potential winery located at 8895 Conn Creek Road, Napa County, CA

#### PROJECT DESCRIPTION

The project proposes the installation of a Visitor Center, commercial kitchen, and full crush winery on a 54.64± acre parcel with the intent of the facility having the capability of producing 475,000 gallons of wine per year. The parcel is currently developed with a vineyard manager's office, 47.5± acres of vineyard, miscellaneous structures associated with vineyard operations and access roads. The project also proposes a Lot Line Adjustment increasing the parcel size to 63.97± acres. Refer to the attached Use Permit drawings for the existing and proposed development.

Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan which includes the following for the proposed winery: thirty (30) year around full-time employees, five (5) seasonal dayshift (harvest) employees and five (5) seasonal swing shift (harvest employees and the following for the proposed Visitor Center: fifteen (15) year around full-time employees and five (5) part-time employees. One (1) additional year around full-time employee is added to account for the Vineyard Manager. The project proposes to offer private tours and tastings for a maximum number of 400 guests per day. The project also proposed to offer the following marketing events: Dinnertime Wine Marketing Events for a maximum of 24 guests that may occur on Friday and Saturday nights, plus up to 4 events monthly occurring on days other than Friday and Saturday – no more than 1 dinnertime wine marketing event may occur on any given day, food may be prepared on-site; Lunchtime Wine Marketing Events for a maximum of 16 guests that may occur Monday through Sunday up to a monthly maximum of 15 lunchtime events - no more than 1 lunchtime wine marketing event may occur on any given day, food may be prepared on-site; Large Events for a maximum of 150 guests that may occur Monday through Sunday up to an annual maximum of 8 large events - no more than 2 large events may occur in a given month – no more than 1 large event may occur on any given day, food to be catered; and participation in the Auction Napa Valley. In no case shall the daily combined tours and tastings and marketing visitation exceed 400 guests.

#### **EXHIBITS**

The associated USGS "Topographic Site Location Map" shows the project site and approximate property line locations. Information regarding the location of existing wells and structures are shown on the associated Use Permit Drawings prepared by Bartelt Engineering.



#### **GROUNDWATER OVERVIEW**

According to the Napa County Watershed Information & Conservation Council (WICC), the subject parcel is primarily located in the St. Helena Groundwater Subarea of Napa County. The Napa County Groundwater Monitoring Program tested wells in this area in 2014 and 2015. The observed groundwater depth in these wells ranged from 44 feet to 240 feet below ground surface. Ground elevations range from 90 feet to 150 feet, mean sea level. The groundwater availability in this subarea is reported to be stable and as the well for this project is on the valley floor, a recharge analysis will not be conducted at this time.

#### WATER USE CRITERIA

TABLE 1: SCREENING CRITERIA	
Parcel Zoning	Agricultural Preserve (AP)
Project Parcel Location	Napa Valley Floor
Parcel Size (Existing)	54.64± acres
Parcel Size (Proposed)	63.97± acres
Water Use Criteria	1 acre-feet per acre per year
Well and Spring Interference	potentially
Groundwater/Surface Water Interaction	No
Screening Tier	Tier 1

The subject parcel is located within the Agricultural Preserve (AP) Zoning District subwatershed area of the Mouth of Napa River watershed. Per the PBES Water Availability Analysis (WAA)-Guidance Document dated May 12, 2015 the water use criteria for a parcel located in the Napa Valley Floor and not designated as a groundwater deficient area without any well or spring interference must follow Tier 1 requirements.

#### WATER DEMAND

The total water demand for the existing and proposed uses for the project is calculated below based on the Guidelines for Estimating Residential and Non-residential Water Use from the WAA Guidance Document (2015):

TABLE 2A: EXISTING WATER DEMAND					
Description	Estimated Water Usage (acre-feet/year)				
Vineyard Manager's Office	0.01				
Vineyard (47.5± acres)					
Irrigation	14.25				
Heat and Frost Protection	23.75				
Total Existing Water Demand :	= 38.01				



TABLE 2B: PROPOSED WATER DEMAND	
Description	Estimated Water Usage (acre-feet/year)
Winery (475,000 gallons per year)	
Process Water	10.21
Employees	0.55
Landscaping Water <sup>1</sup>	1.32
Visitor Center	
Employees	0.34
Landscaping Water <sup>1</sup>	0.85
Vineyard Manager's Office	0.01
Vineyard (42.7± acres)	
Irrigation	12.81
Heat and Frost Protection	21.35
Tours and Tastings	1.322
(400 guests per day; 3 gallons per guest)	1.52
Lunch and Dinner Events	
(29 events per month; 16 guests per lunch event;	0.32
24 guests per dinner event; 15 gallons per guest)	
Large Events (9 events per year; 150 guests per event; 15 gallons per guest)	0.01
Subtotal =	49.27
Vineyard Irrigation Credit for Treated Wastewater Reuse	-8.75
Total Proposed Water Demand =	40.52

As shown in Table 2A and Table 2B, the water demand is estimated to increase from 38.01 to 40.71 acre feet per year as part of the proposed improvements. Treated winery process wastewater is proposed to be beneficially reused as a source for vineyard irrigation. Reusing treated process wastewater for vineyard irrigation would reduce the proposed water demand by 8.75 acre-feet/year. Refer to the Onsite Wastewater Dispersal Feasibility Study prepared by Bartelt Engineering for further information regarding the proposed reuse of treated winery process wastewater for vineyard irrigation.

#### ALLOWABLE WATER ALLOTMENT<sup>3</sup>

The following calculation assumes that the entire parcel lies in an area designated as "Valley Floor".

1.0 acre-feet/acre of water is allotted for parcels located on the Valley Floor.

<sup>&</sup>lt;sup>1</sup> Landscape irrigation estimates provided by CBH Design, Inc.

<sup>&</sup>lt;sup>2</sup> Annual estimated water usage for tours and tastings is adjusted to account for lunch, dinner, and large events without exceeding a maximum of 400 guests per day.

<sup>&</sup>lt;sup>3</sup> Calculation based on the Napa County Policy for water usage.



#### **EXISTING PARCEL CONFIGURATION**

Allowable water allotment =  $54.64 \pm acres \times 1.0 = 54.64 \pm acre-feet/year$ 

#### PROPOSED PARCEL "1" CONFIGURATION

Allowable water allotment =  $63.97 \pm acres \times 1.0 acre-feet/year = 63.97 \pm acre-feet/year$ 

The above analysis shows that the projected water usage will be more than the current water usage and less than the allowable water allotment for the subject parcel.

#### **SOURCE WATER INFORMATION**

The subject parcel currently sources water from the existing onsite "project" well which is located northwest of the proposed winery facility and currently supplies irrigation water. The project proposes to use the existing "project" well as the water source for the proposed project which must be capable of meeting the water demand shown in Table 2B.

According to the Property Owner, the wells serving this parcel are capable of producing flow rates in excess of 100 gallons per minute (gpm). Well water will be used to satisfy irrigation, domestic, production and fire protection requirements. Ground water is pumped from the existing wells into onsite storage tanks and an irrigation pond on an adjacent parcel. A proposed lot line adjustment will allow the irrigation pond to be located on the proposed winery parcel.

Prior to use, domestic water is proposed to be stored in one (1) 40,000± gallon storage tank. Treated Process Wastewater used for irrigation is proposed to be stored in one (1) 126,000 gallon storage tank and fire protection water is also proposed to be stored in one (1) 126,000 gallon storage tank.

### Well Description

At the time this study was prepared, it was not determined if the proposed "project" well was constructed with a minimum 50-foot seal. It will be necessary to verify the construction of the "project" well prior to construction of the proposed winery and Visitor Center. If the proposed "project" well was not constructed with a 50-foot minimum annular seal, it will most likely be necessary to drill a new well to comply with the annular seal depth requirement and satisfy domestic and production demands. If the construction of a new well is required, the proposed project will use the existing well(s) to pump ground water to proposed onsite vineyard irrigation tank(s) and fire protection storage tank and the new constructed well will be used to pump ground water to proposed domestic storage tank(s). Well Completion Reports are attached for additional information.

Under proposed conditions, ground water will be pumped from the existing "project" well into onsite storage tanks and then supplied to the vineyard, Visitor Center, and production facility. The tanks will allow stored water to be distributed as appropriate.

#### **Yield Test**

Yield tests were performed on the two (2) wells constructed with the required 50-foot minimum seal at the time of drilling. Prior to the start of the yield test, static water level was recorded at 40 feet below surface. A sustained yield of over 100 gallons per minute (gpm) was recorded after six (6) and four (4) hours of continuous pumping, respectively. Refer to attached Well Completion Reports for addition information.



# Water System Classification

A Non-Transient – Non-Community Water System (NTNCWS) is identified as a water system that has less than five (5) connections, serves less than 25 yearlong residents<sup>4</sup>, serves 25 people per day at least 60 days per year and serves 25 or more of the same people at least six (6) months out of the year. The ten (10) seasonal employees are not considered yearlong residents. Although the proposed project serves less than five (5) connections, serves less than 25 yearlong residents, it does serve 25 or more of the same people per day at least 60 days per year and a commercial kitchen is proposed. Therefore, under PBES guidelines Benjamin Ranch Winery may be required to operate and maintain a regulated non-transient-non-community water system (NTNCWS) as a result of the proposed Use Permit Application. Refer to the Technical, Managerial and Financial (TMF) Capacity Worksheet included with the Use Permit Application for further information.

# Neighboring Water Source(s)

Based on review of neighboring property records at Napa County PBES and discussions with PBES staff, there appears to be one (1) neighboring well located within 500 feet of the proposed "project" well which is also owned by the applicant and is used for irrigation. Refer to the associated Use Permit Drawings prepared by Bartelt Engineering for location of the existing onsite wells, neighboring wells, and nearby creek.

## **Water Quality**

Water quality results were not available for the "project" well prior to completion of this WAA.

#### **SUMMARY**

The groundwater demand generated as a result of the proposed development is estimated to increase from 38.01 acre-feet per year (see Table 2A) to 40.52 acre-feet per year (see Table 2B). The groundwater project well is proposed to be sourced from the existing onsite "project" well. The "project" well has a reported yield rate of 100 gpm which is more than capable of meeting the proposed water demand.

#### **CONCLUSION**

The estimated water demand for the parcel associated with the proposed Benjamin Ranch Winery Use Permit Application is projected to be less than the allowable water allotment in accordance with the Napa County Water Availability Policy.

The above analysis shows that the groundwater demand for the proposed project can feasibly be sourced by the existing "project" well. Furthermore, the estimated available water for the subject parcel satisfies the Tier 1 Water Use Criterion of the Napa County Water Availability Analysis.

<sup>&</sup>lt;sup>4</sup> Yearlong resident is considered an individual served by the water system for 183 or more days annually and does not include seasonal employees.



#### **ATTACHMENTS**

Appendix A – Water Budget Worksheet, Benjamin Ranch – Winery Building

Appendix B – Water Efficient Landscape Worksheet, Benjamin Ranch – Winery Building

Appendix A – Water Budget Worksheet – Benjamin Ranch Winery Visitor's Center

Appendix B – Water Efficient Landscape Worksheet – Benjamin Ranch Winery Visitor's Center

Neighboring Well Location Map

NRCS Custom Soils Report

#### REFERENCES

Napa County 2015, May 12. Water Availability (WAA) - Design, Construction and Guidance Document.

Napa County Watershed Information & Conservation Council (WICC). (n.d.). Retrieved from www.napawatershed.org

			APPEND	Υ Δ					
								-	
			WATER BUDGET V	VORKSHEET					
		В	SENJAMIN RANCH WINER	Y - WINERY BUIL	DING				
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		get. Your Estimated Total Water					allow you to meet your		
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						-			
	Where:					+			
		nual Net Reference Evapotranspira	ation (inches)			-			
		nversion factor (to gallons)				_			
		Adjustment Factor				_			
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	SLA = Po	rtion of the landscape area identifi	ed as Special Landscape Area (s	quare feet)					
	0.4 = the	additional ET adjustment factor for	Special Landscape Area (1.0 - 0	0.6 = 0.4)					
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		Appendix					Worksheet				
			BENJAMIN R	ANCH WINER	RY - Wi	inery E	Building				
		WA	TER EFFICIEI	NT LANDSCA	PE WC	RKSH	EET				
	This work	sheet is filled out by the	ne project applicant	and it is a required of	element o	f the Land	scape Documentatio	n Package.			
Reference Eva	potranspiration (	FTo)	44.1								
Hydrozone # /	Plant Factor (PF)	Irrigation	Irrigation	ETAF		Landso	cape Area (sq. ft.)	ETAF x Area	Estimated Total		
Planting Description <sup>a</sup>		Method <sup>b</sup>	Efficiency (IE) <sup>c</sup>	(PF/IE)					Water Use (ETWU) <sup>e</sup>		
Description		Metriou*		(FF/IL)					(E1WO)		
Regular Lands	cape Areas										
ZONES											
<b>‡</b> 1	0.3	DRIP	0.85	0.35		546		192.7	5,269		
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#3	0.3	DRIP	0.85	0.35		2832		999.5	27,329		.3
#4	0.3	DRIP	0.85	0.35		4131		1458.0	39,865		6
#5	0.3	DRIP	0.85	0.35		4200		1482.4	40,530		- 1.0
<b>#</b> 6	0.3	DRIP	0.85	0.35		70		24.7	676		
<b>#</b> 7	0.3	DRIP	0.85	0.35		1205		425.3	11,628		
#8	0.3	DRIP	0.85	0.35		615		217.1	5,935		
#9	0.3	DRIP	0.85	0.35		2191		773.3	21,143		
#10	0.3	DRIP	0.85	0.35		486		171.5	4,690		
#11	0.3	DRIP	0.85	0.35		5213		1839.9	50,306		
#12	0.3	DRIP	0.85	0.35		4889		1725.5	47,179		
#13	0.3	DRIP	0.85	0.35		5724		2020.2	55,237		
#14	0.3	DRIP	0.85	0.35		3187		1124.8	30,755		
#15	0.3	DRIP	0.85	0.35		4527		1597.8	43,686		
#16	0.3	DRIP	0.85	0.35		587		207.2	5,665		
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8Hvdrozono #/₽!o	nting Description	Direction 84 - 11	od Glaviansi	Efficiency		_		ETWU Tota	429,218 630,396		
<sup>a</sup> Hydrozone #/Plar E.g	nting Description	<sup>b</sup> Irrigation Meth overhead spray	0.75 for	spray head		a	ETWU (Annual Gall Area	ETWU Tota Allowance (MAWA) ons Required) = Eto	429,218 630,396 × 0.62 x ETAF x		
E.g 1.) front lawn 2.) low water use p	lantings			spray head		a	FETWU (Annual Gall Area where 0.62 acre-inches	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor sper acre per year to s	429,218 630,396 x 0.62 x ETAF x that converts		
E.g 1.) front lawn 2.) low water use p	lantings	overhead spray	0.75 for	spray head		a	FETWU (Annual Gall Area Where 0.62	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor sper acre per year to s	429,218 630,396 x 0.62 x ETAF x that converts		
E.g 1.) front lawn 2.) low water use p	lantings	overhead spray	0.75 for	spray head		a	FETWU (Annual Gall Area where 0.62 acre-inches	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor sper acre per year to s	429,218 630,396 x 0.62 x ETAF x that converts		
E.g 1.) front lawn 2.) low water use p	lantings	overhead spray	0.75 for	spray head drip	°MAWA (	Annual G	FETWU (Annual Gall Area where 0.62 acre-inches foot per yea	ETWU Tota  Allowance (MAWA)  ons Required) = Eto is a conversion factor s per acre per year to g ar.	429,218 630,396 x 0.62 x ETAF x that converts		
E.g 1.) front lawn 2.) low water use p	lantings	overhead spray	0.75 for	spray head drip	°MAWA (: = (Eto) (:	Annual G 0.62) [ (ET. where 0.6	Area where 0.62 acre-inches foot per yea wallons Allowed)  Allons Allowed)  AF X LA) + ((1-ETAF6 is a consense) fact is a consense fact in the second	ETWU Tota  Allowance (MAWA)  For Required) = Eto  is a conversion factor  per acre per year to g  ar.  F) x SLA)]  cot that converts acre	429,218 630,396 x 0.62 x ETAF x that converts allons per square		
E.g 1.) front lawn 2.) low water use p. 3.) medium water u	lantings ise planting	overhead spray	0.75 for	spray head drip	°MAWA (: = (Eto) (:	Annual G 0.62) [ (ET where 0.6	#ETWU (Annual Gall Area where 0.62 acre-inches foot per yea  ### Allons Allowed #### Allons Allowed ####################################	ETWU Tota  MIowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to g  ar.	429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre to total landscape		
E.g 1.) front lawn 2.) low water use p. 3.) medium water u	lantings ise planting	overhead spray	0.75 for	spray head drip	°MAWA (: = (Eto) ( (:	Annual G 0.62) [ (ET where 0.6 per year t area in so	PETWU (Annual Gall Area where 0.62 acre-inches foot per yea allons Allowed) (74F x LA) + ((1-ETA) 62 is a conversion fac ogallons per square quare feet, SLA is the	ETWU Tota Allowance (MAWA) ons Required) = Eto is a conversion factor, uper acre per year to query or,  if x SLA)] clor that converts acre foot per year, LA is the total special landscap	429,218 630,396 x 0.62 x ETAF x that converts allions per square -inches per acre e total landscape be area in square		
E.g. 1,1 front lawn 2,1 fown lawn 3,1 front lawn 3,1 front lawn water u 3,1 front lawn water u	lantings see planting	overhead spray	0.75 for	spray head drip	*MAWA (:= (Eto) (:	Annual G 0.62) [ (ET where 0.6 per year t area in so	PETWU (Annual Gall Area where 0.62 acre-inches foot per yea allons Allowed) (74F x LA) + ((1-ETA) 62 is a conversion fac ogallons per square quare feet, SLA is the	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to g  ar.  F) x SLA)]  clor that converts acre foot per year, LA is th	429,218 630,396 x 0.62 x ETAF x that converts allions per square -inches per acre e total landscape be area in square		
E.g. 1, front lawn 2,) low water use p. 3,) medium water u  ETAF Calculati  Regular Landsc	lantings see planting	overhead spray	0.75 for	spray head drip	*MAWA (:= (Eto) (:	Annual G 2.62) [(ET where 0.6 per year in so feet, and ETAl	PETWU (Annual Gall Area where 0.62 acre-inches foot per yea allons Allowed) (74F x LA) + ((1-ETA) 62 is a conversion fac ogallons per square quare feet, SLA is the	ETWU Tota Allowance (MAWA) ons Required) = Eto is a conversion factor, uper acre per year to query or,  if x SLA)] clor that converts acre foot per year, LA is the total special landscap	429,218 630,396 x 0.62 x ETAF x that converts allions per square -inches per acre e total landscape be area in square		
E.g. 1, front lawn 2, low water use p. 3.) medium water use p. 3.) medium water u  ETAF Calculati  Regular Landsco	lantings see planting	overhead spray	0.75 for	spray head drip	°MAWA (: = (Eto) (: 0	Annual G  Annual G  O.62) (ET  where O.6  per year I  area in sr  feet,  and ETAI  areas.	### Annual Gall frea where 0.62 acre-inches foot per yea  ###################################	ETWU Tota  Nowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  3) x SLA)  tota that converts acre foot per year. LA is it total special landsca, all areas and 0.45 for  udscape Areas m	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1.j front lawn 2.) low water use p. 3.) medium water u  ETAF Calculati  Regular Landsc Total ETAF x Area	lantings see planting  Ons	overhead spray	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1.) front lawn 2.) low water use p. 2.) low water use p. 3.) medium water u  ETAF Calculati  Regular Landsc  Total ETAF x  Area  Total Area	lantings see planting  lons  Lape Areas  (B)	overhead spray or drip	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	### Annual Gall frea where 0.62 acre-inches foot per yea  ###################################	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1.j front lawn 2.) low water use p. 3.) medium water u 2. medium water u 3.j medium water u 4. medium water u 4. medium water u 5. medium water u 6. me	lantings see planting  lons  Lons  Language Areas  (B)  (A)	overhead spray or drip 15,698 44,478	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1.) front lawn (2.) low water use p. (2.) now water use p. (3.) medium water use p. (4.) from the control of the transport of transport of the transport of transpo	lantings see planting  Lons Lance Areas  (B) (A) B ÷ A	overhead spray or drip 15,698 44,478	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1, front lawn (2), low water use p. (3), medium water use p. (3), medium water use p. (4), front and the control of the c	lantings see planting  lons  lons  (B)  (A)  B ÷ A	overhead spray or drip 15,698 44,478	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
*Hydrozone #/Plar E.g 1.) front lawn 2.) low water use p. 3.) medium water u  ETAF Calculati  Regular Landsc Total ETAF x Area  Average ETAF  All Landscape A  Total ETAF x Area	lantings see planting  Lons Lance Areas  (B) (A) B ÷ A	15,698 15,698	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1, front lawn 2, low water use p. 3, low water use p. 3, medium water use p. 3, medium water use p. 4, medium	lantings see planting  LODIS  LODIS	overhead spray or drip 15,698 44,478 0.35	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land areas and 0.45 for  indiscape Areas m  1938	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		
E.g. 1, front lawn 2, low water use p. 3, medium water use p. 3, medium water use p. 3, medium water use p. 4, med	lantings see planting  lons  lons  (B)  (A)  B + A  Areas  (B+D)	15,698 15,698	0.75 for	spray head drip	°MAWA (; = (Eto) ( ; d	Annual G  O.62) [(ET where 0.6 per year area in sc feet, and ETAI areas.  e ETAF below f	Annual Gall Area where 0.62 are-inches foot per yes  allons Allowed) AF x LA) + ((1-ETAF 62 is a conversion per square feet, SLA is the for Regular Lan for residential ar	ETWU Tota  Allowance (MAWA)  ons Required) = Eto  is a conversion factor per acre per year to gr.  (2) x SLA))  Lot that converts acre foot per year. LA is the total special land at areas and 0.45 for	1 429,218 630,396 x 0.62 x ETAF x that converts pallons per square -inches per acre e total landscape be area in square ron-residential		

			APPENDI)						
			WATER BUDGET W						
			BENJAMIN RANCH WINER	Y - Visitor's Cent	er	_			
	The fellow	des estantations will be to your date	ermine your site-specific water bud		1		-11		
	water bud	get. Your Estimated Total Wate	r Use must be less than your Ma	aximum Applied \	Nater Allowance.	wiii	allow you to meet your		
		ENTER DATA IN	LAVENDER-SHADED CELLS ON	ILY. CALCULATI	ONS ARE AUTOM	IATI	C.		
1.)	Maximum	n Applied Water Allowance (MAN	WA)			Н			
	MAWA =	(ETo) (0.62) [(0.6x LA) + (0.4 x S	LA)1			+			
		(2.10) (0.102) [(0.103) 2.1) (0.113) 0	,,						
	Where: ETo = Ann	nual Net Reference Evapotranspir	ation (inches)			$^{+}$			
	0.62 = Co	nversion factor (to gallons)							
	0.6 = ET A	Adjustment Factor dscape Area including SLA (square	- f4)			+			
			ied as Special Landscape Area (so	uare feet)					
	0.4 = the	additional ET adjustment factor fo	r Special Landscape Area (1.0 - 0.	6 = 0.4)					
	A.)	Net Evapotranspiration Calculation	)n			+			
	71.7								
		44,10. (Annual ETo)				-			
		(Almaar E 10)				+			
		24,00 (Annual Rainfall)	x .25 =	6. (Effective	00				
		(Annual Raintall)		(Effective	rainfall)	Н			
		Annual Net Reference Evapotran	spiration = Annual ETo	- Effective Ra	infall	=	38.10		
						Ţ			
	B.)	Adjusted Landscape Area Calcula	ation			+			
		31987 (Landscape Area, including SLA)	x 0.6 Adjustment Factor			= [	19192		
		(Landscape Area, including SLA)	Adjustment Factor			-			
		0	x_0,4 Adjustment Factor			=	0		
		0 (Special Landscape Area)	Adjustment Factor						
				Sum of Adjuster	I Landscape Area	<u>.</u> Г	19192	_	
				Outil Of Aujustice	Lanuscape Area	-	10102		
	MAWA =	38.10	x 0.62 x	19	192	- [	453358.00 gallons		
	MAWA =	38.10	x 0.62 x	19	192	- I	453358.00 gallons		
2.)		38.10 d Total Water Use (ETWU)	x 0.62 x	19	192	-1	453358.00 gallons		
2.)	Estimated	d Total Water Use (ETWU)		19	192	=	453358.00 gallons		
2.)	Estimated A.)	d Total Water Use (ETWU)  Net Evapotranspiration Calculation	on .			=			
2.)	Estimated A.)	d Total Water Use (ETWU)	on .	- Effective Ra		= [	453358.00 qallons		
2.)	Estimated A.)	d Total Water Use (ETWU)  Net Evapotranspiration Calculation  Annual Net Reference Evapotran	on spiration = Annual ETo			=			
2.)	Estimated A.)	d Total Water Use (ETWU)  Net Evapotranspiration Calculatic  Annual Net Reference Evapotran  Adjusted Landscape Area Calcula	on spiration = Annual ETo ation, excluding SLA		infall	=	38.10		
2.)	Estimated A.)	d Total Water Use (ETWU)  Net Evapotranspiration Calculatic  Annual Net Reference Evapotran  Adjusted Landscape Area Calcula	on spiration = Annual ETo ation, excluding SLA		infall	= [			
2.)	Estimated A.)	Adousted Landscape Area Calculatic Annual Net Reference Evapotran Addusted Landscape Area Calculatic 31987. (Low Water Use Area, e.g.ft.)	spiration = Annual ETo ation, excluding SLA  X.0.3.  Plant Factor		infall		38.10 9596		
2.)	Estimated A.)	Adousted Landscape Area Calculatic Annual Net Reference Evapotran Addusted Landscape Area Calculatic 31987. (Low Water Use Area, e.g.ft.)	spiration = Annual ETo ation, excluding SLA  X.0.3.  Plant Factor		infall	= [	38.10		
2.)	Estimated A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic	n spiration = Annual ETo ation, excluding SLA, x, 0,3,		infall		38.10 9596		
2.)	Estimated A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic	n spiration = Annual ETo ation, excluding SLA, x, 0,3,		infall		38.10 9596		
2.)	Estimated A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic	spiration = Annual ETo ation, excluding SLA  X.0.3.  Plant Factor		infall	=	38.10 9596 0		
2.)	Estimated A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic	n spiration = Annual ETo ation, excluding SLA, x, 0,3,	- Effective Ra	infall	=	38.10 9596 0		
2.)	A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adiusted Landscape Area Calcula  31997. (Low Water Use Area, sq.ft.)  (Kaderate Water Use Area, sq.ft.)  (Figh Water Use Area, sq.ft.)	on spiration = Annual ETo tion, excluding SLA  x 0.3  Plant Factor  Your Factor  Plant Factor  Plant Factor	- Effective Ra	infall	=	38.10 9596 0		
2.)	Estimated A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adiusted Landscape Area Calcula  31997. (Low Water Use Area, sq.ft.)  (Kaderate Water Use Area, sq.ft.)  (Figh Water Use Area, sq.ft.)	n spiration = Annual ETo ation, excluding SLA, x, 0,3,	- Effective Ra	infall	=	38.10 9596 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic (Low Water Use Area, s.g.f.) (Moderate Water Use Area, s.g.f.) (prign Water Use Area, s.g.f.) Special Landscape A	spiration = Annual ETo ation, excluding SLA  X. 0.3. Plant Factor  X. 0.6. Plant Factor  A. 1.0. Plant Factor	- Effective Ra Sum of Adjustec	infall	=	38.10 9596 0 0		
2.)	A.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adiusted Landscape Area Calcula  31997. (Low Water Use Area, sq.ft.)  (Kaderate Water Use Area, sq.ft.)  (Figh Water Use Area, sq.ft.)	on spiration = Annual ETo tion, excluding SLA  x 0.3  Plant Factor  Your Factor  Plant Factor  Plant Factor	- Effective Ra	infall	=	38.10 9596 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic (Low Water Use Area, s.g.f.) (Moderate Water Use Area, s.g.f.) (prign Water Use Area, s.g.f.) Special Landscape A	spiration = Annual ETo ation, excluding SLA  X. 0.3. Plant Factor  X. 0.6. Plant Factor  A. 1.0. Plant Factor	- Effective Ra Sum of Adjustec	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calculatic (Low Water Use Area, s.g.f.) (Moderate Water Use Area, s.g.f.) (prign Water Use Area, s.g.f.) Special Landscape A	spiration = Annual ETo ation, excluding SLA  X. 0.3. Plant Factor  X. 0.6. Plant Factor  A. 1.0. Plant Factor	- Effective Ra Sum of Adjustec	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	spiration = Annual ETo ation, excluding SLA  X 0.3.  Plant Factor  X 0.6.  Plant Factor  X, 1.0.  Plant Factor  vea (SLA), sq.ft. =  x 0.62 x	- Effective Ra Sum of Adjustee	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	on spiration = Annual ETo ation, excluding SLA x 0.3.  Plant Factor x 0.6.  Plant Factor x 1.0.  Plant Factor x 1.0.  Irrigation Efficiency Factor % of total landscape area irrig	- Effective Ra Sum of Adjustec	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	spiration = Annual ETo ation, excluding SLA	- Effective Ra Sum of Adjusted 0 9,596 (	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	n   n   spiration	Sum of Adjusted  9,596  9,596  0  ated with Drip 0,71 0,75 0,80	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	on spiration = Annual ETo ation, excluding SLA	Sum of Adjusted  9,596  9,596  0  ated with Drip 0,71 0,75	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	n   n   spiration	Sum of Adjusted  9,596  9,596  0  ated with Drip 0,71 0,75 0,80	infall I Landscape Area	=	38.10 9596 0 0		
2.)	B.)	Net Evapotranspiration Calculatic Annual Net Reference Evapotran Adjusted Landscape Area Calcula  31897. (Low Water Use Area, sq.ft.)  0 (Moderate Water Use Area, sq.ft.)  Special Landscape A	n   n   spiration	Sum of Adjusted  9,596  9,596  0  ated with Drip 0,71 0,75 0,80	infall I Landscape Area	=	38.10 9596 0 0		

Reference Evapotr. Hydrozone #/ Planting Descriptiona   Planting Descriptiona	ranspiration (I	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	TER EFFICIENT SERVICE STREET STREET STREET SERVICE STREET SERVICE SERV	NT LANDSC	APE We	DRKSH of the Land	EET	n Package.  ETAF x Area	Estimated Tota Water Use (ETWU) <sup>e</sup>
Hydrozone # / Planting Description a Planting Description and Descri	ranspiration (I	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	44.1 Irrigation Efficiency (IE)°	ETAF (PF/IE)	element o	of the Land	scape Documentatio	-	Water Use
Hydrozone # / Planting Descriptions Regular Landscape 220NES #1 0.3 #2 0.3 #4 0.3 #5 0	ranspiration (I	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	44.1 Irrigation Efficiency (IE)°	ETAF (PF/IE)	element o	of the Land	scape Documentatio	-	Water Use
Hydrozone # / Planting Description a Planting	ranspiration (I	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	44.1 Irrigation Efficiency (IE)°	(PF/IE)				-	Water Use
Hydrozone # / Planting Description a Planting	lant Factor (PF)  le Areas  3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	Irrigation Efficiency (IE)°	(PF/IE)		Lands	cape Area (sq. ft.)	ETAF x Area	Water Use
Hydrozone # / Planting Descriptions Regular Landscape 220NES #1 0.3 #2 0.3 #4 0.3 #5 0	lant Factor (PF)  le Areas  3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP DRIP DRIP DRIP	Irrigation Efficiency (IE)°	(PF/IE)		Lands	cape Area (sq. ft.)	ETAF x Area	Water Use
Planting Descriptions  Regular Landscape  ZONES  #1 0.3  #2 0.3  #3 0.3  #4 0.3  #5 0.3  #6 0.3  #7 0.3  #8 0.3  #10 0.3  #11 0.3  #11 0.3  #11 0.3  #12 0.3  #14 0.3  #15 0.3  #16 0.3	ae Areas  3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Method <sup>b</sup> DRIP  DRIP  DRIP  DRIP  DRIP  DRIP  DRIP  DRIP  DRIP	0.85 0.85	(PF/IE)		Lands	cape Area (sq. π.)	ETAF X Area	Water Use
Regular Landscape  ZONES  #1 0.3  #2 0.3  #3 0.3  #4 0.3  #5 0.3  #6 0.3  #7 0.3  #8 0.3  #9 0.3  #10 0.3  #11 0.3  #12 0.3  #14 0.3  #15 0.3  #16 0.3	3 3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP DRIP DRIP	0.85 0.85	0.35					(ETWU) <sup>e</sup>
ZONES  #1 0.3  #2 0.3  #3 0.3  #4 0.3  #5 0.3  #6 0.3  #6 0.3  #7 0.3  #8 0.3  #10 0.3  #11 0.3  #11 0.3  #12 0.3  #14 0.3  #15 0.3  #16 0.3	3 3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP	0.85 0.85			<u> </u>			
#1 0.3 #2 0.3 #4 0.3 #4 0.3 #5 0.3 #6 0.3 #6 0.3 #7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #14 0.3 #15 0.3 #15 0.3 #16 0.3	3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP	0.85 0.85						<u> </u>
#2 0.3 #3 0.3 #4 0.3 #5 0.3 #6 0.3 #6 0.3 #7 0.3 #8 0.3 #10 0.3 #11 0.3 #11 0.3 #12 0.3 #14 0.3 #15 0.3 #16 0.3	3 3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP DRIP	0.85 0.85						
#3 0.3 #4 0.3 #5 0.3 #6 0.3 #7 0.3 #7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #11 0.3 #12 0.3 #14 0.3 #15 0.3 #16 0.3 #17 0.1	3 3 3 3 3 3 3 3	DRIP DRIP DRIP DRIP	0.85	0.35	0.35			407.6	11,146
#4 0.3 #5 0.3 #6 0.3 #7 0.3 #7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #14 0.3 #15 0.3 #16 0.3 #16 0.3	3 3 3 3 3 3 3	DRIP DRIP DRIP			0.35			314.1	8,589
#5 0.3 #6 0.3 #7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #16 0.3 #16 0.3	3 3 3 3 3 3	DRIP DRIP	0.85	0.35		1665		587.6	16,067
#6 0.3 #7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	3 3 3 3 3	DRIP		0.35		1995		704.1	19,252
#7 0.3 #8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	3 3 3 3		0.85	0.35		1394		492.0	13,452
#8 0.3 #9 0.3 #10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	3 3 3	DDID	0.85	0.35		3060		1080.0	29,529
#9 0.3 #10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	3	DRIP	0.85	0.35		5220		1842.4	50,374
#10 0.3 #11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	3	DRIP	0.85	0.35		1980		698.8	19,107
#11 0.3 #12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3 #17 0.1		DRIP	0.85	0.35		1218		429.9	11,754
#12 0.3 #13 0.3 #14 0.3 #15 0.3 #16 0.3	_	DRIP	0.85	0.35		1073		378.7	10,355
#13 0.3 #14 0.3 #15 0.3 #16 0.3 #17 0.1	3	DRIP	0.85	0.35		1026		362.1	9,901
#14 0.3 #15 0.3 #16 0.3	3	DRIP	0.85	0.35	1512		533.6	14,591	
#15 0.3 #16 0.3 #17 0.1	3	DRIP	0.85	0.35 1297		457.8	12,516		
#16 0.3 #17 0.1	3	DRIP	0.85	0.35 1080			381.2	10,422	
<del>1</del> 17 0.1	3	DRIP	0.85	0.35		212		74.8	2,046
	3	DRIP	0.85	0.35		2346		828.0	22,639
<b>#18</b> 0.1	1	DRIP	0.85	0.12		2775		326.5	8,926
	1	DRIP	0.85	0.12		2089		245.8	6,720
				Totals			31,987	10,145	277,386
Special Landscape	e Areas								
NONE				1				0	
				1		0		0	
				1	_	0		0	
					Totals			0	0
								ETWU Total	277,386
						Maximur	n Allowed Water A	llowance (MAWA)e	516,424
PHydrozone #/Planting to E.g 1.) front lawn 2.) low water use planting 3.) medium water use pla	ngs	<sup>b</sup> Irrigation Meth overhead spray or drip		spray head			Area where 0.62	ons Required) = Eto x is a conversion factor to per acre per year to ga r.	hat converts
ETAF Calculations	i.					0.62) [ (E7 where 0. per year	to gallons per square	) x SLA)] tor that converts acre-in foot per year, LA is the total special landscape	total landscape
						feet,		al areas and 0.45 for r	1
Regular Landscape	Areas					areas.	.5.00 tor restuetti	3.500 010 0.40 101 1	sordential
Total ETAF x	(B)	40.445							
Area	* *	10,145						dscape Areas mu	st be:
otal Area	(A)	31,987					or residential ar or non-resident		
Average ETAF	B÷A	0.32			J.73 UI	DEIOW I	or mon-residefil	ui aicas.	
<u>l</u>									
All Landscape Areas	S				-				
Гotal ETAF x Area	(B+D)	10,145							
Total Area	(A+C)	31,987							
	+D) ÷ (A+C)	0.32			1				