

# Appendix N

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## Water Service Analysis for the Harmon Ranch Project



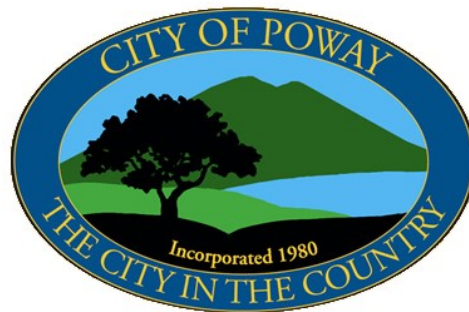
**WATER SYSTEM ANALYSIS**

**FOR**

**HARMON RANCH**

**WITHIN**

**THE CITY OF POWAY**



**September 2023**

# Water System Analysis for Harmon Ranch

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***Prepared for City of Poway***

Client Representative    **Tracy Beach, P.E.**

***Prepared by Mission Consulting Services***

Project Manager        **Jennifer R. Mael, PE**  
**RCE 69606, Exp. 6/30/24**



# Harmon Ranch – Water System Analysis

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## General Policy Statement

This hydraulic analysis is premised upon current criteria. It is not a representation, expressed or implied, that the City of Poway (City) will furnish water at a future date. Applications for water service are governed by separate rules and regulations, and are the subject of separate City proceedings, apart from hydraulic analysis.

Overall demands allow for typical domestic water consumption by residents and estimated consumption by commercial/industrial users, and an allowance for light irrigation. The assumed demands do not consider any high water usage for commercial/industrial processes or for irrigation of orchards and crops unless specifically stated by the Developer/Engineer.

The location of existing improvements and the recommendations of this hydraulic analysis are presented in schematic form only. It is the responsibility of the Developer/Engineer to design the final improvements, including independent investigation of existing conditions.

The results, including the pressures for the fire flows, should be considered approximate and are based upon a hydraulic model of the City's distribution system. In constructing the model, the 24-hour demand patterns are based upon 2020 conditions, and other assumptions were made. Model demands are based on an average meter records from 2017 through 2019. Actual conditions and results may vary from what is assumed in the model. This analysis is only applicable to Harmon Ranch.

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## Introduction and Purpose

This analysis is for Harmon Ranch (Project) in the City of Poway (City). The Project is a 11.51-ac property consisting of 64 residential lots located along Oak Knoll Road west of Carriage Road (see **Figure 1**).

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## Approach

Analysis of the proposed facilities is carried out using an InfoWATER® water distribution system computer model originally developed and updated for the City of Poway as part of their 2001 Potable Water Master Plan Update and updated several times during subsequent master plans and other studies. In the model, the water system is characterized by a series of links (pipes) and nodes (connection points). Links and nodes can also represent reservoirs, pump stations, and pressure reducing valves. The turnover analysis is a simple volumetric calculation.

Information describing the proposed project layout is derived from a four-sheet plan set as provided by the City, prepared by Hunsaker & Associates.

There are also several existing pipes that traverse the project site. The pipes will be either removed or abandoned in place, with connections provided to the proposed onsite water system. These connections and abandoned/removed pipes are shown in Figure 2.

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## Source of Water

The Project is located within the service area known as the 715 Zone. This pressure zone is supplied by gravity from the City’s main 865 Zone through several pressure reducing stations and from the 895 Zone to the south. The 1.0-million gallon Celestial Reservoir provides storage for this zone.

Shown schematically in **Figure 2** is a portion of the existing water distribution system for the 715 Zone.

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## Demands

In conformance with the water demands established in the 2009 Potable Water Master Plan Update, and based on the land use types, lot sizes and development densities, the following unit water demands are employed:

Rural Residential (RR-C): 1.68 gpm/acre

Combining the unit demand with the combined approximate acreage of 11.51 acres, a total average annual water demand of 19.34 gpm is estimated. Peaking factors for Maximum Day Demand (MDD) and Peak Hour Demand (PHD) are included in the daily diurnal pattern for each zone, including the 715 Zone, and are 2.57 and 2.97, respectively.

Project MDD =  $19.34 \text{ gpm} \times 2.57 = 49.70 \text{ gpm}$

Project PHD =  $19.34 \text{ gpm} \times 2.97 = 57.44 \text{ gpm}$

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## Design Criteria

The minimum desirable pressure during a maximum day plus fire condition is 20 psi and the maximum velocity is 15 fps in the vicinity of the fire flow demand. Fire sprinkler demands are typically determined by the fire sprinkler designer, and as such, have not been analyzed as part of this study. Minimum pressures for PHD are 40 psi, with a maximum PHD velocity of 7 fps.

The required fire flow for a single-family residential development such as this is 1,500 gpm for a duration of 2 hours. This time typically occurs on the MDD that occurs after a PHD, such that the tanks serving the zone would be at their lowest level of the day.

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## Results

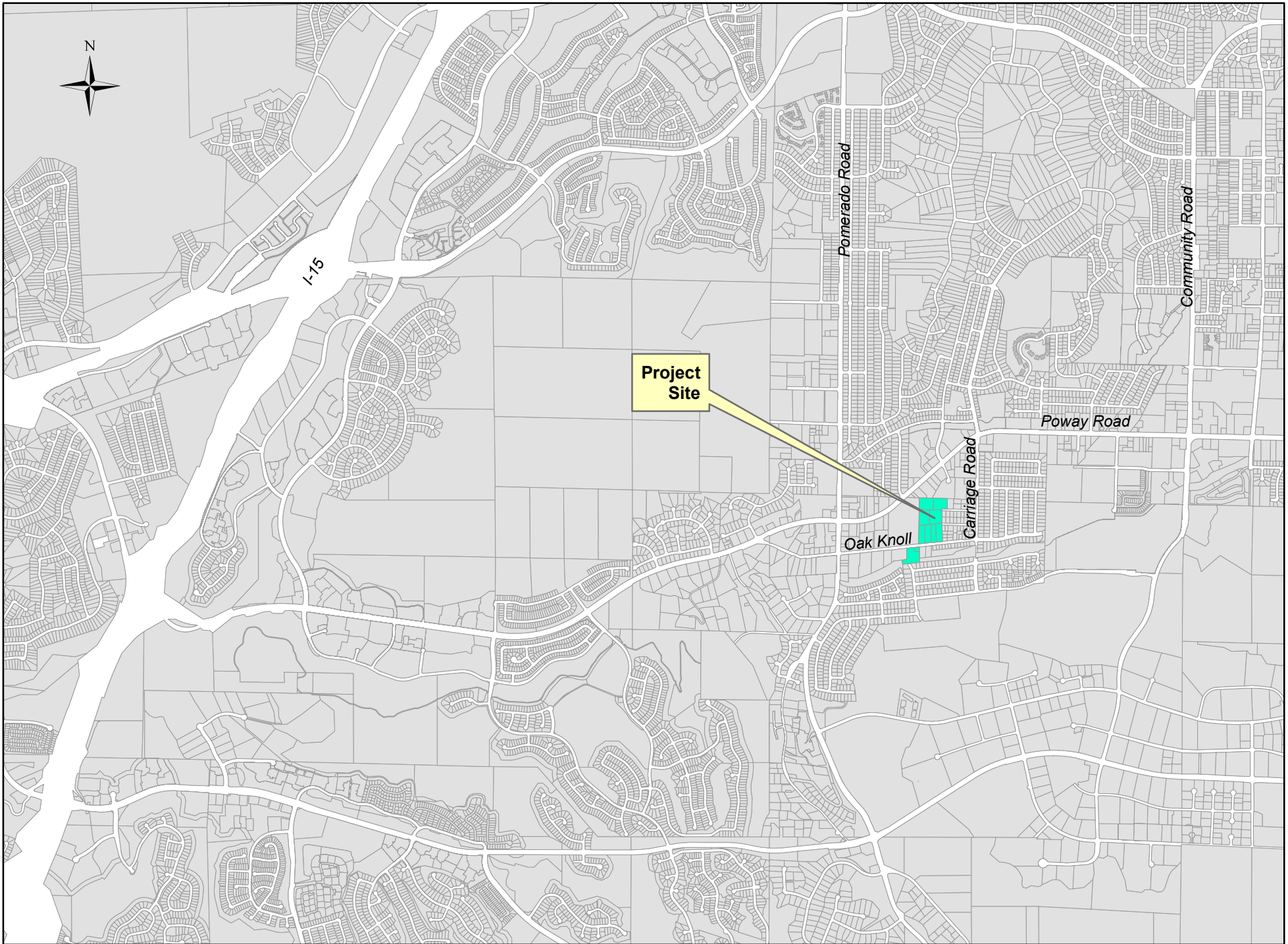
PHD simulation shows that the vicinity and Project area can provide a minimum of 40 psi pressure at velocities less than 7 fps.

A fire flow of 1,500 gpm was placed at various proposed fire hydrants throughout the Project. Results show that the fire flow design criteria are satisfied with a minimum of 20 psi at nodes in the vicinity of the fire, and a maximum velocity of less than 15 fps throughout the site with all 8-inch piping. No offsite improvements are necessary to service the Project. The model results for each hydrant are listed below in Table 1.

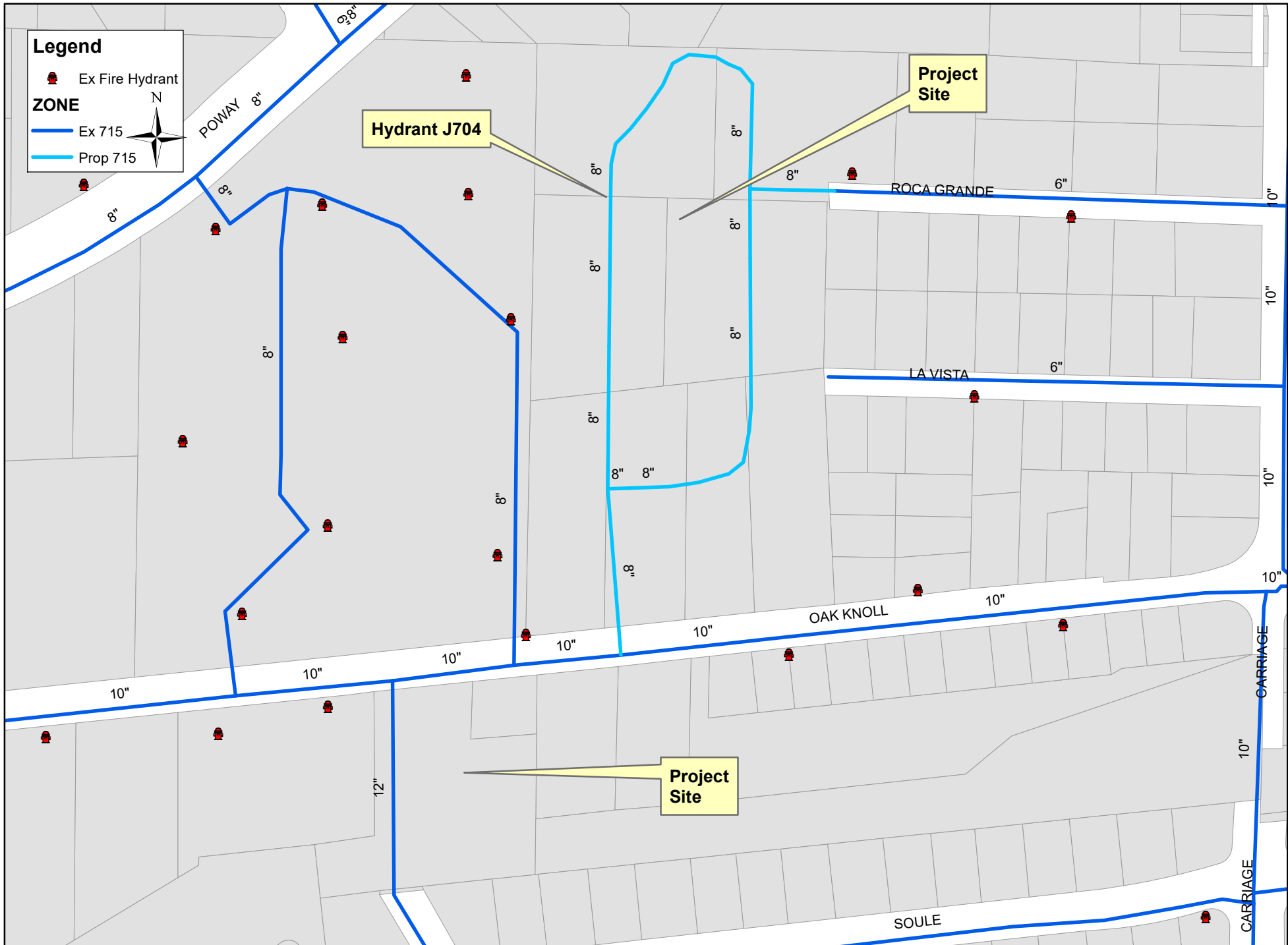
**Table 1. Model Results**

Run No.	Condition	Minimum Pressure	Maximum Velocity
1	Peak Hour Demand	83.2 psi at Node J706	1.4 fps at Pipe 715-0051
2	MDD + 1,500 gpm Fire at Node J702	75.0 psi at Node J702	6.9 fps at Pipe P775
3	MDD + 1,500 gpm Fire at Node J704	74.7 psi at Node J704	7.2 fps at Pipe P775
4	MDD + 1,500 gpm Fire at Node J716	75.5 psi at Node J716	7.3 fps at Pipe P775
5	MDD + 1,500 gpm Fire at Node J722	77.5 psi at Node J706	7.3 fps at Pipe P775
6	MDD + 1,500 gpm Fire at Node J710	77.1 psi at Node J702	7.1 fps at Pipe P775
7	MDD + 1,500 gpm Fire at Node J714	76.5 psi at Node J702	6.9 fps at Pipe P775

Results for the worst-case fire condition at J104 and PHD condition are provided in the **Appendix**.



**Figure 1 - Project Vicinity**  
Harmon Ranch Water System Analysis

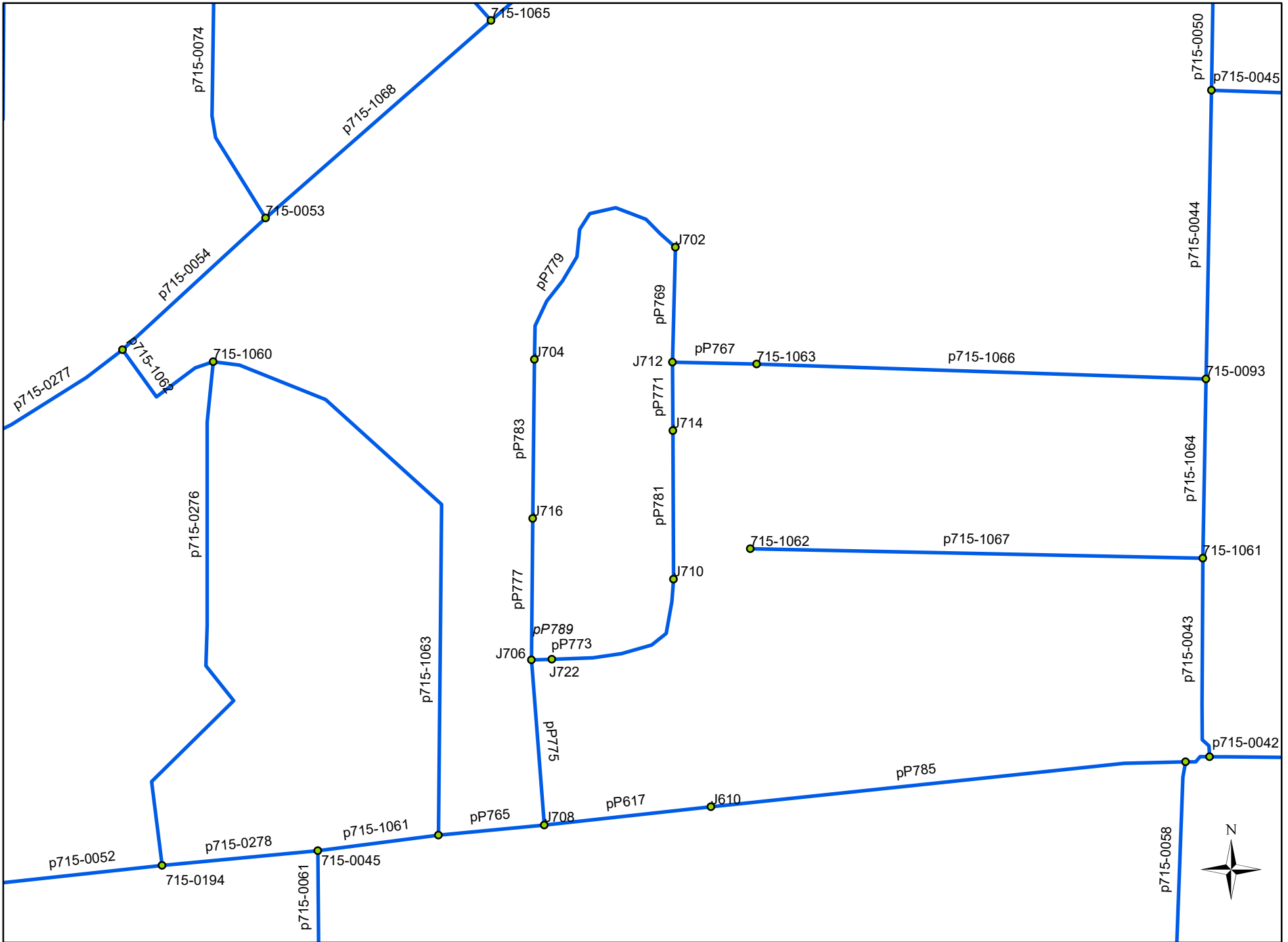


**Figure 2 - Water System**  
Harmon Ranch Water System Analysis

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## **APPENDIX**

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**Pipe and Node Map**  
 Harmon Ranch Water System Analysis

Run No. 1: Peak Hour Demand (Junction Report)

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
<input type="checkbox"/>	J706	8.0	502.0	694.0	83.2
<input type="checkbox"/>	J716	8.0	502.0	694.0	83.2
<input type="checkbox"/>	J704	0.0	502.0	694.1	83.2
<input type="checkbox"/>	J702	0.0	502.0	694.1	83.2
<input type="checkbox"/>	J722	0.0	496.6	694.0	85.5
<input type="checkbox"/>	J712	0.0	481.7	694.1	92.0
<input type="checkbox"/>	J714	8.0	472.1	694.1	96.2
<input type="checkbox"/>	715-0193	11.1	468.0	693.7	97.8
<input type="checkbox"/>	715-1063	3.8	466.9	694.1	98.5
<input type="checkbox"/>	715-1060	38.3	464.6	693.7	99.3
<input type="checkbox"/>	715-0093	6.3	464.0	694.7	100.0
<input type="checkbox"/>	715-1061	5.7	460.3	694.7	101.6
<input type="checkbox"/>	715-1062	5.8	460.0	694.7	101.7
<input type="checkbox"/>	715-0038	13.8	458.0	694.7	102.5
<input type="checkbox"/>	J718	0.0	457.8	694.6	102.6
<input type="checkbox"/>	J610	0.0	453.0	694.2	104.5
<input type="checkbox"/>	J708	0.0	451.2	694.0	105.2
<input type="checkbox"/>	J710	8.0	451.2	694.1	105.2
<input type="checkbox"/>	715-0194	116.9	450.0	693.6	105.6
<input type="checkbox"/>	715-0045	0.0	450.0	693.8	105.6
<input type="checkbox"/>	715-1059	14.5	450.0	693.9	105.7



Run No. 1: Peak Hour Demand (Pipe Report)

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)
<input type="checkbox"/>	715-0051	J718	715-0038	39.5	10.0	129.0	-348.1	1.4	0.0	0.9
<input type="checkbox"/>	P765	J708	715-1059	159.7	10.0	129.0	345.7	1.4	0.1	0.9
<input type="checkbox"/>	715-0278	715-0045	715-0194	234.7	10.0	129.0	293.3	1.2	0.2	0.6
<input type="checkbox"/>	715-0042	715-0038	715-0037	264.0	10.0	129.0	-291.7	1.2	0.2	0.6
<input type="checkbox"/>	P617	J610	J708	251.4	10.0	129.0	291.2	1.2	0.2	0.6
<input type="checkbox"/>	P785	J718	J610	715.7	10.0	129.0	291.2	1.2	0.5	0.6
<input type="checkbox"/>	715-1066	715-1063	715-0093	674.7	6.0	129.0	-90.2	1.0	0.6	0.9
<input type="checkbox"/>	715-1061	715-1059	715-0045	182.6	10.0	129.0	239.4	1.0	0.1	0.4
<input type="checkbox"/>	715-0052	715-0050	715-0194	1,102.6	10.0	129.0	-213.0	0.9	0.4	0.4
<input type="checkbox"/>	715-0277	715-0052	715-0193	1,096.4	8.0	129.0	-136.2	0.9	0.5	0.5
<input type="checkbox"/>	715-0054	715-0053	715-0193	292.0	8.0	129.0	130.4	0.8	0.1	0.4
<input type="checkbox"/>	715-0044	715-0093	715-0033	434.0	10.0	129.0	-178.1	0.7	0.1	0.3
<input type="checkbox"/>	715-1063	715-1060	715-1059	910.9	8.0	130.0	-91.7	0.6	0.2	0.2
<input type="checkbox"/>	P767	715-1063	J712	126.1	8.0	120.0	86.4	0.6	0.0	0.2
<input type="checkbox"/>	P775	J706	J708	249.2	8.0	120.0	54.4	0.3	0.0	0.1
<input type="checkbox"/>	P771	J712	J714	102.9	8.0	120.0	52.4	0.3	0.0	0.1
<input type="checkbox"/>	715-1064	715-1061	715-0093	269.3	10.0	129.0	-81.6	0.3	0.0	0.1
<input type="checkbox"/>	715-0043	715-1061	715-0038	303.0	10.0	129.0	70.2	0.3	0.0	0.0
<input type="checkbox"/>	P781	J714	J710	223.4	8.0	120.0	44.5	0.3	0.0	0.1
<input type="checkbox"/>	715-0276	715-1060	715-0194	824.6	8.0	130.0	36.5	0.2	0.0	0.0
<input type="checkbox"/>	P789	J722	J706	30.8	8.0	120.0	36.5	0.2	0.0	0.0
<input type="checkbox"/>	P773	J710	J722	262.0	8.0	120.0	36.5	0.2	0.0	0.0
<input type="checkbox"/>	715-0058	J718	715-0039	450.9	10.0	129.0	56.9	0.2	0.0	0.0
<input type="checkbox"/>	P769	J712	J702	173.0	8.0	120.0	33.9	0.2	0.0	0.0
<input type="checkbox"/>	P783	J716	J704	239.1	8.0	120.0	-33.9	0.2	0.0	0.0
<input type="checkbox"/>	P779	J704	J702	391.2	8.0	120.0	-33.9	0.2	0.0	0.0
<input type="checkbox"/>	P777	J706	J716	212.7	8.0	120.0	-26.0	0.2	0.0	0.0
<input type="checkbox"/>	715-0061	715-0045	715-0044	494.6	12.0	129.0	-53.9	0.2	0.0	0.0
<input type="checkbox"/>	715-1062	715-0193	715-1060	188.2	8.0	130.0	-16.9	0.1	0.0	0.0
<input type="checkbox"/>	715-1067	715-1062	715-1061	679.2	6.0	129.0	-5.8	0.1	0.0	0.0

Run No. 3: MDD + 1,500 gpm Fire at Node J704 (Junction Report)

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
<input type="checkbox"/>	J704	1,500.0	502.0	674.3	74.7
<input type="checkbox"/>	J716	6.9	502.0	677.9	76.2
<input type="checkbox"/>	J702	0.0	502.0	678.2	76.4
<input type="checkbox"/>	J706	6.9	502.0	681.2	77.6
<input type="checkbox"/>	J722	0.0	496.6	681.1	79.9
<input type="checkbox"/>	J712	0.0	481.7	680.0	85.9
<input type="checkbox"/>	J714	6.9	472.1	680.1	90.2
<input type="checkbox"/>	715-1063	3.3	466.9	680.5	92.5
<input type="checkbox"/>	715-0193	9.6	468.0	688.7	95.6
<input type="checkbox"/>	715-1060	33.1	464.6	688.4	97.0
<input type="checkbox"/>	715-0093	5.4	464.0	690.1	98.0
<input type="checkbox"/>	J710	6.9	451.2	680.6	99.4
<input type="checkbox"/>	715-1061	4.9	460.3	690.0	99.6
<input type="checkbox"/>	715-1062	5.0	460.0	690.0	99.7
<input type="checkbox"/>	715-0038	12.0	458.0	690.0	100.5
<input type="checkbox"/>	J718	0.0	457.8	689.9	100.6
<input type="checkbox"/>	J610	0.0	453.0	688.3	101.9
<input type="checkbox"/>	J708	0.0	451.2	687.7	102.5
<input type="checkbox"/>	715-1059	12.6	450.0	688.0	103.1
<input type="checkbox"/>	715-0045	0.0	450.0	688.3	103.2
<input type="checkbox"/>	715-0194	101.1	450.0	688.3	103.2

Run No. 3: MDD + 1,500 gpm Fire at Node J704 (Pipe Report)

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)
<input type="checkbox"/>	P775	J706	J708	249.2	8.0	120.0	-1,123.9	7.2	6.6	26.3
<input type="checkbox"/>	P777	J706	J716	212.7	8.0	120.0	838.7	5.4	3.3	15.3
<input type="checkbox"/>	P783	J716	J704	239.1	8.0	120.0	831.8	5.3	3.6	15.1
<input type="checkbox"/>	715-1066	715-1063	715-0093	674.7	6.0	129.0	-407.0	4.6	9.6	14.2
<input type="checkbox"/>	P779	J704	J702	391.2	8.0	120.0	-668.2	4.3	3.9	10.0
<input type="checkbox"/>	P769	J712	J702	173.0	8.0	120.0	668.2	4.3	1.7	10.0
<input type="checkbox"/>	715-0051	J718	715-0038	39.5	10.0	129.0	-632.3	2.6	0.1	2.7
<input type="checkbox"/>	P767	715-1063	J712	126.1	8.0	120.0	403.7	2.6	0.5	3.9
<input type="checkbox"/>	P785	J718	J610	715.7	10.0	129.0	579.4	2.4	1.6	2.3
<input type="checkbox"/>	P617	J610	J708	251.4	10.0	129.0	579.4	2.4	0.6	2.3
<input type="checkbox"/>	715-0054	715-0053	715-0193	292.0	8.0	129.0	367.6	2.3	0.8	2.9
<input type="checkbox"/>	P765	J708	715-1059	159.7	10.0	129.0	-544.5	2.2	0.3	2.0
<input type="checkbox"/>	715-0042	715-0038	715-0037	264.0	10.0	129.0	-541.3	2.2	0.5	2.0
<input type="checkbox"/>	715-0044	715-0093	715-0033	434.0	10.0	129.0	-525.3	2.1	0.8	1.9
<input type="checkbox"/>	P773	J710	J722	262.0	8.0	120.0	-278.3	1.8	0.5	2.0
<input type="checkbox"/>	P789	J722	J706	30.8	8.0	120.0	-278.3	1.8	0.1	2.0
<input type="checkbox"/>	P781	J714	J710	223.4	8.0	120.0	-271.4	1.7	0.4	1.9
<input type="checkbox"/>	715-1061	715-1059	715-0045	182.6	10.0	129.0	-419.7	1.7	0.2	1.3
<input type="checkbox"/>	P771	J712	J714	102.9	8.0	120.0	-264.5	1.7	0.2	1.8
<input type="checkbox"/>	715-1062	715-0193	715-1060	188.2	8.0	130.0	263.6	1.7	0.3	1.5
<input type="checkbox"/>	715-0061	715-0045	715-0044	494.6	12.0	129.0	-361.4	1.0	0.2	0.4
<input type="checkbox"/>	715-1063	715-1060	715-1059	910.9	8.0	130.0	137.4	0.9	0.4	0.5
<input type="checkbox"/>	715-0277	715-0052	715-0193	1,096.4	8.0	129.0	-94.4	0.6	0.3	0.2
<input type="checkbox"/>	715-0276	715-1060	715-0194	824.6	8.0	130.0	93.0	0.6	0.2	0.2
<input type="checkbox"/>	715-1064	715-1061	715-0093	269.3	10.0	129.0	-112.8	0.5	0.0	0.1
<input type="checkbox"/>	715-0043	715-1061	715-0038	303.0	10.0	129.0	102.9	0.4	0.0	0.1
<input type="checkbox"/>	715-0052	715-0050	715-0194	1,102.6	10.0	129.0	66.3	0.3	0.0	0.0
<input type="checkbox"/>	715-0278	715-0045	715-0194	234.7	10.0	129.0	-58.3	0.2	0.0	0.0
<input type="checkbox"/>	715-0058	J718	715-0039	450.9	10.0	129.0	52.9	0.2	0.0	0.0
<input type="checkbox"/>	715-1067	715-1062	715-1061	679.2	6.0	129.0	-5.0	0.1	0.0	0.0