

**To:** David Bogstad, LCA Architects  
**From:** Marc Fernandez, Hydroscience Engineers  
**Reviewed By:** Curtis Lam, Hydroscience Engineers  
**Subject:** Double T Ranch Water Demand Study  
**Date:** January 22, 2024

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## Introduction

The County of Solano Planning Services Division (County) requested a detailed water demand study be conducted to provide a Will Serve letter for the proposed development project named Double T Ranch Equestrian Center (Project). The study is intended to itemize project water demands for the peak day, and annual average demands. All water demands at the project site are to be included in this study, including water demands for livestock (horses), potable demands for tenants, employees, and visitors. Cumulative impacts should also be addressed.

LCA Architects (LCA) retained HydroScience Engineers (HydroScience) to conduct a Water Demand Study for the proposed development project named Double T Ranch Equestrian Center, located on Quail Canyon Road in unincorporated Solano County, west of the City of Winters.

## Project Description

The Project proposes to transform the existing 47.49-acre site to its agricultural roots. The project includes barns, accessory agricultural structures, horse training facilities, existing water well and maintenance facilities for the care and boarding of horses.

### ***Potable Water Supply: Solano Irrigation District***

Per a subscription agreement with the Solano Irrigation District (SID), the property is supplied a maximum of 670 gallons per day (gpd) for potable water use. The District owns and operates an existing public water system located in unincorporated Solano County north of the City of Vacaville known as the Quail Canyon Public Water System (PWS). The Quail Canyon PWS is one of the District's small rural public drinking water systems, and operates from a well as its single source of water. SID is currently in the process of designing and constructing a new well and pipeline to tie into this system.

### ***Non-Potable Water Supply: On-Site Well***

In addition to the potable water supply, the site also generates non-potable water from two sources. The first source is an existing well. The well was constructed with a 5.5-inch diameter casing, drilled to a depth of 83 feet below ground surface (bgs). The most recent water level reading on the well put static water levels at 19 feet BGS. The existing well will supply water at a constant rate of 1.4 gallons per minute (GPM) throughout the year. Which equates to 2,075 gallons per day.

## **Water Demands**

Site water demands include staff, guests, restrooms, kitchen facilities, and horses. SID's allotment is proposed to supply the entirety of the potable water demands of guests, staff, and potable uses associated with the kitchen and restrooms. In addition to supplementing the existing non potable well for the horses who are stabled on-site.

A summary of how the potable and non-potable water demands were calculated is presented below.

### **Potable Water Demands**

Information provided by LCA identified that up to five employees will be on-site at any time, as well as up to ten guests visiting in two different four-hour visiting periods during the day.

Facility uses of potable water include restrooms and kitchen facilities. These facilities include a total of four sinks and three toilets. **Table 1** summarizes the peak daily potable water demands for the site.

**Table 1: Daily Potable Water Demands**

<b>Use</b>	<b>Daily Demand (Gallons)</b>
Staff & Guests Drinking Water	30
Restroom Facilities	68.4
Kitchen Facilities	60
<b>Total Daily Demand</b>	<b>158.4</b>
Excess Potable Supply	511.6

1. Appendix A has detailed calculations of potable water demands.

In summary, the daily potable water demand of 158.4 gpd for drinking water and use of the kitchen and restroom facilities for employees and guest does not exceed SID's maximum daily allotment of 670 gpd. **Appendix A** provides additional detail for these potable water demand calculations.

### **Non-Potable Water Demands – Livestock**

The non-potable water for the livestock is used for consumption, animal cleaning, and barn maintenance. There is to be a maximum number of 48 horses on site, with each horse consuming up to 20 gpd in drought conditions based on recent studies for standard care for horses. Other standards of care include cleaning, sweeping and stall sanitation. These tasks are not to be completed daily for each horse, but **Table 2** summarizes the peak daily non potable water demands for livestock at the site.

**Table 2: Daily Livestock Non-Potable Water Demands**

Use	Daily Demand (Gallons)
Livestock Consumption	960
Cleaning and Stall Sanitation	1,560
<b>Total Daily Demand</b>	<b>2,520</b>

With up to 48 horses on site, peak daily non-potable water demands for livestock is 2,520 gpd, as detailed in **Appendix B**.

## Annual Water Balance

### *Potable Water Balance*

In summary, the daily potable water demand is 158.4 gpd. This demand is used for drinking water, in the kitchen, and restroom facilities for employees and guests. This daily potable water demand would be supplied by the SID water service and is less than the SID maximum daily allotment of 670 gpd. Excess potable water supply of 445 gpd will be used to supplement non-potable water supply from the existing well. The daily SID potable water demand of 603.4 gpd is approximately 90% of SID’s daily allotment of 670 gpm.

### *Non Potable Water Balance*

To determine annual water demands for horse maintenance the daily supply of 445 gallons of SID potable water supplements 2,175 gallons pumped from the existing well. **Table 3** below shows the water supply source for the maximum daily demand for each month. **Appendix C** shows the calculations that meet the annual water demands for two consecutive dry-year weather.

**Table 3: Daily Non-Potable Water Balance**

Source (Gal)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Existing Well	2,175	2,175	2,175	2,175	2,175	2,175	2,175	2,175	2,175	2,175	2,175	2,175
SID	445	445	445	445	445	445	445	445	445	445	445	445
Use	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Livestock	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520	2,520

1. Appendix C has detailed calculations for two consecutive dry years.

## Groundwater Management

Use of the existing well for the project, as described above, does not significantly change the historical water use on site. It can be concluded that the proposed project, utilizing the existing well with a constant production rate of 1.4 gpm, will not substantially decrease groundwater

supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

## **Conclusion**

Peak and average daily water demands for potable and non-potable water will be met by a combination of water supplied by SID and an existing water well pumping at a constant rate of 1.4 gpm or 2,175 gallons daily. Average daily demands for potable water supply of 603.4 gpd does not exceed SID's daily allotment of 670 gpm. In summary supply of SID potable water and non-potable water from the existing well will meet the annual water demands for the project.

## **APPENDIX A**

### Double T Ranch Water Demand Study Potable Water Demand Calculations

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**Double T Ranch**  
**Water Supply and Demand Analysis**  
 8/1/2023

Analysis Conditions

No of Employees	5	
No of Guests	5	maximum per group, 2 groups per day
No of Toilets	3	
No of Sinks	3	
No of Kitchen Sinks	1	

Water Unit Demands for Employee/Guest

**Average Day**

Quantity (employees):	5	<i>(3 employees, 2 animal care employee)</i>
Rate of Demand:	2 gpd/unit	<i>Per Cal-OSHA 1 quart min. per hour is required (1 qt = 0.25 gallons per hour, 0.25 gph x 8 hr shift, 2 gpd)</i>
Base Demand:	10 gpd	
Usage Factor	100%	<i>The rate of demand is equivalent to the gallons per day for an 8-hour shift</i>
Total Daily Demand:	10.0 gpd	<i>On site demand for an 8 hour work period</i>

Quantity (Guests):	10	<i>Maximum of 5 guests every 4 hours for a total of 10 guests onsite in a single 8-hour day</i>
Rate of Demand:	2 gpd/unit	<i>Assumed same unit demand as employee per Cal-OSHA</i>
Base Demand:	20 gpd	
Usage Factor	100%	<i>The rate of demand is equivalent to the gallons per day for an 8-hour day</i>
Total Daily Demand:	20.0 gpd	

	No. Days	31	30	31	31	28	31	30	31	30	31	31	30	Water Year
Scenario	Units	October	November	December	January	February	March	April	May	June	July	August	September	
Average Monthly	gal	930	900	930	930	840	930	900	930	900	930	930	900	10,950

Water Unit Demands for Restroom Facilities

**Average Day**

Quantity:	3 toilets	
Rate of Demand:	1.28 gpd/unit	<i>Assumed new water efficient toilets</i>
Frequency	2 per day/person	
No. of Guest/Empl	15	
Total Daily Demand:	38.4 gpd	

Quantity:	3 sinks	
Rate of Demand:	0.5 gpm/unit	<i>Assumed new water efficient fixtures</i>
Frequency	2 per day/person	
No. of Guest/Empl	15	
Duration	2 min	
Total Daily Demand:	30 gpd	

	No. Days	31	30	31	31	28	31	30	31	30	31	31	30	Water Year
Scenario	Units	October	November	December	January	February	March	April	May	June	July	August	September	
Average Monthly	gal	2,120	2,052	2,120	2,120	1,915	2,120	2,052	2,120	2,052	2,120	2,120	2,052	24,966

Water Unit Demands for Kitchen Facility

**Average Day**

Quantity:	1 sink	
Rate of Demand:	0.5 gpm/unit	<i>Assumed new water efficient fixtures</i>
Frequency	8 per day	
Duration	15 min	
Total Daily Demand:	60 gpd	

	No. Days	31	30	31	31	28	31	30	31	30	31	31	30	Water Year
Scenario	Units	October	November	December	January	February	March	April	May	June	July	August	September	
Average Monthly	gal	1,860	1,800	1,860	1,860	1,680	1,860	1,800	1,860	1,800	1,860	1,860	1,800	21,900

Existing Potable Water Supply

Solano Irrigation District Allotment 670 gpd

No. Days	31	30	31	31	28	31	30	31	30	31	31	30	Water Year
Units	October	November	December	January	February	March	April	May	June	July	August	September	
gal	20,770	20,100	20,770	20,770	18,760	20,770	20,100	20,770	20,100	20,770	20,770	20,100	244,550

Summary of Potable Demand and Supply

	No. Days	31	30	31	31	28	31	30	31	30	31	31	30	Water Year
Scenario	Units	October	November	December	January	February	March	April	May	June	July	August	September	
Total Demand - Average	gal	4,910	4,752	4,910	4,910	4,435	4,910	4,752	4,910	4,752	4,910	4,910	4,752	57,816
Excess Supply - Avg	gal	15,860	15,348	15,860	15,860	14,325	15,860	15,348	15,860	15,348	15,860	15,860	15,348	186,734



## **APPENDIX B**

### Double T Ranch Water Demand Study Non-Potable Water Demand - Animals

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**Double T Ranch**  
**Water Supply and Demand Analysis**  
 497-001

Non Potable Water Unit Demands for Livestock (Horses)<sup>1</sup>

Quantity: 48 horses  
 Rate of Demand<sup>2</sup>: 20 gpd/horse Previous 10 gpd rate assumed double for high heat and humid conditions  
 Total Daily Demand: 960 gpd

Scenario	No. Days	31	30	31	28	31	30	31	30	31	30	31	30	Water Year
		Units	October	November	December	January	February	March	April	May	June	July	August	
Average Monthly	gal	29,760	28,800	29,760	26,880	29,760	28,800	29,760	28,800	29,760	28,800	29,760	28,800	350,400

1. See water balance sheet for irrigation demands  
 2. UC Davis Veterinary Medicine Center for Equine Health - A Guide: Minimum Standards for Horse Care in the State of California, February 2023.

Non Potable Water Unit Demands for Livestock Sanitation

Quantity: 1 hose  
 Rate of Demand: 13 gpm/unit typical hose garden flow rate 9-17 gpm, average 13 gpm  
 Frequency: 4 stalls per day Assumes only one employee available to fully clean stalls, and full stall sanitation duration of 45-60 minutes  
 Water Use Duration: 30 min Actual duration for full stall sanitation greater than 30 minutes, which includes scrubbing, drying and disinfecting stall  
 Total Daily Demand: 1,560 gpd

Scenario	No. Days	31	30	31	28	31	30	31	30	31	30	31	30	Water Year
		Units	October	November	December	January	February	March	April	May	June	July	August	
Average Monthly	gal	48,360	46,800	48,360	43,680	48,360	46,800	48,360	46,800	48,360	46,800	48,360	46,800	569,400

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## **APPENDIX C**

### Double T Ranch Water Demand Study Water Balance Calculations – Consecutive Dry Years

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