APPENDIX U

WATER SYSTEM MEMO AND CAL AM WATER WILL SERVE LETTER

CALIFORNIA
AMERICAN WATER

February 1, 2022

Mark S. Rogers
898 Production Place
Newport Beach, Ca 92663

WILL-SERVE NOTICE

Subject: Chadwick Ranch Estates in Bradbury

Mr. Rogers:

This is to advise that California American Water will supply water service, without exception to the subject property. However, arrangements **may** have to be made for the installation of water service(s) or other appurtenances. Any costs associated with the installation of water service(s) or other appurtenances will be the sole responsibility of the property owner.

To provide adequate water flow for fire protection, as may be required by the cognizant fire department, the exact size and length of any main, fire service or fire hydrant that may have to be installed will have to be determined by a qualified hydraulics engineer (by other than the Water Company).

The quality of water delivered by California American Water meets all requirements of the California State Department of Health Services and the Los Angeles County Health Department.

If you have any questions or concerns regarding this correspondence, please contact me at (626) 614-2537.

Regards,
CALIFORNIA AMERICAN WATER
SOUTHERN DIVISION, LOS ANGELES DISTRICT

Eric A Rojas, Operations Supervisor

Technical Memorandum

Subject: Chadwick Ranch Development Proposed Water System

Prepared For: Mark Rogers, TRG Land, Inc.

Prepared By: Steve Lowry

Date: 1/28/2022

Background

The Chadwick Ranch area is a proposed housing development consisting of 14 home sites that are each 20,000 square feet in size. House pad elevations range from 900 feet at Lots 10 and 13 to 1,100 feet at Lots 3 and 4. Water requirements for the development have been estimated as follows:

	Average	Maximum Day
Domestic - Indoor	14.5 gpm	29 gpm
Irrigation	64 gpm	146 gpm
Totals:	**78.5 gpm**	**175 gpm**

Water mains proposed to serve the Chadwick Ranch development would connect to California American Water's Duarte System at the intersection of Long Canyon Road and Bliss Canyon Road. Additional facilities proposed for the development include a 1.0 MG tank, booster pumping station, and pressure control valves. The proposed Chadwick Ranch development and water system are shown on Figure 1.

The objectives of the proposed Chadwick Ranch water system include:

1. Provide acceptable pressures in the development
2. Provide adequate fire flows
3. Maintain water quality

California American Water's Duarte System will provide the water supply for the Chadwick Ranch development. The Chadwick Ranch supply connection will be located in the Duarte System – Spinks/Bradbury pressure zone. Duarte System water mains at the connection point are 12-inch diameter.

An important facility in the Spinks/Bradbury pressure zone is the Bradbury Tank, which is located approximately 1,000 feet northwest of the Chadwick Ranch connection point. The Bradbury Tank is a ground storage facility, with a base elevation of 1,040 feet and an overflow

elevation of 1,059 feet. The water main serving the tank is 12-inch diameter. It has been reported the 8-inch diameter altitude valve at Bradbury Tank is undersized and can restrict tank operations. The Spinks/Bradbury pressure zone is shown on Figure 2.

Proposed Water System

The proposed water system for the Chadwick Ranch includes a 1.0 MG cylindrical, ground storage tank, a pumping station near the connection point at the intersection of Long Canyon Road and Bliss Canyon Road, two pressure reducing valve (PRV) stations to serve lower elevation Lots 5 through 14, and 8-inch and 12-inch diameter water mains. The proposed Chadwick Ranch water system is shown on Figure 1. Facilities are summarized in Table 1.

Chadwick Ranch Storage Tank

The proposed 1.0 MG water tank, located in the northeast section of the development, would have a base elevation of 1,230 feet. Tank diameter and height should be determined during design, but for this preliminary analysis it was assumed the tank diameter would be 65 feet and tank height would be 40 feet. The resulting tank overflow elevation would be 1,270 feet. The tank should be equipped with an altitude valve to prevent overflows.

Tank sizing for Chadwick Ranch should consider equalizing and fire flow volumes, but also allow for water quality and seismic factors. Tank water quality issues are discussed further on pages 5 and 6.

Equalizing storage was estimated as 450% of average demands. Average demands include indoor domestic needs (21,000 gpd) plus irrigation use (64,000 gpd). Fire reserve storage was based on a proposed fire flow need of 1,250 gpm for a 2-hour duration. Due to the large size of the homes proposed for the Chadwick Ranch development, a higher fire flow rate could be necessary. Therefore, tank sizing also was determined based on a 2,500 gpm flow for two hours. Estimated storage requirements are:

	Water Volume (gallons) (1)	**Water Volume (gallons) (2)**
Equalizing Volume	382,500	382,500
Fire Flow Volume	150,000	300,000
Totals:	**532,500**	**682,500**

(1) - Fire flow - 1250 gpm for 2 hours
(2) - Fire flow - 2500 gpm for 2 hours

Due to water quality concerns, it is recommended to periodically lower the Chadwick Tank water level, and then refill it with fresh water, to produce tank volume turnover and reduce residence time in the tank. Please note that in order to adequately serve Chadwick Ranch customers, the volume of water remaining in Chadwick Tank after its water level has been lowered should be 532,500 gallons or 682,500 gallons, depending on the fire reserve volume.

A typical turnover rate desired for storage tanks is 20% per day, or a total volume turnover every 5 days. Average water usage in Chadwick Ranch during non-irrigation periods is 21,000 gpd. Assuming a 532,500 gallon storage volume, the turnover time would be:

$$\frac{532{,}500 \text{ gallons}}{21{,}000 \text{ gpd}} = 25 \text{ days}$$

For a 682,500 gallon storage volume, the turnover time would be:

$$\frac{682{,}500 \text{ gallons}}{21{,}000 \text{ gpd}} = 33 \text{ days}$$

The turnover period can be improved by providing an additional water volume to allow operators to manually lower the tank water level. The following table shows tank volumes and turnover periods for a proposed Chadwick Ranch Tank:

1,250 gpm Fire Flow			**2,500 gpm Fire Flow**	
Storage Volume	**Turnover Period**		**Storage Volume**	**Turnover Period**
532,500 gallons	25 days		682,500 gallons	33 days
550,000 gallons	14 days		700,000 gallons	18 days
600,000 gallons	7 days		750,000 gallons	8 days
650,000 gallons	5 days		800,000 gallons	6 days
700,000 gallons	4 days		850,000 gallons	5 days

A 650,000 gallon to 850,000 gallon storage volume could provide a 5-day turnover period.

Seismic activity concerns can be addressed by including freeboard space in the tank to allow for water movement or “sloshing”. Typical freeboard recommendations range from 3 feet to 5 feet. A freeboard of 4 feet was assumed to apply to the Chadwick Ranch Tank.

Tank diameter and height should be determined during design. But based on an assumed overall height of 40 feet, a water volume of 650,000 gallons, and 4 feet of seismic freeboard,

the tank diameter would be about 56 feet. The overall tank size would be approximately 750,000 gallons. Similarly, a tank 40 feet tall containing 850,000 gallons with 4 feet freeboard, would have a diameter of about 64 feet. The overall tank size would be approximately 970,000 gallons. Therefore, the proposed 1.0 MG tank would be adequate to provide estimated storage requirements. Tank design should include an attitude valve.

Chadwick Ranch Pumping Station

The proposed pumping station should be sized to reliably deliver maximum daily demands from the Duarte Spinks/Bradbury pressure zone into the Chadwick Ranch service area and the Chadwick Ranch Tank. Estimated maximum day demands are approximately 175 gpm. Hydraulic analyses indicate the suction hydraulic grade line (HGL) would be about 1,040 feet and the discharge HGL would be about 1,270 feet (assuming a Chadwick Tank height of 40 feet). Therefore, total dynamic head (TDH) required would be 230 feet.

The resulting Chadwick Ranch pumping station reliable capacity should be 175 gpm at 230 feet TDH. This could be accomplished by installing two pumps, each rated at 175 gpm at 230 feet TDH. Installation of two pumps provides reliability because the station could maintain adequate delivery capacity when one of the pumps is off-line. Pump sizing should be finalized during design.

Hydraulic analyses also indicate that, due to the relatively short distance from the proposed pumping station to the Bradbury Tank, when pumping at 175 gpm most of the water would be drawn from the Bradbury Tank storage volume. Consideration should be given to including a lower capacity “jockey” pump in the Chadwick Ranch pumping station. The jockey pump would be rated at approximately 30 gpm at 230 feet TDH. Pumping at the lower rate, when possible, would reduce the impact on the Bradbury Tank.

It is also possible that the undersized altitude valve at Bradbury Tank could restrict tank outflow and impact pressures at the Chadwick Ranch pumping station. The altitude valve at Bradbury Tank should be replaced with a larger valve (12-inch diameter) to reduce the potential for inadequate suction conditions at the Chadwick Ranch pumping station.

Pressure Reducing Valve Stations

Two PRV stations are proposed to reduce pressures to acceptable levels for lower elevation Lots 5 through 14. PRV stations could be underground or above ground installations. The approximate outlet HGL at both PRV stations should be 1,140 feet, which would produce

customer pressures ranging from about 50 psi at Lot 5 (pad elevation 1,024 feet), to about 100 psi at Lots 10 and 13 (pad elevation 900 feet). Customer pressures at all 14 lots are presented in Table 2.

PRV pressure settings will depend on each station's elevation. It is recommended PRV station installations are at elevations no higher than about 1,090 feet (assuming 1,140 feet outlet HGL) to maintain at least 20 psi outlet pressure. A typical PRV station design includes a small valve (approximately 2-inch diameter) for domestic flows and a larger valve (8-inch or larger) for fire and emergency flows. Valve sizes should be determined during design.

Water Mains

Water mains proposed for the Chadwick Ranch service area are 8-inch and 12-inch diameter, as shown on Figure 1. The maximum pipeline pressure would occur at the lowest elevation point near Lot 13 (see Figure 1). The elevation at that point is estimated to be approximately 815 feet. Static pressure would be about 140 psi, assuming PRV hydraulic grade line settings of 1,140 feet. If a PRV fails, pressures at the low elevation point could reach about 200 psi, assuming a Chadwick Tank water level of 1,270 feet.

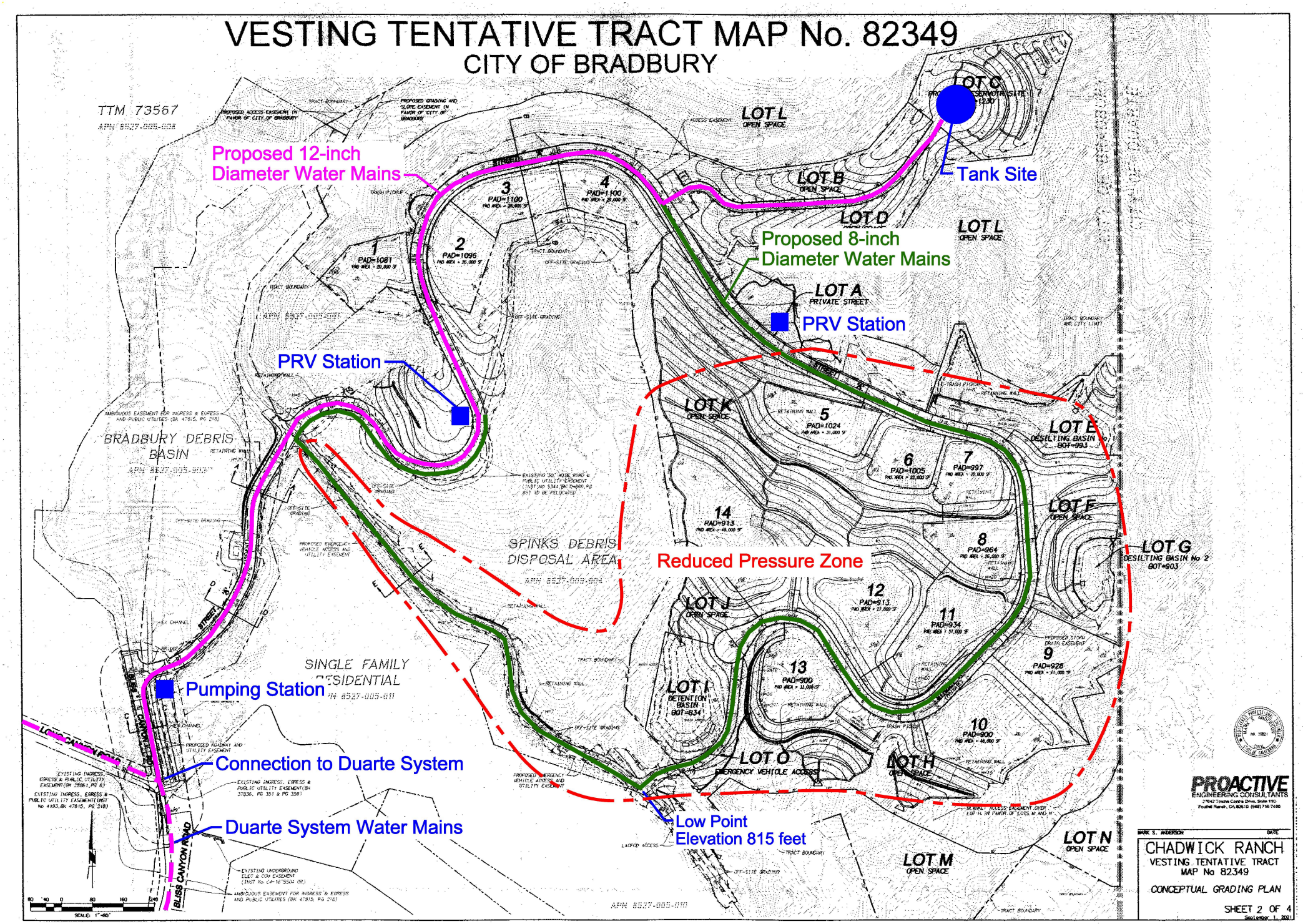
Estimated Fire Flow Capacity

Available fire flows at 20 psi residual pressure (Q_{20}) were estimated for the 14 housing sites in the Chadwick Ranch development. Available fire flows conservatively assume the Chadwick Ranch pumps are off, such that all flows are provided from the 1.0 MG storage tank. Hydraulic analyses indicate flow capacities ranging from 3,500 gpm to 6,000 gpm in the development. Table 2 shows estimated fire flow capacities for the Chadwick Ranch development.

Water Quality

Water quality issues could occur in the Chadwick Ranch development associated with low volume turnover and water age in the 1.0 MG storage tank. Potential water quality problems could be amplified during periods when irrigation water use is limited. Based on average indoor domestic demands (21,000 gpd) it could take more than a month for Chadwick Ranch customers to consume the water stored in the tank. Chadwick Tank water age evaluations also should consider that much of the water pumped into the Chadwick Ranch Tank could be water that already has been residing in the Bradbury Tank for several days.

Adequate turnover in the Chadwick Ranch Tank could be accomplished by installation of a pressure control valve in the proposed Chadwick Ranch pumping station. The control valve would function to allow water from the Chadwick Ranch Tank to flow back into the Spinks/Bradbury pressure zone, while sustaining pressure in the Chadwick Ranch service area. System operators could, therefore, periodically produce turnover and refresh the Chadwick Tank storage volume by lowering its water level and then refilling with water from the Spinks/Bradbury pressure gradient. When lowering the Chadwick Tank water level, operators would need to prevent control valve flows from entering the Bradbury Tank.



PROPOSED CHADWICK RANCH DEVELOPMENT

FIGURE 1

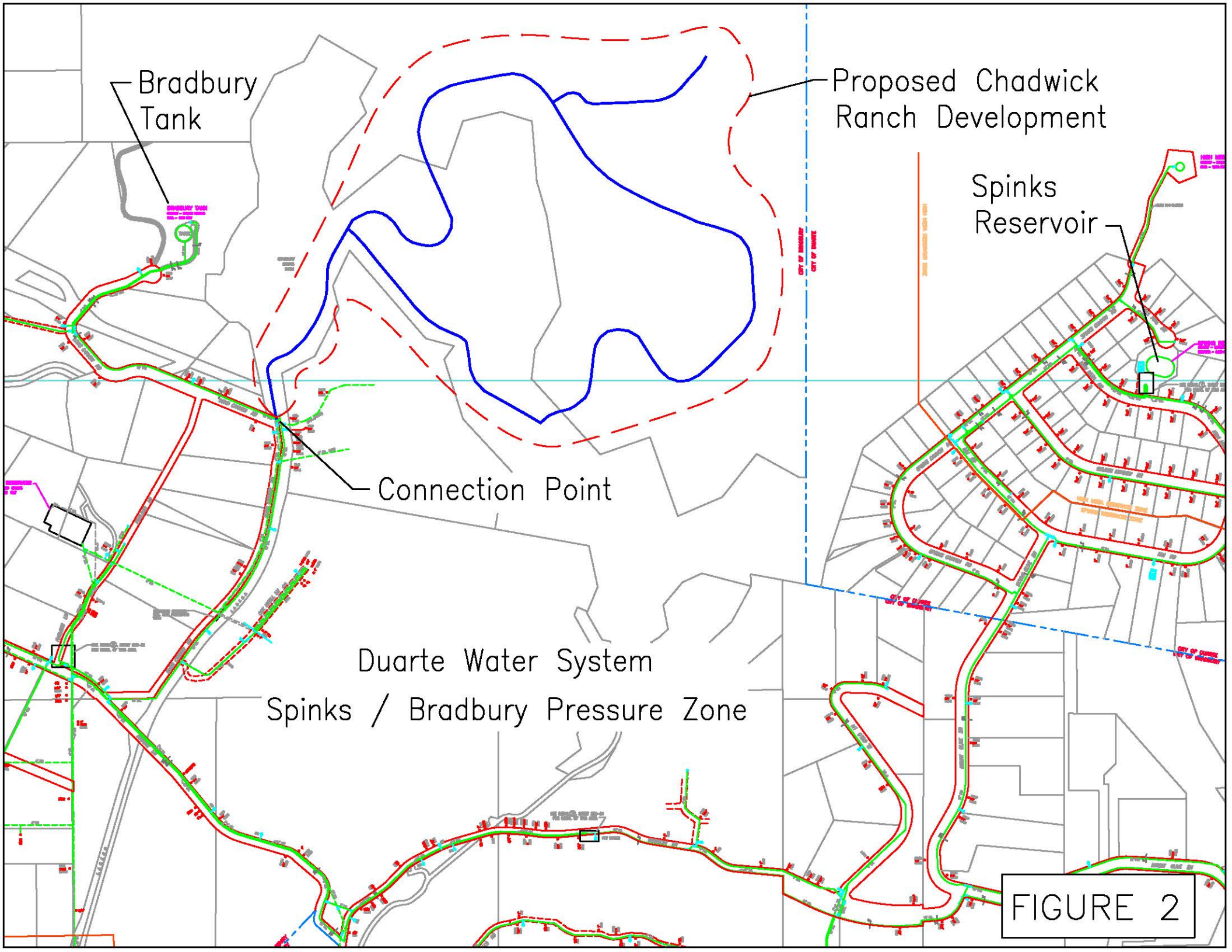

Bradbury Tank
Proposed Chadwick Ranch Development
Spinks Reservoir
Connection Point
Duarte Water System
Spinks / Bradbury Pressure Zone
FIGURE 2

Table 1
Chadwick Ranch Proposed Water System Facilities

1. Pipelines

a. 8-inch diameter:	5,000 feet
b. 12-inch diameter:	4,100 feet
Total:	9,100 feet

2. 1.0 MG Cylindrical, Ground Storage Tank

a. Preliminary Dimensions

- Base Elevation:	1,230 feet
- Overflow Elevation:	1,270 feet
- Tank Height:	40 feet
- Tank Diameter:	65 feet

b. Altitude valve

3. Pumping Station

a. Preliminary Pump Capacities

- Pump No. 1	175 gpm at 230 feet TDH
- Pump No. 2	175 gpm at 230 feet TDH
- Pump No. 3	30 gpm at 230 feet TDH

b. Pressure reducing / pressure sustaining control valve

4. Two Pressure Reducing Valve Stations

a. Preliminary Valve Sizes per station
   - 2-inch domestic flow valve
   - 12-inch emergency / fire flow valve

5. Bradbury Tank

a. Replace existing altitude valve with 12-inch diameter valve

Table 2
Chadwick Ranch Development

Lot Number	Elevation (feet)	Static HGL (feet) (1)	Static Pressure (psi)	Available Fire Flow (gpm) (2)
1	1,081	1,255	75	5,000
2	1,096	1,255	69	4,500
3	1,100	1,255	67	5,000
4	1,100	1,255	67	6,000
5	1,024	1,140	50	3,500
6	1,005	1,140	58	3,500
7	997	1,140	62	3,500
8	964	1,140	76	3,500
9	928	1,140	92	4,000
10	900	1,140	104	4,000
11	934	1,140	89	3,500
12	913	1,140	98	3,500
13	900	1,140	104	4,000
14	913	1,140	98	4,000

(1) - Assumed Chadwick Tank water level = 1,255 feet.

(2) - Estimated fire flow capacity at 20 psi residual pressure. (Q20)