2017 Jenny Lind Water System Master Plan
F I N A L

Calaveras County Water District

Prepared under the responsible charge of

Karl Brustad
C 57869

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

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Folsom, CA 95630

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RESOLUTION NO. 2018 - 13

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE CALAVERAS COUNTY WATER DISTRICT

ADOPTION OF THE 2018 JENNY LIND WATER SYSTEM MASTER PLAN CCWD CIP #11064J-130

WHEREAS, in order to better serve current and establish needs for future water customers in the Jenny Lind water service area, a water facilities master plan update has been developed for the community; and

WHEREAS, Peterson Brustad, Inc. was retained by the District in 2016 to prepare the water master plan update which is a replacement of the prior 2005 Jenny Water System Master Plan previously adopted by Resolution 2005-43; and

WHEREAS, the Board of Directors received the Draft Jenny Lind Water System Master Plan at a public meeting on January 10, 2018 at which time a presentation was given for the purpose of receiving Board, staff, and public comment which have been incorporated into the Final version being submitted to the Board for consideration; and

WHEREAS, the Board of Directors of the CALAVERAS COUNTY WATER DISTRICT recognizes that funding of the costs of facilities recommendations within said plan update will be addressed by a financial analysis and evaluation of proposed capacity fees.

NOW, THEREFORE, BE IT RESOLVED the Board of Directors of the CALAVERAS COUNTY WATER DISTRICT hereby adopts the 2018 Jenny Lind Water System Master Plan, attached hereto and made a part hereof.

PASSED AND ADOPTED this 28th day of March, 2018 by the following vote:

AYES: Directors Davidson, Thomas, Underhill and Ratterman
NOES: None
ABSTAIN: None
ABSENT: Director Strange

CALAVERAS COUNTY WATER DISTRICT

Scott Ratterman, President
Board of Directors

ATTEST:

Mona Walker
Clerk to the Board

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Table of Contents

Table of Tables

Table of Figures

Appendices

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Existing System

Introduction

The Calaveras County Water District (District) is updating the Jenny Lind Water Master Plan (WMP). The most recent WMP was published in 2006.

This master plan report presents a summary of the results and findings for the 2017 Jenny Lind Water Master Plan update. The intent of this report is to provide a basis for managed upgrade of the water supply, treatment, storage, and distribution systems and develop a capital improvement plan.

Construction of the first Jenny Lind Water Treatment Plant (WTP) was initiated in 1967 and given to the District for operation and maintenance in 1970. The treatment plant's capacity was one million gallons per day (mgd) and served approximately 30 connections in the Rancho Calaveras area. By 1988, the Rancho Calaveras subdivision had expanded and a new La Contenta subdivision was added. La Contenta consumed water in excess of the treatment plant's capacity. In 1988, the District completed the first Water System Master Plan for the area. Based on the master plan recommendations, the WTP was to be expanded to two mgd and subsequently five mgd to meet projected demand through 2010. The WTP's second phase of expansion was completed in fall of 1997, expanding the WTP capacity to five mgd. In 2005, the Jenny Lind Water Master Plan was updated. The recommendations lead to the expansion of the WTP from five mgd to its current capacity of six mgd, which was completed in 2008.

Purpose and Specific Objectives

The purpose of this master plan report is to describe water supply, treatment, storage, and distribution system improvements required to meet current and future service area needs. In particular, this master plan report provides the following information:

- Delineation of the service area.
- Characterization of historic water demands, including existing and projected average day, maximum day, and peak hourly demands (PHDs).
- Description and evaluation of the existing facilities.
- Identification of the improvements needed to meet growth, improve operations, comply with current and known future regulations, and correct deficiencies.
- Recommendations for system improvements needed to serve buildout conditions.
- Timelines and cost information for constructing the recommended improvements.

Existing Service Area

The service area encompasses the community of Jenny Lind, the Rancho Calaveras Subdivision, and the La Contenta Subdivision. The service area is defined by the Sphere of Influence (SOI) presented in the 2017 Calaveras County Water District Sphere of Influence Report, in addition to the existing connections already being served outside the SOI. The topography ranges in elevations from approximately 200 feet in the

southwestern portion of Rancho Calaveras to approximately 800 feet in the northeastern portion of the La Contenta subdivision. Hot summers and cool winters characterize the region, with temperatures ranging from the low 50's to the mid 90's. The elevation of the watershed is generally in the 4,000 ft range and one of the highest tributaries of the watershed is approximately 5,800 in elevation. Snow accounts for little of the precipitation in the watersheds supplying the study area.

These communities include a total of 3,755 existing connections spread out across the 8,068 acre service area. The current facilities include one raw water reservoir (the New Hogan Reservoir, owned and operated by others), one raw water diversion facility (Calaveras River pumped supply), one water treatment plant (Jenny Lind WTP), four pump stations, five treated water storage tanks, three hydropneumatic systems, and the associated distribution system. Appendix A provides a complete map book of the modelled distribution for reference.

Water Supply

The Jenny Lind water system has one source of supply: the Calaveras River downstream of the New Hogan Reservoir. No groundwater sources are available. Historically, the water supply is of generally good quality and is easily treated to potable standards, with the exception of winter 2015 to summer 2016. The 2015 Butte Fire, in combination with the 2014 to 2016 drought, released significant levels of organics and manganese as rains washed the ash and debris into the reservoir. High concentrations of manganese in the raw water have required additional treatment and were enhanced by low water levels in the new Hogan Reservoir. The District has been allocated water for municipal, industrial, and agricultural use. The District obtains water from New Hogan Reservoir pursuant to agreements with the U.S. Bureau of Reclamation (USBR) and the Stockton East Water District (SEWD). This agreement allocates 43.5 percent of the New Hogan Project "conservation storage" yield to CCWD, typically estimated at 30,928 acre feet per year plus 350 acre feet per year in downstream riparian demand from New Hogan, for a total of 31, 278 acre feet per year. The Jenny Lind WTP draws its water from the Calaveras River approximately one mile downstream of the New Hogan Dam. For this reason, the raw water supply has qualities which are associated with both lake and river sources. The New Hogan Dam and Reservoir are owned and operated by the U.S. Army Corps of Engineers.

Water Treatment Facilities

Raw water delivered to the WTP is collected via 12-inch-diameter perforated collector pipes installed in the Calaveras River. The collection pipes are bedded in drain rock and set one to three feet below the river channel. The raw water flows from the collector pipes by gravity to the intake manifold and is delivered to the influent pumps.

The influent pump station includes three multi-stage vertical turbine pumps equipped with variable speed drives. Two of the pumps are rated for 1,900 gallons per minute (gpm) and the third pump is rated at 1,560 gpm; all three pumps deliver raw water to the treatment plant.

The Jenny Lind WTP was upgraded in 2008 and has an ultimate capacity of 6.0 mgd. For consideration of treated water availability, this master plan uses 92.5 percent of the

ultimate capacity of the WTP to account for water losses during backwash events. This equates to a firm capacity of approximately 5.55 mgd for planning purposes. The system includes chemical addition for taste and odor control, coagulation, and corrosion control. The water is first treated with ozone in two vertical baffled ozonation tanks. Potassium permanganate is then added at the base of the second ozone tower for additional pretreatment of manganese and organics. After further chemical addition for coagulation and disinfection, the water is passed through six parallel 1-mgd Microfloc treatment trains. The trains are prefabricated adsorption clarification/filtration units. After a corrosion control chemical is added, the treated water is sent to the clearwells and pumped from the clearwells to the A Tank. From A Tank, water enters the distribution system. The contact time is achieved in the clearwells at the WTP site, the dedicated pipeline to A Tank, and in A Tank.

To address the increased organics and turbidity following the 2015 Butte Fire, the District is currently in the process of adding pretreatment at the WTP.

Treated Water Distribution System

The distribution system is operationally divided into 14 pressure zones. The pressure zones allow water to be delivered at acceptable pressures to customers at a range of elevations. All the pressure zones are served by one of the five storage supply reservoirs. Apart from E Tank and 602 Tank, all the pressure zones are supplied by gravity via their respective storage tank. The pressure zones are summarized in Table 1 which presents the elevation ranges and the pressure ranges. The high pressure condition is given under static pressure conditions. The low pressure condition is given under the peak hour demand conditions.

Table 1. Jenny Lind Pressure Zones.

Pressure Zone	Storage Supply	Elevation Range		Low Pressure (psi) – PHD Condition	High Pressure (psi) – Static Condition
		Low (ft)	High (ft)		
A1	A Tank	356	712	17	162
A2	A Tank	382	427	79	82
A3	A Tank	299	575	17	166
A4	A Tank	257	361	62	107
A5	A Tank	216	306	55	112
A6	A Tank	298	414	47	132
B1	B Tank	513	747	30	180[1]
B2	B Tank	423	618	36	129
B3	B Tank	419	690	73	159
B4	B Tank	706	727	55	64
B5	B Tank	543	671	51	107
E	E/F Tank	738	787	16	38
F	F Tank	596	793	21	104
602	602 Tank	617	778	27	133

[1] Pressure at lowest distribution node is 170. Pressure at pump station discharge is 180 psi.

Treated Water Storage Facilities

The existing water system includes five storage tanks in addition to the two clearwells that provide water storage for fire flow, emergency, and operational needs. These tanks are summarized in Table 2.

Table 2. Jenny Lind Water Storage Tanks.

Name	Model ID	Nominal Volume (gallons)	Ground Elevation (ft)	Diameter (ft)	Maximum Water Depth (ft)	Overflow Elevation (ft)
B Tank	T2	1,000,000	898	78	31	929
602 Tank	T5	150,000	821	40	17	838
E Tank	T3	500,000	811	69	19	830
F Tank	T4	1,000,000	811	98	19	830
A Tank	T1	2,000,000	699	108	30	729
WTP Clearwell	T7009	80,000	538	46	7	545
WTP Clearwell		165,000	534	52	11	545

Treated Water Pumping Stations & PRVs

The boundaries between these pressure zones are defined by booster pumping stations, pressure regulating valves (PRVs), and isolation valves. Information about the booster pumping stations is summarized in Table 3. Information about the PRVs is summarized in Table 4.

Table 3. Jenny Lind Pump Stations.

Station	Description	Model ID	Shutoff Head (ft)	Design Head (ft)	Design Flow (gpm)
Pump Station A	Clear Well to A Tank	Pump 8	270	218	1,388
		Pump 7	280	225	2,082
		Pump 6	280	225	2,082
Pump Station B	A Tank to Zone B	Pump 5	560	341	600
		Pump 4	560	341	600
		Pump 3a[1]	560	341	600
Pump Station E & F	A Tank to Zone E & F	Pump 3b[1]	560	138	820
		Pump 2	210	138	834
		Pump 1	210	138	834
Pump Station 602	Zone A to Zone 602	Pump 135	-	305	200
		Pump 136	-	305	200

[1] Pumps 3a and 3b are one pump which is modelled as two pumps because the pump operates as a swing pump in the event the primary pumps at Pump Station B or Pump Station E & F fail. The pump has two different operating points depending on if its pumping to Zone B or Zones E & F based on the zones HGL.

Table 4. Jenny Lind PRVs.

Model ID	CCWD ID	Location	From Zone	To Zone	Diameter (in)	Elevation (ft)	Effective HGL (ft)	Setting (psi)
401	JL-015	Baldwin & Rippon	B1	B2	4	547	720	75
402	JL-014	Bergsma & Treosti	B1	B2	4	618	701	36
403	JL-011	West Hill	B1	B3	6	614	787	75
404	JL-012	Usher & Treosti	B1	B3	6	618	786	73
406	JL-019	Baldwin & Garner	A1	A3	6	419	680	113
408	JL-009	Friedman & Hironymous	A1	A2	6	409	559	65
409	JL-010	Friedman & Coultrup	A1	A2	6	409	571	70
410	JL-016	Friedman & Garner	A1	A2	4	382	569	81
411	JL-005	Baldwin & Mann	A3	A5	8	347	474	55
415	JL-007	Highway 26 & Garner	A1	A3	10	353	683	143
420	-	Jenny Lind Vista	A3	-	6	379	610	100
4014	JL-007	Jenny Lind & Kirby	A3	A5	8	301	469	73
403B	-	Baldwin & Treosti	B3	A3	6	453	682	99
404B	-	Anderson & Yost	B3	A3	6	496	669	75
New01	-	Pardini & Sparrowk	A3	A6	4	431	602	74
New02	-	Hautly & Siegal	A3	A6	4	482	583	44
New03	-	Thornicroft & Cox	B1	B4	4	727	854	55
New04	-	Thornicroft & Cox	B1	B4	4	706	831	54
New05	-	Dunn & Bane	B1	B5	6	607	790	79
New06	-	Dunn	B1	B5	6	671	785	49
New07	-	O'Reilly & McAtee	A3	A4	6	331	504	75
New08	-	Goggin & McAtee	A3	A4	6	392	503	48
New09	-	Goggin & Redman	A3	A4	6	409	502	40

[1] Elevations and settings from InfoWater model, unless updated values were provided by the District.

The District keeps some valves in the closed position to define pressure zone boundaries or to improve water quality. The normally closed valves are listed in Table 5.

Table 5. Normally Closed Valves.

Model ID	Location	Reason
P17	Treosti	Normally Closed
P200	Ganer & Westhill	Isolate Zone A1 and A3
P202	Conner	Maintain Pressure
P270	Coultrup & Friedman	Isolate Zone A2 and A3
P531	Berkesey and Vista del Lago	Isolate Zone A1 and F
P600	McAtee & Sparrowk	Closed for Water Quality
P90	Marsden & Heinemann	Closed for Water Quality
900	Highway 26, West of Patridge	Isolate Zone A1 and F
901	Huckleberry & Delin	Isolate Zone A1 and F
902	Antonovich & Huckleberry	Isolate Zone A1 and F

Treated Water Pipelines

The distribution system model includes approximately 90 miles of distribution pipe ranging from four inches to 18 inches in diameter as shown previously in Figure 1. The Jenny Lind system is composed mainly of six-inch diameter mains. The smallest distribution pipe diameter found in the model is four inches. Figure 1 does not show some distribution lines in many of the cul-de-sacs, which in many cases are two inches in diameter. Table 6 summarizes the distribution system characteristics from the distribution system model.

Table 6. Distribution System Characteristics.

Pipe Diameters	18 inches - 71 feet
	12 inches – 5.0 miles
	10 inches - 7.5 miles
	8 inches – 19.7 miles
	6 inches – 57.6 miles
	4 inches- 0.25 miles

Baseline and Projected Demands

Baseline Average Daily Demands

The baseline average daily demands (ADD) presented in the 2015 UWMP have been adopted and used to represent the existing system for the Jenny Lind service area in this WMP. The baseline water demands developed in the 2015 UWMP are presented in Table 7. For comparison, Table 8 presents a summary of the annual WTP production records. The baseline water demand is less than 1% lower than the highest annual average daily demand on record. Use of the baseline demands presented in the 2015 UWMP provides consistency between planning documents and an accurate distribution of water demand by user type.

Table 7: Baseline Average Daily Demand per the 2015 UWMP

Water User Type	Baseline ADD (MGD/yr)
Residential[1]	1.36
Commercial	0.03
Public Service	0.03
Landscape (Treated Water)	0.01
Losses + Other	0.50
Total	1.94
[1]Residential demands represent both the single family and multifamily water demands.	

Table 8. Historic Connections and Demand.

Year	New Connections	Number of Connections	Treated Water (MG)	Average Daily Demand (MGD)	Average Demand Per Connection (gpd/conn.)
2004	-	3,324	666	1.82	548
2005	100[1]	3,424	678	1.86	543
2006	100[1]	3,524	713	1.95	570
2007	100[1]	3,624	631	1.73	477
2008	23	3,647	640	1.75	479
2009	8	3,655	626	1.72	469
2010	14	3,669	567	1.55	423
2011	8	3,677	570	1.70	425
2012	4	3,681	667	1.83	495
2013	1	3,682	707	1.94	526
2014	6	3,688	577	1.58	429
2015	30	3,718	492	1.35	363
2016	37	3,755	-	-	-
[1] New connections were not provided prior to 2007. It has been assumed that 100 new connections were added each year to present a conservative estimate of the demand per connection during peak water use years.					

Baseline Maximum Daily Demands

A maximum daily demand (MDD) of 4.65 MGD is used to model the existing system demand. The MDD was developed by applying the average maximum day peaking factor (2.4) to the baseline demand. While there are several days on record with demands peaking above 4.65 MGD, these peaks were isolated incidents were high demands were not sustained. The highest 2-day and 3-day average demands occurred in 2007 and were 4.44 MGD and 4.24 MGD respectively (see Table 9). The deviation between the MDD and the 2-day average demand is the result of delayed operator responses to low tank levels. Using 4.65 MGD as a baseline MDD better reflects the true maximum daily demand of the system. The baseline MDD by user type used to represent the system are presented in Table 10.

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Table 9: Historic Maximum Daily Demand and Peaking Factors.

Year	Average Daily Demand (MGD)	Maximum Daily Demand (MGD)	Maximum 2-Day Average Demand	Maximum 3-Day Average Demand	Maximum Day Peaking Factor
2004	1.8	4.3	-	-	2.4
2005	1.9	4.7	-	-	2.5
2006	2.0	4.7	-	-	2.4
2007	1.7	5.0	4.44	4.24	2.9
2008	1.8	4.4	3.94	3.75	2.5
2009	1.7	4.2	3.77	3.59	2.5
2010	1.6	4.1	3.66	3.47	2.6
2011	1.6	3.9	3.56	3.28	2.5
2012	1.8	3.8	3.58	3.56	2.1
2013	1.9	4.2	3.85	3.73	2.1
2014	1.6	3.2	2.90	2.75	2.0
2015	1.4	2.8	2.48	2.42	2.1
Average	***1.7***	***4.1***	-	-	***2.4***

Table 10: Baseline Maximum Daily Demand

Water User Type	Baseline MDD (MGD)
Residential	3.25
Commercial	0.07
Public Service	0.08
Landscape (Treated Water)	0.03
Losses + Other	1.20
Total	4.65

Baseline Water Demand Factors

The 2015 UWMP baseline water demands have been adapted to develop user type based demand factors (DF). The baseline water demand factors are presented in Table 11 and are used to model the existing system. The baseline demands were developed by dividing the user demand by user type by the total area of corresponding user type.

Areas were determined by mapping the District's current list of connections (using APNs provided by the District) to the County's Land Use Map. Of the 3,755 connections provided by the District, 3,657 matched the County records. These 3,657 connections are used to model the extent of the existing system area and land use types. Figure 1 presents the existing system map.

Table 11. Baseline Demand Factors.

User Type	Baseline Area (Acre)	Baseline ADD (MGD)	Baseline ADD Demand Factor (gpm/Acre)	Baseline MDD (MGD)	Baseline MDD Demand Factor (gpm/Acre)
Residential	4217[1]	1.355	0.22	3.25	0.54
Commercial	72	0.029	0.29	0.07	0.69
Public Service	7	0.035	3.58	0.08	8.60
Landscape	4	0.014	2.41	0.03	5.78
Losses + Other	4299[2]	0.502	0.08	1.20	0.19
Total	***4299***	***1.94***	**-**	***4.65***	**-**

[1] Existing Residential area is the sum of low density, medium density, rural residential and transition residential parcels.
[2] Losses and Other demands applied evenly across the total area of the existing system.

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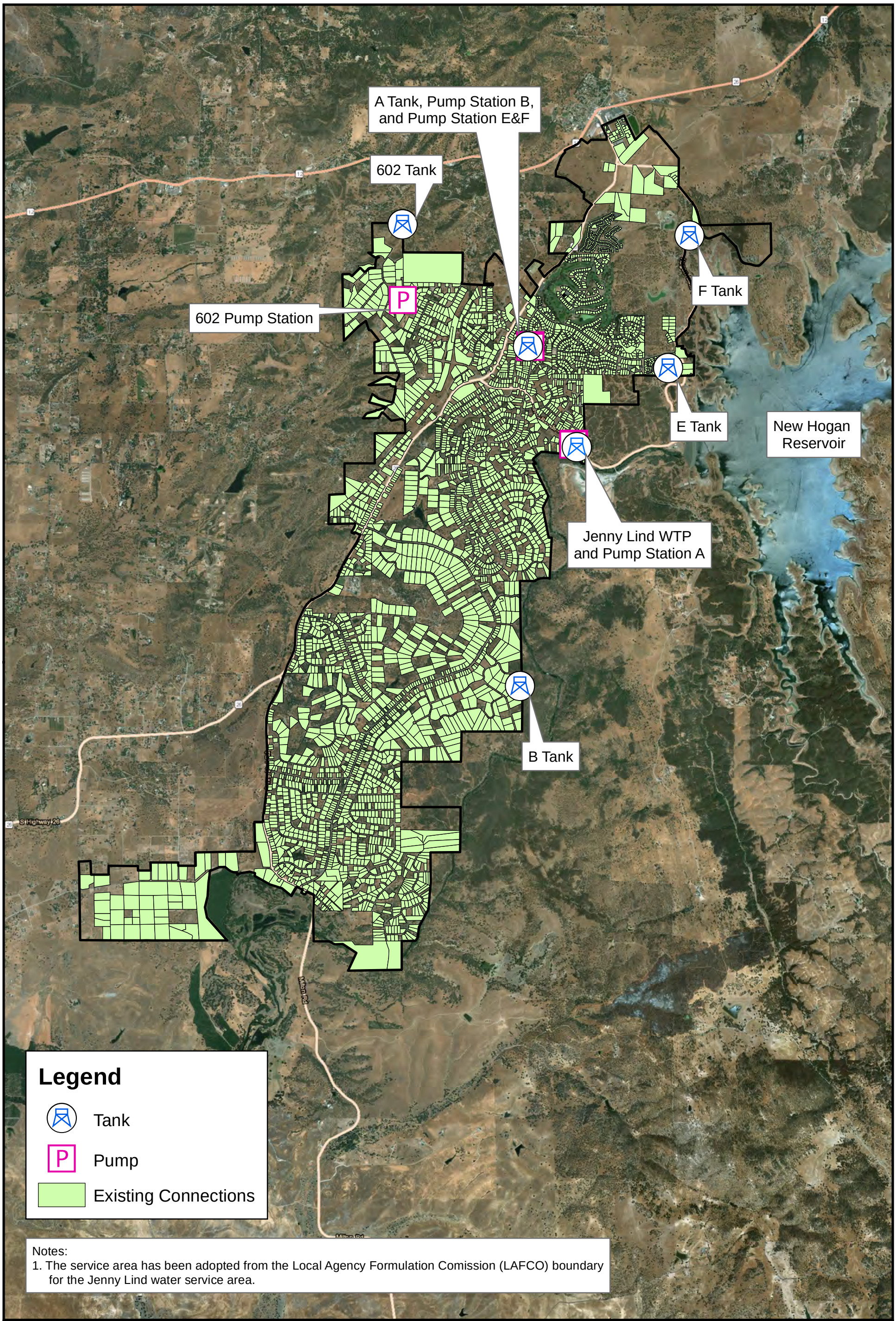

Notes:
1. The service area has been adopted from the Local Agency Formulation Comission (LAFCO) boundary for the Jenny Lind water service area.

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0 0.75 Miles

1" = 0.75 mi.

JENNY LIND WATER MASTER PLAN

EXISTING SYSTEM MAP

FIGURE 1

Demand Projections

Buildout water demands have been developed assuming complete infill of the Jenny Lind service area. The following subsections document the means and methods for assessing developments and demands.

Infill Growth

The Jenny Lind service area has not reached buildout and has considerable room to support future developments. Of the 8,068 acres within the service area, 6,805 acres are zoned for development with only 4,299 acres developed to date. This leaves approximately 2,250 acres available for future connections residential connections, and 256 acres available for future non-residential connections.

An estimated 6,533 residential connections are anticipated to fill the area zoned for residential development at buildout. The infill connections were determined through the combined effort of using planned/proposed developments provided by the District, estimating the number of parcels in unplanned areas, and estimating the number of new connections from existing parcel subdivisions.

The District identified 10 proposed/planned developments. These developments and the associated number of planned connections is presented in Table 12.

Table 12. Planned/Proposed Developments.

Development	Area (acre)	Planned/Proposed Infill Connections	Land Use Type
North Vista Plaza	28	156	Residential Low Density
Old Golden Oaks	116	96	Residential Low Density
Mission Ranch		219	Residential Low Density
Hogan Oaks I	41	122	Residential Low Density
Hogan Oaks II	40	122	Residential Low Density
Hogan Oaks III	27	29	Transition
Golden Creek Estate III	45	100	Residential Low Density
New Hogan Lakes	29	83	Residential Low Density
Del Verde	40	91	Residential Low Density
Spring Valley Springs	71	71	Residential Low Density
West Gate	7	45	Residential Low Density
Total	***444***	***1,134***	-

The unplanned areas are assumed to be developed at buildout based on the existing average parcel density size by zoned land use type. Table 13 summarizes the number of homes anticipated in unplanned areas.

Table 13. Unplanned Area Growth.

Land Use Type	Existing Parcel Density (parcels/acre)	Unplanned Area	Unplanned Infill Connections
Residential Low Density	2.61	80	208
Residential Medium Density	4.01	3	13
Transition Residential	0.14	454	65
Rural Residential	0.78	1,269	1,001
Total	-	1,806	1,287

Large parcels were assumed to be subdivided at buildout if the lot was three or more times greater than the average density. The number of infill connections associated with parcel subdivisions is presented in Table 14.

Table 14. Subdivision Infill Growth.

Land Use Type	Parcel Density (parcels/acre)	Subdivision Infill Connections
Residential Low Density	2.61	261
Residential Medium Density	4.01	5
Transition	0.14	1
Rural	0.78	233
Total	-	500

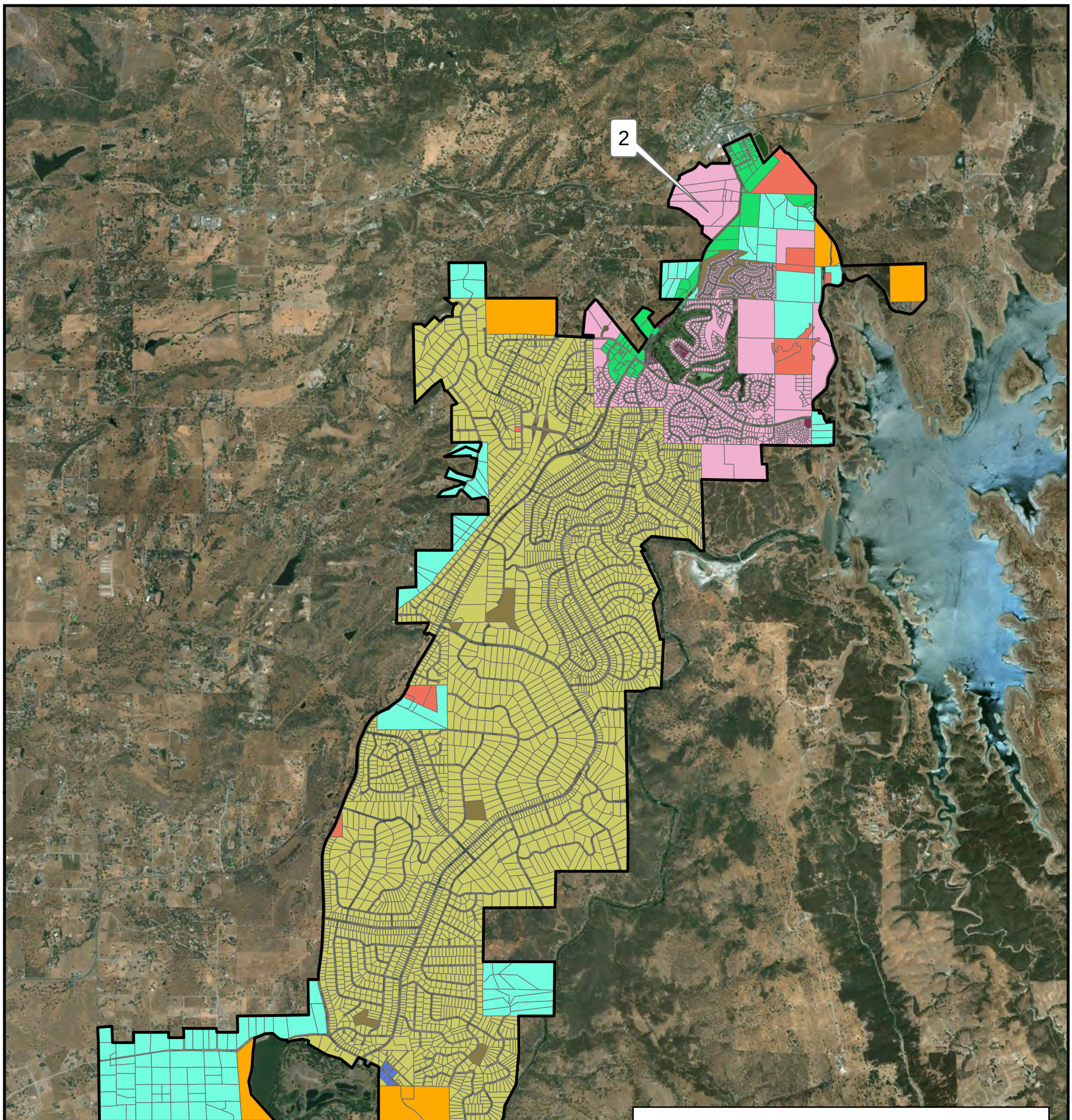
The service area is estimated to support 6,533 residential connections at buildout. The total number of connections is summarized in Table 15.

Table 15. Infill Growth Summary.

Infill	Residential Low Density	Residential Medium Density	Transition	Rural	Total
Existing Connections Modelled	901	29	81	2,601	3,657[1]
Planned/Proposed Connections	1,105	0	29	0	1,134
Unplanned/Undeveloped Connections	208	13	65	1,001	1,287
Subdivision Infill Connections	261	5	1	233	500
Total	***2,475***	***47***	***176***	***3,835***	***6,533***

Buildout Average Daily Demand and Buildout Maximum Daily Demand

Buildout water demands are used to model the future demands of the Jenny Lind service area assuming complete infill (see Figure 2). The buildout ADD and MDD demand factors are summarized in Table 16. The sources and rational for the demand factors are presented in detail below.



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JENNY LIND WATER MASTER PLAN

BUILDOUT CONNECTIONS AND LANDUSE DESIGNATIONS

FIGURE 2

Table 16: Buildout Average Daily and Maximum Daily Demand Factors

User Type	Buildout Area (Acre)	Buildout ADD (MGD)	Buildout ADD Demand Factor (gpm/Acre)	Buildout MDD[1] (MGD)	Buildout MDD Demand Factor (gpm/Acre)
Residential	6,466	2.22	0.24	5.34	0.57
Commercial	163	0.09	0.36	0.20	0.87
Public Service	100	0.04	0.26	0.09	0.62
Landscape	76	0.06	0.56	0.15	1.35
Losses + Other	6,805	0.84	0.09	2.02	0.21
Total	***6,805***	***3.25***	-	***7.80***	-

[1]The build ADD demand was scaled by max day peaking factor (2.4) to estimate the buildout MDD. The derivation of the max day peaking factor is described in *Baseline Maximum Daily Demand* subsection.

The average residential demand is estimated at 2.2 mgd based on the buildout population and a gallons per capita day (GPCD) demand of 141.2 for residential users. The residential GPCD was determined by evaluating demand per capita used in the recommended 2015 UWMP demand projections. The recommended demand approach in 2015 UWMP used a common demand per capita to project future demands. Table 17 presents the data used to derive the GPCD from the data presented in the 2015 UWMP.

The infill analysis presented in the previous section identified 6,533 potential residential connections at buildout. Utilizing the 2.41 capita per connection from the County's General Plan, the buildout population is estimated to be 15,745; therefore, the average buildout water demand for residential water users is approximately 2.2 mgd.

Table 17: Derivation of Residential GPCD

Year	Baseline	2020	2025	2030	2035	2040
Jenny Lind Population[1]	9,592	10,226	10,739	11,136	11,469	11,671
UWMP Single Family Demand[2] (AF/yr)	1,515	1,615	1,696	1,759	1,811	1,843
UWMP Multi Family Demand[2] (AF/yr)	3	3	3	3	3	3
UWMP Residential (AF/yr)	1,518	1,618	1,699	1,762	1,814	1,846
Residential Demand (AF/yr-person)	0.1583	0.1582	0.1582	0.1582	0.1582	0.1582
Mean Residential Demand (AF/person-yr)	0.1582					
Mean Residential-GPCD (gal/person-day)	141.2					

[1]2015 UWMP Table 3-4
[2]2015 UWMP Table E-3

The commercial, landscape, and public service buildout demand factors were adopted directly from Appendix F of the 2015 UWMP.

Losses at buildout were developed by deriving the percentage of water losses presented in the 2015 UWMP. Similar to the residential GPCD, losses are consistently 35 percent of the residential and non-residential (commercial, irrigation, and landscape) demands for all future demand projections. To be consistent with the 2015, this relationship was used to calculate the average daily loss demand at buildout. Table 18 presents demand data from the 2015 UWMP to support the water loss evaluation.

Table 18: Water Loss Evaluation (AF/yr)

Year	2015	2020	2025	2030	2035	2040
Single Family	1,515	1,615	1,696	1,759	1,811	1,843
Multi-Family	3	3	3	3	3	3
Commercial	33	35	36	38	39	40
Public Service	39	41	43	45	46	47
Landscape	16	17	18	19	19	19
Other	6	6	6	6	6	6
Losses	556	592	622	645	664	675
Total	2,168	2,309	2,424	2,515	2,588	2,633
Percent Losses (of Res. and Non. Res.)	35%	35%	35%	35%	35%	35%

Buildout Year

Buildout is anticipated to occur in year 2150 when the District population grows to 15,745 residents. The buildout year was determined based on the 2017 Department of Finance (DOF) population growth rates for Calaveras County. Growth rates are projected until year 2060 in five year increments. Projections beyond 2060 were assumed to equal the 2055-2060 growth rate. Table 19 presents the DOF population growth rates.

Table 19. 2017 DOF Growth Rates for Calaveras County.

Years	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050	2051-2055	2056-2060	2061 - 2150
Growth Rate	0.59%	2.17%	2.14%	1.53%	0.82%	0.46%	0.64%	1.28%	2.17%	2.17%
Population at End of Period	9,648	9,858	10,068	10,223	10,306	10,354	10,420	10,553	10,782	15,745
Number of Connections at End of Period	3777	3859	3941	4002	4035	4053	4079	4131	4221	6,533

Buildout Demand History

The buildout demand used in this WMP differs from the methods used for prior water master plans. Traditionally, water master plans will base buildout demands on the historical demand per connection observed over a period of record. Others will use a district standard which provides an added factor of safety. This WMP aligns the system demands with SB X7-7 20x2020 Water Conservation Plan presented in the 2015 UWMP. The selected method is expected to accurately represent the future demands given that the District is complying with SB X7-7 goals and that it will need to continue complying with these goals in order to remain eligible for State water grants and loans.

While the District is expected to remain in compliance with the 2015 UWMP, it is still important to understand alterative demand scenarios. Figure 3 compares the three alternative buildout demand scenarios. The “UWMP Approach” scenario presents the future demand based on the 2015 UWMP, which is used to model the buildout system. The “Historic Approach” scenario presents future demand based on the highest historical

ADD of 570 GPCD (see Table 8 for derivation of "Historic Approach" GPCD). The "2005Approach" scenario presents the future demand based on CCWD's design standard of 750 GPCD, which was used to model the buildout system in the 2005 WMP.

The comparison of demand approaches in buildout ADD is as follows: UWMP 497 GPCD, Historic 570 GPCD, 2005 750 GPCD. The recommended demand approach is consistent with long term conservation goals and represents a significant reduction in demands from the other approaches.

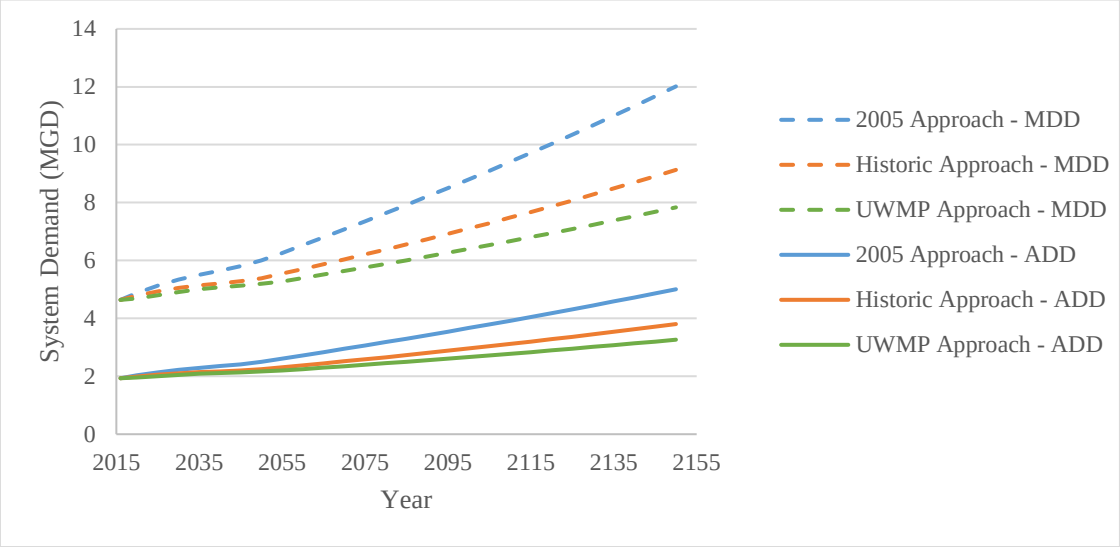

Figure 3: System Demand of Alternative Buildout Scenarios.

System Demand Allocation

The existing system is divided into pressure zones so that water can be delivered at acceptable pressures to customers at a range of elevations. Baseline and buildout demands were allocated throughout the model and summed to estimate the demand within each pressure zone. This process was repeated to estimate the demand by tank zone. Subtotals were calculated for the A Tank and B Tank zones, which serve lower pressure zones that have no storage of their own. The allocations of demands by pressure zone are shown in Table 20 and by tank zone in Table 21. Figure 4 presents a map of the system pressure zones.

Table 20. Baseline Demand by Pressure Zone.

Pressure Zone	Acres	Percent of Total Area	Baseline MDD (mgd)	Buildout MDD (mgd)
A1	1,764	21.9%	1.03	1.74
A2	74	0.9%	0.07	0.09
A3	1,112	13.8%	0.78	1.14
A4	132	1.6%	0.12	0.17
A5	707	8.8%	0.41	0.59
A6	303	3.8%	0.10	0.16
B1	896	11.1%	0.70	0.99
B2	383	4.7%	0.30	0.46
B3	494	6.1%	0.34	0.51
B4	60	0.7%	0.02	0.04

Pressure Zone	Acres	Percent of Total Area	Baseline MDD (mgd)	Buildout MDD (mgd)
B5	39	0.5%	0.02	0.03
E1 & F1	1,684	20.9%	0.52	1.60
602	420	5.2%	0.31	0.32
Total	***8,068***	***100 %***	***4.65***	***7.8***

[1] Demands by pressure zone are outputs from the model allocation and are subject to rounding error due to model precision.

Table 21. Baseline Demand by Tank Zone.

Tank Zone	Acres	Percent of Total Area	Baseline MDD (mgd)	Buildout MDD (mgd)
A Tank	8070	100.0 percent	4.65	7.8
B Tank	1,872	23.2 percent	1.37	2.0
E & F Tank	1,684	20.9 percent	0.52	1.6
602 Tank	420	5.2 percent	0.31	0.3

[1] Demands by pressure zone are outputs from the model allocation and are subject to rounding error due to model precision.

F Zone
Elevation Range: 596 - 793 ft
Pressure Range: 21 - 104 psi

Isolation valve not shown
isolates E Zone from A1 Zone

602 Zone
Elevation Range: 617 - 778 ft
Pressure Range: 27 -133 psi

E Zone
Elevation Range: 738 - 787 ft
Pressure Range: 16 - 38 psi

A1 Zone
Elevation Range: 356 -712 ft
Pressure Range: 17 -162 psi

B5 Zone
Elevation Range: 543 - 671 ft
Pressure Range: 51 - 107 psi

B4 Zone
Elevation Range: 706 - 727 ft
Pressure Range: 55 - 64 psi

Isolation valve not shown
isolates A1 Zone from A2 Zone

B1 Zone
Elevation Range: 513 - 747 ft
Pressure Range: 30 - 170 psi

A2 Zone
Elevation Range:382 - 427 ft
Pressure Range: 79 - 82 psi

A4 Zone
Elevation Range: 257 - 361 ft
Pressure Range: 62 - 107 psi

B3 Zone
Elevation Range: 419 - 690 ft
Pressure Range: 73 - 159 psi

A3 Zone
Elevation Range: 299 - 575 ft
Pressure Range: 17 - 166 psi

A6 Zone
Elevation Range: 298 - 414 ft
Pressure Range: 47 - 132 psi

A5 Zone
Elevation Range: 216 - 306 ft
Pressure Range: 55 - 112 psi

Legend

Tank

Status

Active

Isolation

602

A1

A2

A3

A4

A5

A6

B1

B2

B3

B4

B5

E

F

Notes:
1. Isolation valves shown are PRVs that have been closed by the district due to water quality concerns.

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N

0 0.75 Miles

1" = 0.75mi

2017 Jenny Lind Water Master Plan

System Pressure Zones

FIGURE 4

Existing and Future Regulations

Drinking Water Regulations

The quality of the water provided by existing and any future facilities must meet all existing and proposed regulatory requirements. A summary of the existing and proposed drinking water quality regulations covering surface water and groundwater sources is below.

Background

The Safe Drinking Water Act (SDWA) of 1974 gave the United States Environmental Protection Agency (EPA) the authority to set standards for contaminants in drinking water supplies. The EPA established primary regulations for the control of contaminants that affect public health and secondary regulations for compounds that affect the taste, odor or aesthetics of drinking water. Under the provisions of the SDWA, the California Department of Drinking Water (DDW) has the primary enforcement responsibility. Title 22 of the California Administrative Code establishes DDW authority and stipulates State drinking water quality and monitoring standards.

Existing and Proposed Federal Regulations

The EPA has recently finalized and is in the process of finalizing several new regulations since the 1986 and 1996 Amendments to the SDWA. These regulations address both surface water and groundwater. Significant final and proposed regulations are shown in Table 22. The schedule for promulgation of the Safe Water Drinking Act Regulations (Current as of 2015) is shown in Table 23.

Table 22. Recently Adopted and Proposed Federal Regulations.

Regulations	Year Rule Finalized	Targeted Contaminants
National Interim Primary Drinking Water Regulations	1975	Set maximum levels for a wide variety of contaminants
Total Trihalomethanes	1979	Trihalomethanes
Fluoride Rule	1986	Fluoride limits
Surface Water Treatment Rule	1989	Giardia lamblia, viruses, Legionella and heterotrophic plate count
Total Coliform Rule	1989	Representative sampling of the distribution system for total and fecal coliform
Phase II Rule (organics)	1991	VOCs, SOCs and IOCs
Lead and Copper Rule	1991	Lead and copper corrosion products
Phase V Rule (organics)	1992	VOCs, SOCs and IOCs
Source Water Protection	1997	Delineate boundaries and determine origins and susceptibility of water supplies to contamination
Stage 1 Disinfection/Disinfection By-products Rule (D/DBPR)	1998	Disinfection Byproducts (THMs and HAAs); compliance date for systems serving greater than 10,000 was January 2002
Interim Enhanced Surface Water Treatment Rule (IESWTR)	1998	Giardia, Cryptosporidium, Turbidity, DBPR profiling
Variance and Exemptions Rule	1998	Variance and exceptions to help public water systems achieve compliance with MCLs
Arsenic Rule	2001	Arsenic
Filter Backwash Rule	2001	Filter backwash recycle
Long-term 1 Enhanced Surface Water Treatment Rule	2002	Microbiological, Turbidity and control of DBPs
Public Health Security and Bioterrorism Prevention and Response Act	2002	Vulnerability Assessments
Radon Rule	2004	Radon
Contaminant Candidate List 2	2004	CCL1 required no new regulated contaminants, CCL2 may include perchlorate, metolachor and MTBE
Stage 2 Disinfectants/Disinfection Byproducts Rule	2004	Introduces locational running annual average compliance for the 80/60 TTHM/HAA5 requirements
Long-term 2 Enhanced Surface Water Treatment Rule	2006	Introduction of microbial toolbox for control of Cryptosporidium
Groundwater Rule	2004	Microbial protection of groundwater supplies
Reduction of Lead in Drinking Water Act (RLDWA)	2011	Use of lead free pipes, fittings, fixtures, solder and flux for drinking water
Revised Total Coliform Rule	2014	E Coli and Total Coliforms
Drinking Water Protection Act (DWPA)	2015	Algal Toxins[1]

[1] The DWPA is an amendment to the SWDA. It requires Congress to develop a strategic plan to assess and manage the risks associated with algal toxins in public drinking water supplies. No new regulations were imposed with the amendment to the SWDA.

Table 23. Schedule for Promulgation of Safe Water Drinking Act Regulations (Current as of 2015).

Regulation	Proposed	Final	Effective
Fluoride	11/85	4/86	10/87
Trihalomethanes	2/78	11/79	11/83
8 VOCs (Phase I)	11/85	7/87	1/89
Surface Water Treatment Rule (SWTR)	11/87	6/89	6/93
Coliform Rule	11/87	6/89	12/90
Lead and Copper	8/88	6/91	1/92[1]
Minor Revisions to Lead and Copper	4/98	1/00	1/01
26 Synthetic Contaminants[8], Seven Inorganic Contaminants (Phase II)	5/89	1/91[2]	7/92
MCLs for barium, pentachlorophenol (Phase II)	1/91	7/91	1/93
Phase V Organics, Inorganics	7/90	7/92	1/94
Radionuclides (Phase III) Except Radon	4/00	12/00	12/03
Radionuclides (Phase III) Radon	11/99	8/01[3]	8/04[4]
Sulfate	12/94	Decision on whether to regulate due 8/01	
MCLs for aldicarb, aldicarb sulfoxide, aldicarb sulfone	Administrative hold; no current schedule available		
Disinfectants/Disinfection Byproducts, Stage 1 DBPR	7/94	12/98[3]	1/02[6,7]
Disinfectants/Disinfection Byproducts, Stage 2 DBPR	9/01	5/02	5/05
Information Collection Rule	2/94	5/96	Completed
Interim ESWTR	7/94	12/98[3]	1/02[6]
Interim ESWTR, Stage 1 Long Term Enhanced SWTR	4/00	8/01	1/04
Interim ESWTR, Stage 2 Long Term Enhanced SWTR	9/01	5/02	5/05
Filter Backwash Recycle Rule	4/00	6/01	12/0[3]
Consumer Confidence Reports Rule	2/98	8/98	9/98
Ground Water Rule (GWR)	5/00	11/01	6/04
Operator Certification, State Guidance	3/98	2/99	2/01
Unregulated Contaminants, Monitoring Only[9]	2/99	9/99	1/01
Five New Drinking Water Contaminants	8/00	8/01	8/04
Chlorine Gas as Restricted Use	9/00	10/01	10/03
Source Water Protection Program, Guidance[5]	8/97	Completed	Completed
Arsenic Rule	6/00	1/01	1/06
Revised Total Coliform Rule	-	4/14	4/16

Notes:

[1] Start date for tap monitoring in systems of more than 50,000 consumers.
[2] Maximum Contaminant Level (MCL), MCL + Goal (MCLG) for atrazine to be reconsidered.
[3] Dates mandated by district court
[4] Assumes regulation in effect three years after final promulgation.
[5] Program required as part of 1996 amendment.
[6] For Public Water Systems (PWS) serving more than 10,000 consumers
[7] Effective January 2004 for PWS serving more than 10,000 consumers.
[8] MCL for atrazine to be revisited.
[9] Tiered monitoring approach pending availability of analytical methods.

State Regulations

The State of California retains primacy for enforcement of drinking water regulations. In this role, the state must adopt regulations equal to or more stringent than federal regulations. For the most part, state regulations are equal to federal regulations with the following exceptions:

- Cryptosporidium Action Plan - The State set additional more stringent standards for the recycle of filter backwash and other recycle streams.
- California IESWTR - The State has increased the required level of monitoring for filters and may require additional inspections, monitoring and reporting.
- Source Water Assessment - The State has structured its SWAP program to allow water utilities to conduct their own assessments to help improve and preserve water quality of the public water supply sources.

Disinfection By-Products

Starting on January 1, 2004, trihalomethane (TTHM) and haloacetic acids (HAA5) monitoring and compliance is required under the Federal Environmental Protection Agency (EPA) regulations for systems with service populations of 500 to 9,999 that use treated surface water supplies.

There are four monitoring points for disinfection byproducts (DBPs) within the Jenny Lind WTP distribution system. Monitoring records indicate that total TTHM (Figure 5) and HAA5 (Figure 6) levels have increased since September 2014. When DBPs are observed at levels close to or above their respective maximum contaminant level (MCL), they can be minimized by periodically flushing fire hydrants to reduce the water age. Minimizing the water age reduces the time for DBPs to form, thus keeping levels low. While flushing fire hydrants may be appropriate during normal conditions, it is not appropriate during drought conditions.

Recent samples have measured DBPs above the 80 parts per billion (ppb) (TTHM) and 60 ppb (HAA5) MCLs. No violations have occurred as the quarterly average has remained below the MCL, however, the data shows a trend of increasing levels. The new pretreatment system at the WTP is expected to lower the DBP levels. No added treatment is expected to be necessary to remain in compliance with DBP requirements.

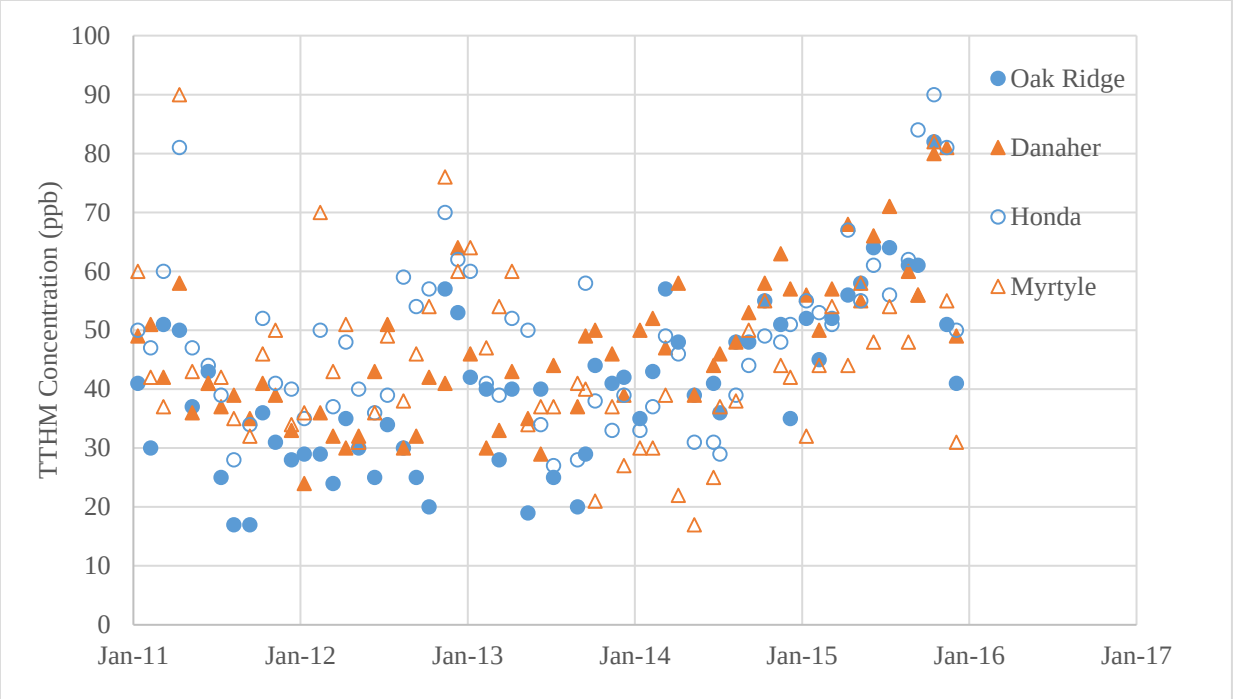


Figure 5. TTHM Concentrations (MCL 80 ppb).

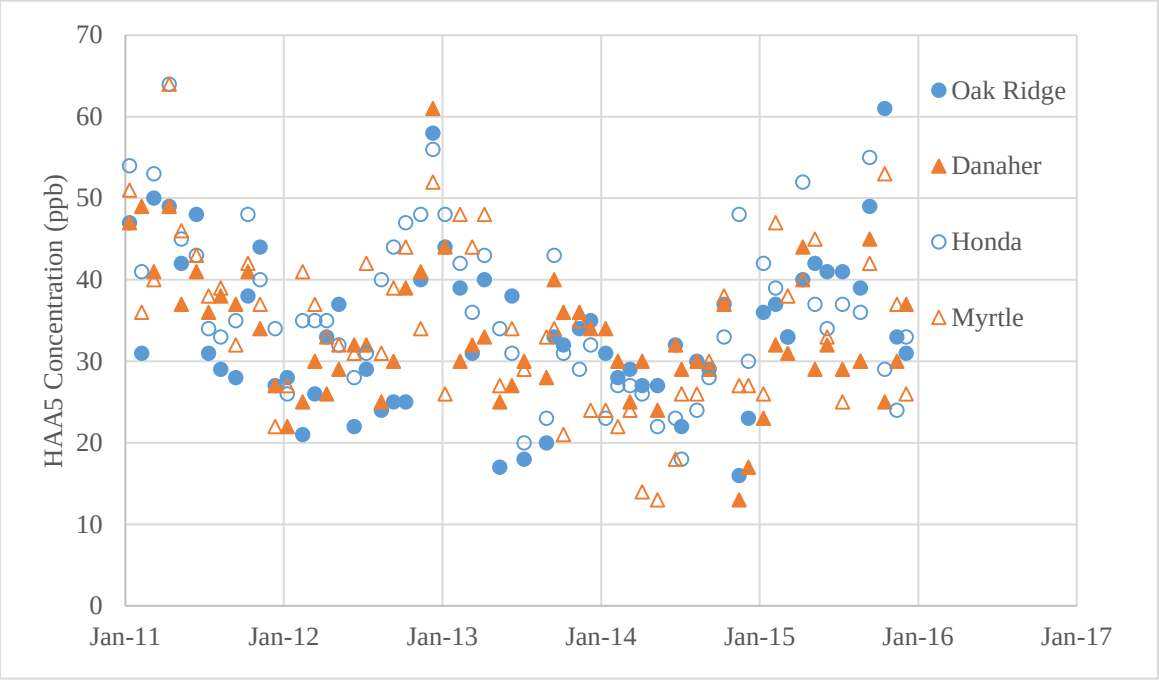
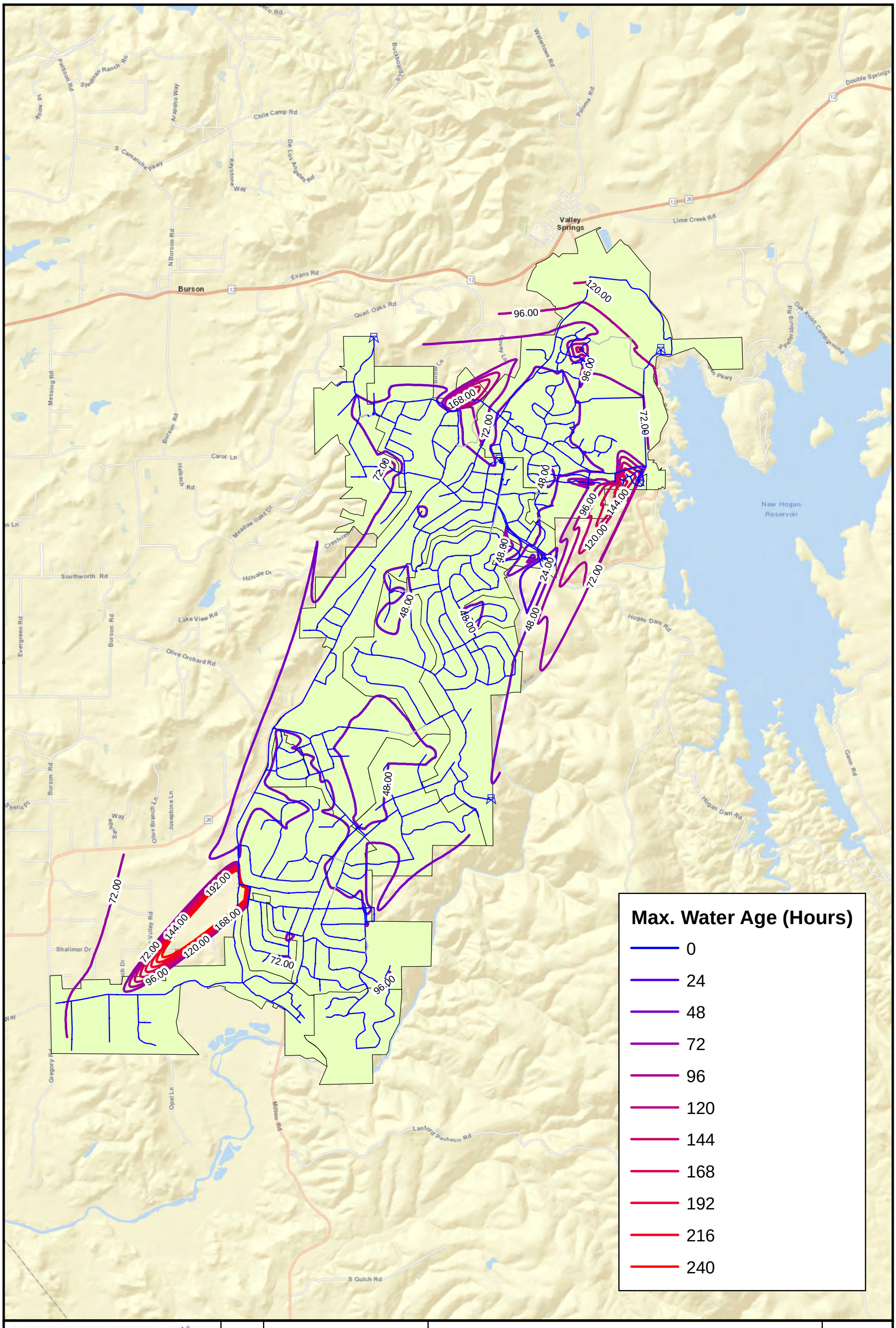


Figure 6. HAA5 Concentrations (MCL 60 ppb).

Water Age

An extended period simulation water age analysis has been performed on the existing distribution and storage system under average day demands. The WTP is not detailed in the hydraulic model so water coming from the clearwell is considered "new" water (i.e., zero hours old). The hydraulic model water age analysis then calculates the age of the water after leaving the WTP (clearwell). Pump controls were added to the model as provided by the WTP operator, indicating at what tank levels pumps cycle on or off.

Based on the analysis, water is oldest in the 602/A-1 Tank Zones and nodes in the E&F Zone with zero existing demands. Figure 7 shows the range of values of water age, in hours, throughout the distribution system. 602 Zone is known to have existing water quality issues due to water age.



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0 0.75 Miles

1" = 0.75 mi.

Jenny Lind Water Master Plan

System Water Age
Baseline ADD

FIGURE

7

System Evaluation

The Jenny Lind water system was evaluated to identify deficiencies in meeting current District standards. The infrastructure for raw water supply, water treatment, storage, and distribution were evaluated using District and other criteria.

Treated Water Storage and Distribution

Evaluation Criteria

The Jenny Lind water system will be evaluated for its ability to meet existing and future water demands and to comply with the District's Design and Construction Standards. Two different scenarios will be analyzed as part of the 2017 WMP:

1. Existing System
2. Future System at Build-out

The system will be divided into five categories for this evaluation: water supply, water treatment, storage, pumping, and piping. The district provided a system-wide hydraulic model that was updated in 2013 to analyze the system's distribution facilities, including storage, pumping, and piping. The system model has been updated to capture new demand criteria and any new or replacement water mains installed since the last model update. A comprehensive list of model programming is included as Appendix B.

A summary of the system evaluation planning criteria is presented below.

System Model Criteria:

- Baseline Demand (ADD) = 1.94 MGD
- Buildout Demand (ADD) = 3.25 MGD
- MDD Factor = 2.4
- PHD Factor = 1.5

Water Treatment Design Criteria:

- Treatment Plant Capacity: Hydraulic and treatment capacity sized to meet MDD.

Water Storage Design Criteria[1]:

- Storage tank sizing shall be equal to the sum of the following three components:
  - Fire Storage Reservation: A minimum of four hours times the appropriate fire flow demand (presented in Table 24 below).
  - System Peaking Storage: Equal to 20 percent of the maximum day flow.
  - Emergency Storage: Equal to four hours of the MDD.
- Fire Storage may be supplemented by pumps.

Water Pumping Criteria[2]:

- Pump stations shall be able to deliver the MDD with the largest pump out of service. Peak hour demands and fire flows are expected to be supplied by storage without additional pumping. If the uphill zone does not have adequate storage for fire flow,

[1] Per the Construction and Design Standards (January 2009)
[2] Per the Jenny Lind Water System Master Plan (June 2005)

the booster pump station should have the ability to deliver the fire flow to the higher zone.

Existing System Piping System Design Criteria[1]*:*

- Transmission Lines: Hydraulic capacity sized to pass PHD at a maximum velocity of five feet per second (ft/s) and/or MDD plus fire demand, while maintaining 20 psi residual pressure in the system.
- Hazen Williams "C" Factor: Pipes shall use a "C" factor of 130 for new pipe and 110 for existing pipe.
- Fire Flow Requirements[5]: A maximum velocity of 12 ft/s shall apply to fire flow conditions and the minimum velocity shall be two ft/s. The existing Jenny Lind Fire District minimum fire flow requirements are listed in Table 24.
- System Pressure:
  - System shall maintain a minimum pressure of 40 psi under PHD.
  - System shall maintain a maximum pressure of 120 psi under static conditions.

Table 24. Fire Flow Requirements[2].

Development	Required Fire Flow (gpm)
Residential Districts and/or Individual Dwellings < 3,600 Sq. Ft.[2,4]	1,000
Commercial/Industrial Districts and/or Individual Dwellings > 3,600 Sq. Ft.[2,4]	1,500
Undeveloped Commercial/Industrial Districts	1,500

Raw Water Supply

The existing facilities and infrastructure used by the District to collect raw water have been evaluated for ability to convey the existing and projected demand discussed previously.

Calaveras River Intake and Pump Station

The raw water supply to the Jenny Lind WTP is located on the Calaveras River just down stream of the New Hogan Reservoir. The New Hogan Reservoir provides year round raw water storage for Jenny Lind Community. The New Hogan Reservoir has a capacity of 325,000 acre-feet; however, the Army Corps of Engineers limits the maximum storage volume to 250,000 acre-feet.

During dry years, the minimum delivery quantity or Safe Yield under the current rights is 8,437 acre-feet per year. During 2014-2015 drought period, the New Hogan Reservoir approached "minimum pool", or about 15,000 acre-feet of storage (See Figure 8). While there were water quality issues, there was still adequate water supply available during

[1] Per the Construction and Design Standards (January 2009)
[2] Residential homes within the service area were surveyed and no homes greater than 3,600 Sq. Ft. were identified the exception of multi-family units.
[3] All commercial and industrial land uses have been assumed to be greater than 3,600 Sq. Ft.
[4] Per Central Calaveras Fire – Building Requirements (April 2010)
[5] Existing piping is not required to be replaced immediately to meet fire flow demands. As existing piping is replaced, new piping will be constructed to meet buildout demands.

this highly unusual event to meet demands which are currently about 1,600 acre-feet for potable water users including losses and about 1,500 acre-feet for agricultural uses. The combined demand of approximately 3,100 acre-feet is far less than the available Safe Yield under current water rights.

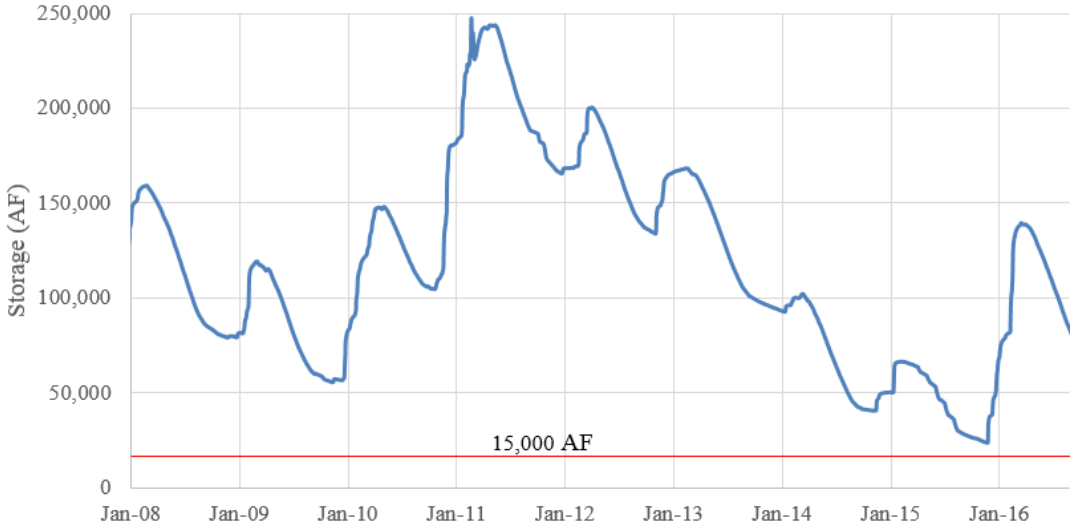


Figure 8. Historic Storage Data for New Hogan Reservoir.

At buildout the potable water demands are expected to increase to approximately 3,152 acre-feet per year, leaving approximately 5,285 acre-feet available to agricultural users before the Safe Yield threshold is exceeded. According the District's 2015 UWMP, agricultural uses are anticipated to reach 4,267 acre-feet by 2040. If agriculture demands continue to increase beyond the 2040 estimate, the District is at risk of exceeding the Safe Yield threshold. The District should anticipate the need to obtain additional water rights or limit agricultural development in the future. The District should begin taking measures to procure additional water rights when the total demand exceeds 6,750 acre-feet per year (80% of the current Safe Yield).

The raw water intake and pump station is currently sized to pump up to six mgd of raw water to the treatment plant. Plans to expand the raw water intake and pump station should begin when the MDD becomes 95 percent of the raw water pumping capacity (5.7 mgd). Based on the DOF growth rates (Table 19), the MDD is expected to reach 5.7 mgd in 2077 or when the number of connections in the District is approximately 4,681.

The capacity of the pump station will need to provide approximately 8 mgd to support the 7.8 mgd buildout demand if the existing raw water pump station is to support the entire systems raw water supply. Pursuit of expanding the capacity of the existing pump station or constructing a secondary one will depend on location of future water treatment facilities.

Water Treatment

The Jenny Lind WTP was last upgraded in 2008 and has an ultimate capacity of six mgd. For consideration of treated water availability, this master plan uses 92.5 percent of the ultimate capacity of the WTP to account for water losses, including during backwash events. This equates to a firm capacity of approximately 5.55 mgd for planning purposes.

The existing MDD is approximately 4.65 mgd. The MDD projected at buildout is approximately 7.80 mgd.

Plans to expand the treatment capacity of the system should begin when the MDD becomes 95 percent of the WTP's firm capacity (5.25 mgd). Based on the DOF growth rates (Table 19), the MDD is expected to reach 5.25 mgd in 2057 or when the number of connections in the District is approximately 4,284. There is no need to expand the WTP capacity within the next 15 years; therefore, expansion of the treatment capacity has not been included in the CIP.

Plans for expanding the treatment capacity of the system need to consider the space availability for future expansion. The Jenny Lind WTP is currently built-out and has no space available on site for future growth. A new site will need to be selected. Based on the pressure zone demands, the new site should be selected to directly serve Zones E & F or Zone B.

The firm capacity evaluation assumes that the Jenny Lind WTP operates on a 24-hour per day cycle. The WTP is currently only operated part of the day. Operations will need to be adjusted in the future to allow the facility to keep up with demand.

Treated Water Storage Evaluation

The tank capacity in each zone was compared to the required storage based on the water storage design criteria and the fire flow criteria. Evaluations are presented for baseline demands and buildout demands in Table 25 and Table 26 respectively.

Table 25. Evaluation of Available Storage under Baseline Demand Scenario.

Criteria	A Tank	B Tank	E & F Tank	602 Tank
Tank capacity (gallons)	2,000,000	1,000,000	1,500,000	150,000
Highest FF requirement in zone (gpm)	1,500	1,000	1,500	1,000
Required FF storage (gallons)	360,000	240,000	240,000	144,000[2]
Baseline MDD (mgd)	4.65	1.37	0.52	0.31
Required emergency storage (gallons)	420,500[1]	228,800	87,200	52,000
Required operational storage (gallons)	930,000	274,600	104,700	62,300
Total required storage (gallons)	1,710,200	743,400	551,900	258,300
Storage deficit (gallons)	-	-	-	108,300[3]

[1] Only required to support emergency storage volume needed to serve downhill zones served by A Tank.

[2] A portion of the 240,000 gallon fire flow storage requirement is supplemented by the 602 Pump Station.

[3] Due to water quality concerns associated with water age in the 602 Tank Zone, fire flow storage cannot be provided in addition to emergency and operational storage requirements.

[4] Total Required Storage = Required FF storage (4 hours) + Emergency storage (4 hours of MDD) + Operational storage (20 percent of MDD)

Table 26. Evaluation of Available Storage at Buildout without Improvements.

Criteria	A Tank	B Tank	E & F Tank	602 Tank
Tank capacity (gallons)	2,000,000	1,000,000	1,500,000	150,000
Highest FF requirement in zone (gpm)	1,500	1,000	1,500	1,000
Required FF storage (gallons)	360,000	240,000	360,000	144,000[2]
Buildout MDD (mgd)	7.80	2.02	1.60	0.32
Required emergency storage (gallons)	631,300[1]	337,500	267,200	53,300
Required operational storage (gallons)	1,568,100	405,000	320,600	64,000

Criteria	A Tank	B Tank	E & F Tank	602 Tank
Total required storage (gallons)	2,559,400	982,500	947,800	261,300
Storage deficit (gallons)	559,400	-	-	111,300

[1] Only required to support emergency storage volume needed to serve downhill zones served by A Tank.

[2] A portion of the 240,000 gallon fire flow storage requirement is supplemented by the 602 Pump Station.

[3] Total Required Storage = Required FF storage (4 hours) + Emergency storage (4 hours of MDD) + Operational storage (20 percent of MDD)

A Tank distributes water to the entire system which requires A Tank to support the operational storage demand for the entire system. A Tank is only required to support an emergency storage volume to serve the downhill zones served by A Tank (Zones A1-A6). A Tank has been identified as having storage deficiencies at buildout and will require an additional 559,400 gallons of storage to meet the design criteria. The total required storage is expected to exceed the capacity of A Tank (2.0 mgd) when the system reaches 4,695 connections in year 2078.

The storage capacity of 602 Tank is insufficient to meet the storage requirements under baseline and buildout conditions. Due to water quality concerns associated with water age in Zone 602, additional fire flow is not recommended in addition to emergency and operation storage requirements. In order to sustain water quality in this zone, fire flow pumps are recommended as an alternative to fire flow storage.

Adding a 1,000 gpm fire flow pump at buildout will address the fire flow requirement, thereby eliminating any storage deficiency at buildout. Given that the demand of Zone 602 is projected to increase by only 0.01 mgd upon buildout, the conditions of the 602 Zone are not expected to worsen within the planning horizon of this study. Timing for adding the additional fire flow pump the 602 Pump Station is at the District's discretion.

Tanks B, E & F are all expected to be large enough to support their respective zones. Other than regular maintenance, no improvements are expected for these tanks.

Treated Water Pumping Evaluation

Each booster pumping station should have a firm capacity equal to the zones MDD given that each zone is supported by at least one tank. Firm capacity assumes the largest pump is out of service. In addition, if the uphill zone does not have adequate storage for fire flow, the booster pumping station should have the ability to deliver fire flow to the higher zone. The MDD for each pumping zone are presented in Table 27.

Table 27. Evaluation of Treated Water Pumping.

Pump Station	Distribution	Pump ID	Design Flow (gpm)	Firm Capacity (gpm)	Baseline MDD (gpm)	Buildout MDD (gpm)
Pump Station A	Clearwell to A Tank	Pump 8	2,082	3,470	3,285	5,440[2]
		Pump 7	2,082			
		Pump 6	1,388			
Pump Station B	A Tank to Zone B	Pump 5	600	1,200	950	1,410
		Pump 4	600			
		Pump 3[1]	600			

Pump Station	Distribution	Pump ID	Design Flow (gpm)	Firm Capacity (gpm)	Baseline MDD (gpm)	Buildout MDD (gpm)
Pump Station E & F	A Tank to Zones E & F	Pump 3[1]	820	1,654	360	1,110
		Pump 2	834			
		Pump 1	834			
Pump Station 602	Zone A to Zone 602	Pump 135	200	200	215	220
		Pump 136	200			

[1] Pump 3 is a swing pump and operates as a backup for Zone B and Zones E & F.
[2] Buildout MDD assumes that Pump Station A continues to be the only treated water supply.

The pumping evaluation identified a baseline deficiency at Pump Station 602 and buildout deficiencies at Pump Station A & B.

No immediate improvements are recommended to Pump Station 602 despite the deficiency. While this analysis identified a deficiency, the District has reported no problems serving the existing system demands. Furthermore, the demand of Zone 602 is only expected to increase by 5 gpm upon buildout. The existing Zone 602 Pump Station is expected to be capable of continuing to serve the Zone 602 demands. Improvements can be deferred until the end of the useful life of the existing pumps or upon an increase in the Zone 602 demand.

The firm capacity of Pump Station B is inadequate to serve the 1,410 gpm MDD at buildout. Based on the growth rates presented in Table 19, the pump station will require an upgrade when the system expands to 5,265 connections in year 2108.

The firm capacity of Pump Station A is inadequate to serve the 5,440 gpm MDD at buildout if the system is to continue delivering all water from the Jenny Lind facility. Based on the growth rates presented in Table 19, the pump station will require an upgrade when the system expands to 3,993 connections in year 2042. However, upgrades to Pump Station A will depend on whether the District pursues an expansion of the Jenny Lind facility, which is not recommended. The District will need to construct a new pump station to deliver water from future water treatment facilities when the system demand exceeds the capacity of the existing WTP.

Treated Water Pipeline Evaluation

The InfoWater hydraulic model was used to evaluate the distribution system. Several model scenarios were developed to identify low system pressure areas, high system pressure areas and fire flow deficient nodes.

Low System Pressure Areas

The first set of model scenarios was created to represent baseline PHD. Under PHD, several areas do not maintain a minimum pressure of 40 psi. These problems are typically not due to excessive head loss, but are caused by inadequate elevation difference between storage tanks and the areas served. These problems can be addressed by adjusting pressure zone boundaries, adding a hydropneumatic pressure system, or providing individual booster pumps to homes or developments. The nodes identified as low

pressure are presented in Figure 9 and summarized in Table 28. With the exception of some of the nodes served by A Tank and the nodes in the vicinity of the old Tank C, all of the low pressure nodes are within the vicinity of their respective water tank supply and should be supplied by booster pumps or hydropneumatic tanks if they are not already.

Table 28. Low Pressure Deficiencies under Baseline PHD.

Area	Model Node IDs	Comments
A1 Zone	J16, J18, J86, J94, J111[1], J403, J404, J405, J414, J416, J423, J426, J427, J428, J429, J431, J433, J435, J439, J1120, J1125, J1126, J1128, J1129, J1033, J1034, J1035, J1040, J1050, J1041, J1043, J1044, J1048, J1053, J1054, J1056, J1057, J1064, J1129, J1133, J1148, J2034	Nodes J431, J439, J1148, J416, and J414 are in the immediate vicinity of A Tank, these nodes do not serve any connections and are not an issue.
E&F Zone	J714, J1147, J723 J1146, J1134, J730	Nodes J730 and J1134 are in the immediate vicinity of E and F Tank respectively.
602 Zone	J801, J802 J1131, J5002	Nodes served by 602 Tank
Vicinity of WTP Clearwell	J123, J125, J127	No demands served from these nodes.
B2 Zone	J4002	PRV is set to 36 psi
A3 Zone	J22, J24, J26, J28, J72, J80, J82 J402, J601, J608, J2010, J2019, J2024, J2025, J2034, J2037, J2039, 9997,	J80, J82, J440, J510, J512, and J514 are all located at the old C Tank Site. Node J608 is the location of the old D Tank Site
[1] Node distributes water to B Pump Station and E/F Pump Station. [2] Node ID locations are mapped in the System Map Book (See Appendix A)		

The nodes in the hydraulic model were marked in the model with an "LP" designation, for low pressure, to indicate that low pressures at these nodes are due to insufficient static head.

High System Pressure Areas

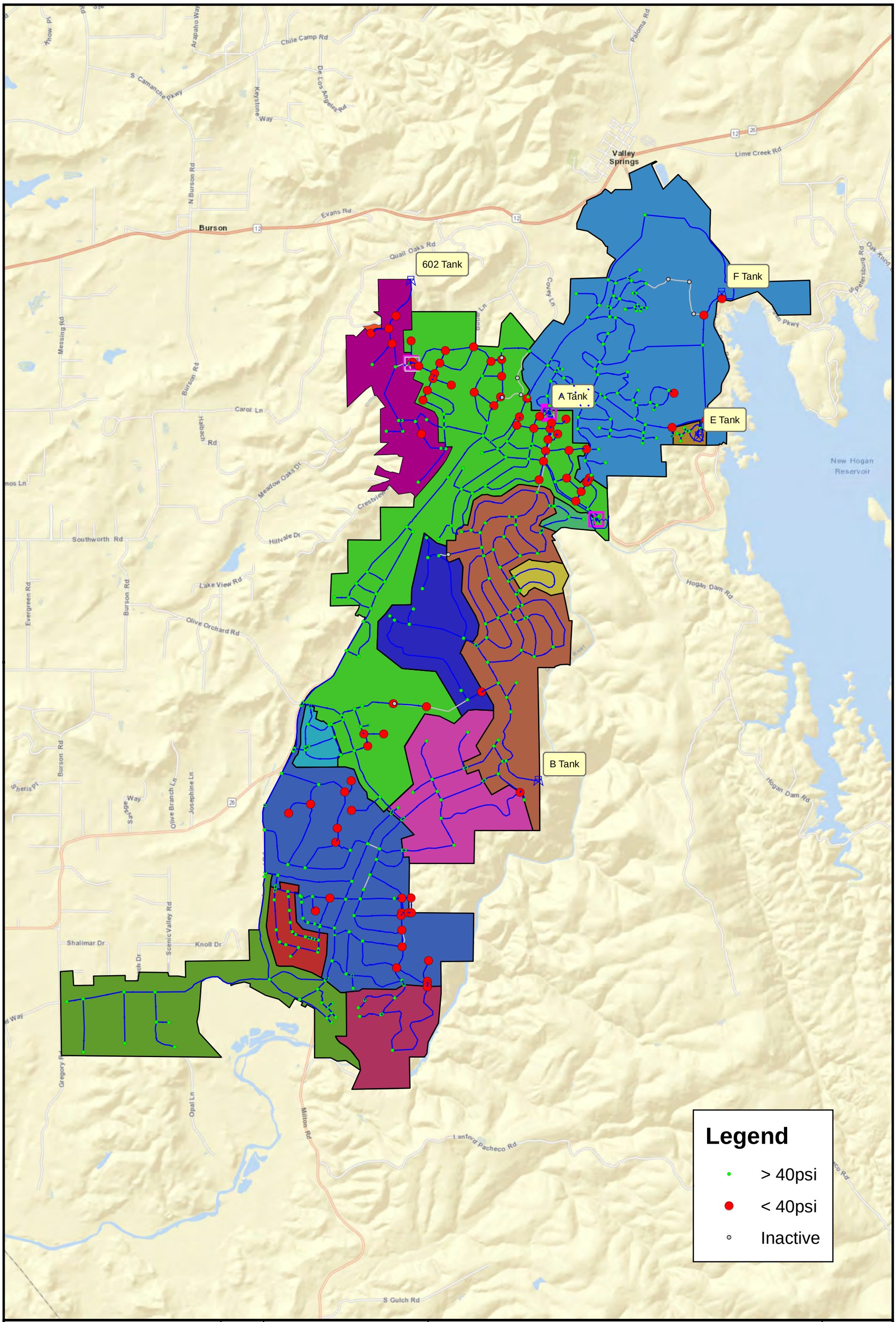
Areas of high system pressure were identified using the baseline ADD scenario. Areas where the system pressure exceeds 120 psi are considered high pressure areas according to the Districts design standards. Some high pressure areas cannot be avoided due to the ranging elevations within individual pressure zones. Zones A1 and B1 have the highest susceptibility to high pressure due to pockets of low elevations along pipe mains. Figure 10 presents a map of the areas under high pressure. The District is aware of these high pressure issues and equips all new connections with a PRV.

High Velocity Pipelines

High velocity pipelines were identified using the baseline PHD scenario. Pipelines conveying water at a rate exceeding 5 ft/s do not comply with the existing District standard and were flagged. The majority of deficiencies occur in Zone A1, but the most alarming is the AB Transmission Main deficiency. Recommendations for addressing these deficiencies are discussed in detail in the following sections. Figure 11 presents a map of the pipeline deficiencies.

Fire Flow Deficiencies

The model was used to calculate the available MDD plus fire flow for the baseline conditions. Nodes throughout the system were programmed to support either a 1,000 gpm fire flow, or a 1,500 gpm fire flow depending on the user type. All nodes within 300 feet of medium residential, commercial, industrial, or community center parcels were assigned a 1,500 gpm fire flow. All other nodes were assigned 1,000 gpm. Approximately three-quarters of nodes are able to deliver 1,000 gpm fire flow demands. The other quarter of nodes have some deficiency, ranging from marginally to severely deficient. Zero nodes serving 1,500 gpm fire flow demands were identified as deficient.



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N

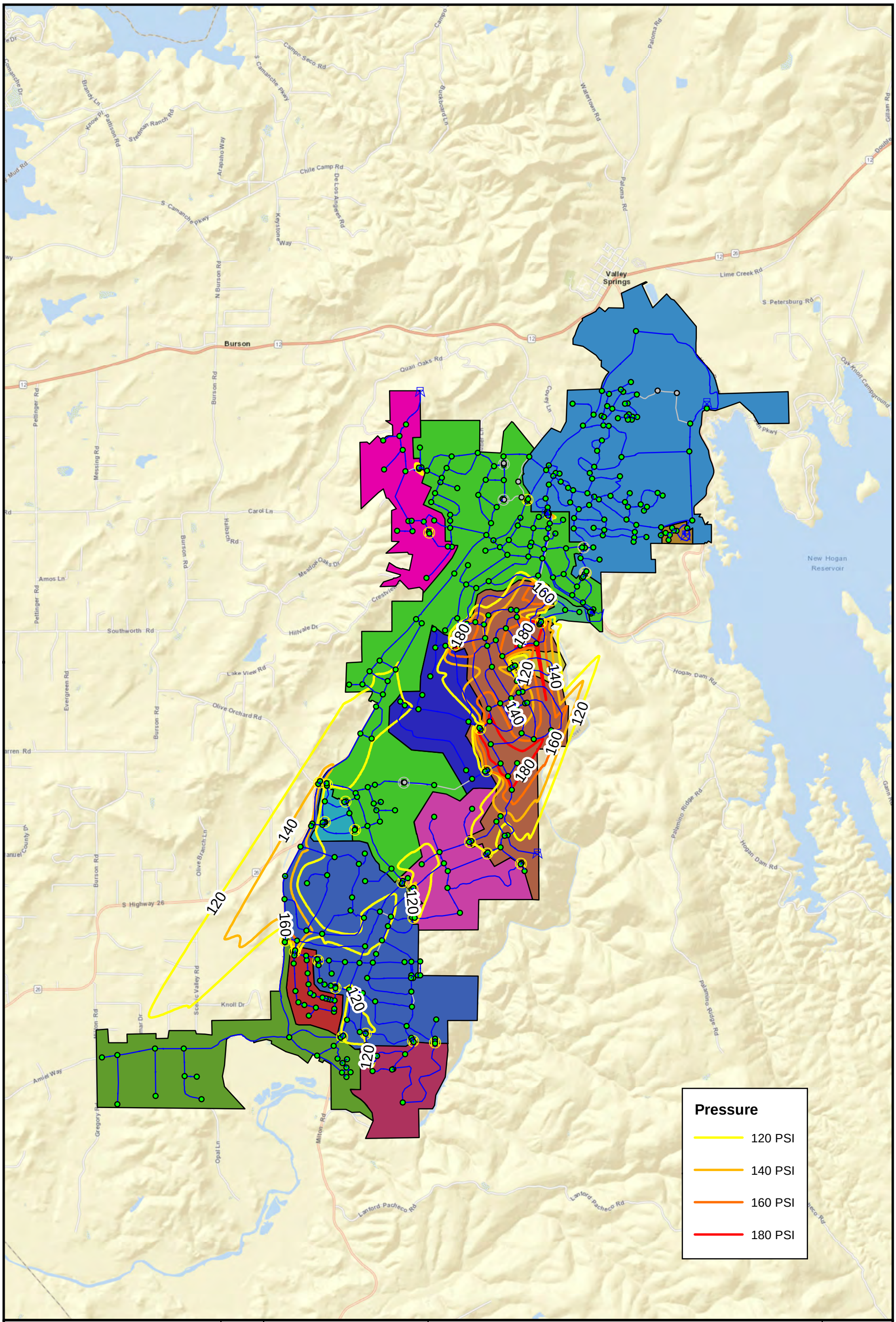
0 0.75 Miles

1" = 0.75 mi.

Jenny Lind Water Master Plan

Low Pressure Nodes
Baseline PHD

FIGURE
9



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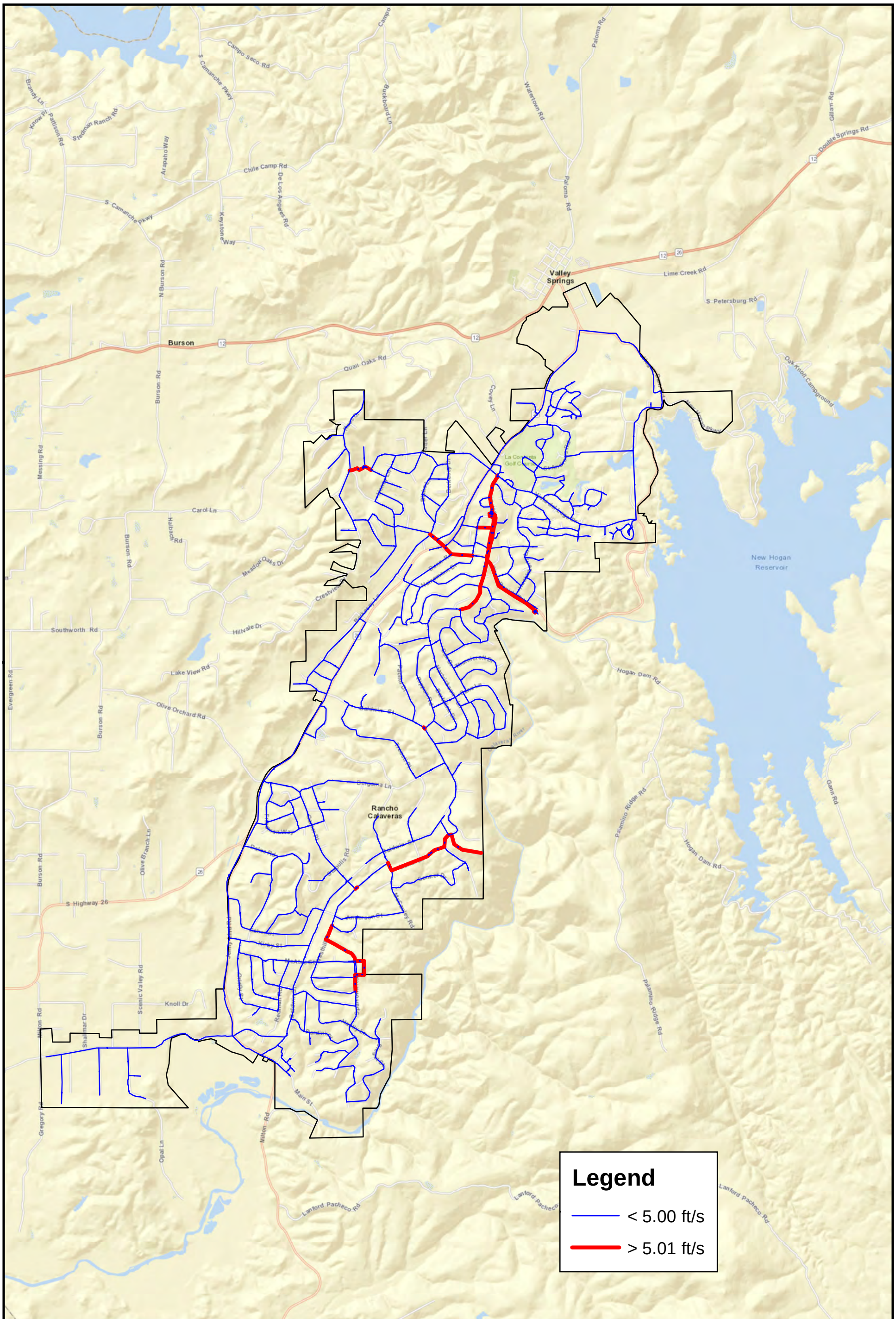
Jenny Lind Water Master Plan

High Pressure Areas
Baseline ADD

FIGURE
10



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0 0.75 Miles

1" = 0.75 mi

Jenny Lind Water Master Plan

High Velocity Pipes
Baseline PHD

FIGURE

11

Recommended Improvements

Based on the system evaluation, the District will need to address a number of system deficiencies to supply future demands and comply with district and other standards. The District will need to provide a new tank, pumps and pipelines throughout the Jenny Lind Water System. For the study area to achieve a sustainable treated water supply and to be assured fire protection meets fire flow requirements, some recommended projects must be in place in the immediate future, and others must be in place before buildout.

Raw Water Supply

The existing water rights are expected to provide adequate supply for the Jenny Lind area through buildout assuming agricultural water rights do not exceed those presented in the 2015 UWMP. Recommendations for improvements to portions of the raw water supply infrastructure are detailed below.

Intake Pump Station and Treatment Facility

The raw water pumping and treatment capacity of the system will both need to be expanded to 7.8 mgd to meet the future demands of treated water. The space constraints at the Jenny Lind WTP exclude the possibility of expanding the existing facilities to meet the buildout demand; therefore, an entirely new pump station and treatment facility will need to be developed to provide the additional two mgd demand. This will require an additional point of diversion from the Calaveras River or an intake at the reservoir.

The need to expand the treated water capacity will not occur until the system MDD exceeds 5.25 mgd, and the system demand is not expected to exceed this point until the year 2057. Construction of expanded facilities is not recommend in the planning horizon of this master plan.

A planning level cost estimate has been provide so the District can adjust rates and begin allocating funds to support future improvements. At a planning level estimate of $4/gallon, a new 2.5 mgd facility with an intake system is anticipated to cost approximately $10 million to construct, plus an additional $3 million for contingency, design, environmental review, administration and land acquisition. The total cost to build a new facility is estimated at $13 million.

Treated Water Storage

Based on the storage system evaluation criteria stated previously, A Tank requires additional storage.

A second tank in parallel to A Tank is recommended to support the buildout storage requirements and should be online by year 2078. A new 1.0 mgd tank will provide redundancy and allow the District to rehabilitate A Tank when the need arises and support storage demands through buildout. The new tank for A Zone will not be necessary within the planning horizon of this master plan.

Aerial survey of the area surrounding A Tank did not identify an open space that would support a second tank at the same HGL. Areas of similar elevation were surveyed along the path of pipeline to determine if it would be cost effective to pipe to a new location.

The closest location was approximately one mile away and will require cross country piping. The most cost effective approach for the District storage at buildout is to procure a nearby property to A Tank at approximately the same elevation.

No tank improvements are recommended within the planning horizon of this master plan.

Treated Water Pumping

Several pump station improvements are recommended to meet baseline and buildout design criteria. Recommendations are presented to support firm capacities greater than or equal to the buildout MDD. Individual pump station improvement projects should be reviewed to consider the projected demand at the end of the pumps design life. Future pump station improvements are recommended for Pump Station 602 and Pump Station B.

Pump Station 602 does not provide the full firm capacity necessary under baseline and buildout conditions according to this study; however, the existing deficiency is minor and the demand is only expected to increase by 0.01 mgd upon buildout. Improvements to the existing 602 Pump Station pumps can be deferred based on the insignificant increase in demand and the reliability of the existing water supply in 602 Zone. The pumps should be replaced with higher capacity pumps when the existing pumps reach the end of their useful life, or if system demand increases beyond that projected.

Pump Station B meets the existing system criteria and requires only future improvements. The pump station provides sufficient capacity to support Zones E & F until year 2107 when the District is anticipated to grow to 5,265 connections. At which point, the Pump Station will need be upgraded so support future growth. The two existing 600 gpm pumps should be replaced entirely, or have their motors replaced, such that each pump is capable of delivering 825 gpm or greater. When combined with the existing 600 gpm swing pump, these improvements will provide a future firm capacity of 1425; thus, exceeding the 1410 gpm required at buildout.

Pump Station A will require future improvements if Pump Station A is expected to continue conveying all the treated water supply to system; although, this is unlikely. The Jenny Lind WTP does not have the space to provide additional treatment capacity and it is likely that a new WTP and a new pump station will be constructed at a new location to support buildout demands.

No pump station improvements are recommended within the planning horizon of this master plan.

Treated Water Distribution

Recommended improvements to the distribution system reflect the results of the hydraulic model and the need to meet the system design criteria. The pipeline improvements are summarized in the paragraphs below and in the following tables.

Low Pressure and High Velocity Improvements to Address Existing Deficiencies

Deficient nodes in the northern portion of Zone A1 require significant piping improvements to provide pressures of 40 psi or greater to the homes in the area. Any pipe improvements recommended to address current deficiencies will be sized to

accommodate buildout conditions. Pipes were targeted due to their high headloss and need for high capacity flows at buildout. Table 29 presents the pipe schedule recommended to improve the immediate system deficiencies in upper portion of Zone A1.

Table 29: Pipe Improvements to Address Existing Low Pressure Deficiencies

Pipe ID	Location	Length (ft)	Baseline Headloss per 1000 ft	Existing Diameter (in)	Buildout Diameter (in)
P387	Anderson St (Loop)	538	-	-	12
P489	Westhill Rd (Loop)	669	-	-	8
P391	Hanley Dr (Loop)	427	-	-	8
P397	Bergsma Ln (Loop)	1830	-	-	8
P437	Hart Vickson Ln	544	24.2	10	18
P435	Hart Vickson Ln	235	24	10	18
P155	Marsden Ln	662	21.3	6	10
P351	Farris Dr	76	19	6	8
P92	Silver Rapids Rd	407	18.8	10	16
P431	Dennis Ln	294	16.4	6	14[1]
P93	Silver Rapids Rd	423	15.7	10	16
P89	Hart Vickson Ln	452	14.3	10	16
P420	Hart Vickson Ln	487	14.1	10	16
P82	Silver Rapids Rd	482	12.5	10	14[1]
P83	Silver Rapids Rd	942	9.9	10	14[1]
P74	Hart Vickson Ln	427	8.3	10	16
P129	Heney Ln	264	7.9	6	12
P125	Dennis Ln	732	6.6	6	14[1]
P126	Heney Ln	547	6.3	6	12
P75	Silver Rapids Rd	622	5.8	10	12
P120	Butter Ln & Blake Ln	973	5.7	6	8
P432	Heney Ln	218	5.2	6	12
P94	Berkesey Dr	623	2.4	8	12
P128	Emereff Ln	1056	2.3	6	12
P402	Heney Ln	434	2	6	12
P127	Gallius Ln	1941	1.7	6	12
P119	Blake Ln	760	1.2	6	10
P113	Berkesey Dr	776	1.2	8	10
P111	Silver Rapids Rd	1681	1.2	10	14[1]
P112	Blake Ln	1424	0.8	6	10
P114	Berkesey Dr	450	0.8	8	10
P130	Heney Ln	320	0.7	10	12
P84	Hart Vickson Ln	784	0.5	10	12

[1] Due to limited availability, 14-in pipes will be upsized to 16-in
[2] Pipe ID locations are mapped in the System Map Book (See Appendix A)

Making the recommended improvements will resolve pressure issues at all but two of the deficient nodes at buildout. Further pipe improvements will not resolve the low static pressure at these nodes, thus the District will need to serve the surrounding homes using booster pumps. These nodes include; J1040 and J428.

Low pressures located at the southern end of Zone A1, can be resolved by installing a new 8" pipe between node J18 and pipe P453 with a new PRV on Pipe 213 set to 80 psi. This improvement also addresses fire flow deficiencies described in the following section.

Low pressures located in Zone A3 can be improved by installing two new loop pipes. The low pressure located in the northwest portion can be improved by installing a loop pipe between nodes J2006 and J008 (Anderson St Loop). Installing this pipe significantly reduces pressure losses from flow entering from Zone B3 and raises the overall system pressure in this area. Similarly, the low pressures located at the southern end of the Zone A3 near the old tank sites can be improved by installing a loop pipe between node J612 and J438 (Westhill Rd Loop). The Westhill Rd Loop will effectively bypasses the old Tank C site.

Low pressures located in the lower portion of Zone A can be improved by installing a new 8" loop between nodes J18 and P453 along Bergsma Lane (Bergsma Ln Loop). This will provide a looped pipe network to this subsection of the District and resolve fire flow deficiencies described in the following section.

Low pressures located in the upper portion of Zone B2 can be improved by installing a new 8" loop between nodes J508 and J1090 along Hanley Drive (Hanley Dr Loop). This will provide a looped pipe network to this subsection of the District and resolve fire flow deficiencies described in the following section.

The five ft/s maximum pipe velocity is the other governing requirement for immediate pipe improvements. The baseline PHD model scenario identified 34 pipes that have velocities greater than the maximum pipe velocity. Most pipe improvements will be addressed by upsizing existing pipe, while others can be improved by adjusting pressure reducing valve (PRV) settings for better flow distribution through the network.

Replacing the existing AB Transmission Main was identified as the highest priority project among the pipes recommended for improvement. The AB Transmission Main is the primary source of water for the Zones B1, B2, B3, B4 and B5, and the AB Transmission Main supports fire flow demands to Zones A1, A2, A3, A4, A5, and A6. During peak events, the velocity through the AB Transmission Main exceeds the District standard which makes it susceptible to failure. The majority of the Jenny Lind service area relies on the AB Transmission Main; therefore, it is recommended that replacement of the AB Transmission Main be listed as the highest priority in Phase I of the CIP. Similarly, The E&F Zone Transmission Main should be improved in the immediate future due to high velocity concerns.

A summary of the recommended pipeline improvements is presented in Table 30. Appendix C presents the full report of baseline and buildout pipe velocities under PHD.

Table 30. Improvements to Address High Velocity Deficiencies.

Location Description	Model ID	Existing			Buildout	
		Diameter (in)	Length (ft)	Velocity (ft/s)	Diameter (in)	Velocity (ft/s)
Hart Vickson Ln	P172	8	3382	9.3	14[3]	4.7
Usher Dr	P507	8	139	8.6	14[3]	3.7
Hart Vickson Ln	P732	10	227	7.3	18	3.5
Hart Vickson Ln	P161	10	637	7.3	18	3.4
Hart Vickson Ln	P158	10	416	6.4	18	3.3
Usher Dr	P13	8	582	6.2	14[3]	3.6
Hart Vickson Ln	P162	10	431	6.0	16	3.1
McCauley Rd	P204	6	375	5.6	14[3]	3.2
Baldwin St	P508	8	617	5.6	14[3]	3.5
Hart Vickson Ln	P64	8	1491	5.4	12	4.5
Usher Dr	P282	8	229	5.3	14[3]	3.4
Westhill Rd	P604	6	403	0.11[2]	8	4.7
Westhill Rd	P404	8	682	5.2	10	3.0
Wind River Ct	P10	8	1740	5.1	14[3]	1.4
602 Pump Station Discharge	P2006	4	665	10.6	14[1,3]	3.7

[1] Assumes fire flow pumps are installed at buildout to address storage deficiencies.
[2] Installing the 10" loop pipe along Westhill Road requires improvements to P604 as flow will largely bypass the old C Tank Site.
[3] Due to limited availability, 14-in pipes will be upsized to 16-in
[4] Pipe ID locations are mapped in the System Map Book (See Appendix A)

Improvements for Fire Flow Deficiencies

The baseline MDD plus fire flow scenario was run to discover any potentially deficient fire flow nodes. The simulation identified 125 nodes that do not meet the user demands plus the fire flow demands. Many of these nodes are within the immediate vicinity of an existing water tank and are known to have low pressure; therefore, no improvements are recommended at these nodes. The full report of total demand and available flows for each system node is presented in Appendix C.

The majority of deficient nodes were found in groups or at dead end nodes. Grouped deficiencies can be targeted and remedied through a single project. Table 24 presents recommended projects and lists the deficient nodes improved.

Table 31. Recommended Projects to Improve Fire Flows at Deficient Nodes.

Recommended Project	Improved Deficient Nodes
Hanley Dr Loop - Install new pipe between J508 and J1090 with new PRV set at 80 psi	J551, J1124, J550, J554, J1123, J552
Bergsma Ln Loop - Install new 8" pipe between node J18 and pipe P453 with a new PRV on Pipe 213 set to 80psi	J409, J406, J2048, J401, 2055
Install PRV on P135 set to open during FF events, and open P434	J16, J1126, J1040, J404, J1125, J1034, J1133, J1056, J2043, J403, J1120, J1054, J1043, J2046, J1044, J1127

Recommended Project	Improved Deficient Nodes
Westhill Rd Loop - Install new 10" loop pipe between J612 and J438	J22, 9997, J510, J2039, J2025, J512, J2040, J2041A, J2019, J2024, J2038, J2037, J2041, J603, J612
Remove valve 409 (not necessary to maintain A-2 HGL), open P270 to eliminated A2 and provide fire flow	J434, J2047, J601, J4016
Replace valve 901 with a PRV (set to 80 psi) to open during fire flow events	J433, J1050, J1053, J413, J415, J708, J1057
Replace valve 902 with a PRV set to open during fire flow events	J423
Set PRV 402 to 75 PSI or open P17	J555
Upsize P19 to 8 inches	J553
Install Booster Pumps to Service Low Pressure Nodes	Old Tank C Site: J82, J514, J440, J611, J422, J442
	Known Low Pressure Nodes: J405, J439, J427, J1129, J28, J402, J714, J26, J700, J18, J608, J428, J1128
	Dead End Nodes: J425, 9995, J429, J411, J24, J678, J407, J683, J1002.2, J709, J2044, J34, J715, J606A, J621, J681, J606, J604, J36
[1] Node ID locations are mapped in the System Map Book (See Appendix A)	

Industry standard does not require improvements to existing systems for purpose of meeting fire flow demands. When the identified pipes reach the end of the useful life they should be replaced with the buildout pipe sizes presented in Appendix D to meet fire flow.

PHD at Buildout

For the buildout scenario, PHD pressure and velocity design criteria were still the governing design criteria for future system improvements. Under peak hour buildout demands velocities and headloss increased significantly in some portions of the system. The District will need to make additional improvements to the pipe network as the system demands increase.

The buildout PHD model scenario identified 34 pipes that will need to be upsized to meet buildout conditions. These 34 pipes are presented in Table 32. The pipe improvements recommended assume that improvements to existing pipe and PRV settings/installations previously recommended are in place.

Table 32: Additional Improvements to the Buildout Pipe System to Address Remaining High Velocity and Low Pressure Deficiencies.

ID	Location	Length (ft)	Buildout without Improvements		Buildout with Improvements		
			Diameter (in)	Velocity (ft/s)	Diameter (in)	Flow (gpm)	Velocity (ft/s)
P802	Ross Dr	649	6	19.0	12	1676	4.8
P2004	Ross Dr	616	6	18.7	12	1652	4.7
P125	Dennis Ct	732	6	18.6	12	1638	4.7
P137	Ross Dr	1656	6	18.3	12	1612	4.6
P129	Heney Ln	264	6	17.3	12	1527	4.3

ID	Location	Length (ft)	Buildout without Improvements		Buildout with Improvements		
			Diameter (in)	Velocity (ft/s)	Diameter (in)	Flow (gpm)	Velocity (ft/s)
P126	Heney Ln	547	6	16.9	12	1491	4.2
P136	Ross Dr	984	8	11.1	12	1733	4.9
P168	Hwy 26	2372	6	9.7	14[3]	857	1.8
P163	Grouse Dr	1613	6	9.1	12	802	2.3
P56	Hart Vickson Ln	616	8	8.8	12	1381	3.9
P207	Westhill Rd	1868	8	8.5	12	1336	3.8
P208	Westhill Rd	1546	8	8.4	12	1317	3.7
P315	Grouse Dr & Huckleberry Ln	483	6	8.3	12	727	2.1
P167	Hwy 26	241	6	8.1	14[3]	714	1.5
P18	Baldwin St	967	8	7.8	12	1226	3.5
P504	Baldwin St	662	8	7.7	12	1209	3.4
P509	Baldwin St	644	8	7.5	12	1176	3.3
P67	Milton Rd	254	8	7.5	10	1175	4.8
P68	Hart Vickson Ln	1074	8	7.4	10	1163	4.8
P69	Hart Vickson Ln	452	8	7.3	10	1151	4.7
P312	Vista del Lago Dr	1117	8	7.3	16	1141	1.8
P14	Baldwin St	2450	8	7.3	12	1139	3.2
P23	Rippon Rd	529	6	6.8	8	601	3.8
P183	Vista del Lago Dr	243	8	6.2	12	978	2.8
P54	Hart Vickson Ln	353	8	6.2	12	966	2.7
P26	Hart Vickson Ln	960	8	5.9	12	920	2.6
P300	Vista del Lago Dr	495	8	5.9	12	918	2.6
P714	Vista del Lago Dr	415	10	3.6	12	880.7	2.5
P165	Vista del Lago Dr	424	10	3.2	12	776	2.2
P721	Vista del Lago Dr	244	10	3.6	12	870	2.5
P722	Vista del Lago Dr	659	10	3.8	12	933	2.2
P55	Hanley Dr	1370	6	6.7	8	593	3.8
P26	Hart Vickson Ln	960	8	5.2	12	812	2.3
P197	Vista del Lago Dr	1518	8	5.4	12	846	2.4

[1] Pipe ID locations are mapped in the System Map Book (See Appendix A)
[2] Pipe improvements identified in this table have no order of priority. The District should use this table to select pipe sizes as existing pipes are replaced.
[3] Due to limited availability, 14-in pipes will be upsized to 16-in
[4] Pipe ID locations are mapped in the System Map Book (See Appendix A)

Buildout MDD plus Fire Flow

Improvements to the existing system have been sized to address buildout fire flow conditions. No additional improvements are necessary to meet the system design criteria beyond those previously identified.

New Developments

For distribution lines in cul-de-sacs with pipe size currently two inches in diameter and known to be made of asbestos cement, the pipes should be replaced with four inch polyvinyl chloride or ductile iron pipe. The new pipe should be no longer than 300 feet and have no more than 12 residential services connected. If additional length is required, if the pipe is not in cul-de-sac (dead end), or if more than 12 residential services must be connected, the pipe should be a minimum of six inches in diameter.

Annual Pipe Replacement Program

The District currently maintains 90 miles of distribution lines 4 inches and greater. The average useful life of pipe is approximately 100 years. To avoid deferring maintenance, the District should plan to replace approximately 0.9 miles of pipeline each year. The District should begin with making the recommended pipe improvements to Zone A1 in the first four years following the release of this WMP update. Subsequently, the District should replace aging asbestos-concrete pipes as they are likely to be the oldest and most likely to fail.

Annual Infrastructure Repair and Replacement Program

A condition assessment of District assets was not included as part of the scope of this WMP. Instead, the annual cost of repair and replacement (R&R) of District assets has been considered.

A life cycle assessment was prepared to update the annual budget required to maintain the existing facilities. Based on the value of existing assets, the District should allocate $396,500 annually for R&R. Table 33 presents a summary of District assets, their value, their lifetime and the annual cost of R&R.

Table 33: Annual R&R Program Summary

Asset	Present Value	Lifetime (years)	Annual R&R Cost ($/year)
Jenny Lind WTP	$12,000,000	30	$400,000
A Pump Station	$500,000	30	$16,700
B Pump Station	$250,000	30	$8,300
E&F Pump Station	$200,000	30	$6,700
602 Pump Station	$100,000	30	$3,300
A Tank	$2,700,000	50	$54,000
B Tank	$1,350,000	50	$27,000
E Tank	$675,000	50	$13,500
F Tank	$1,350,000	50	$27,000
Annual Cost of R&R Program			***$556,500***
[1]This is a ANSI Class 3 Estimate and should be considered 20% low to 30% high.			

Capital Improvement Plan

Recommendations for a CIP have been developed based on the assessment of the Jenny Lind water system described in the *Recommended Improvements* chapter above. The

following section summarizes project recommendations, estimates costs and presents a prioritized implementation schedule.

Summary of Recommended Projects

The recommended improvements associated with a 10-year planning horizon only include improvements to the distribution system. The individual distribution system improvements identified in the previous section have been grouped to specific projects and summarized in Table 34. Figure 12 maps the locations of the proposed projects. Individual project figures for each of the recommended projects are provided in Appendix E.

Table 34: Recommend Projects

Project	Project Description	Project Goals	Improved Pipe Segments[1]
AB Transmission Main	Replace pipeline connecting A Tank to B Tank	Reduce pipe velocity and headloss.	P172, P64
E&F Transmission Main	Replace pipeline connecting A Tank to Zone F and E Tank	Reduce pipe velocity and headloss; Increase available fire flows	P158, P161, P162, P732
Westhill Rd Loop	Install New 8" Loop Pipe and improve adjacent piping	Reduce pipe velocity and headloss; Increase available fire flows	P604, P404
Anderson St Loop	Install New 12" Loop Pipe	Reduce pipe velocity and headloss; Increase available fire flows	
Hanley Dr Loop	Install New 8" Loop Pipe and install new PRV	Reduce pipe velocity and headloss; Increase available fire flows	
Bergsma Ln Loop	Install New 8" Loop Pipe and install new PRV	Reduce pipe velocity and headloss; Increase available fire flows	
Lower B Zones Improvements	Replace pipeline loops within Upper B Zones	Reduce pipe velocity and headloss; Increase available fire flows	P10, P13, P204, P282, P507, P508,
A1 Transmission Main	Replace pipeline connecting A Tank to Zone A1 and Zone 602	Reduce pipe velocity and headloss; Increase available fire flows	P111, P125, P126, P127, P128, P129, P130, P155, P402, P420, P431, P432, P435, P437, P74, P75, P82, P83, P84, P89, P92, P93
A1 Zone Improvements	Replace pipeline loops within A1 Zone	Reduce pipe velocity and headloss; Increase available fire flows	P112, P113, P114, P119, P120, P94
Fire Flow Improvements	Remaining Fire Flow Projects Presented in Table 32.	Increase available fire flows	

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E&F Transmission Main

A1 Zone Improvements

A1 Transmission Main

Hanley Dr Loop

AB Transmission Main

Bergsma Ln Loop

Lower B Zone Improvements

Anderson St Loop

Westhill Rd Loop

Legend

Improved

Existing Pipe

Recommended Improvements

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0 0.75 Miles

1" = 0.75 mi.

Jenny Lind Water Master Plan

Recommended Projects

FIGURE

12

Implementation Schedule

Projects are grouped in phases such that Phase I addresses the highest priority projects first. The highest priority projects are those high velocity and low pressure deficiencies. Once these projects are complete, the District can then begin addressing the lesser system deficiencies and implement an annual pipe replacement program to replace system piping at a rate of one percent per year. Phases are intended to be implemented over 5 year periods according to the following schedule:

- Phase I – (2019-2023)
    - AB Transmission Main
    - E&F Transmission Main
    - Westhill Rd Loop
    - Anderson St Loop
    - Hanley Dr Loop
    - Bergsma Ln Loop
    - Lower B Zone Improvements
    - R&R
- Phase II – Fire Flow Improvements & Low Pressure Improvements (2024-2028)
    - A1 Transmission Main
    - A1 Zone Improvements
    - Miscellaneous Fire Flow Improvements
    - R&R
- Phase III – Annual Pipe Replacement Program (2029-2033)
    - Annual Replacement of 1% of Existing Pipe Network
    - R&R Projects

Estimated Costs

Planning-level cost estimates are included for each of the recommended capital improvements. The cost of pipeline projects is based on a $23 per linear foot per inch diameter estimate based on cost estimates prepared for other recent pipeline projects. The cost of PRVs are based on a $2,250 per inch diameter estimate. The cost of pump stations is based on a $8,000/hp estimate. The estimated cost of the proposed tanks was discussed in the *Recommend Improvements* chapter above due the necessary consideration for site selection. The following contingencies and allowances were added to the base cost:

- 20% Estimated Contingency
- 10% Allowance for Engineering/Design
- 10% Allowance for Construction Management
- 10% Allowance for Bonds/Insurance/Mobilization

The recommended projects, estimated costs, and proposed schedule were developed through a planning-level analysis that was appropriate for the WMP update and should be revaluated in further detail prior to implementation.

Table 35 presents the infrastructure improvements for the recommended CIP and provides a planning-level estimate for each project.

Table 35: Estimated Cost of Capital Improvement Projects

Project	Recommened Imrovements	Existing Diameter, inches	Recommended Diameter, inches	Length, lineal feet	Component Cost	Project Cost
Phase I: 2019-2023						
AB Transmission Main	Upsize P172	8	14	3382	$1,634,000	$2,481,000
	Upsize P64	8	12	1491	$618,000	
	Upsize P155	6	10	662	$229,000	
E&F Transmission Main	Upsize P158	10	18	416	$259,000	$1,034,000
	Upsize P161	10	18	637	$396,000	
	Upsize P162	10	16	431	$238,000	
	Upsize P732	10	18	227	$141,000	
Weshill Rd Loop	New 8" Pipe	-	8	669	$185,000	$533,000
	Upsize P404	8	10	682	$236,000	
	Upsize P604	6	8	403	$112,000	
Anderson St Loop	New 12" Pipe	-	12	538	$223,000	$223,000
Hanley Dr Loop	New 8" Pipe	-	8	427	$118,000	$132,000
	New PRV	-	-	-	$14,000	
Bergsma Ln Loop	New 8" Pipe	-	8	1830	$506,000	$520,000
	New PRV	-	-	-	$14,000	
Lower B Zone Improvemetns	Improve P10	8	14	1740	$841,000	$1,783,000
	Improve P13	8	14	582	$282,000	
	Improve P204	6	14	375	$182,000	
	Improve P282	8	14	229	$111,000	
	Improve P507	8	14	139	$68,000	
	Improve P508	8	14	617	$299,000	
Phase I Total						***$6,706,000***

Project	Recommened Imrovements	Existing Diameter, inches	Recommended Diameter, inches	Length, lineal feet	Component Cost	Project Cost
Phase II: 2024-2028						
A1 Transmission Main	Improve P111	10	14	1681	$812,000	$6,490,000
	Improve P125	6	14	732	$354,000	
	Improve P126	6	12	547	$227,000	
	Improve P127	6	12	1941	$804,000	
	Improve P128	6	12	1056	$438,000	
	Improve P129	6	12	264	$110,000	
	Improve P130	10	12	320	$133,000	
	Improve P155	6	10	662	$229,000	
	Improve P402	6	12	434	$180,000	
	Improve P420	10	16	487	$269,000	
	Improve P431	6	14	294	$143,000	
	Improve P432	6	12	218	$91,000	
	Improve P435	10	18	235	$146,000	
	Improve P437	10	18	544	$338,000	
	Improve P74	10	16	427	$236,000	
	Improve P75	10	12	622	$258,000	
	Improve P82	10	14	482	$233,000	
	Improve P83	10	14	942	$455,000	
	Improve P84	10	12	784	$325,000	
	Improve P89	10	16	452	$250,000	
	Improve P92	10	16	407	$225,000	
	Improve P93	10	16	423	$234,000	
A1 Zone Improvements	Improve P112	6	10	1424	$492,000	$1,706,000
	Improve P113	8	10	776	$268,000	
	Improve P114	8	10	450	$156,000	
	Improve P119	6	10	760	$263,000	
	Improve P120	6	8	973	$269,000	
	Improve P94	8	12	623	$258,000	
Phase II Total						***$8,196,000***

Project	Recommened Imrovements	Existing Diameter, inches	Recommended Diameter, inches	Length, lineal feet	Component Cost	Project Cost
Phase III: 2029-2034						
Annual Pipe Replacement Program	1% of Pipe per Year	-	--	23760	$9,837,000	$9,837,000
Annual R&R Program	Miscellaneous R&R	-	-	-	$2,782,500	$2,782,500
Phase III Total		--	--	***23,760***		***$12,619,500***

TOTAL COST OF CIP IMPLEMENTATION	**$27,521,500**

APPENDIX A

System Map Book

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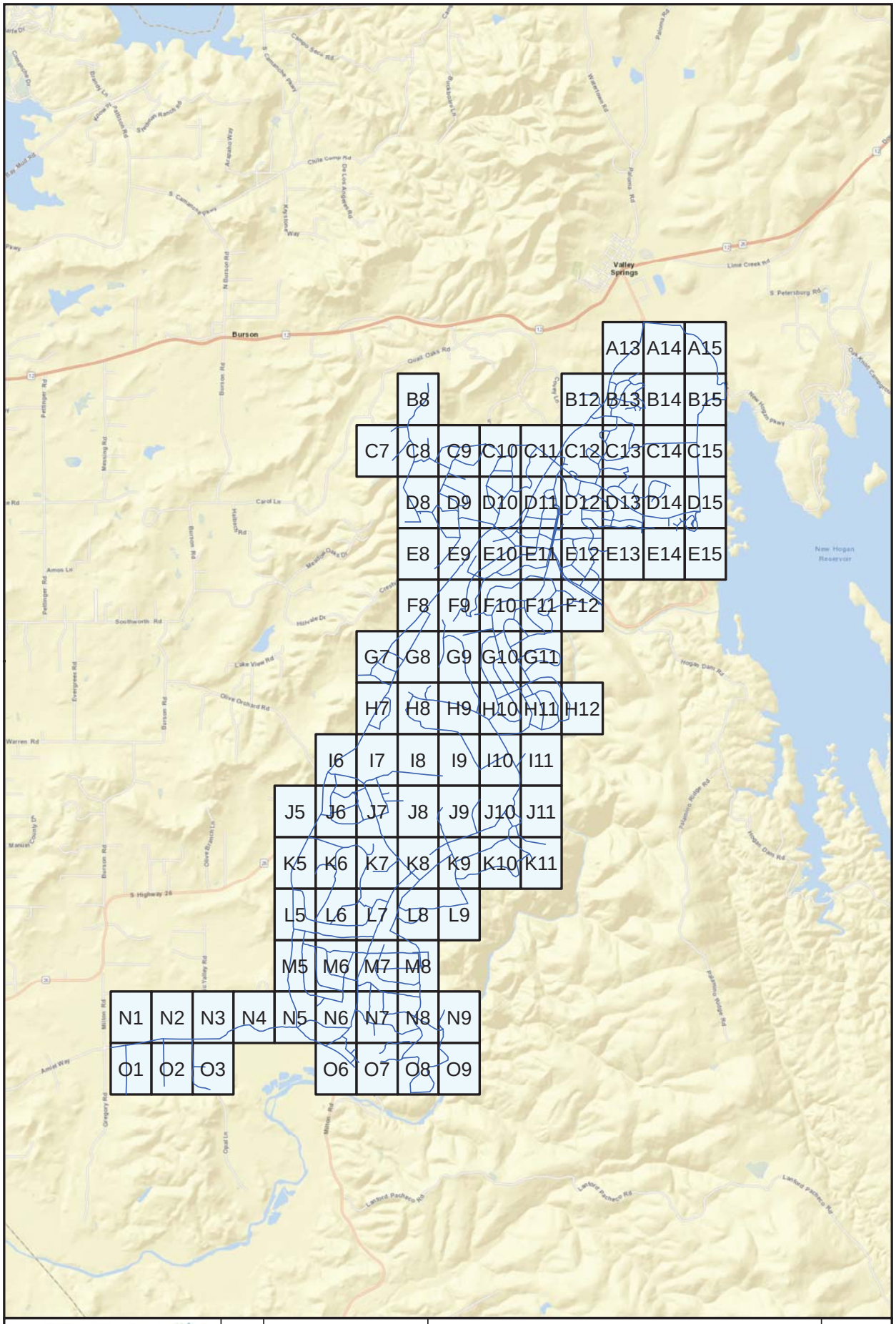

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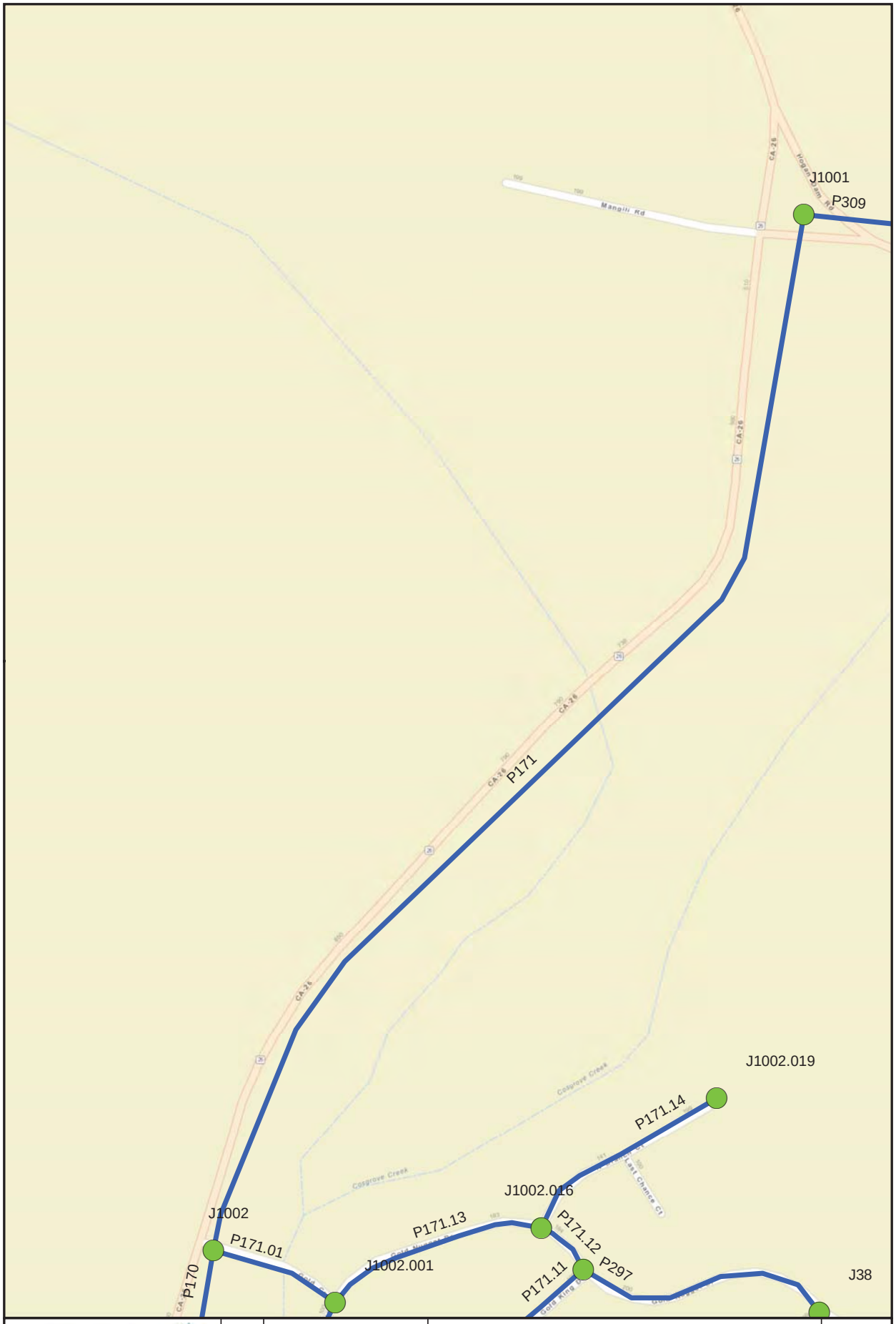

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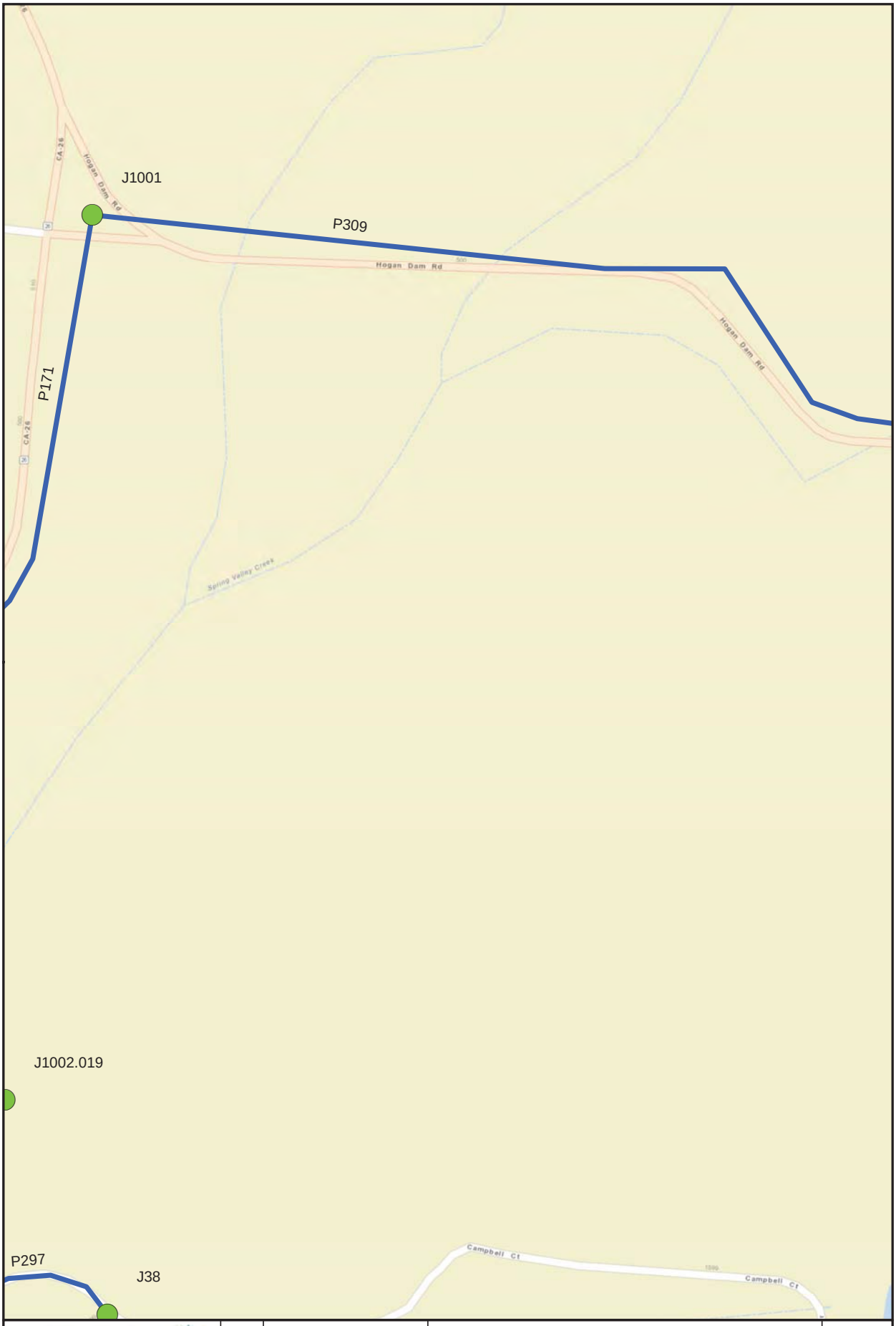

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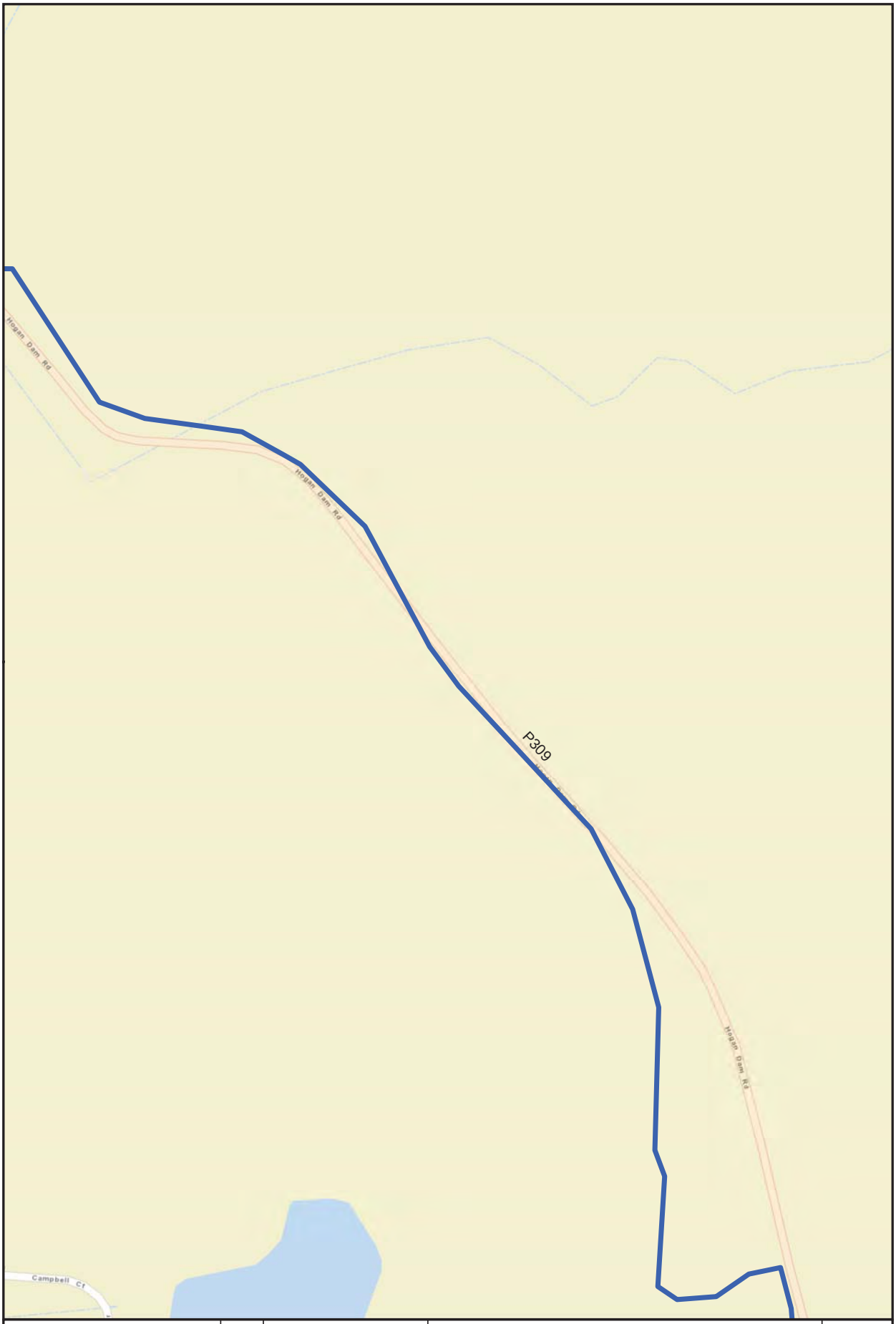

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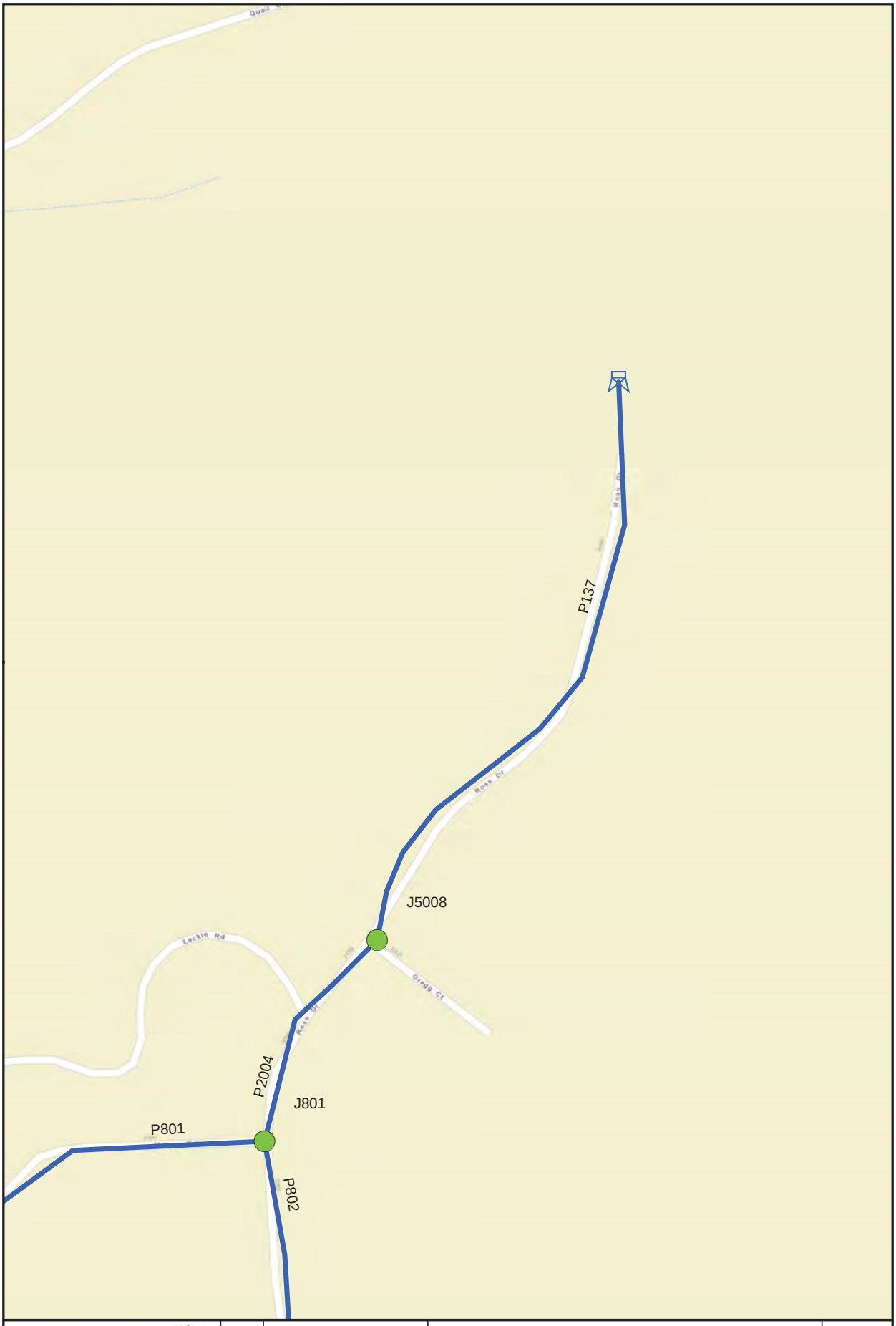

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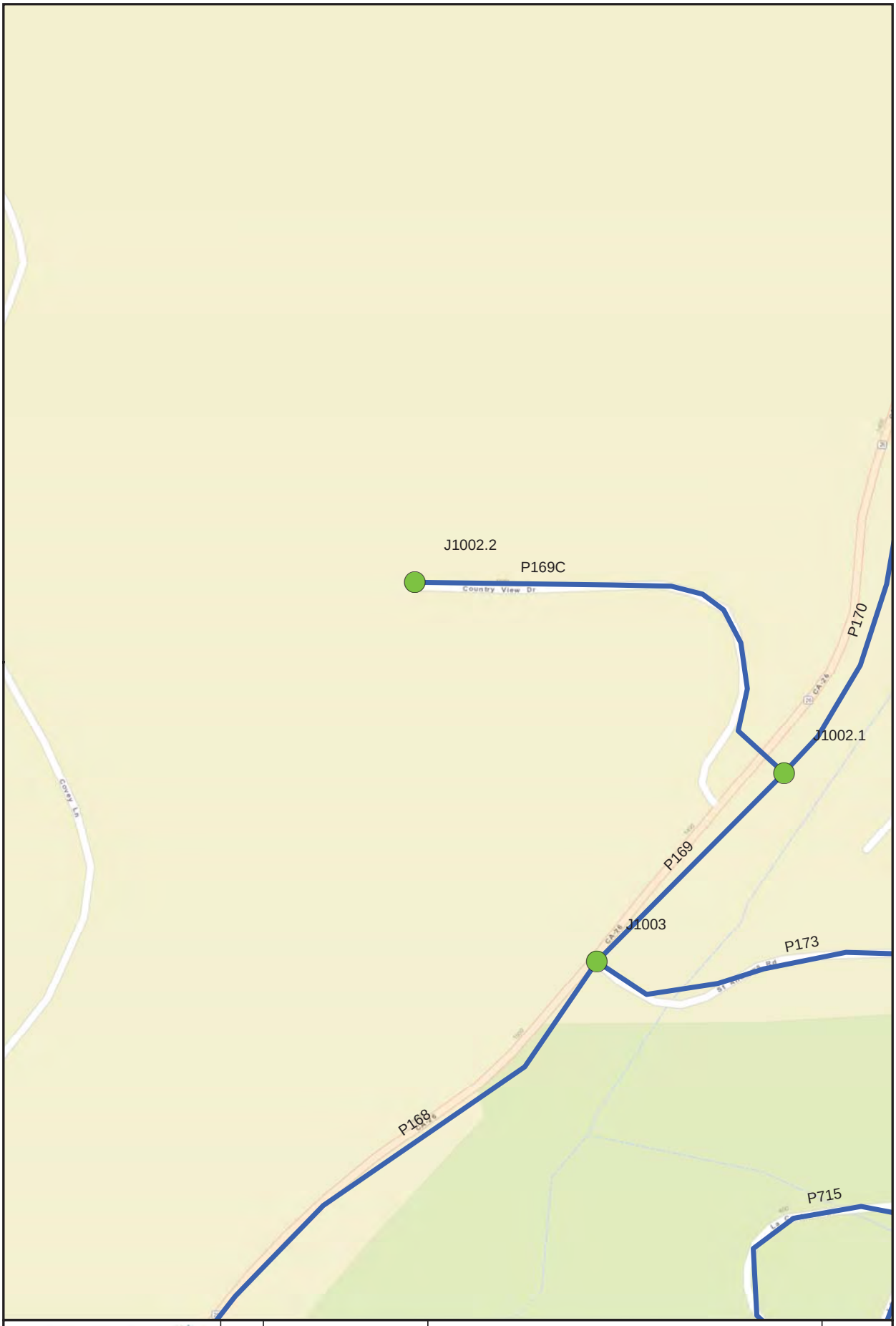

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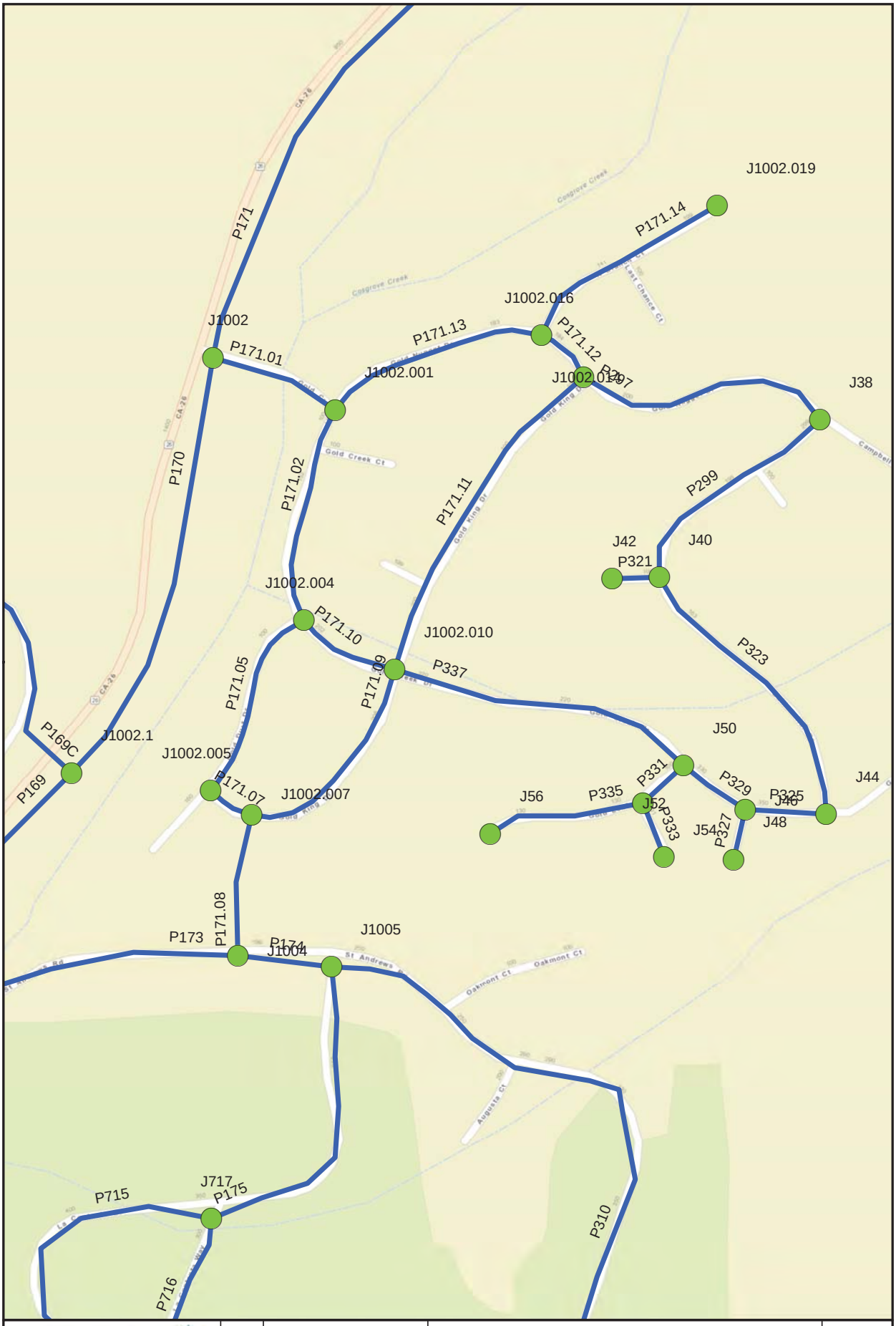

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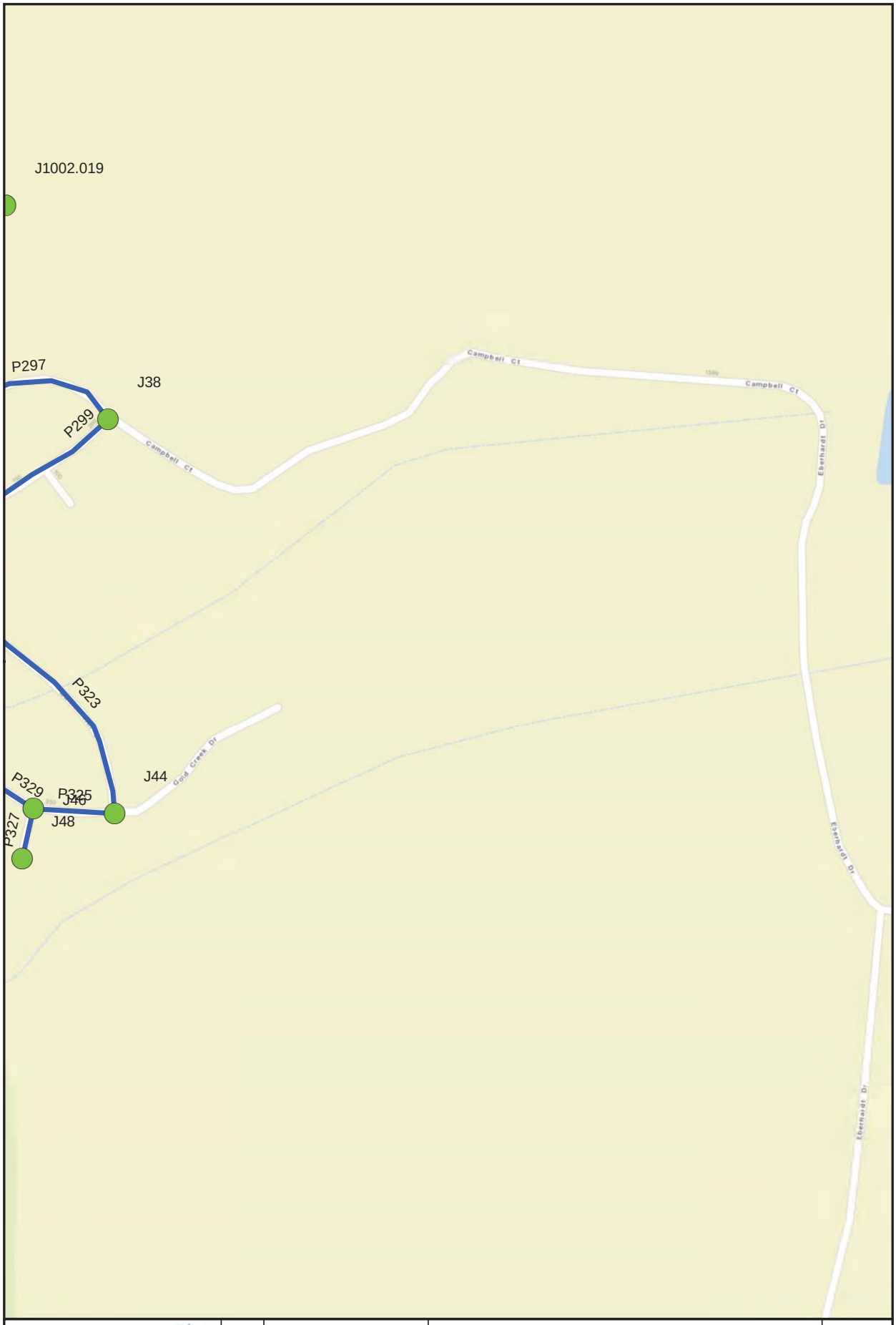

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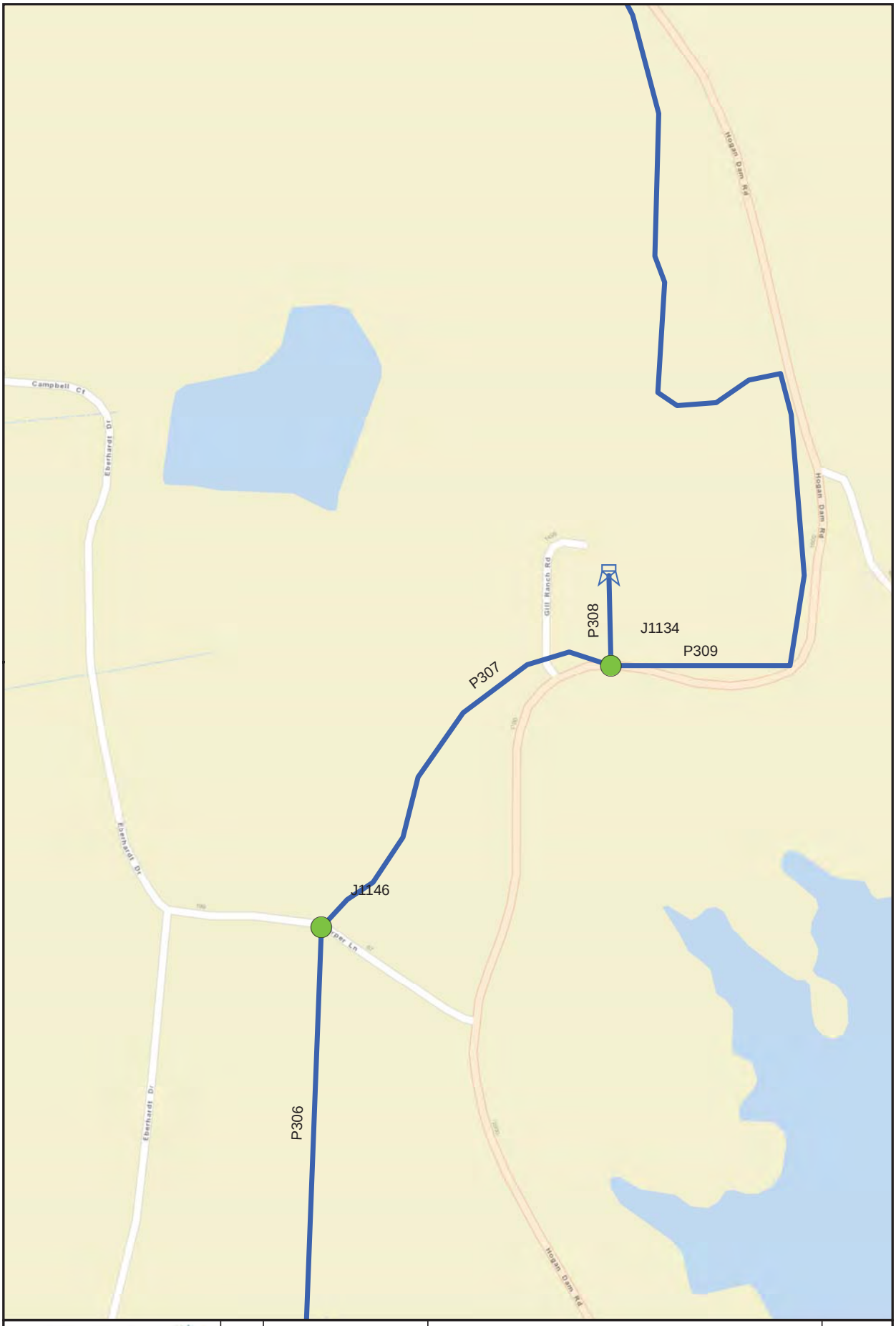

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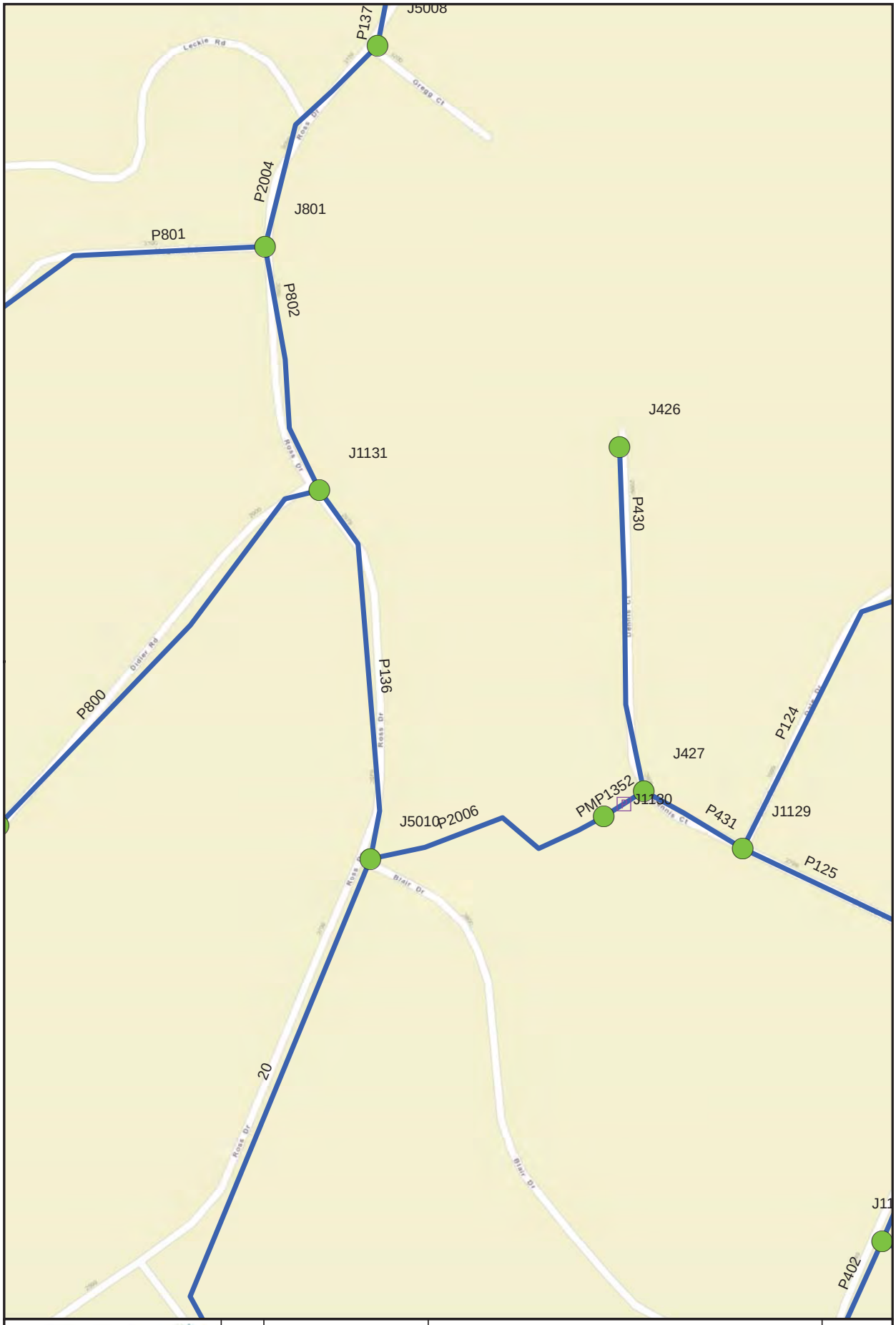

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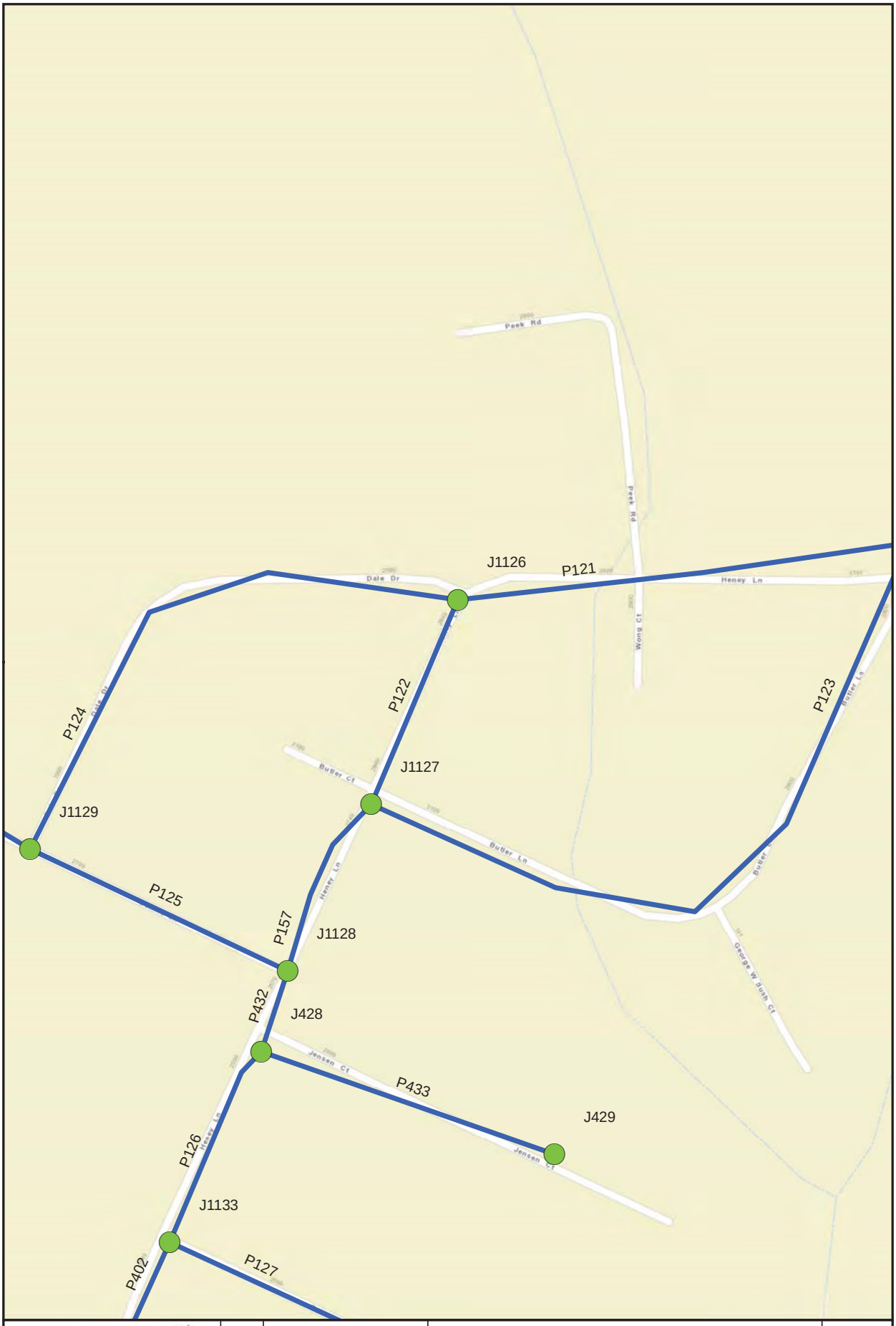

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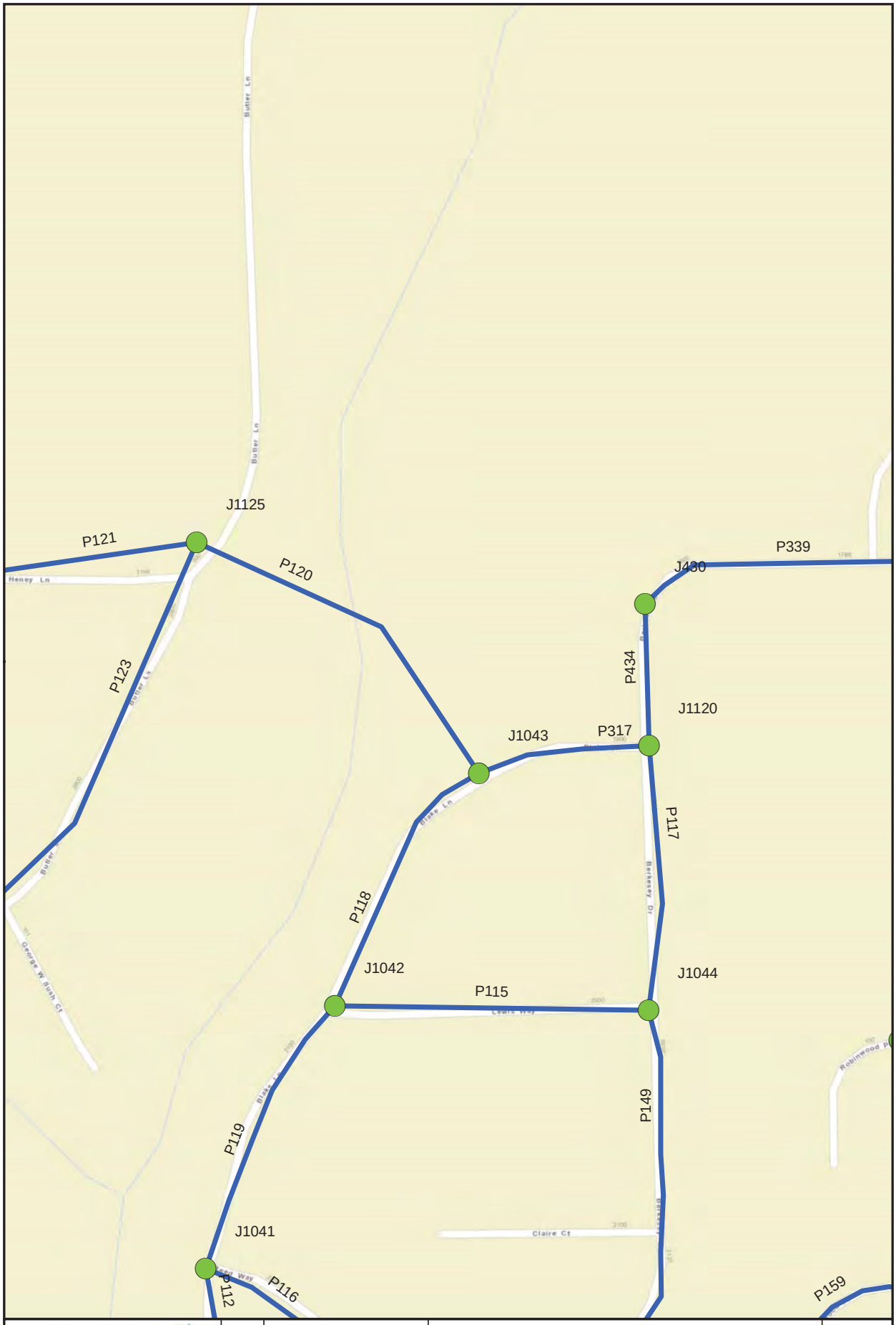

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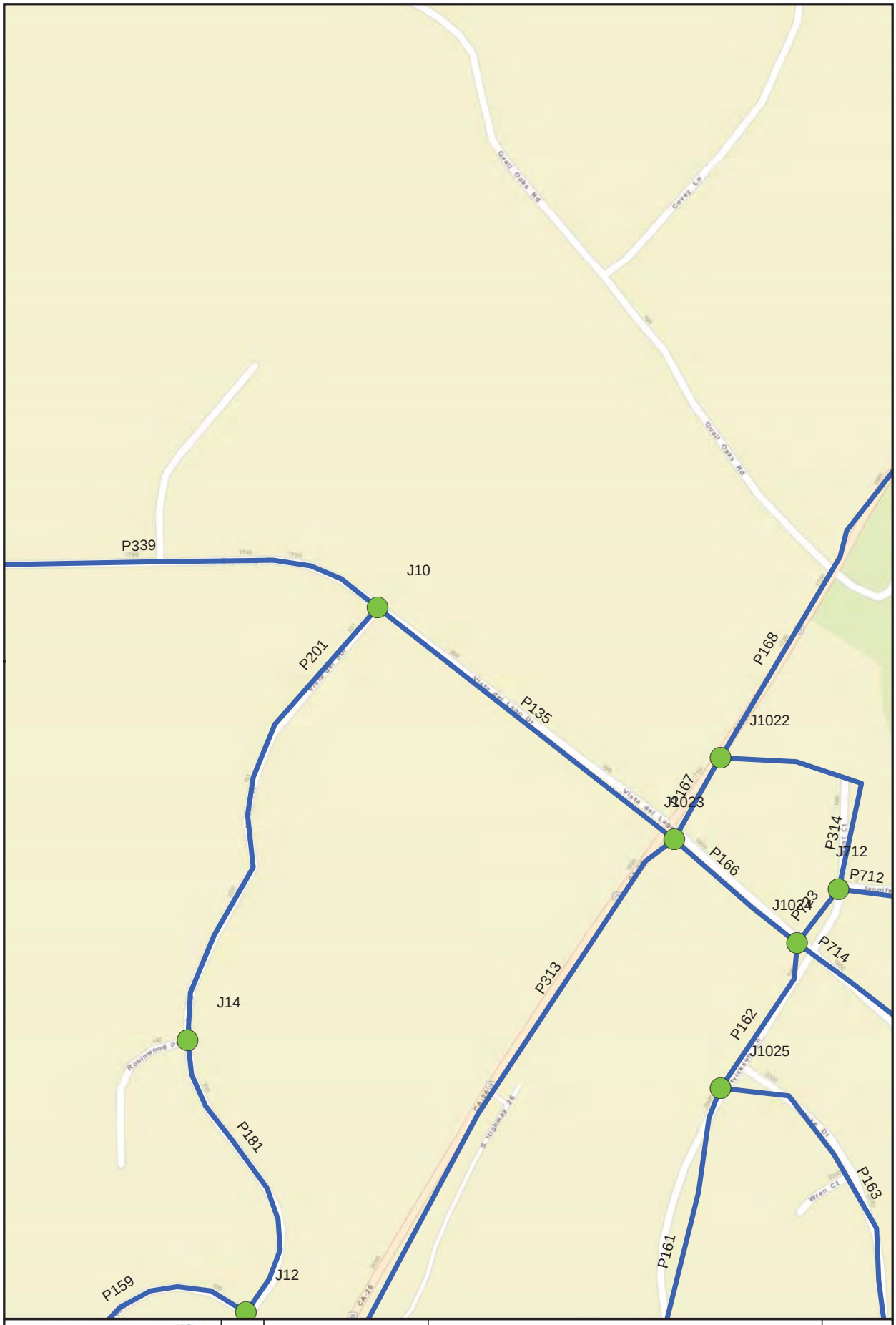

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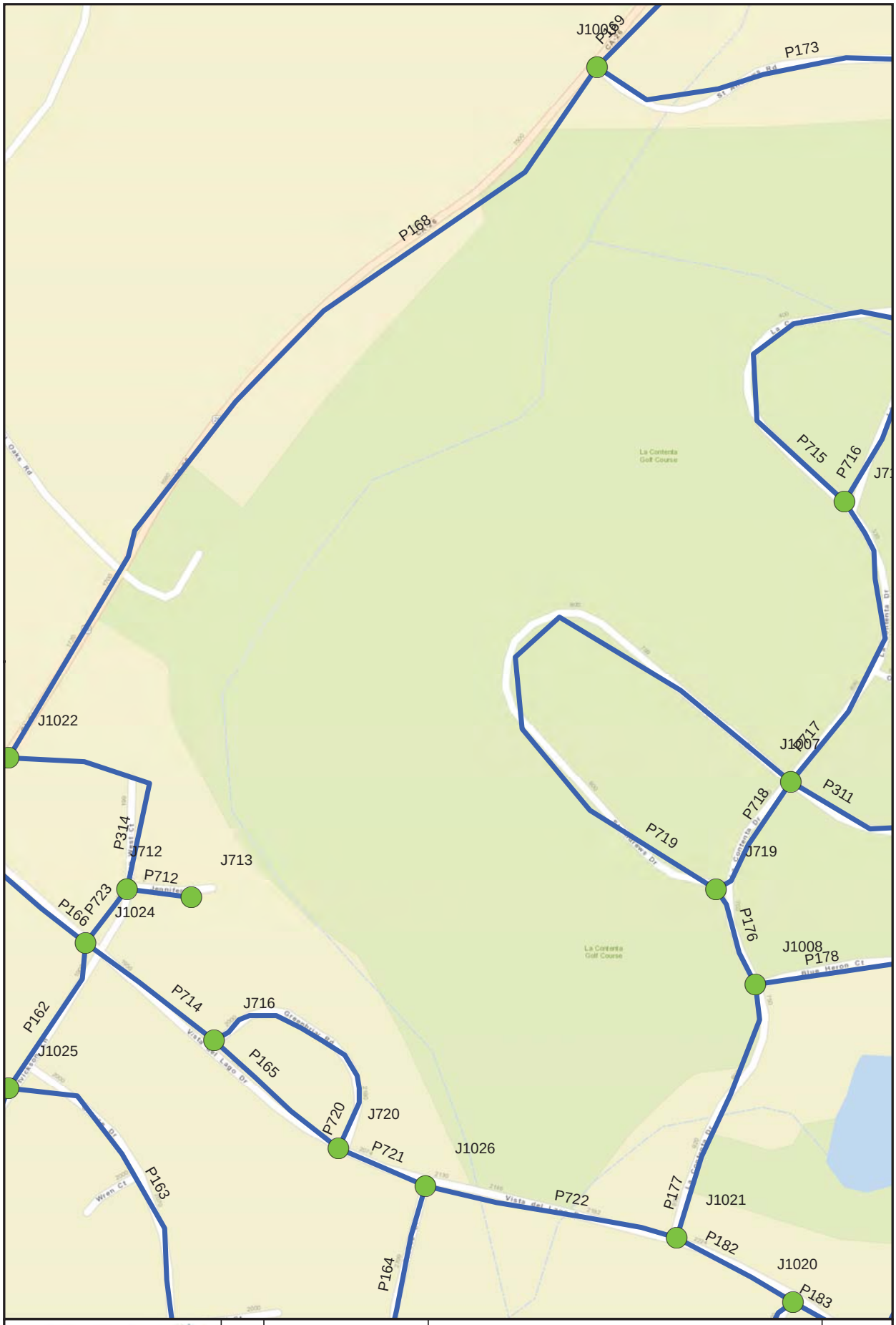

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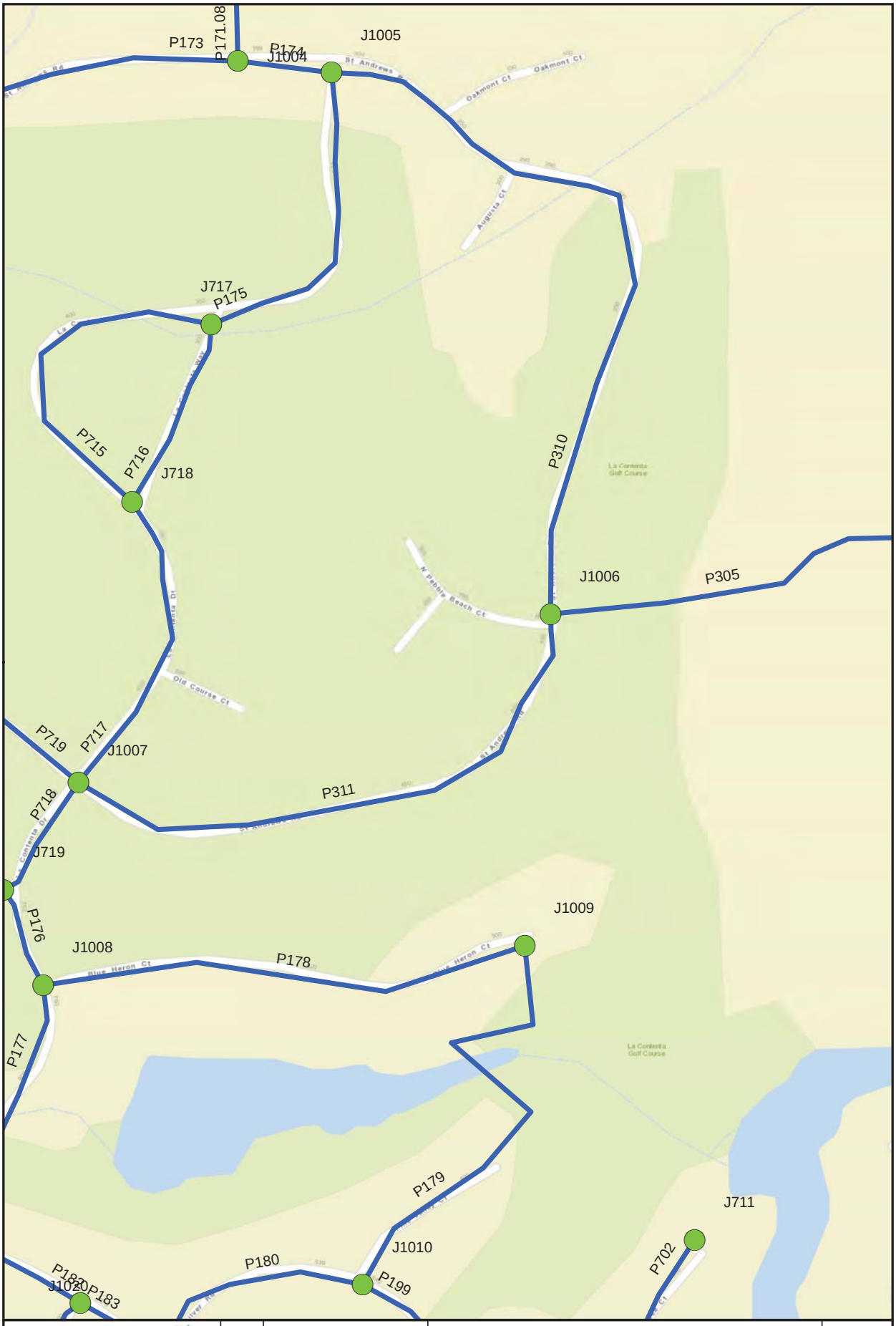

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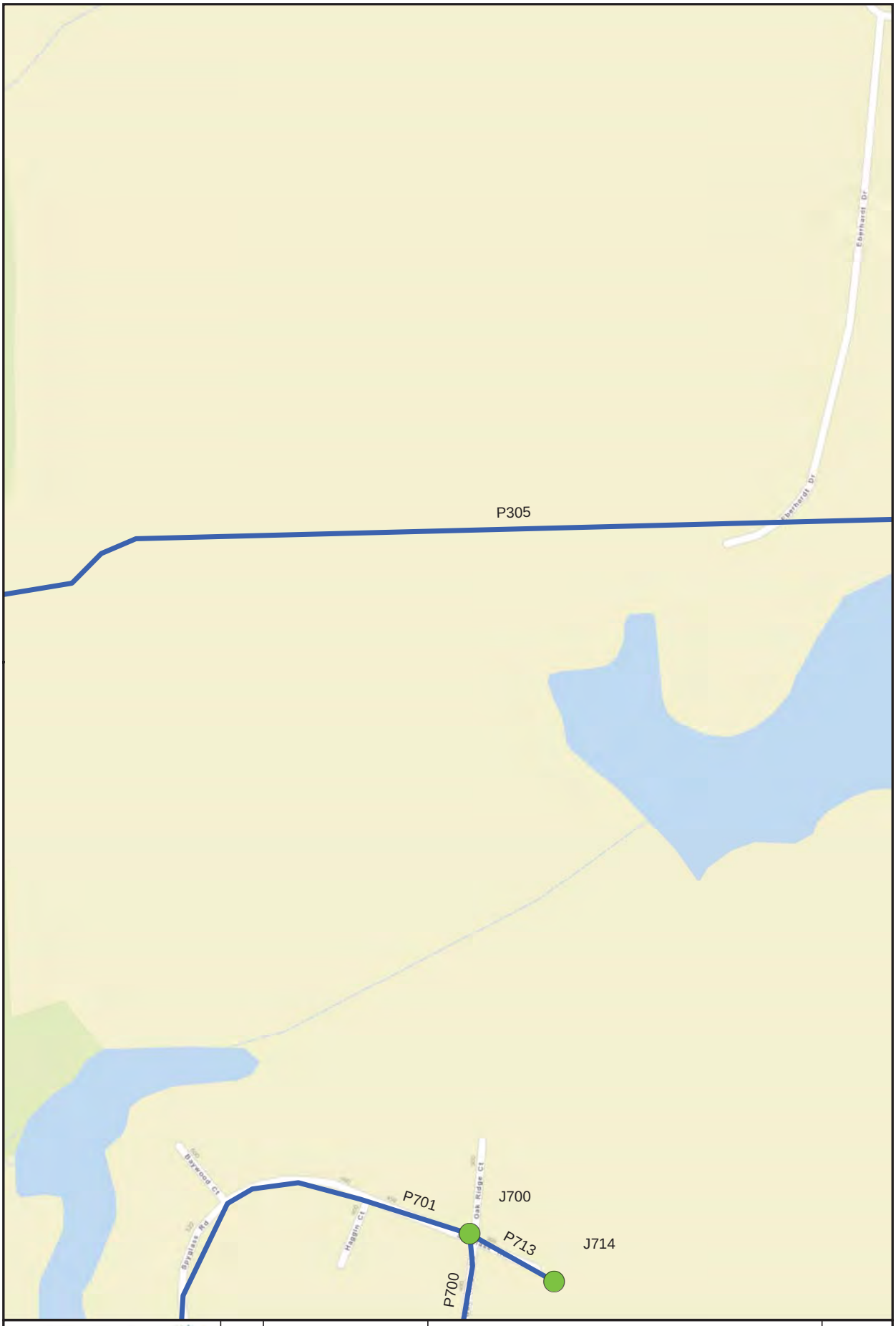

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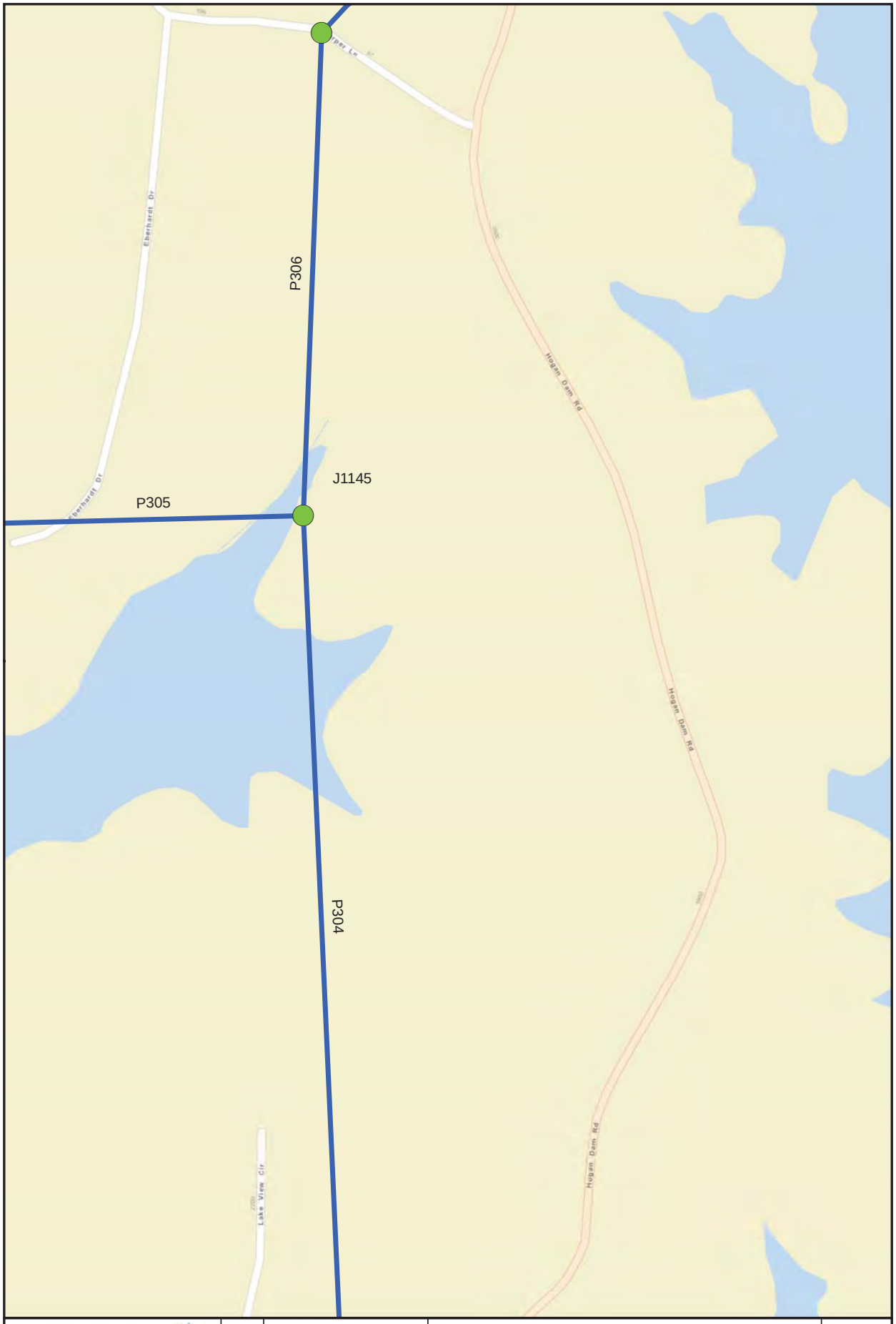

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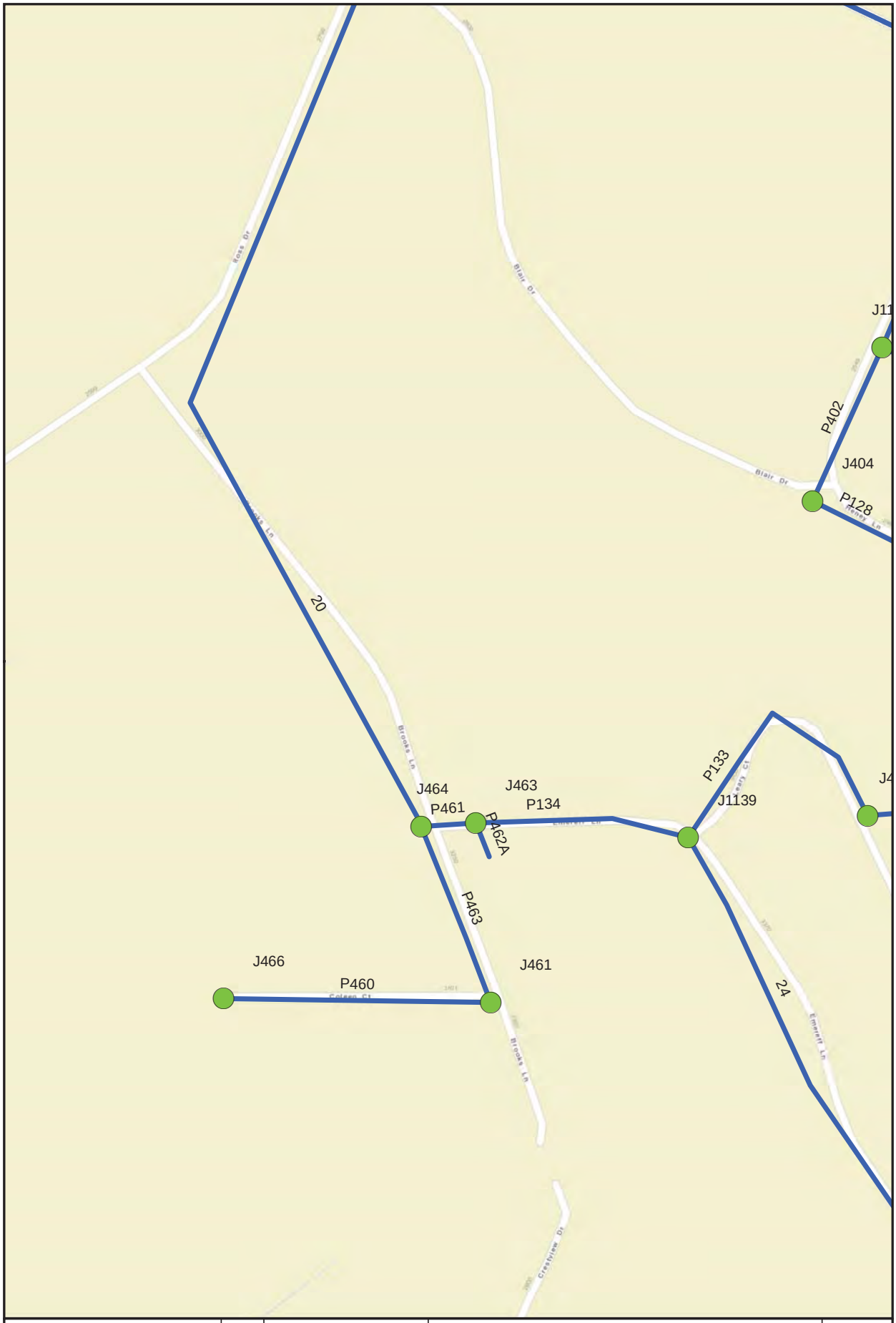

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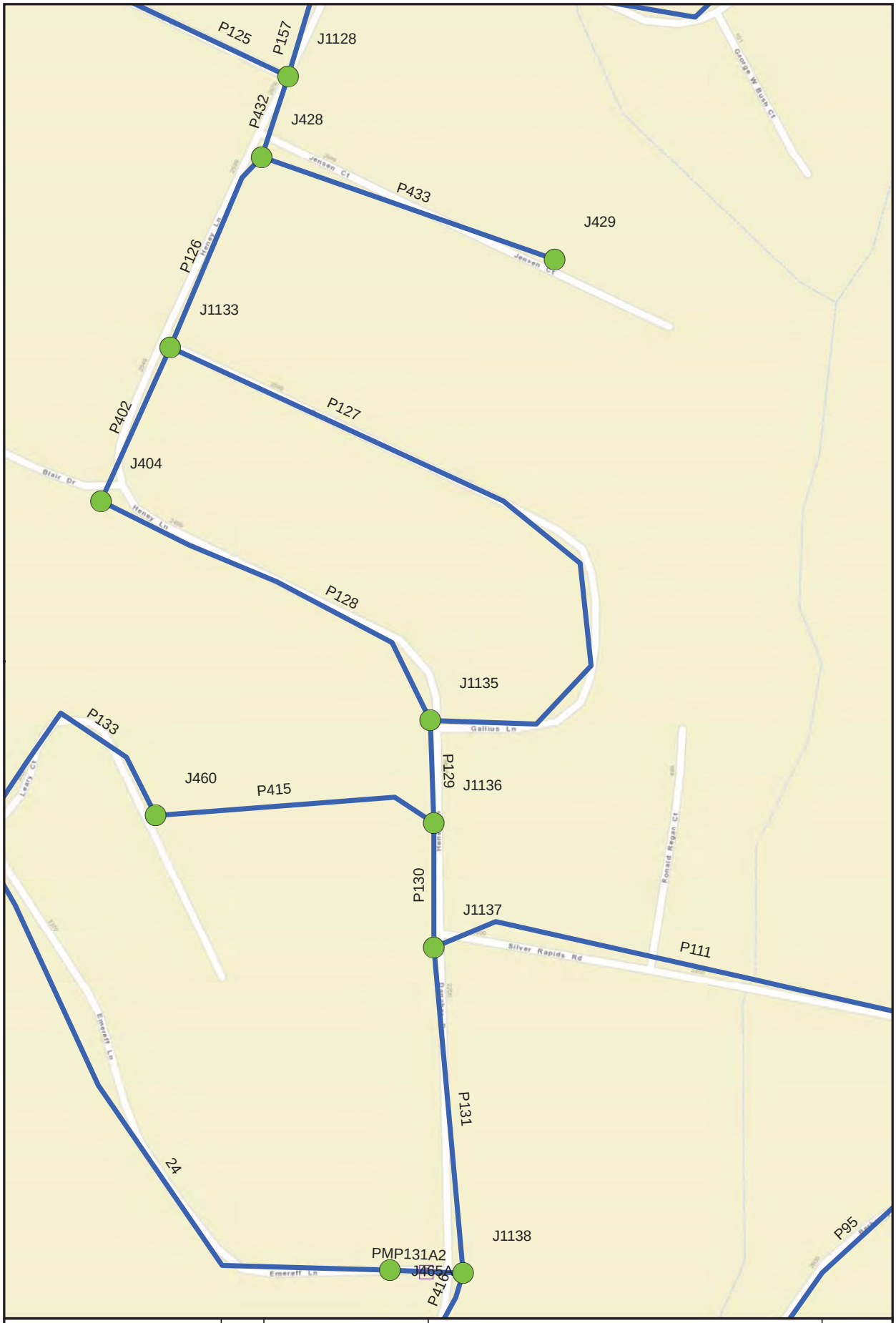

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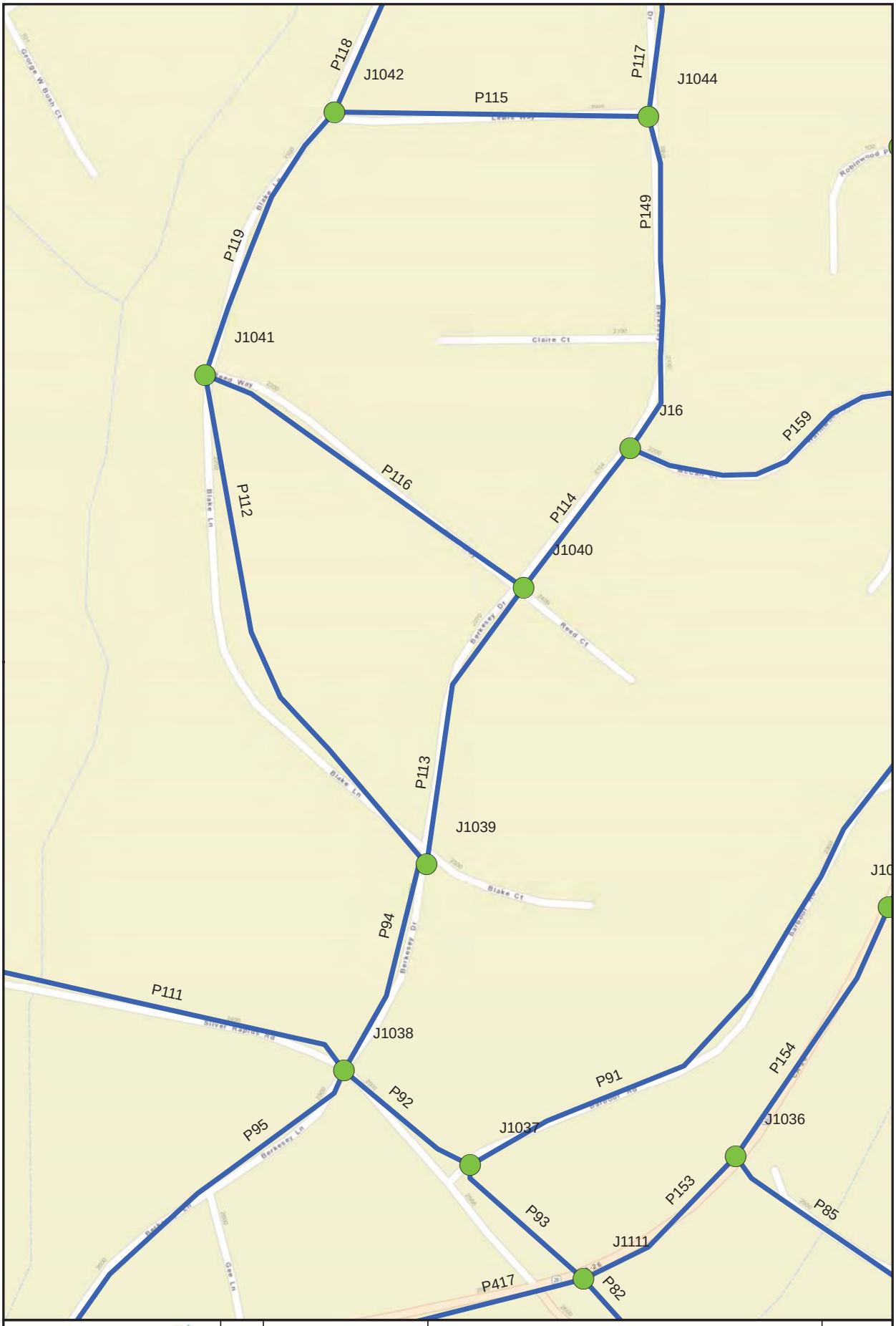

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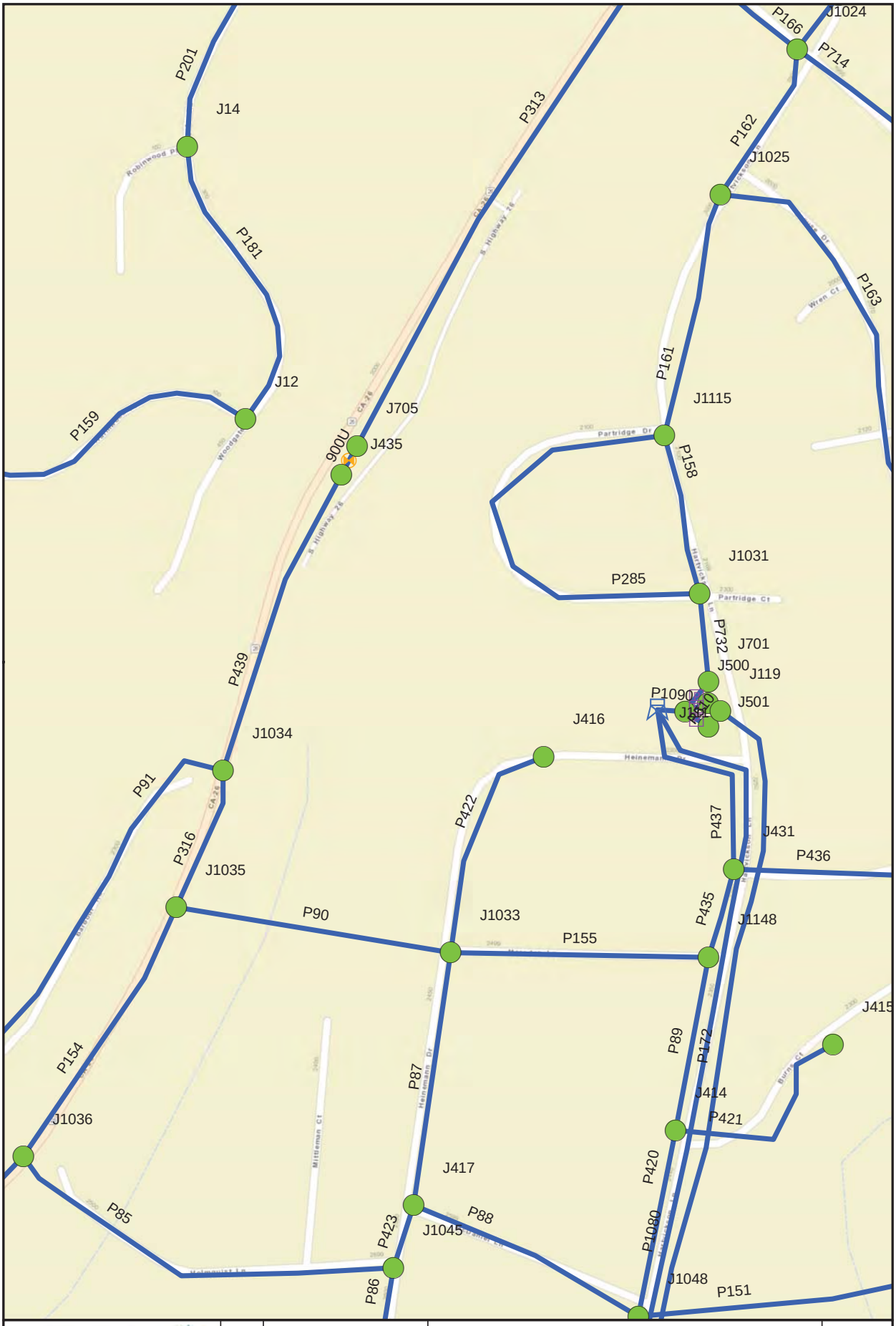

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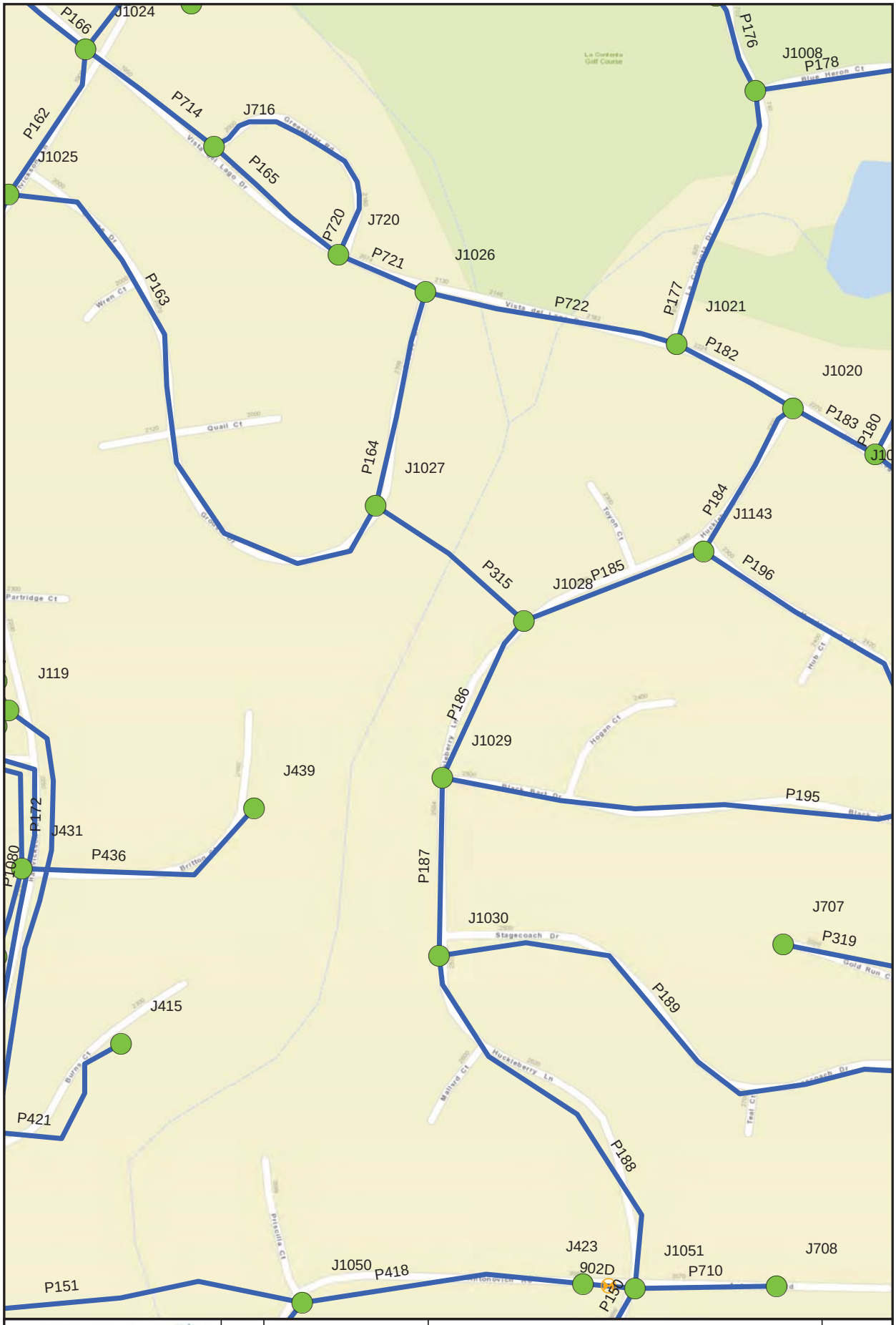

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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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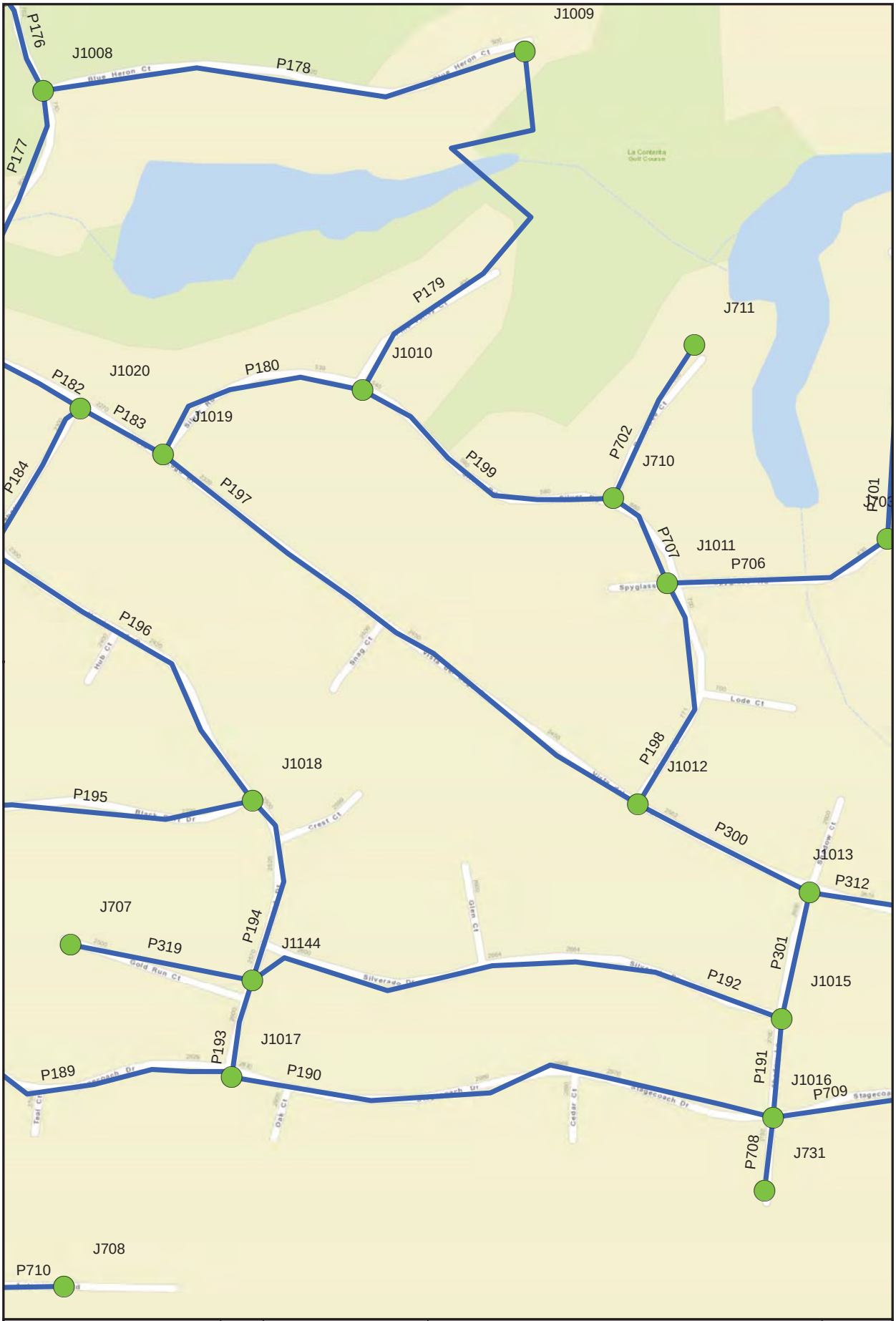

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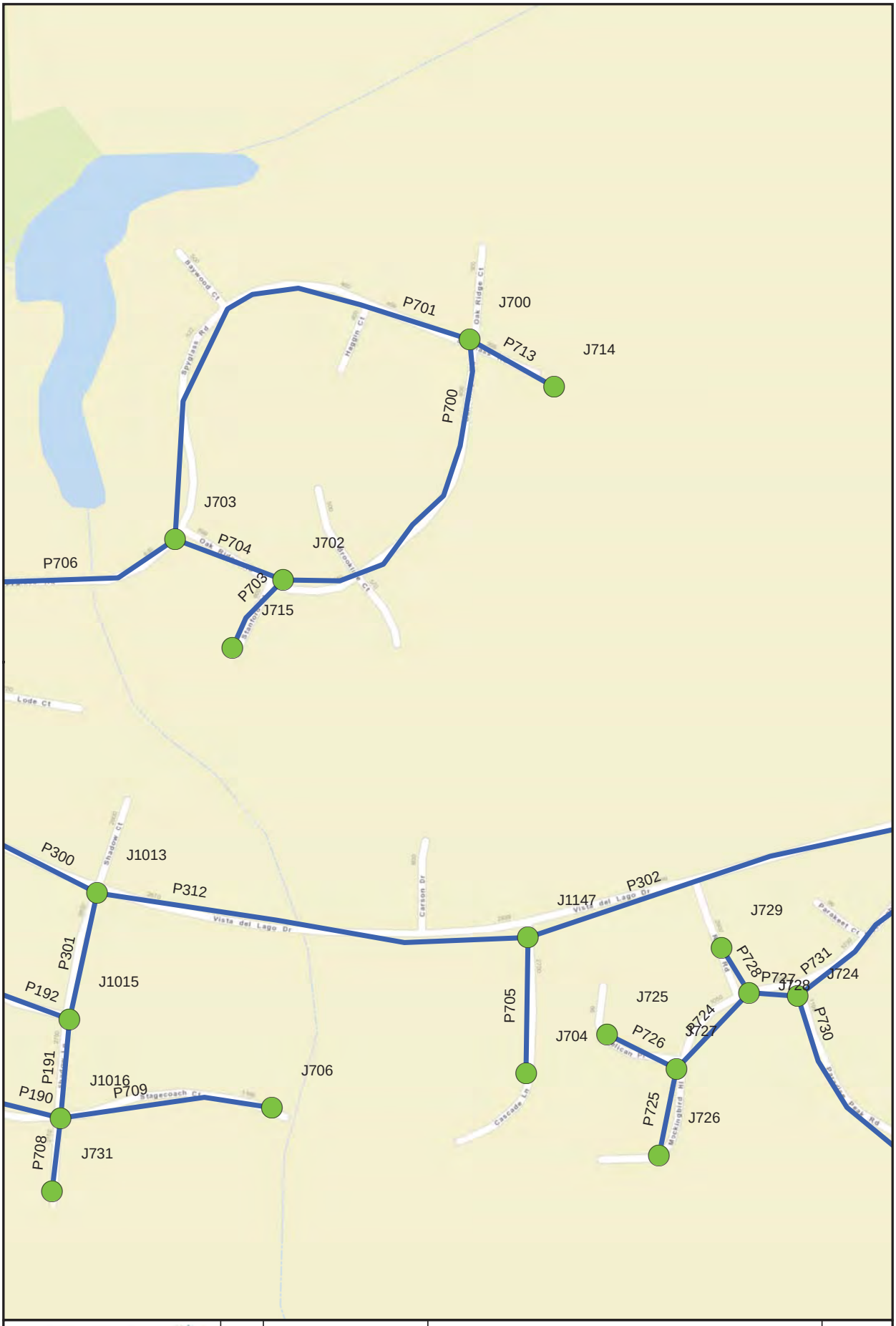

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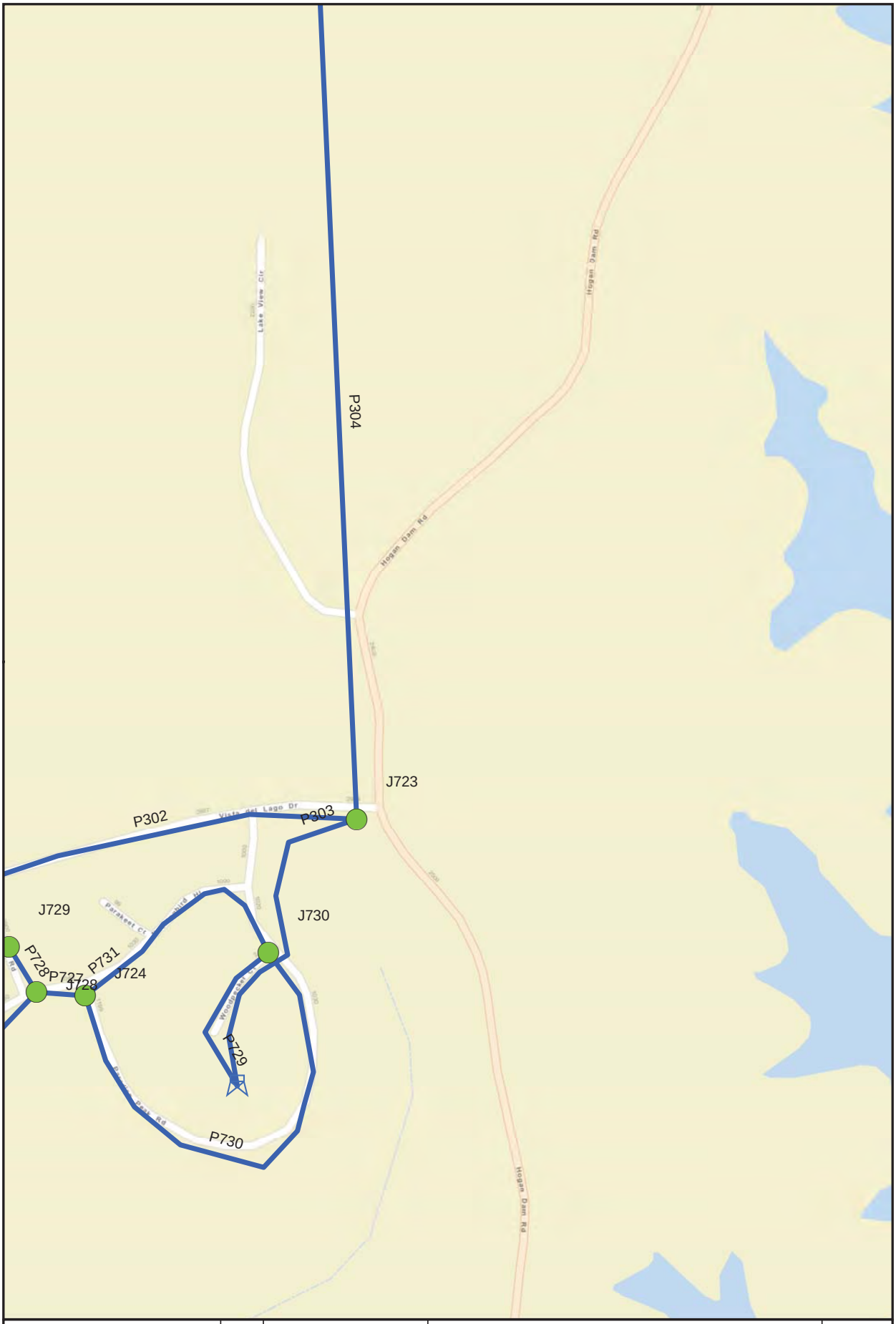

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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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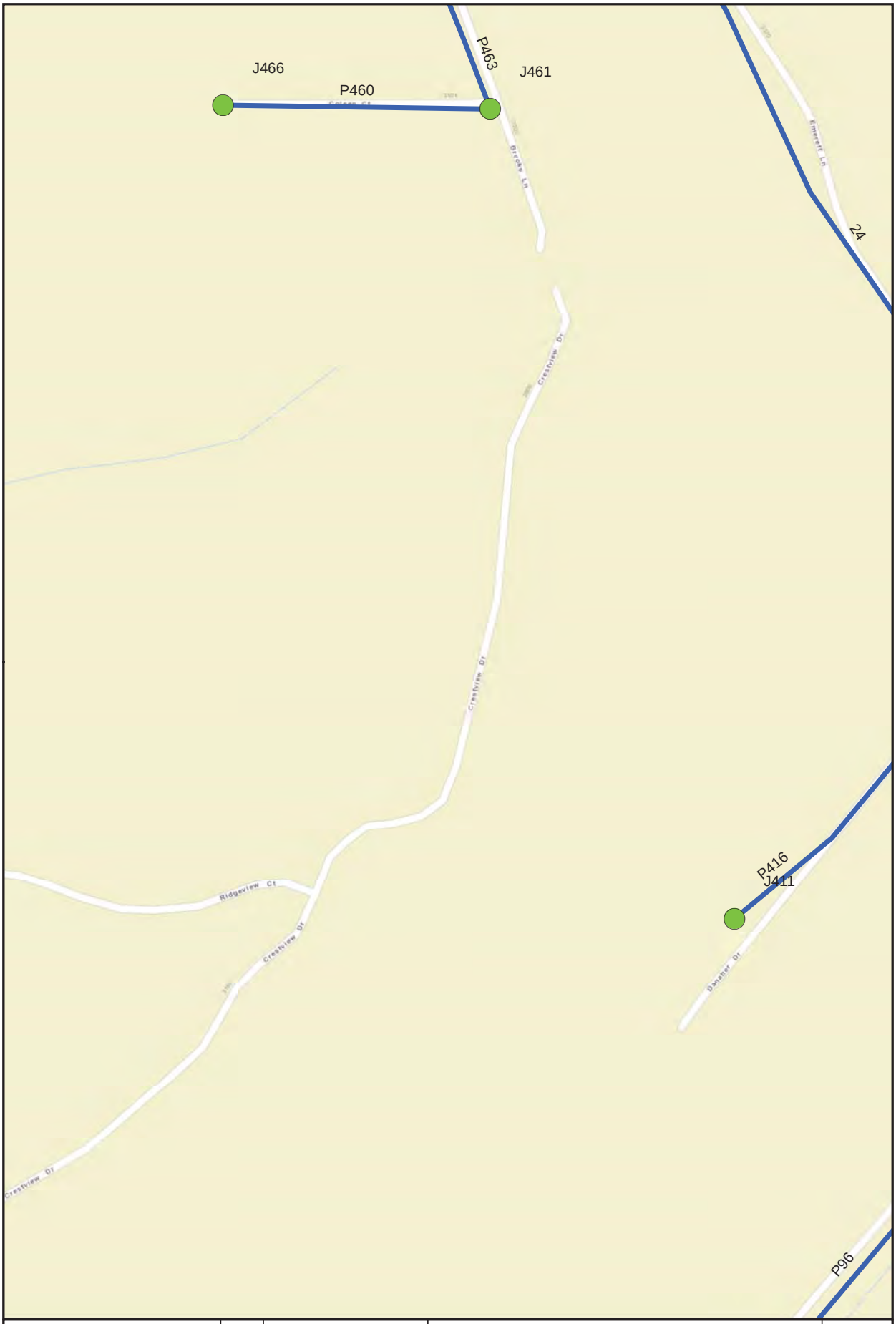

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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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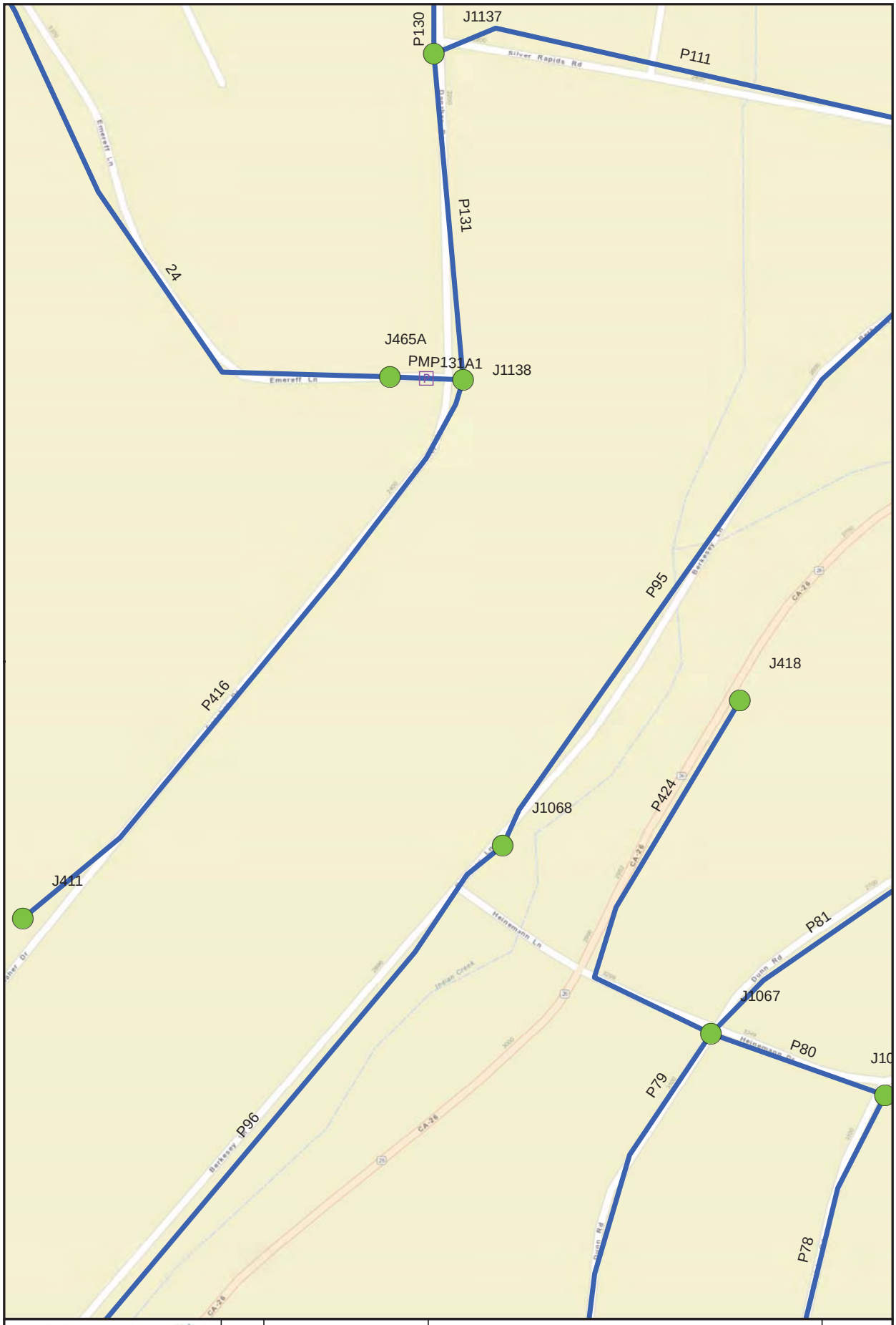

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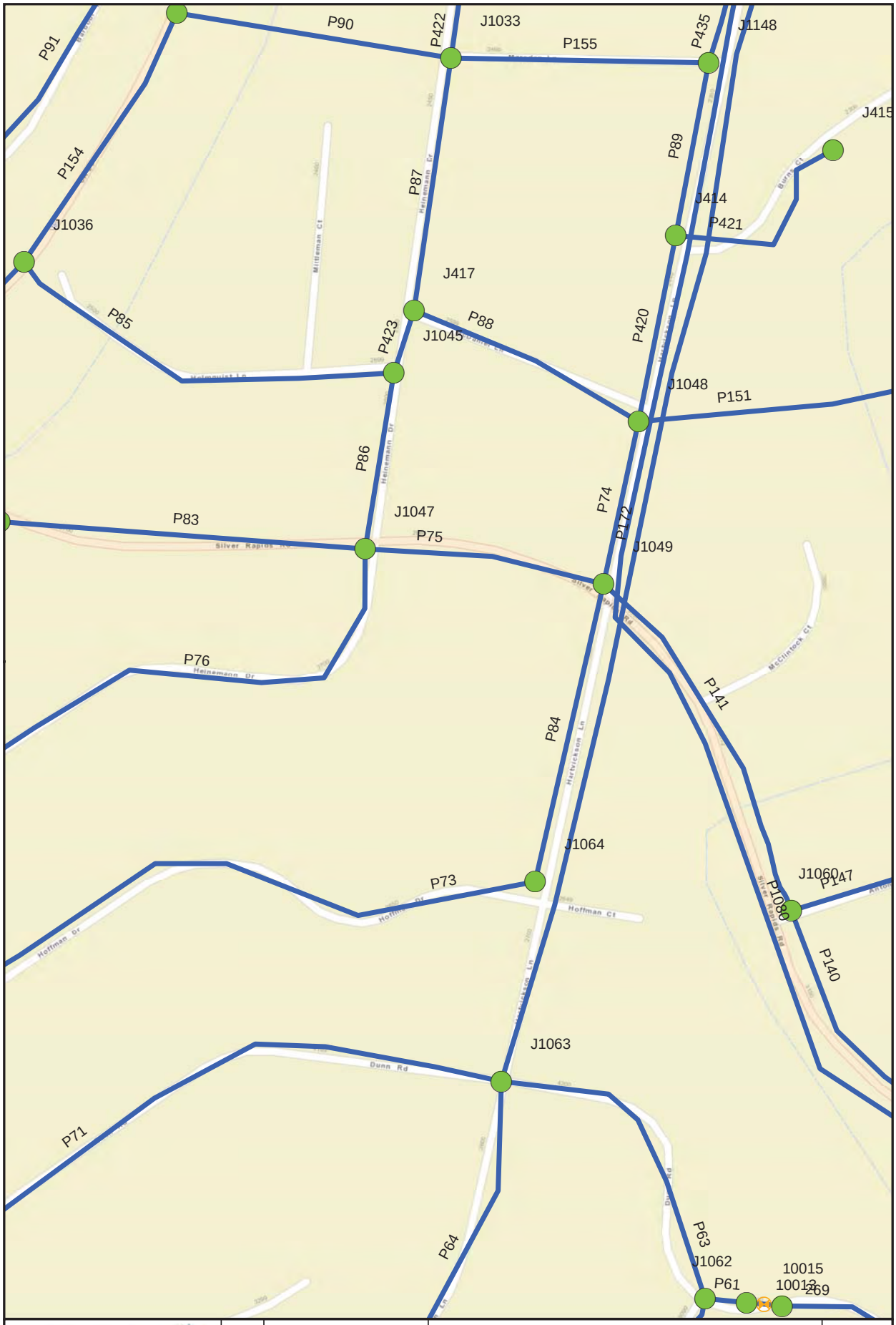

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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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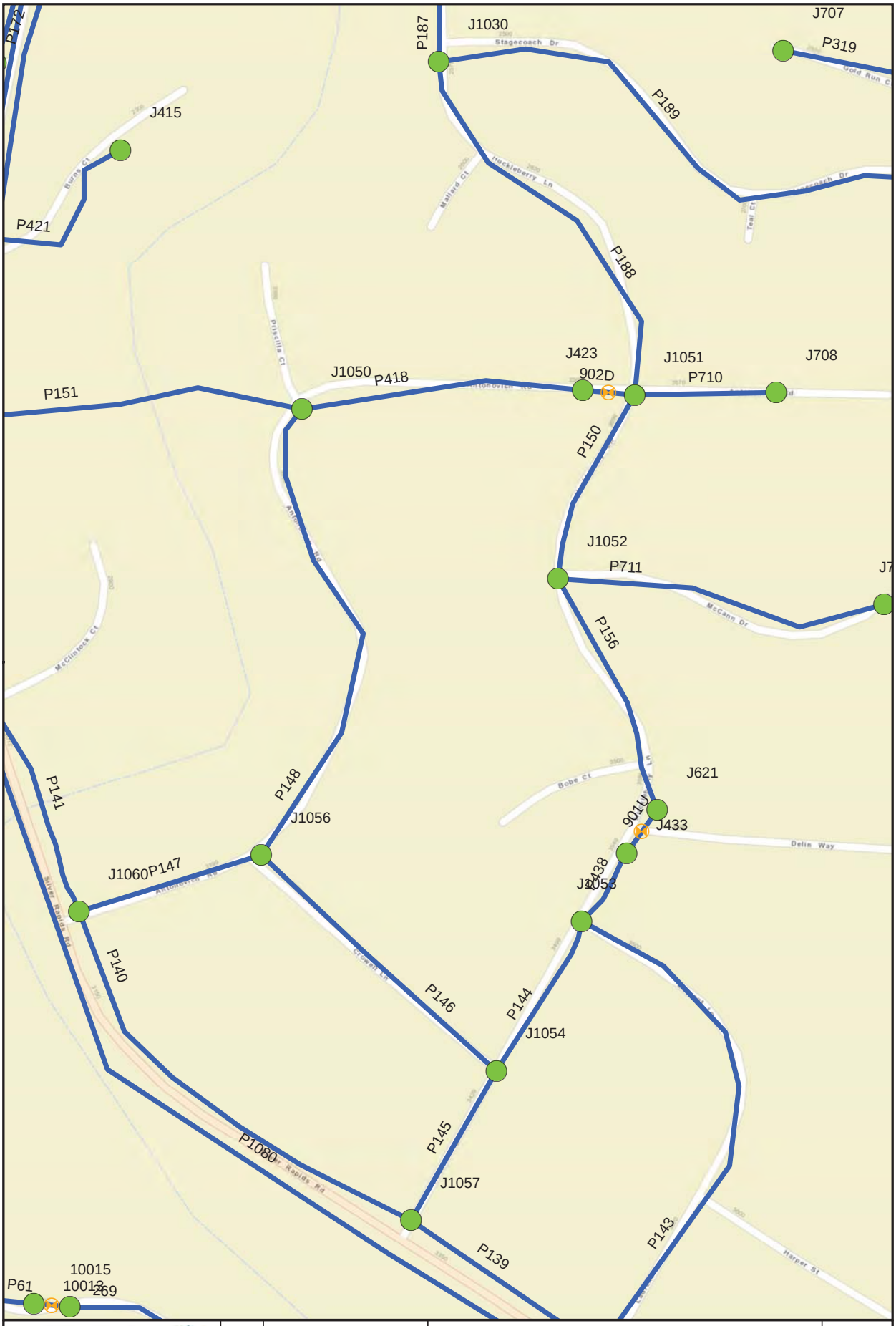

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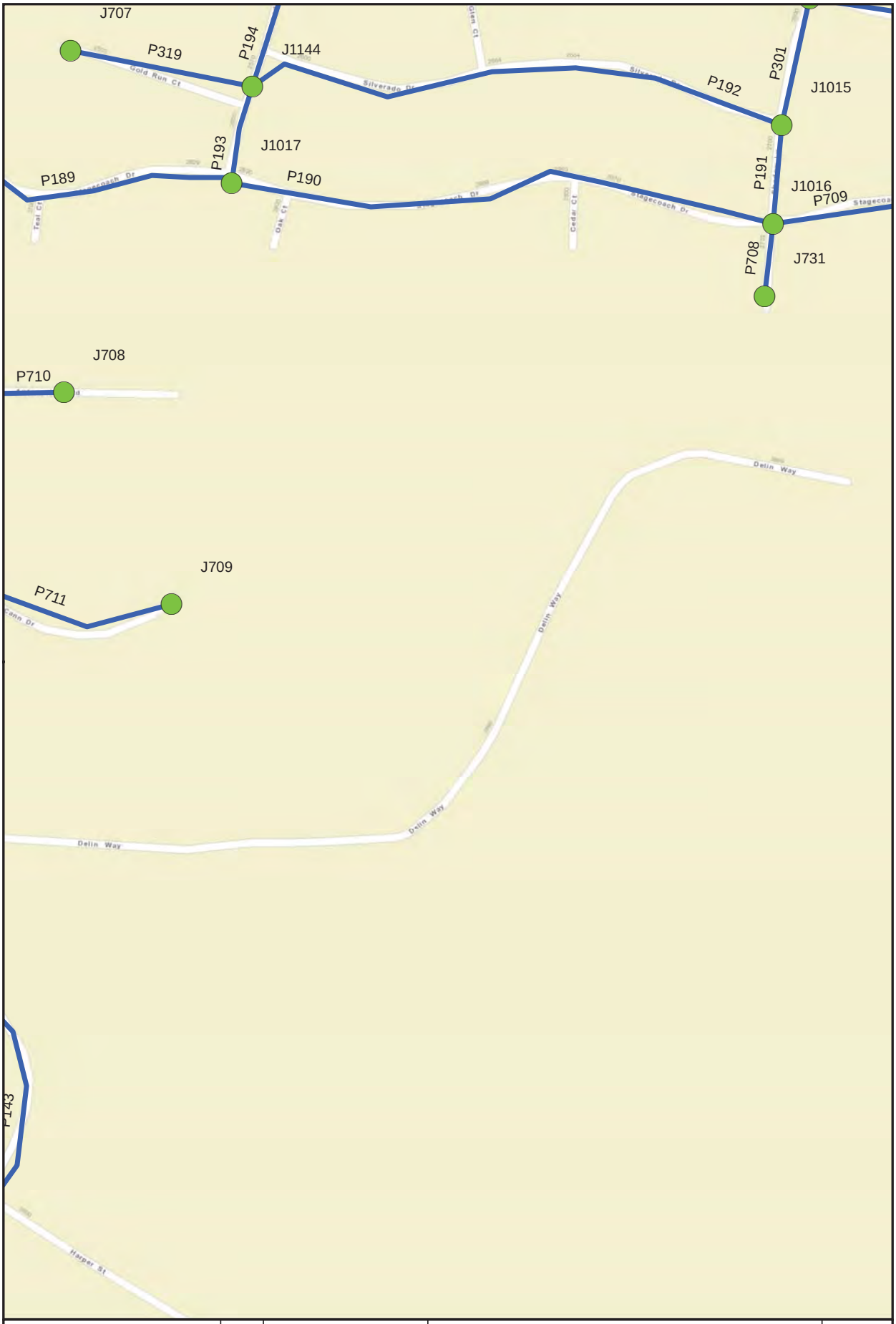

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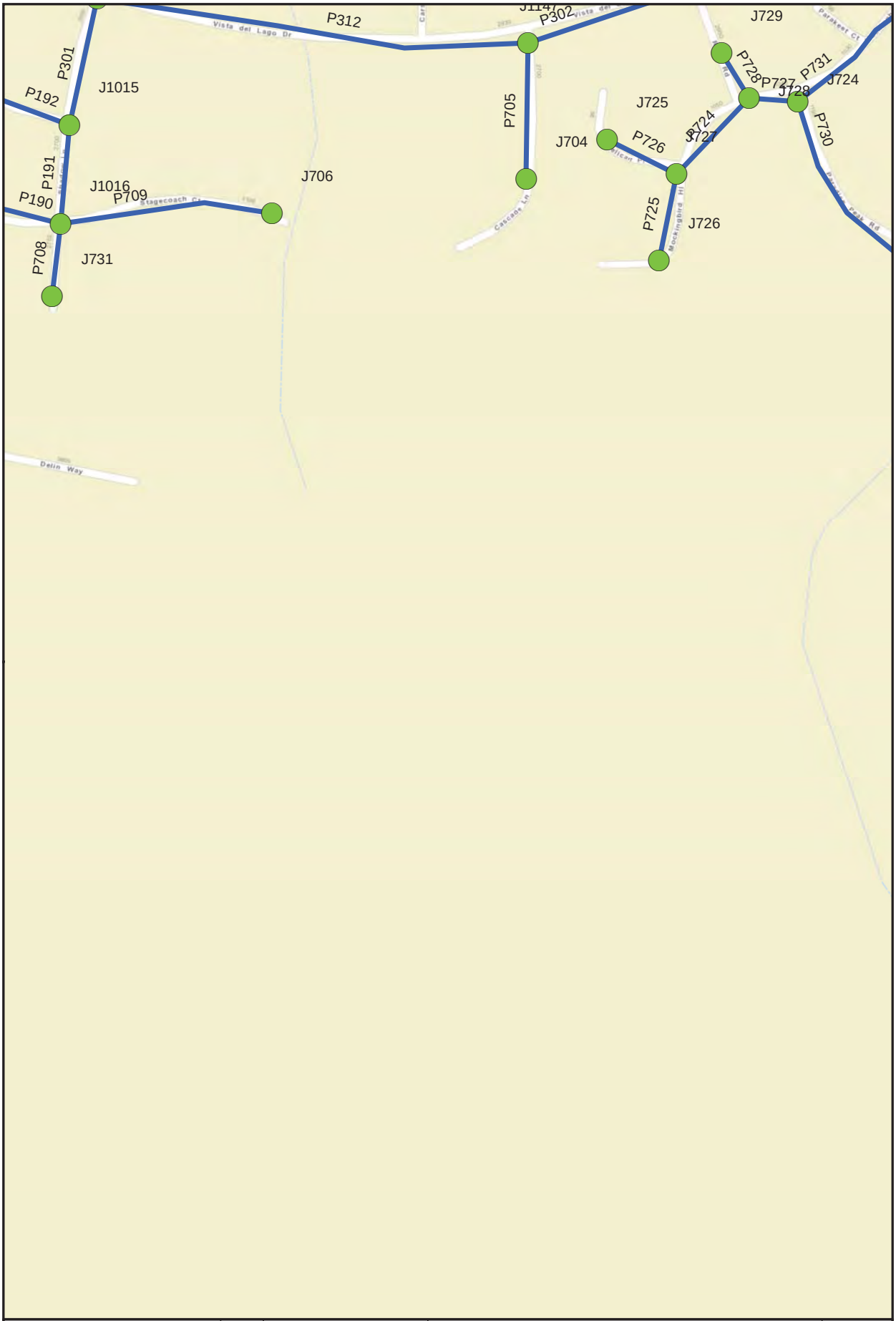

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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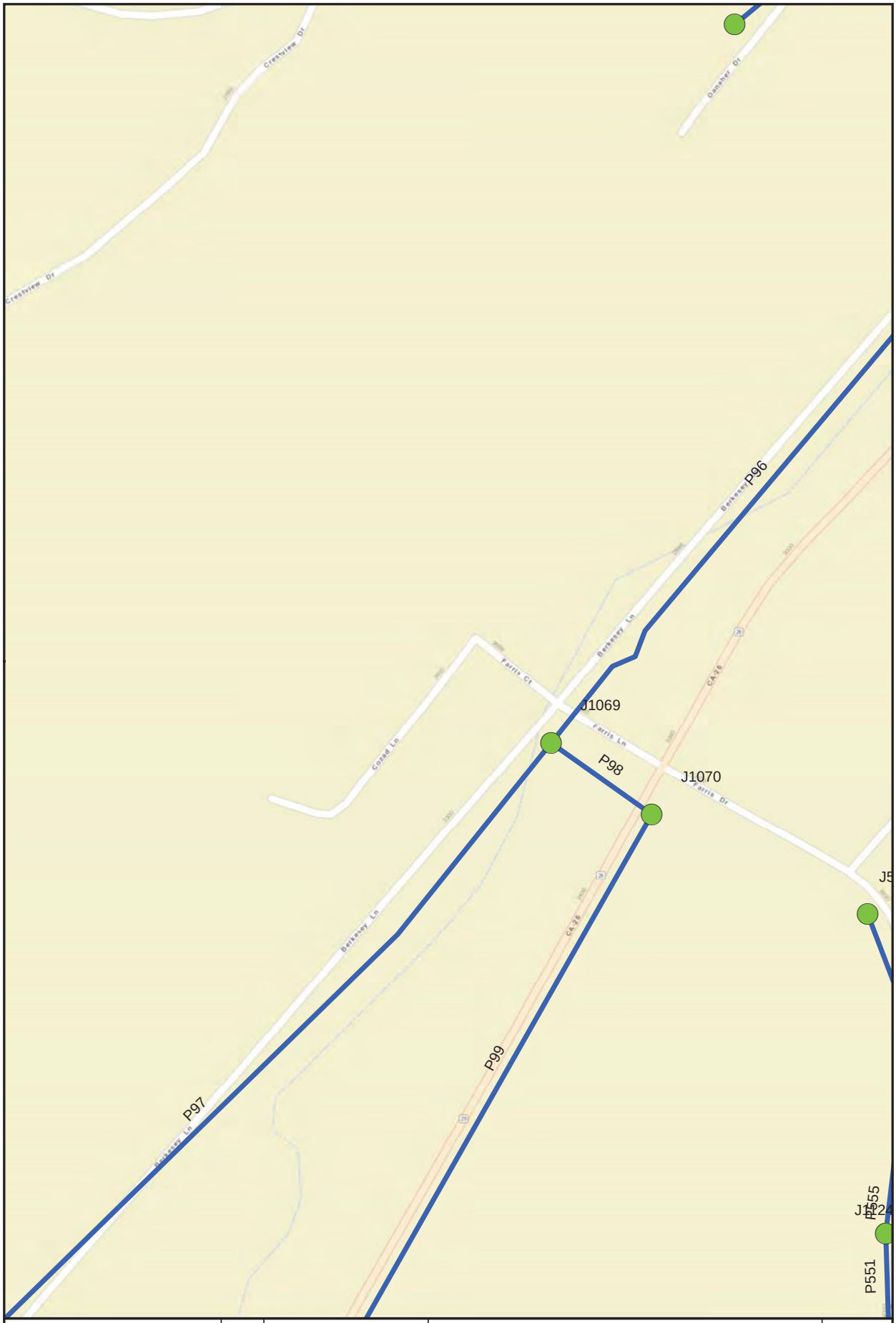

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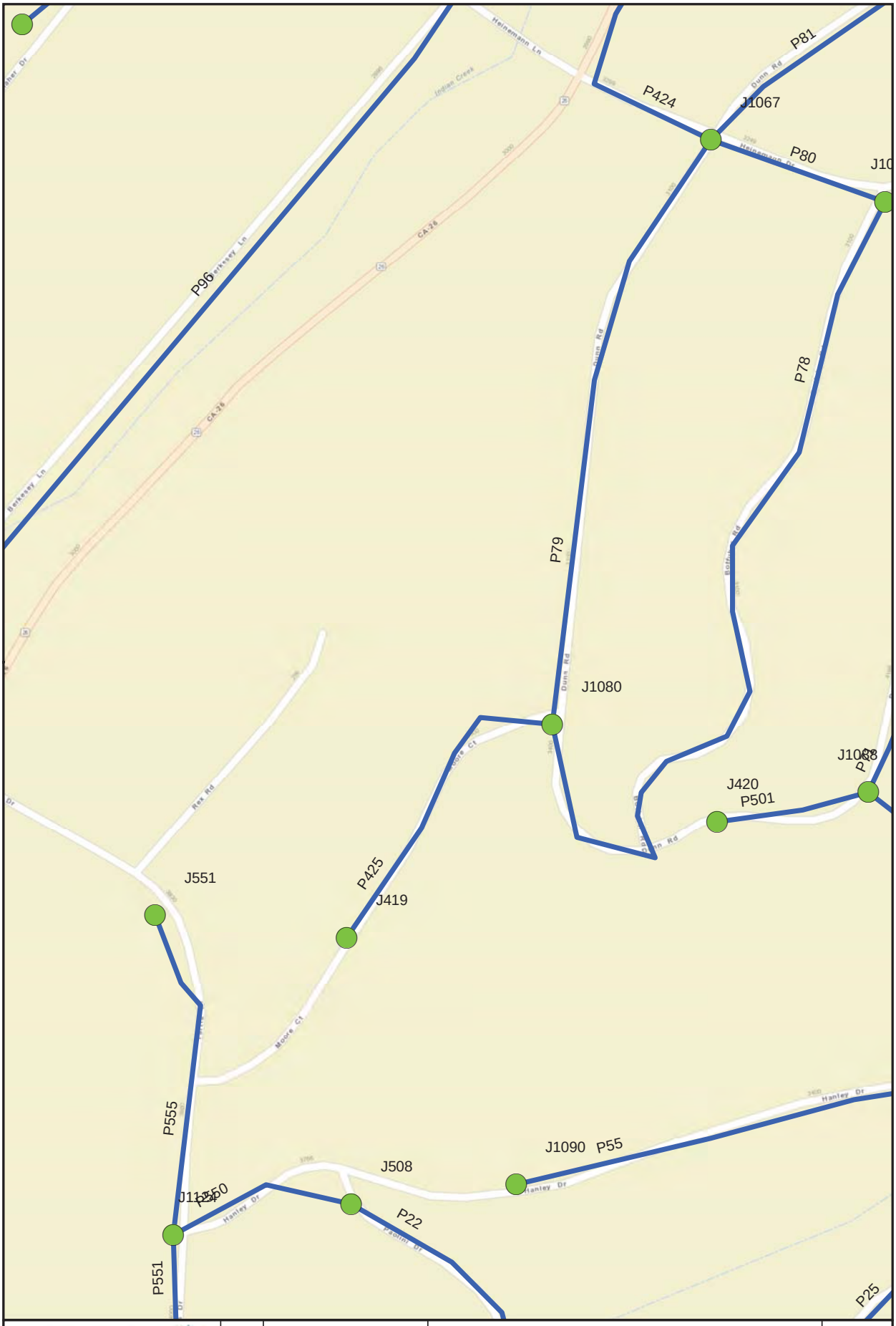

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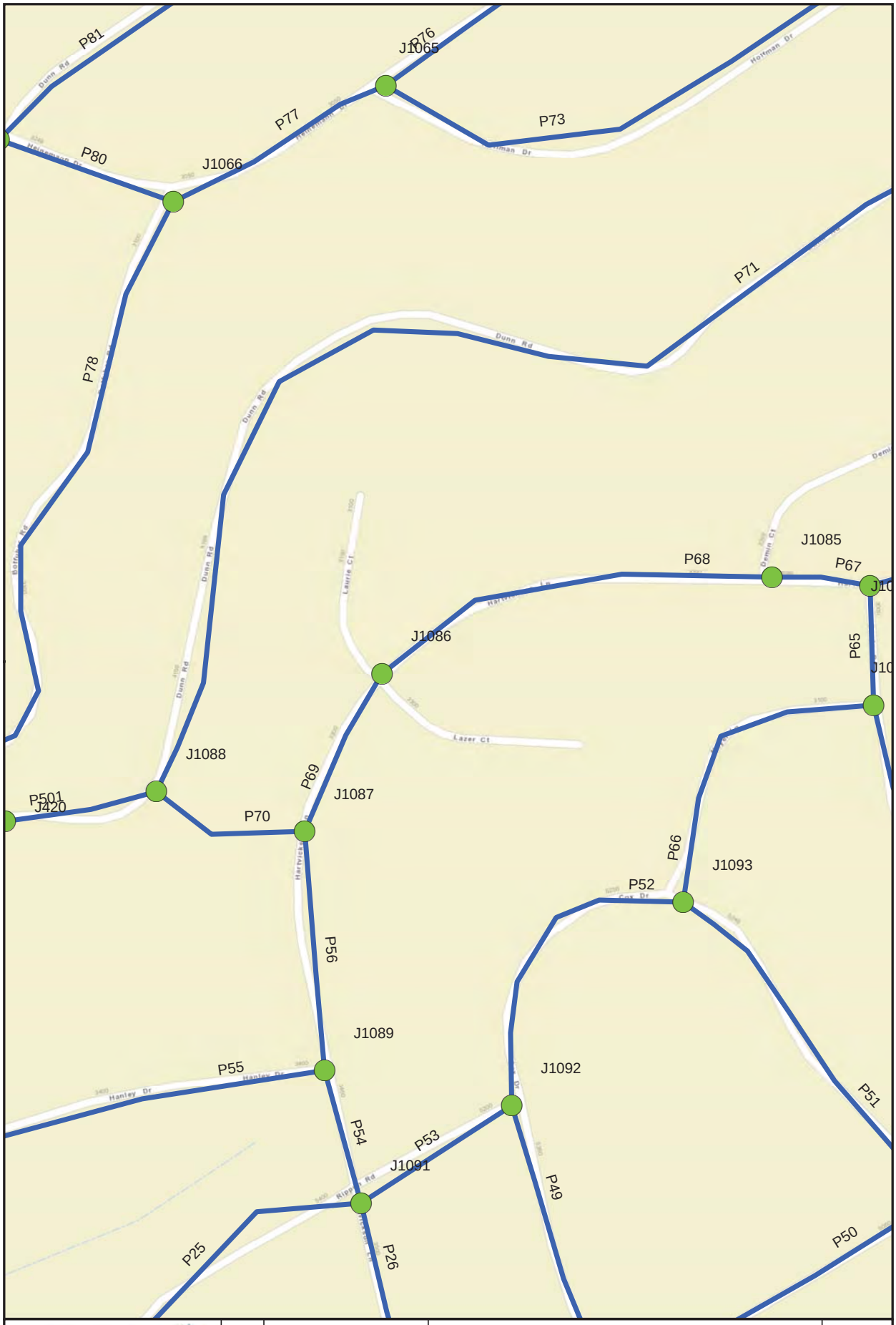

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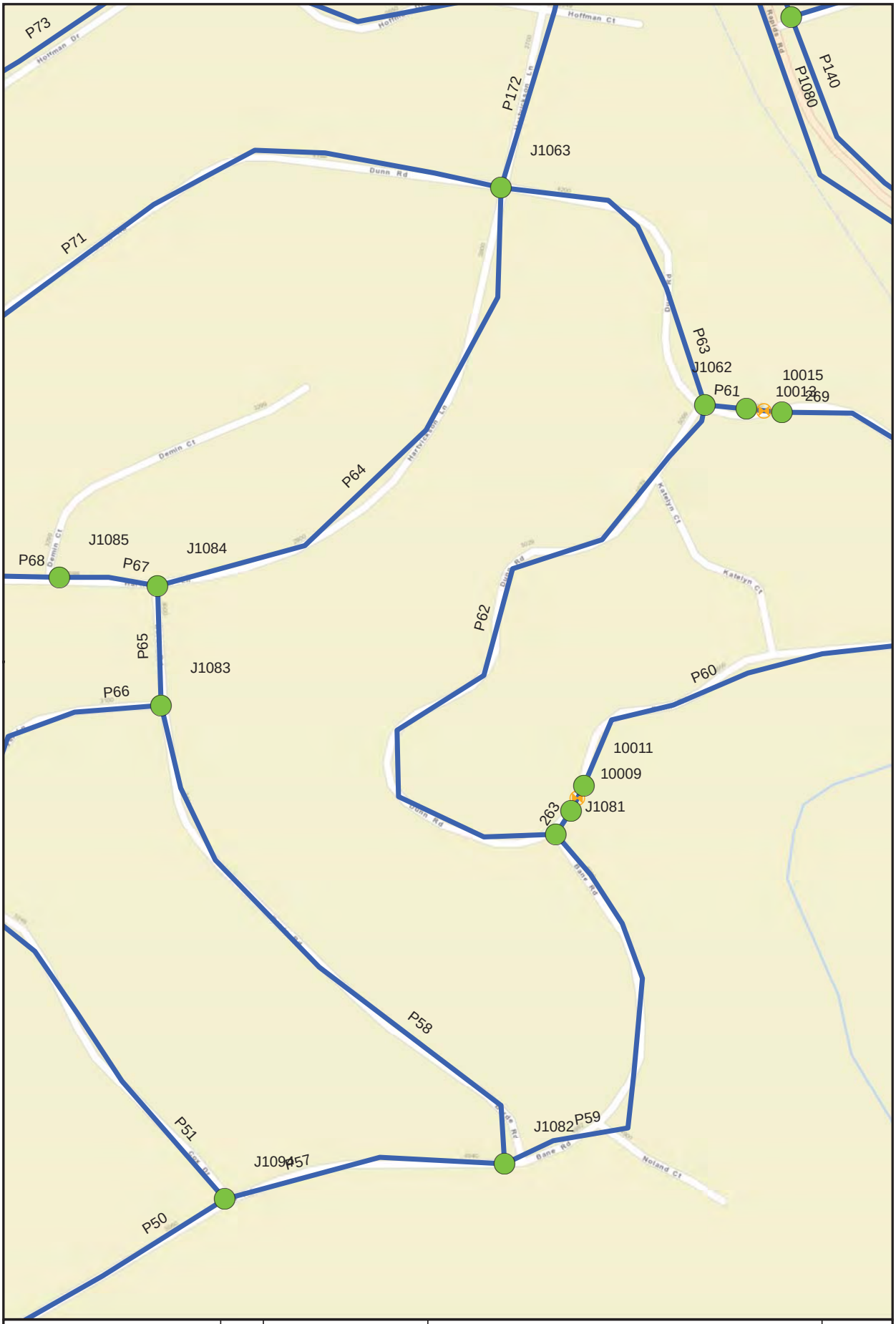

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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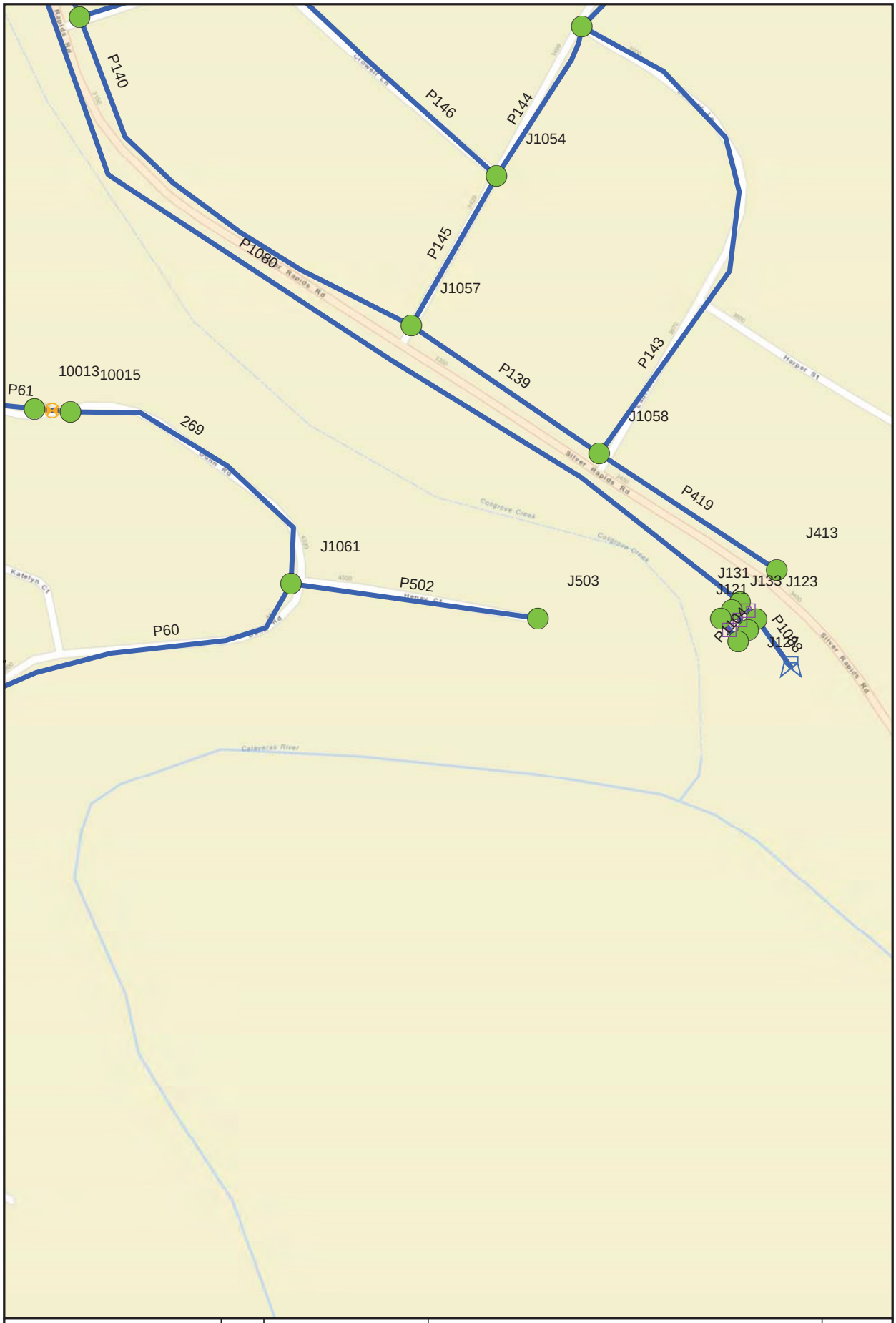

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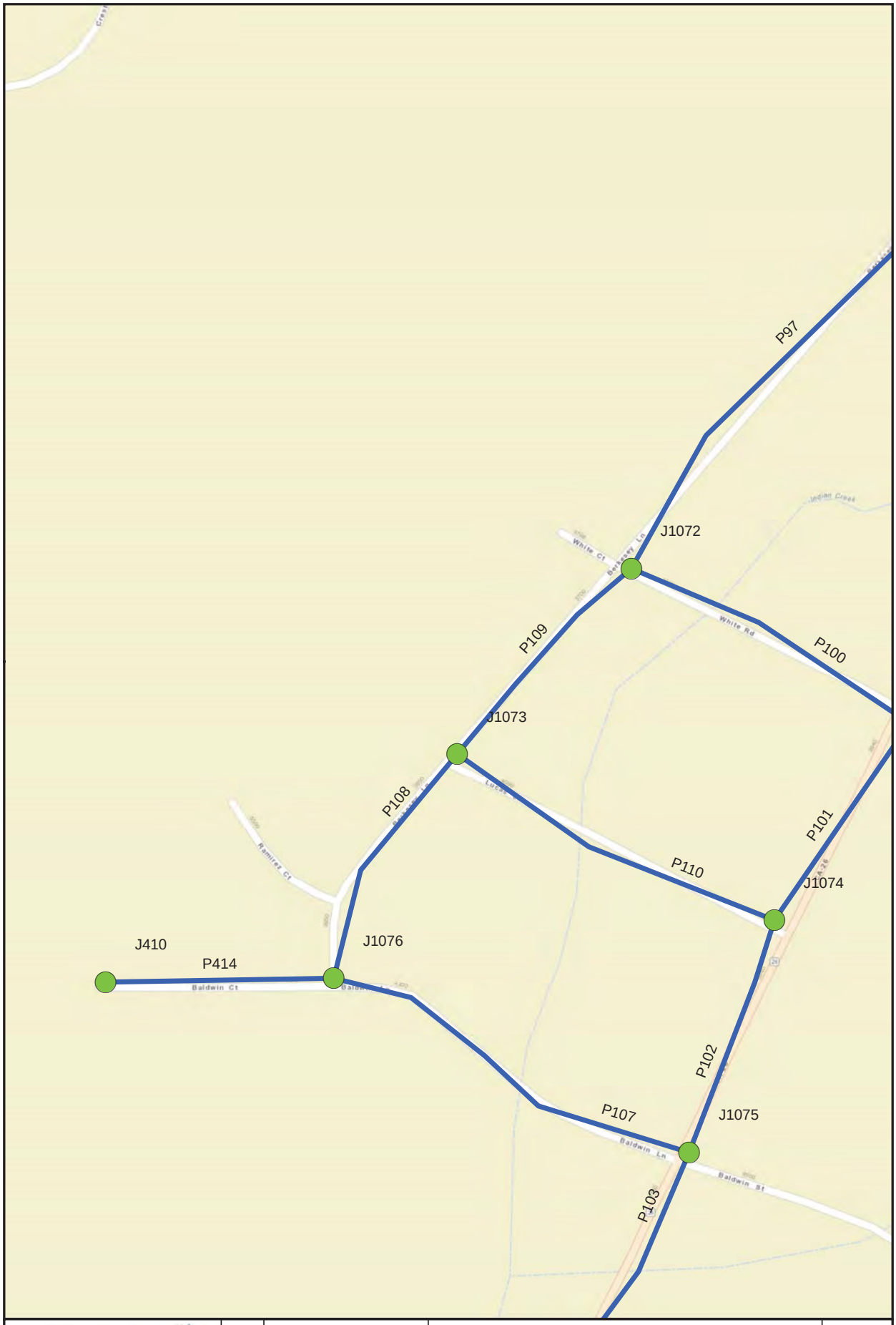

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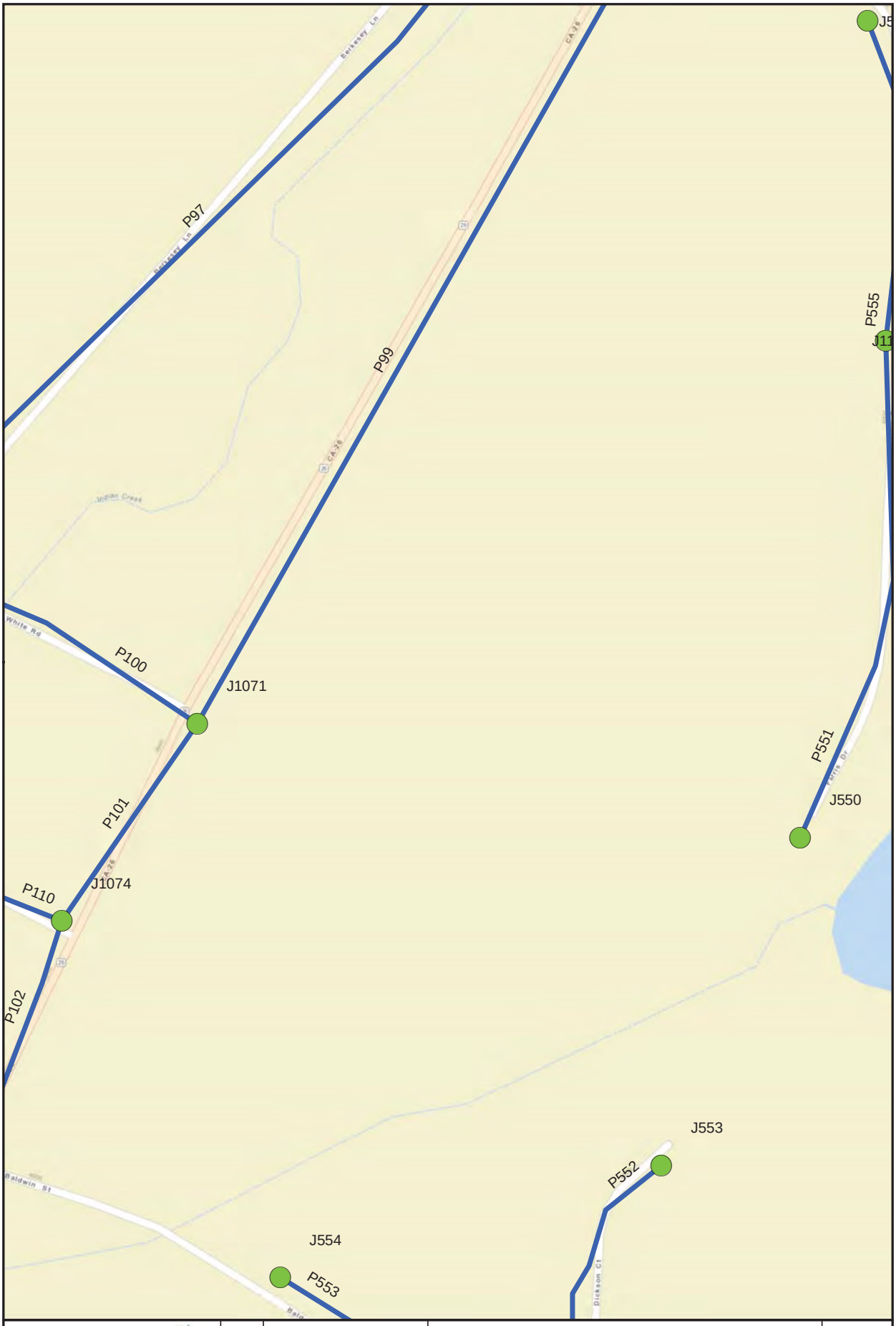
	No Scale	2017 Jenny Lind Water Master Plan	PAGE ID
		System Map	G7



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	No Scale	2017 Jenny Lind Water Master Plan	PAGE ID
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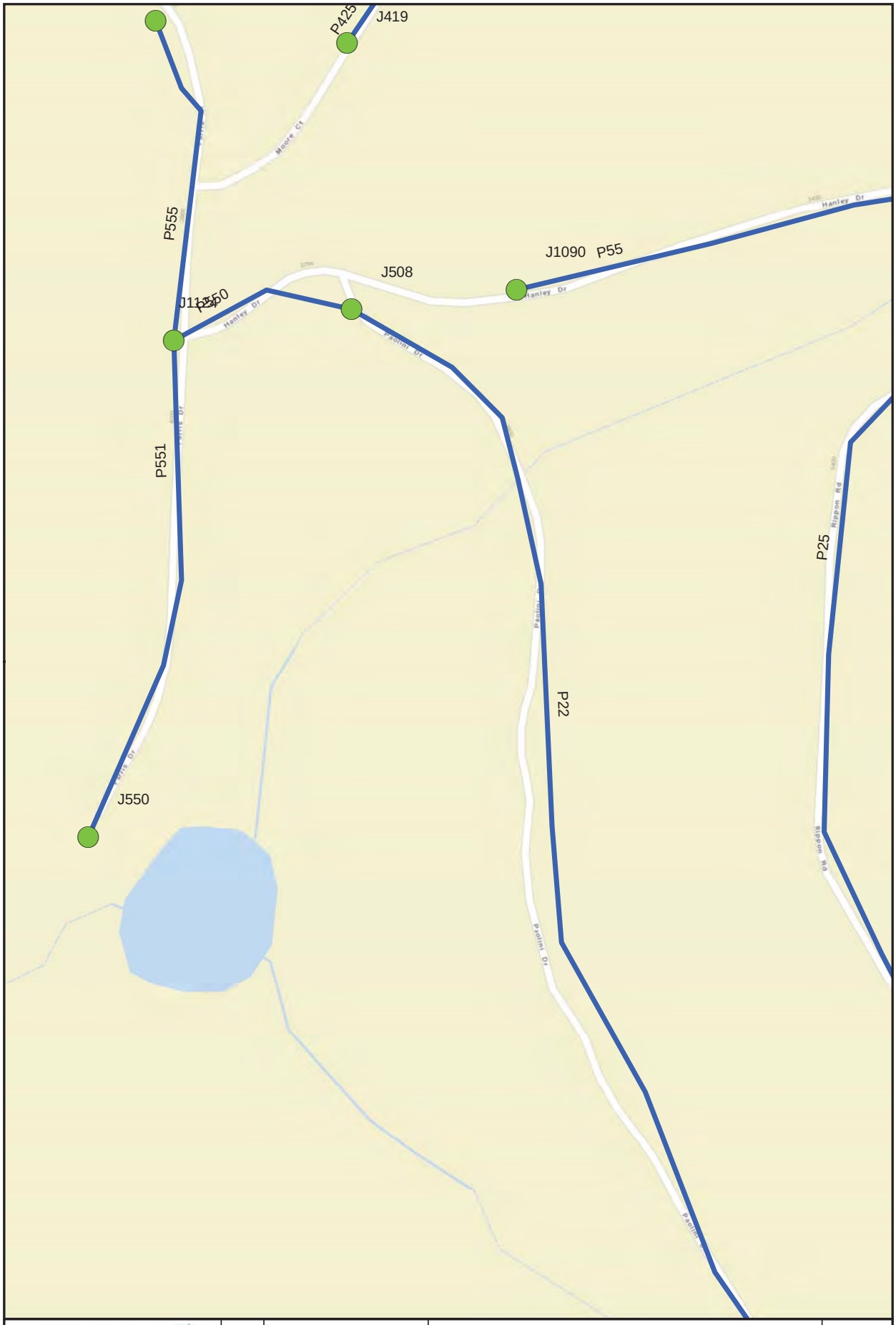

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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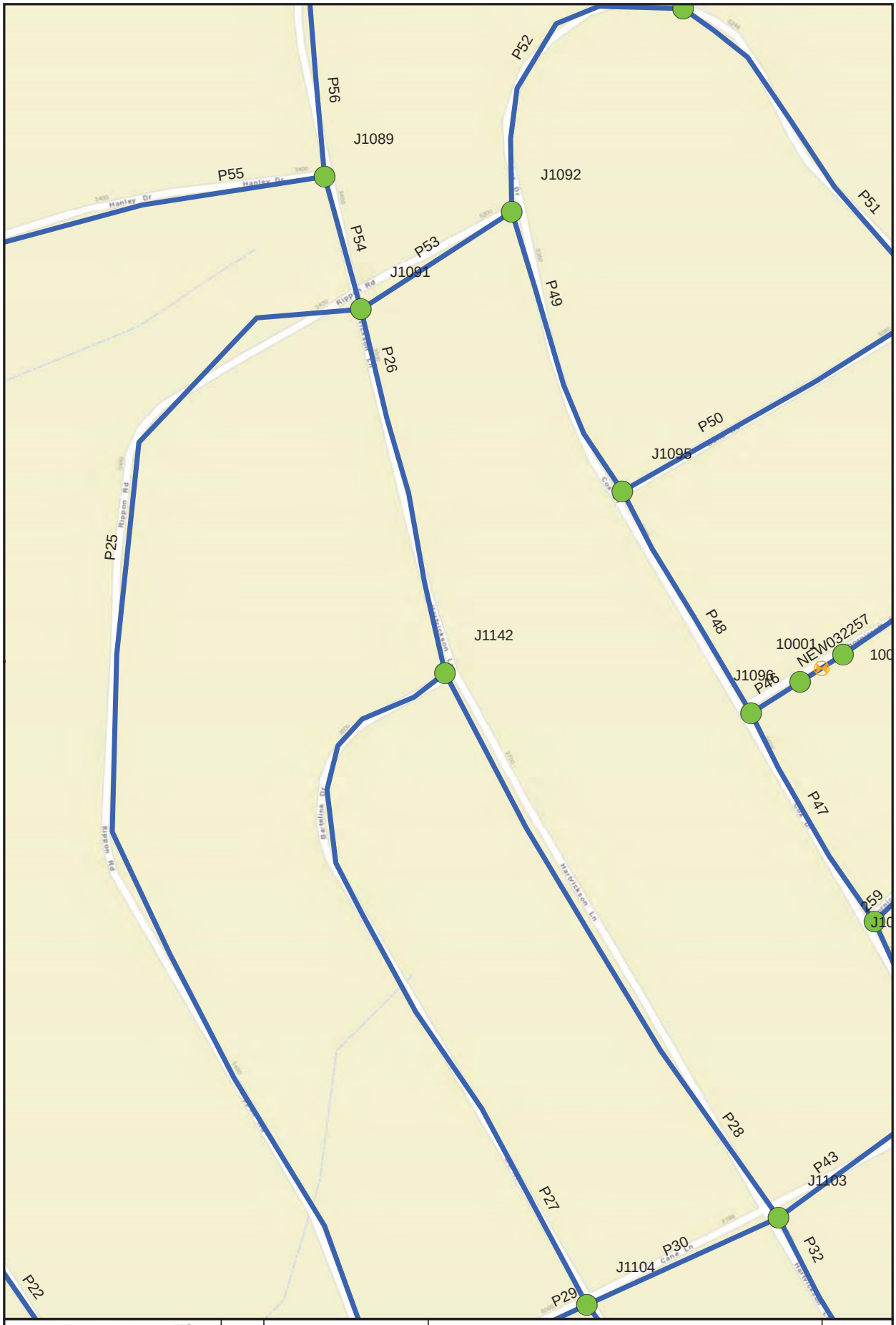

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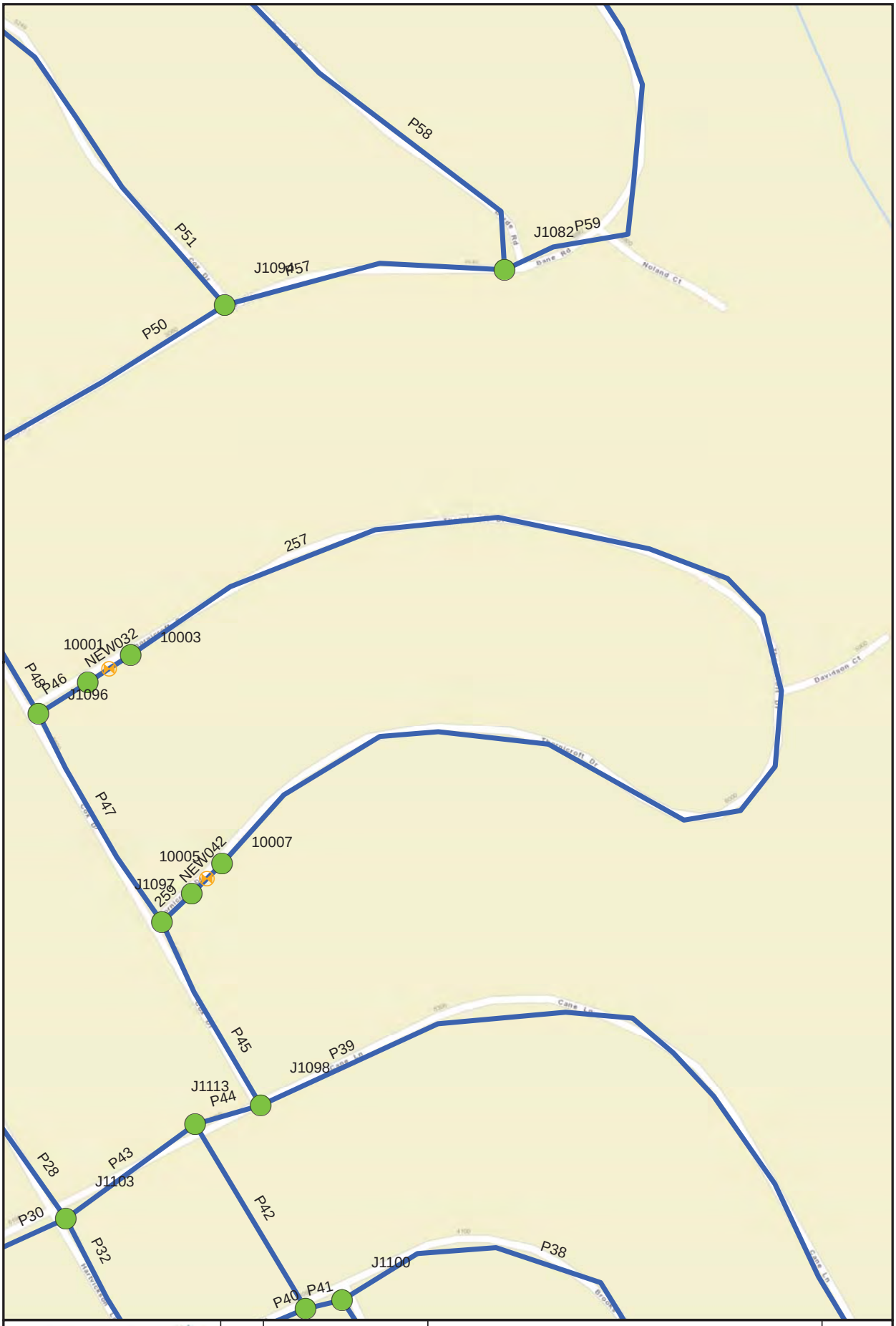

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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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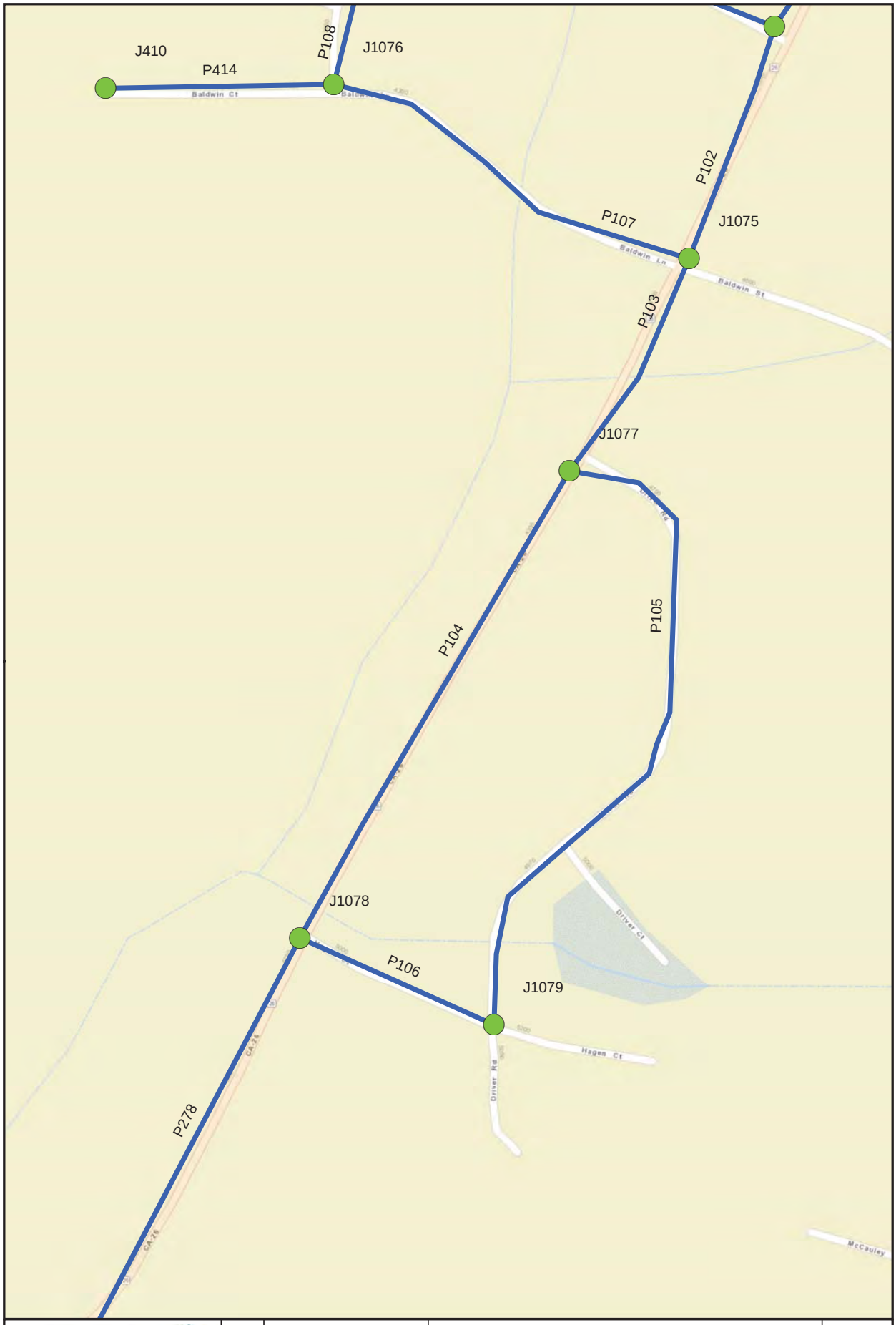

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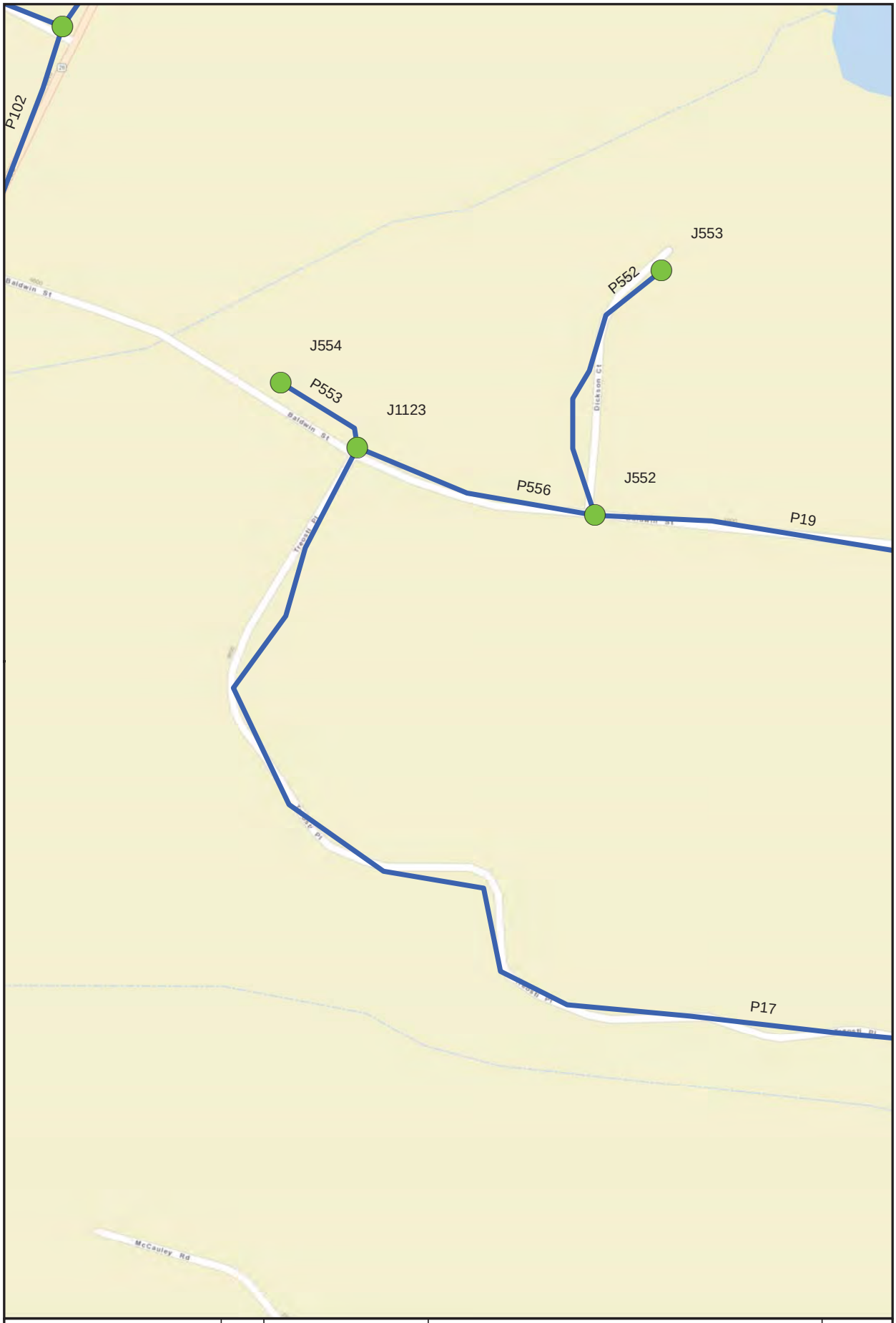

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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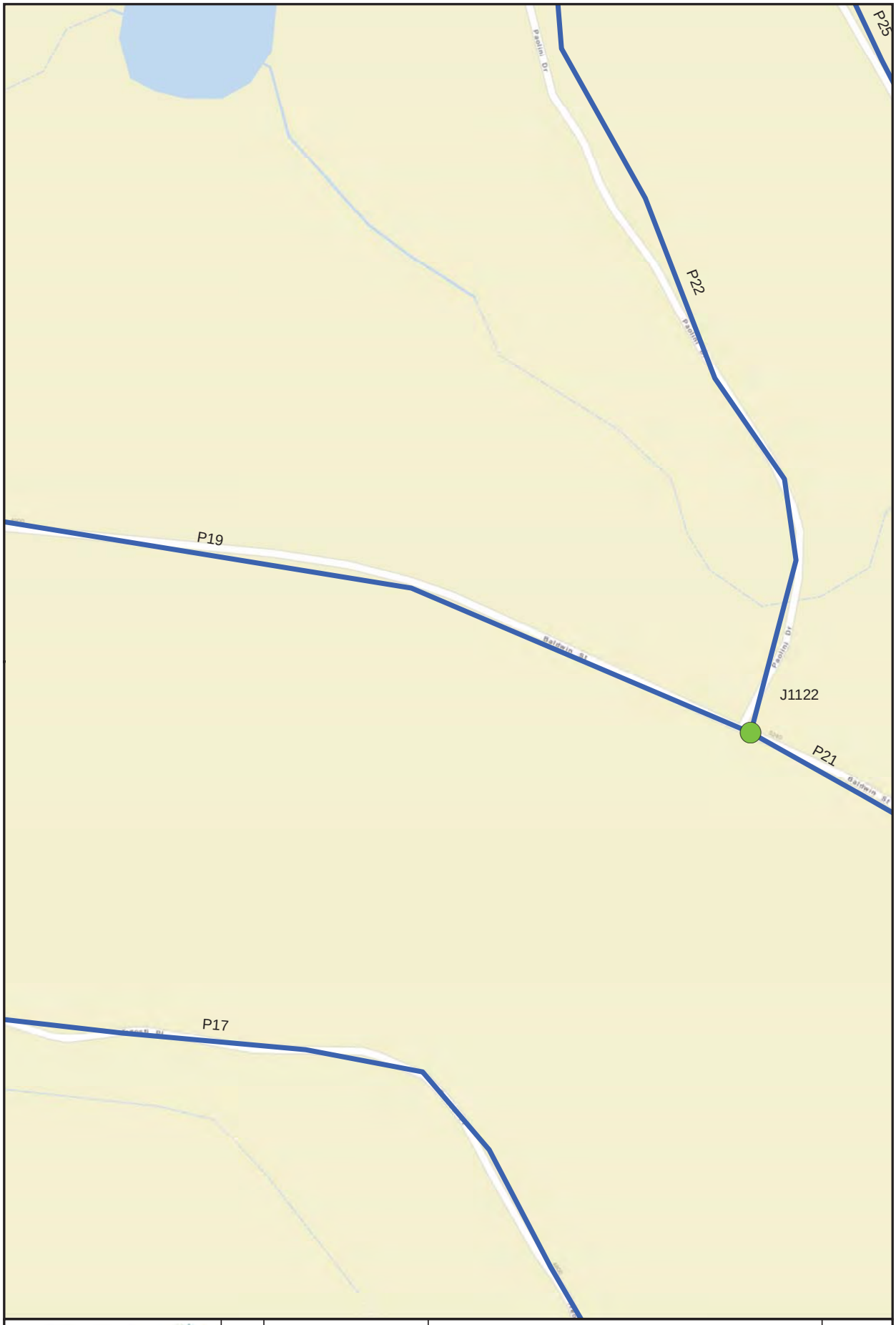

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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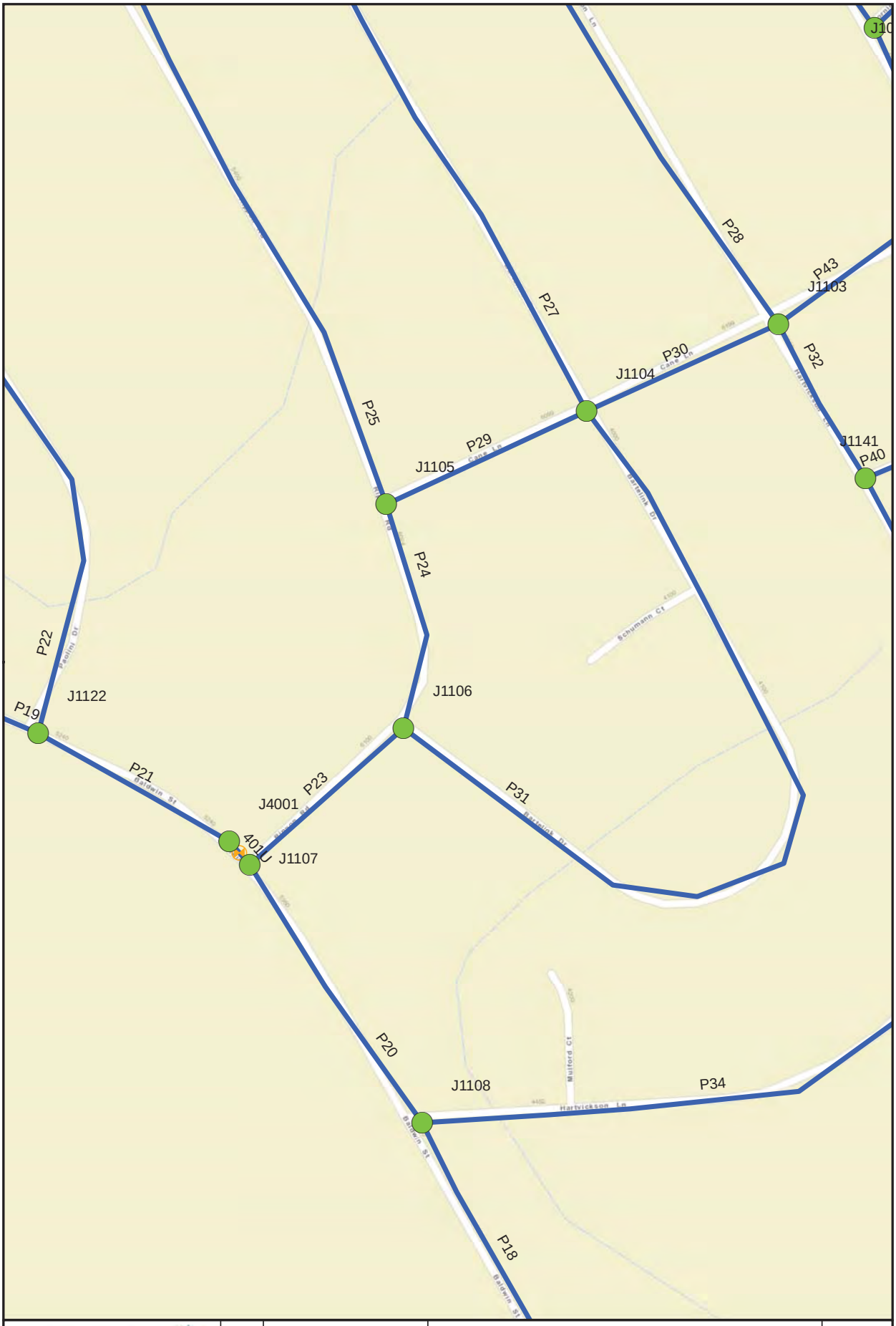

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

H10

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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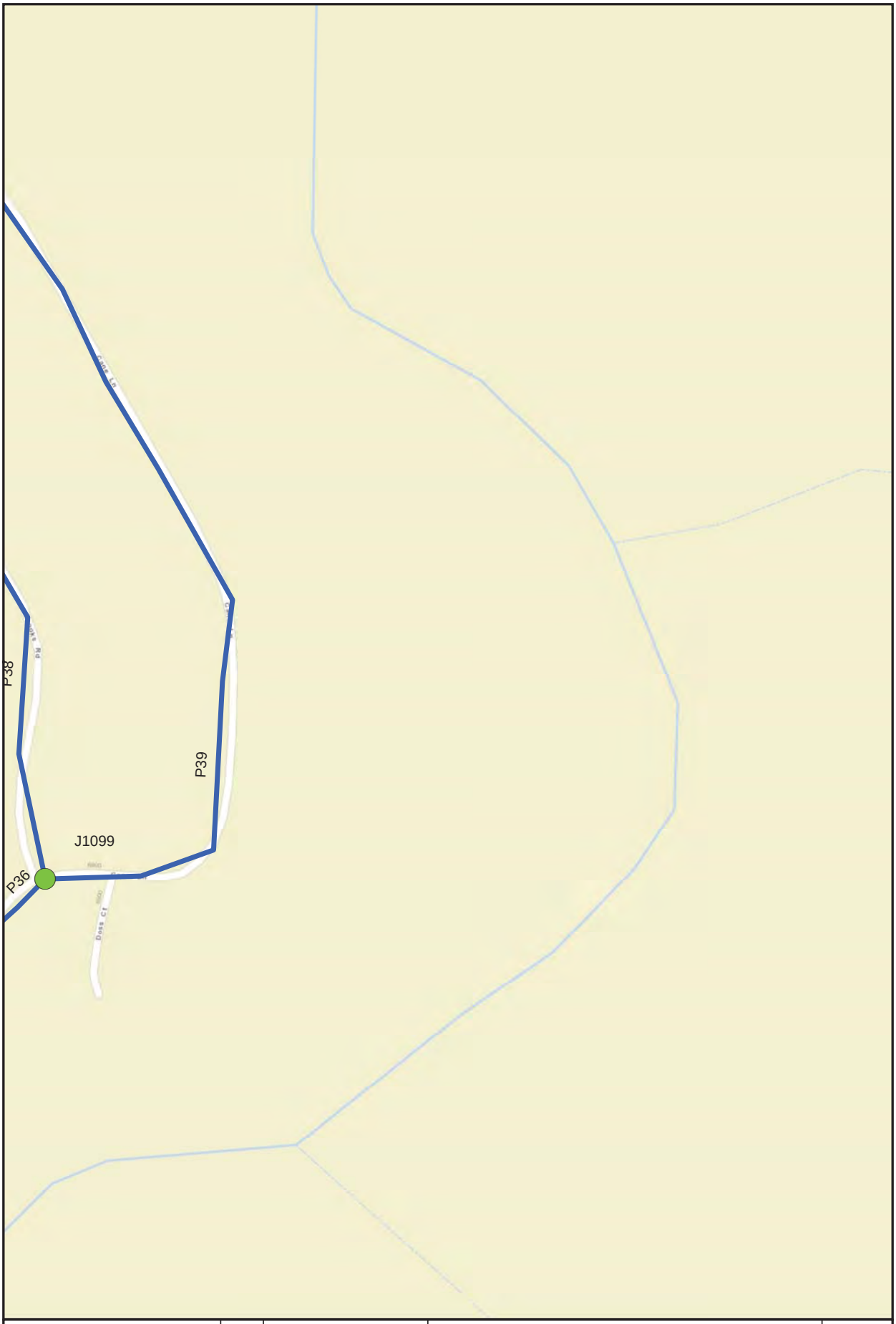

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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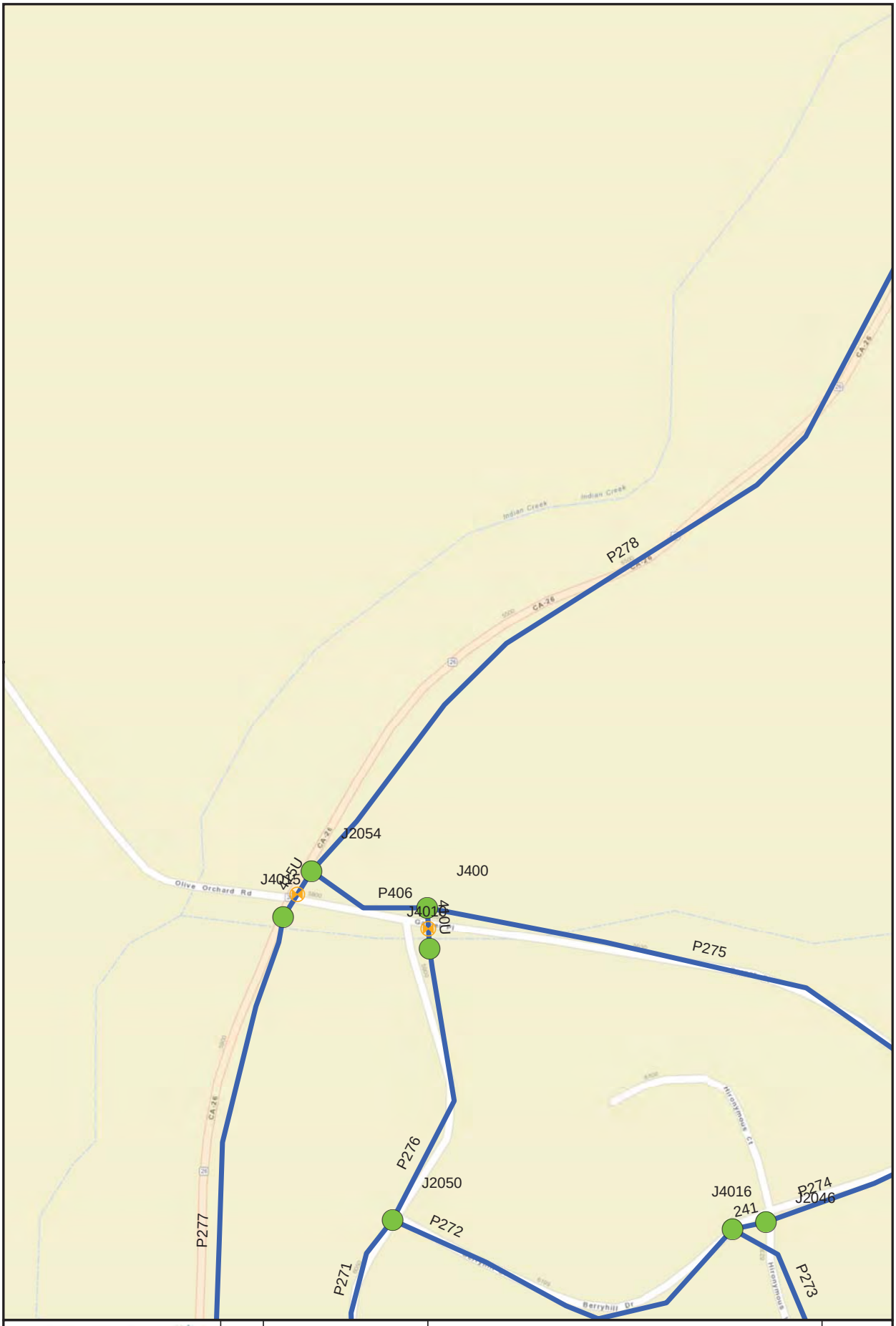

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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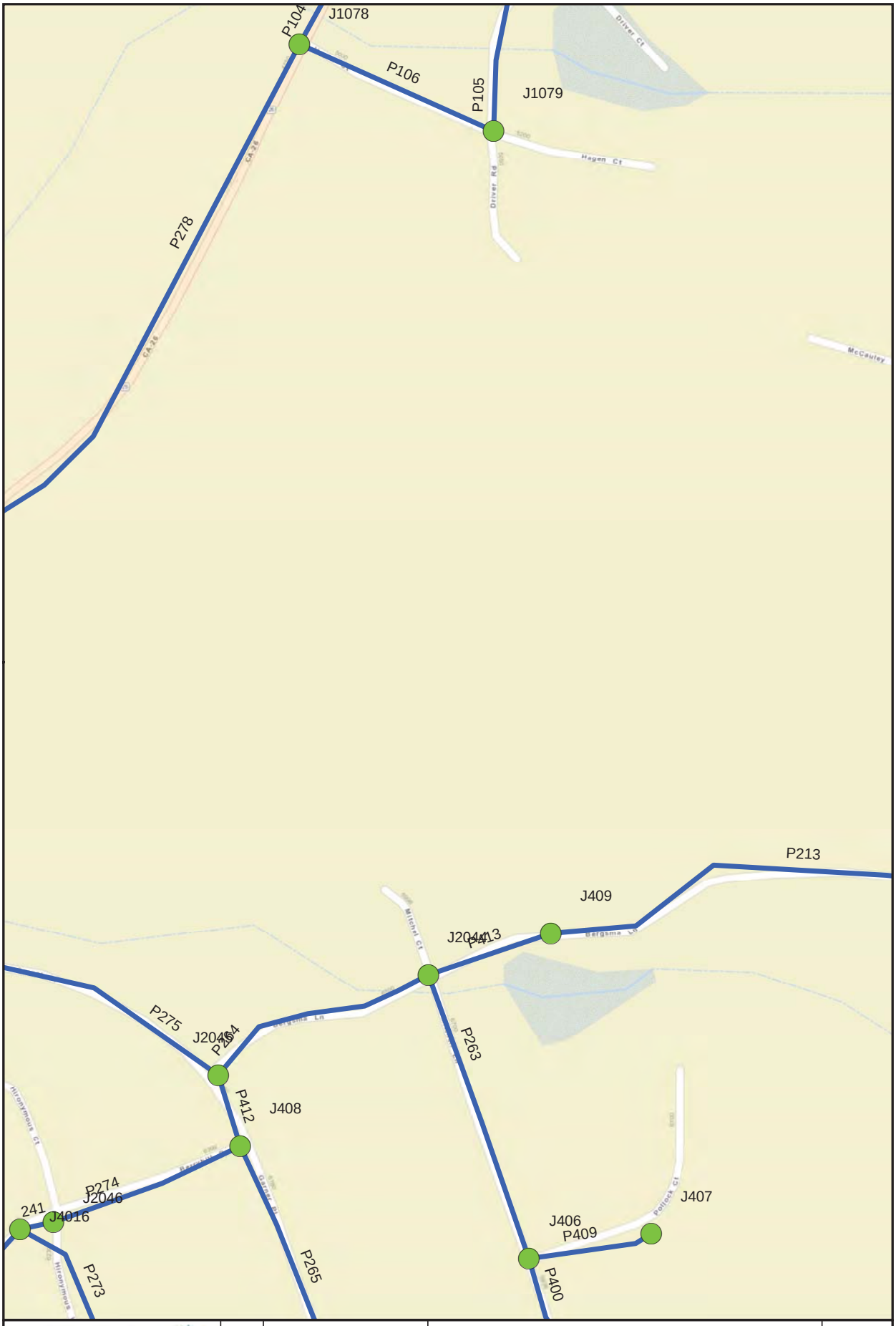

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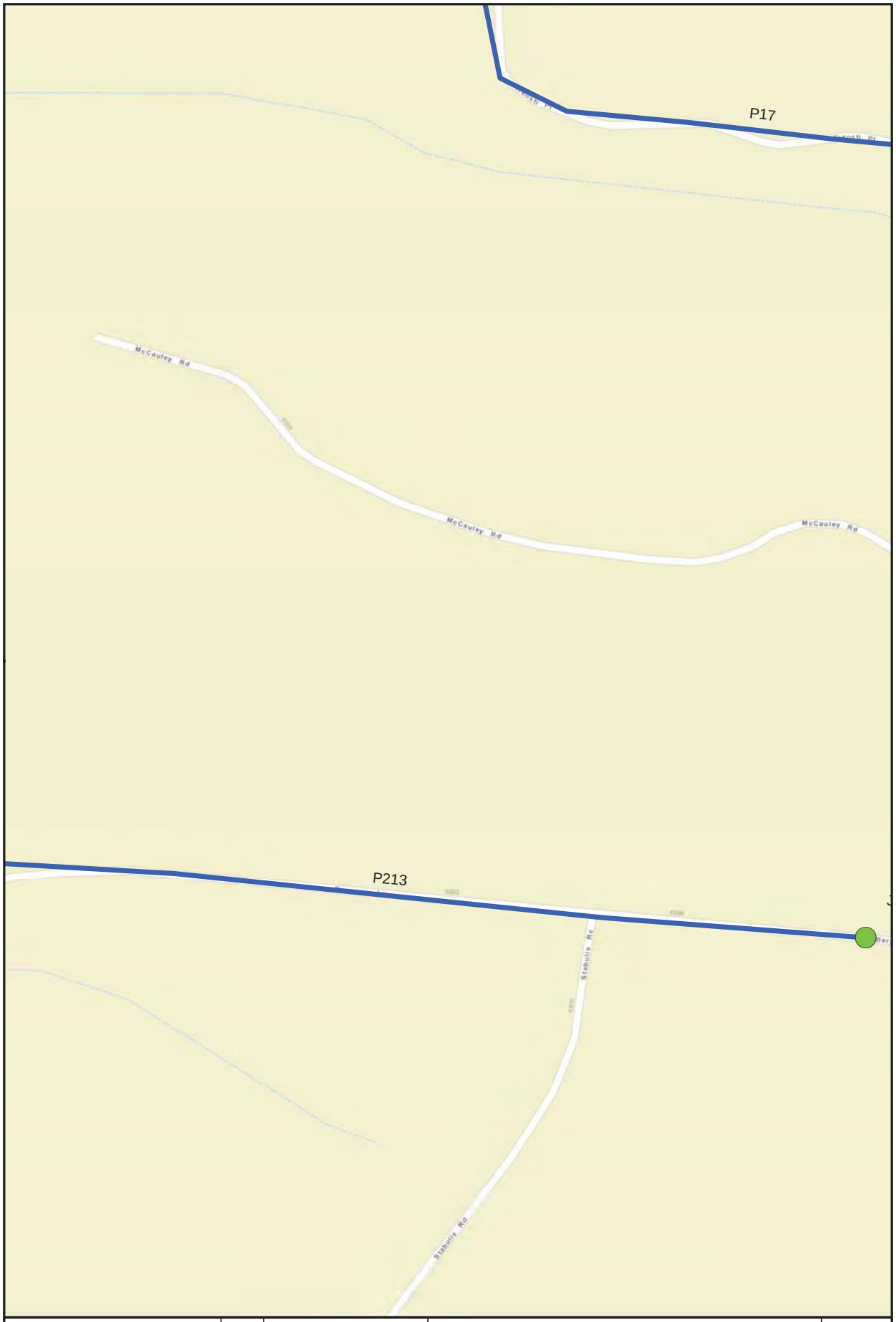

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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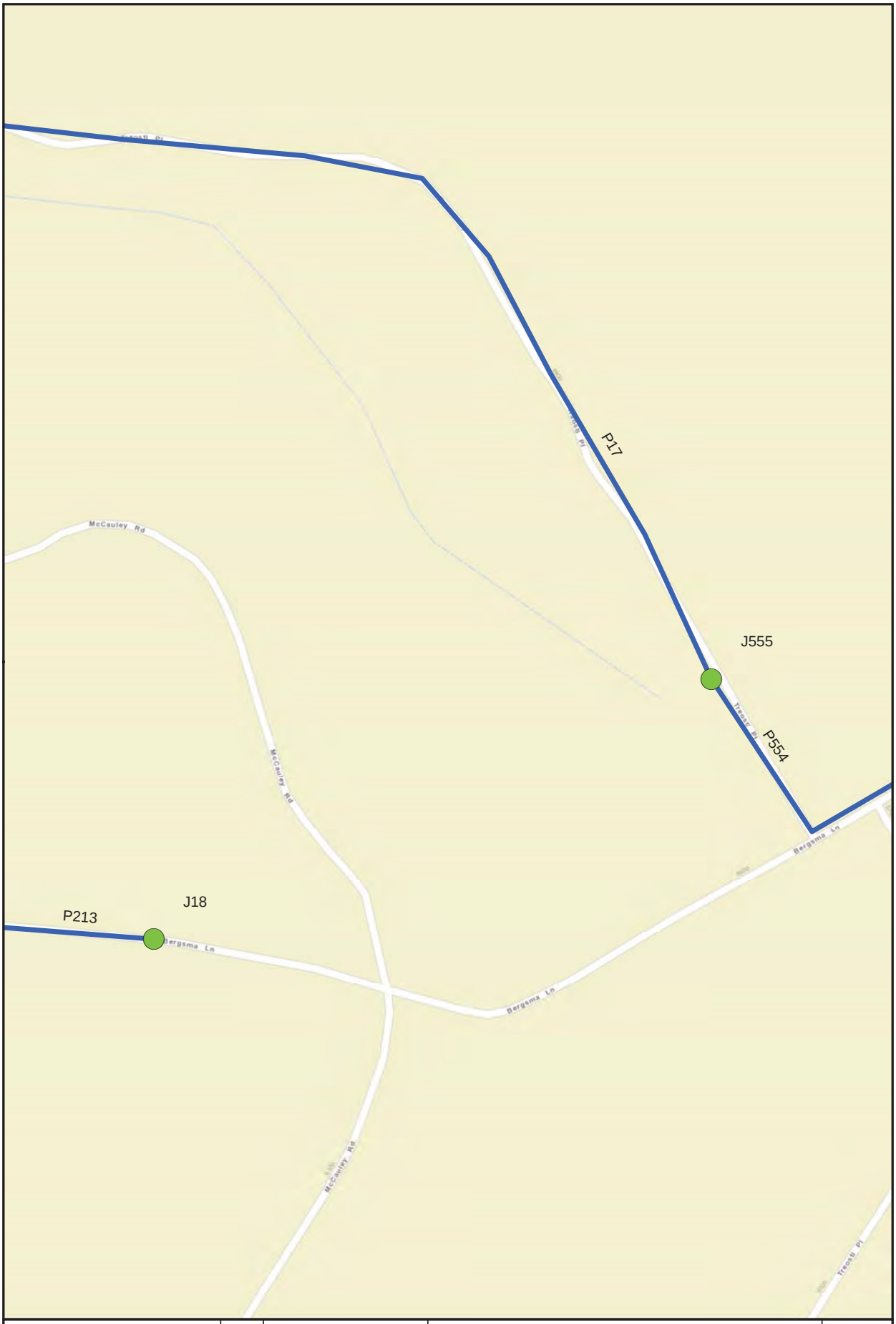

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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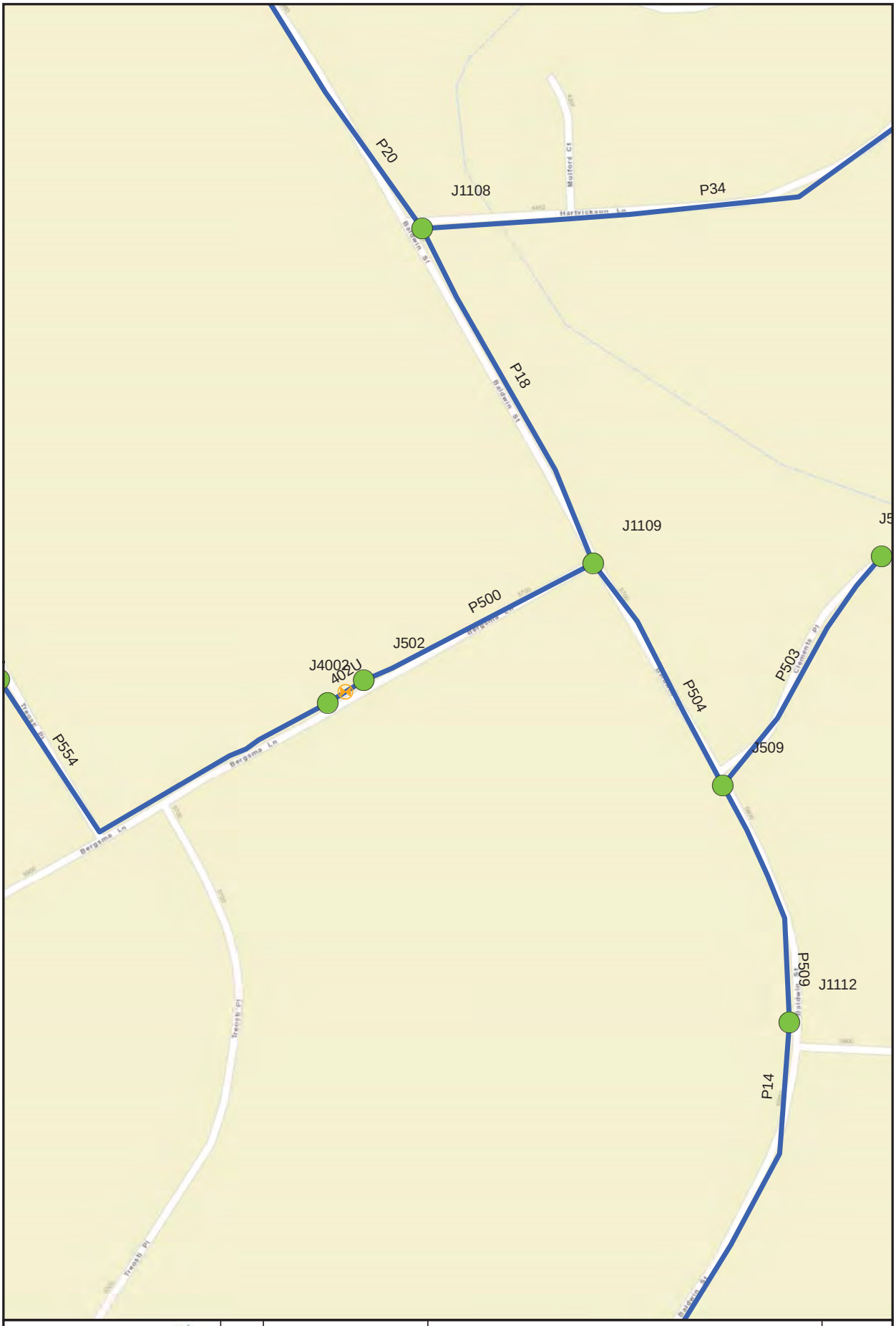

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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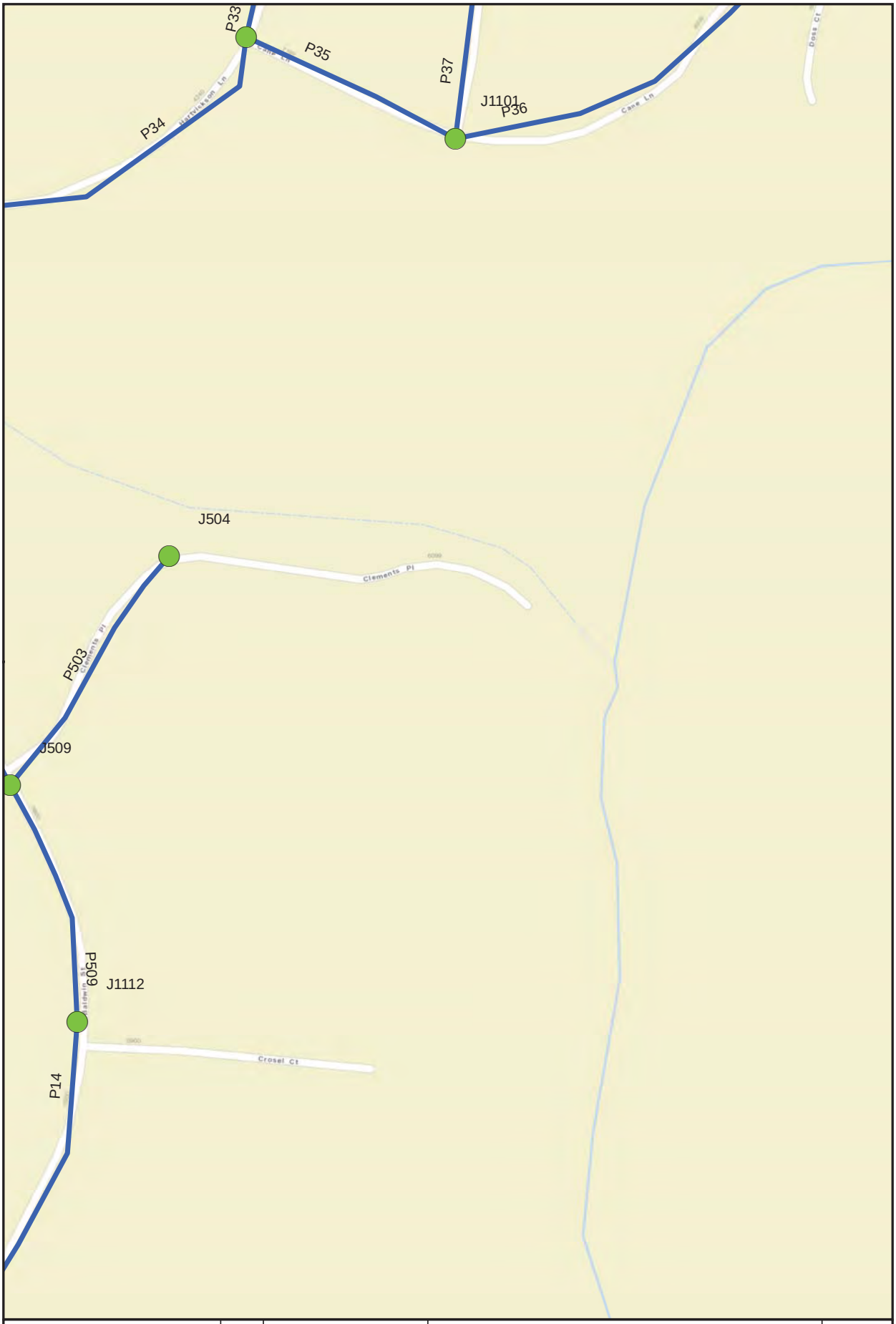

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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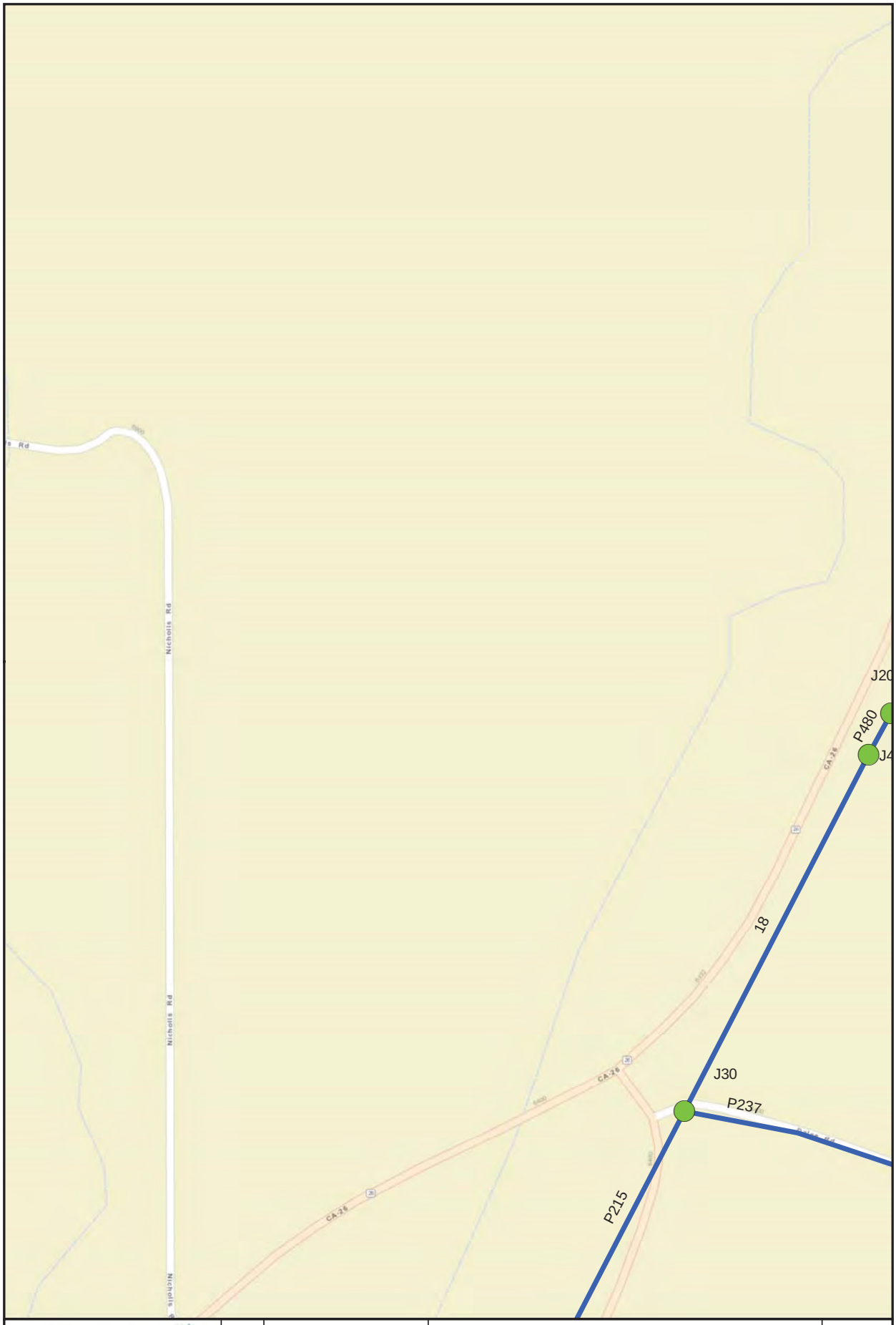

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No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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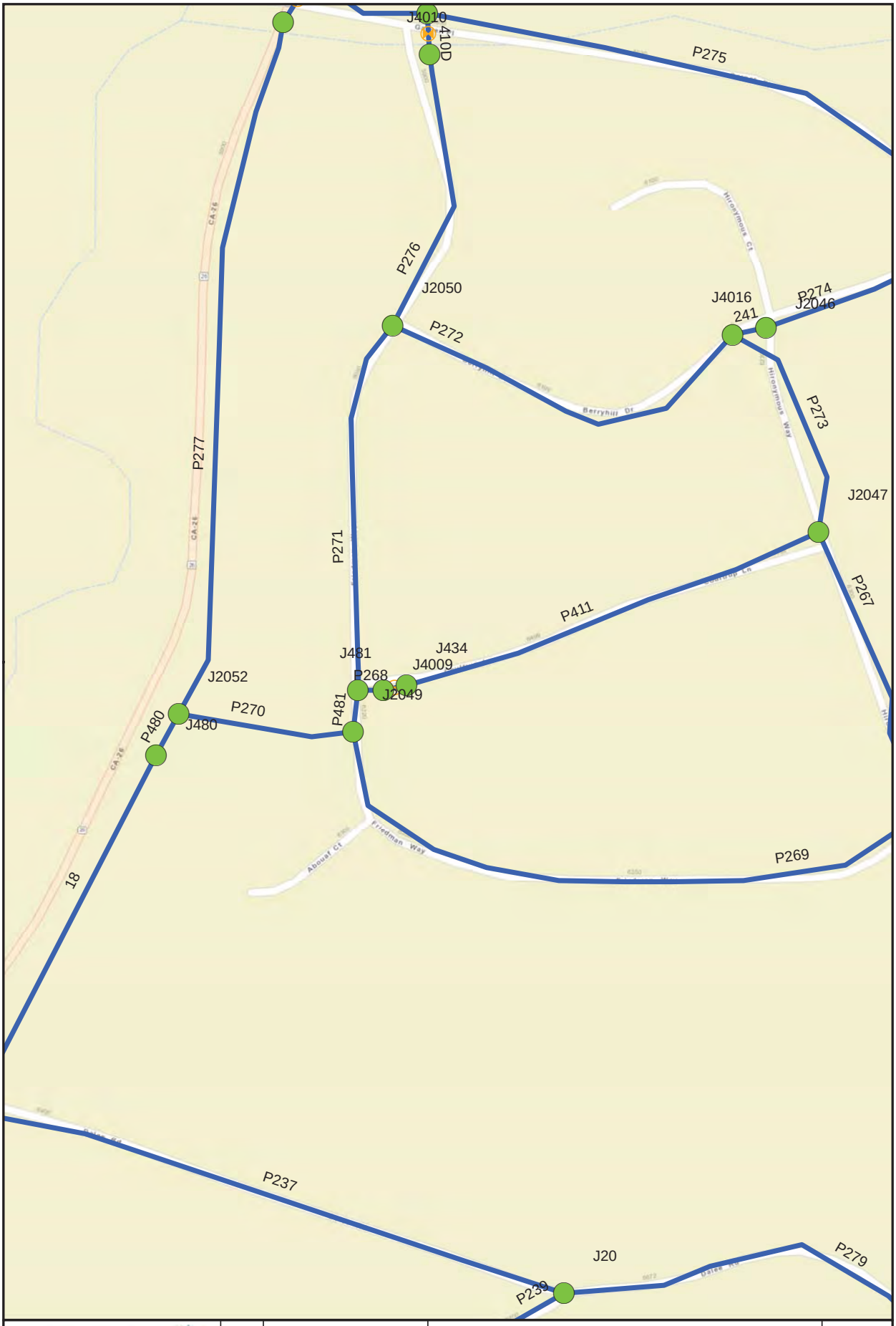

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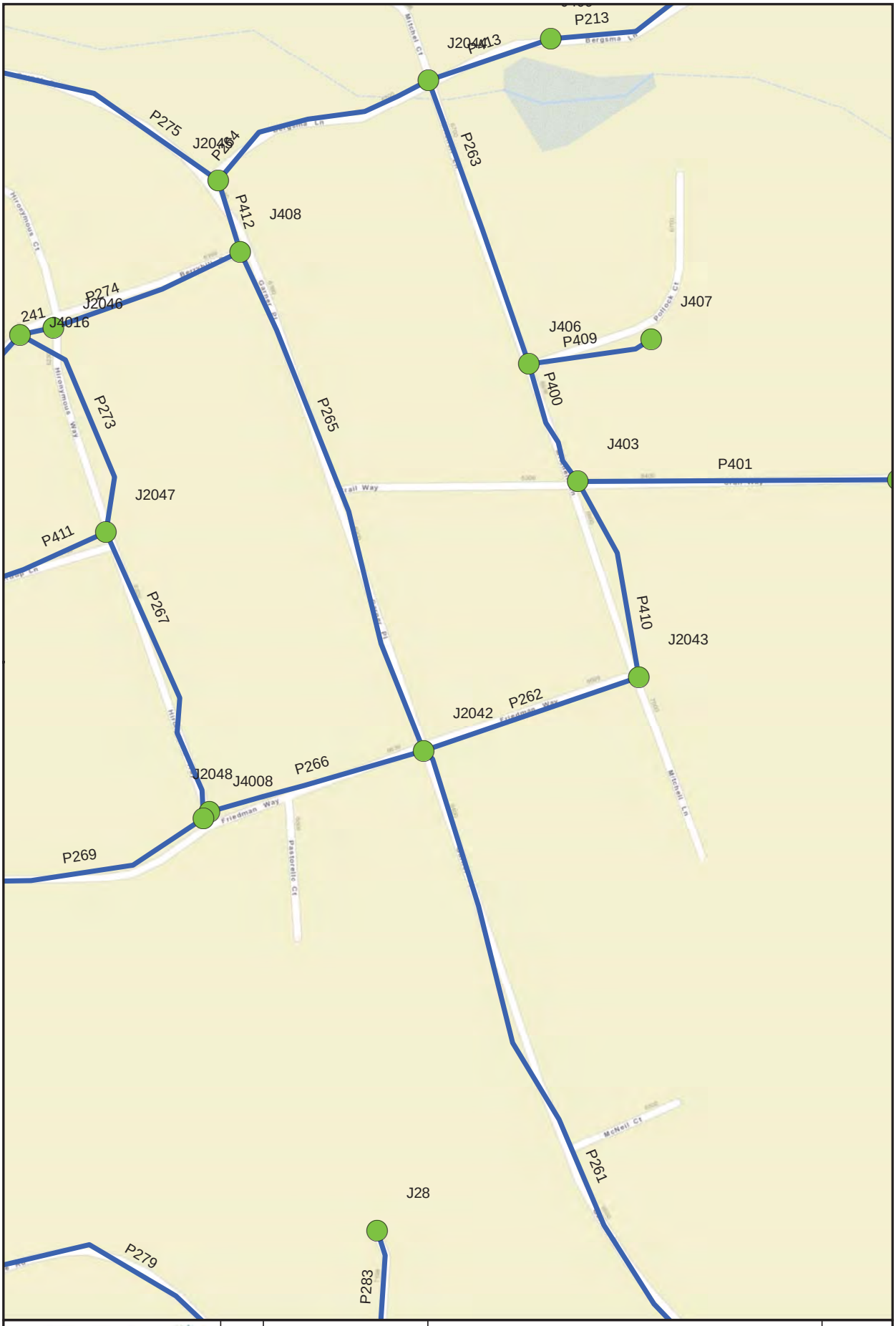

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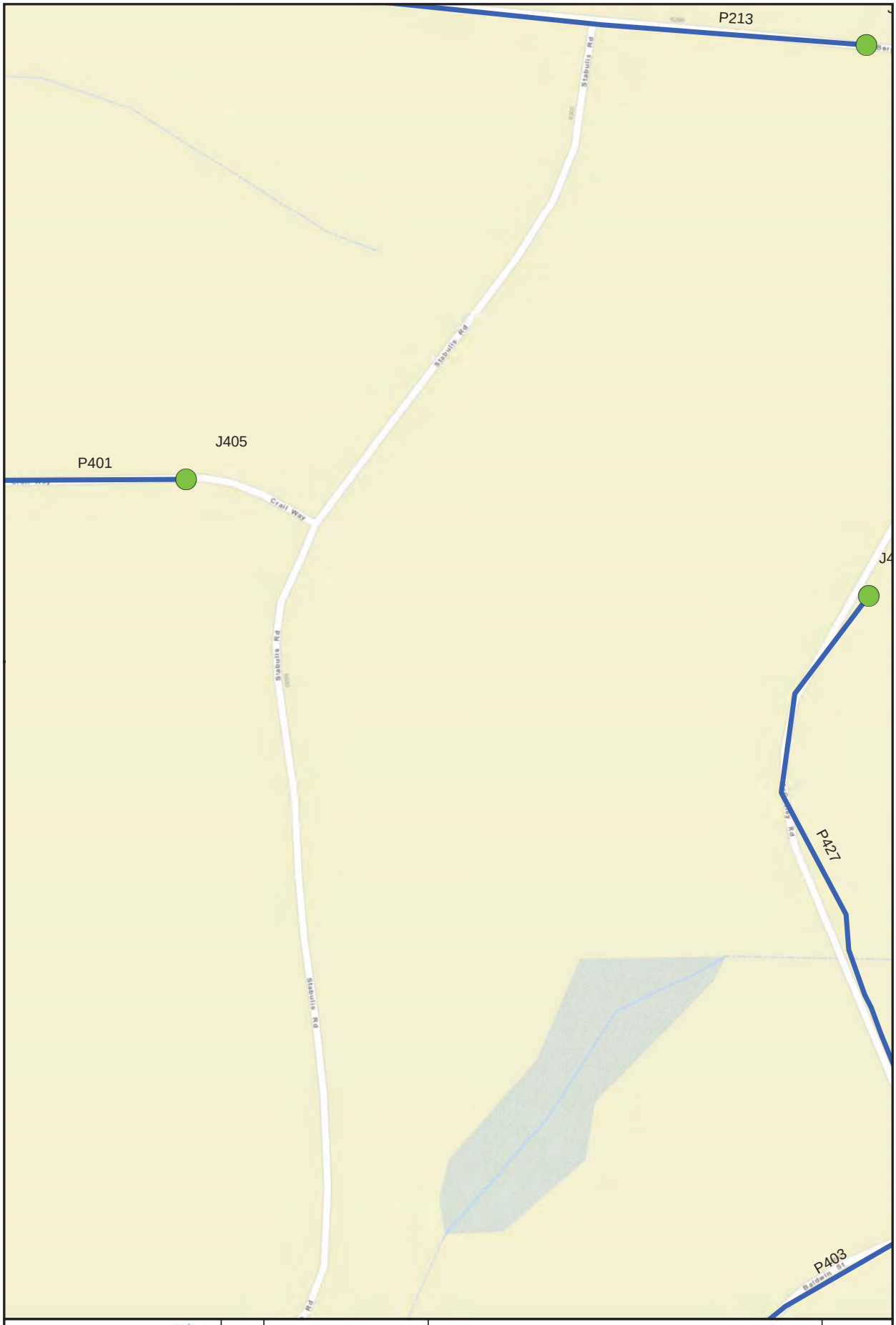

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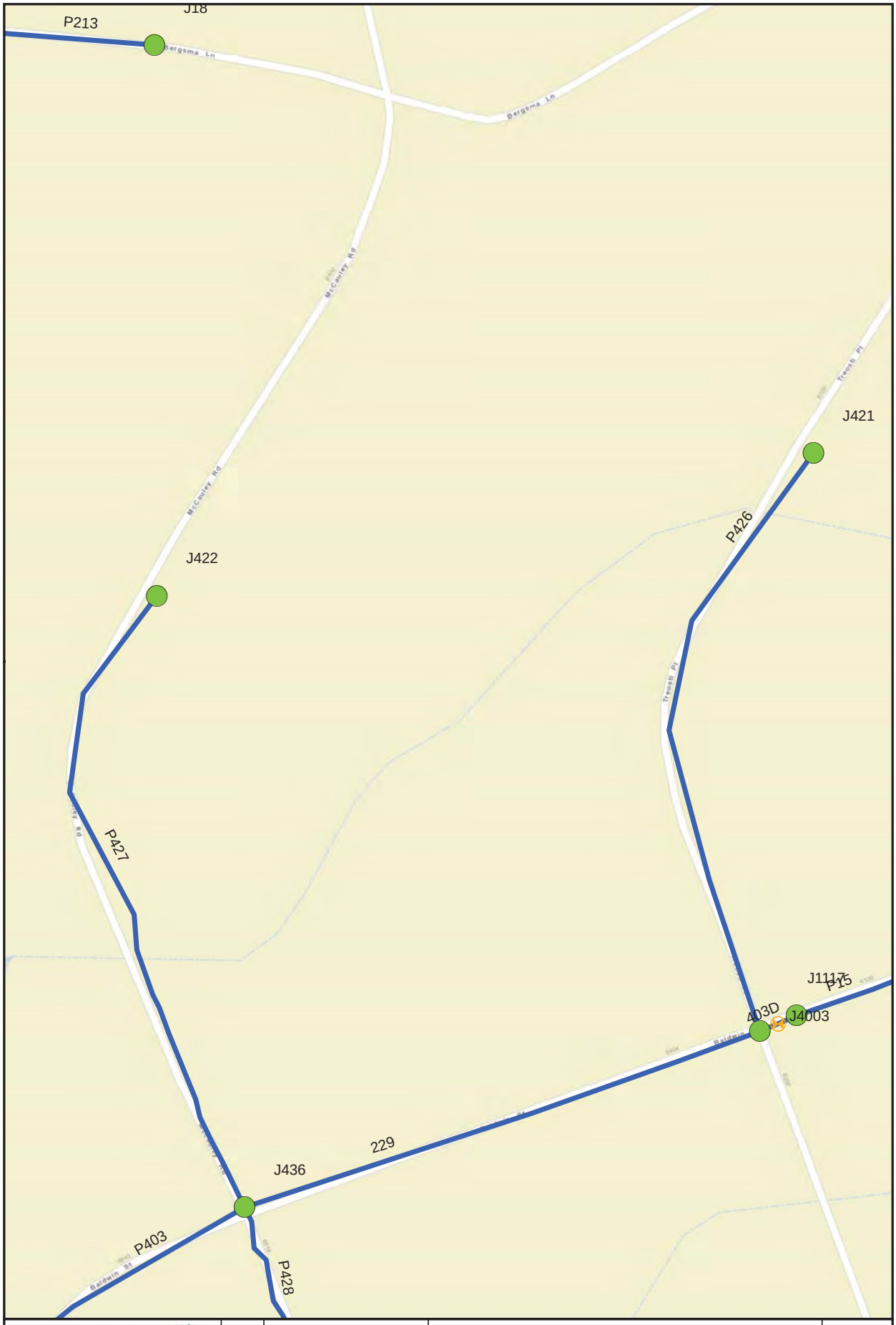
No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

J8



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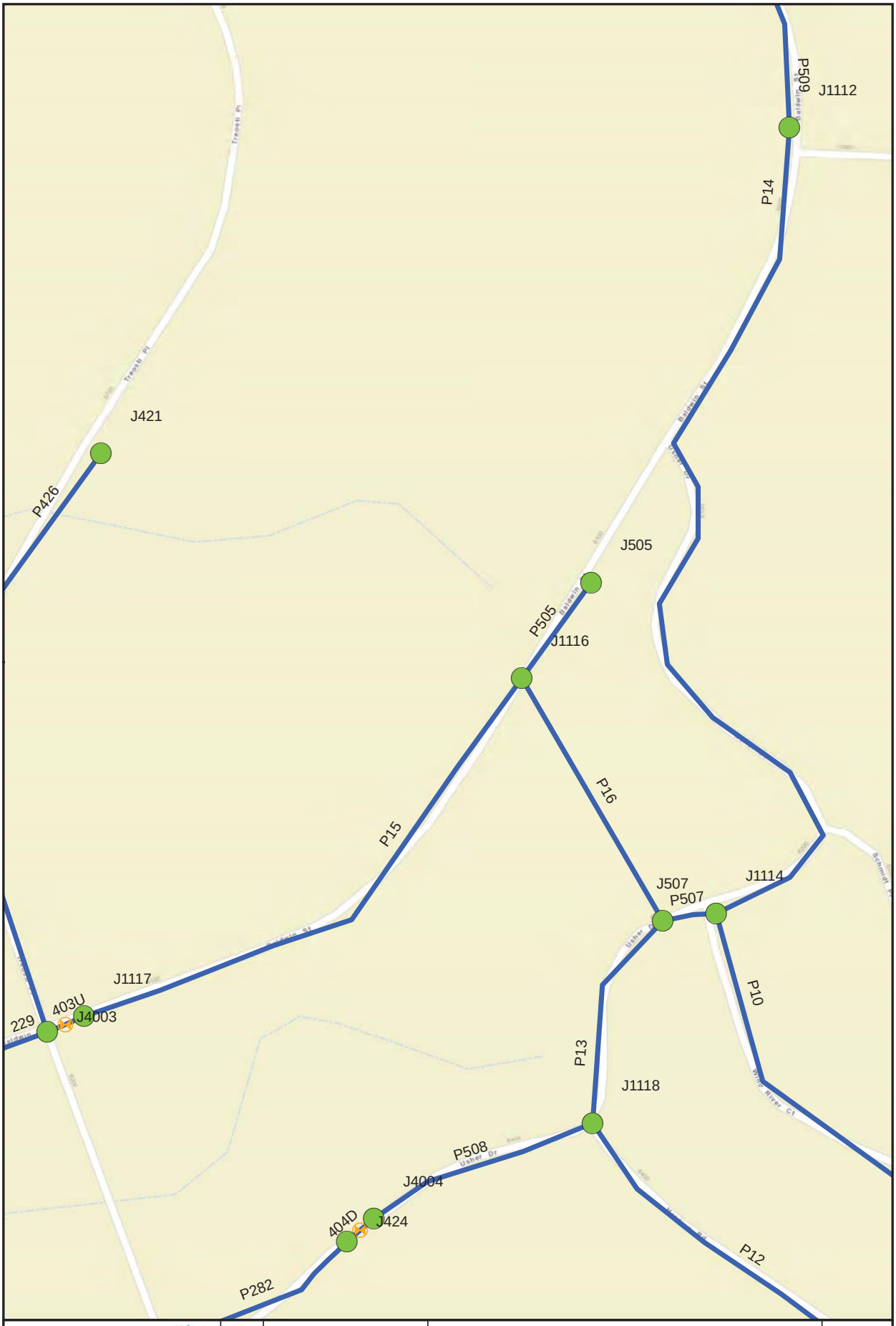
No Scale

2017 Jenny Lind Water Master Plan

System Map

PAGE ID

J9



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2017 Jenny Lind Water Master Plan

System Map

PAGE ID

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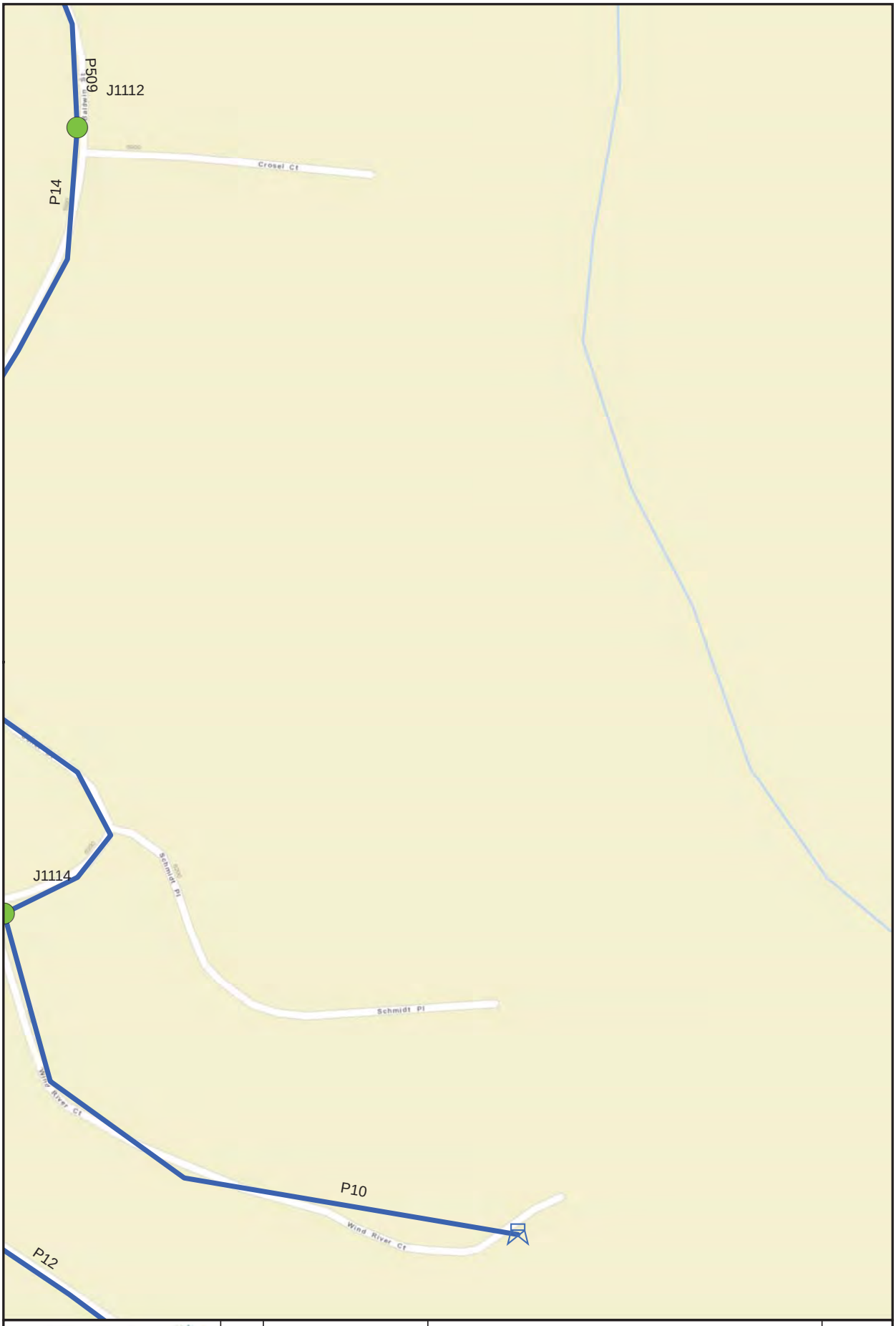

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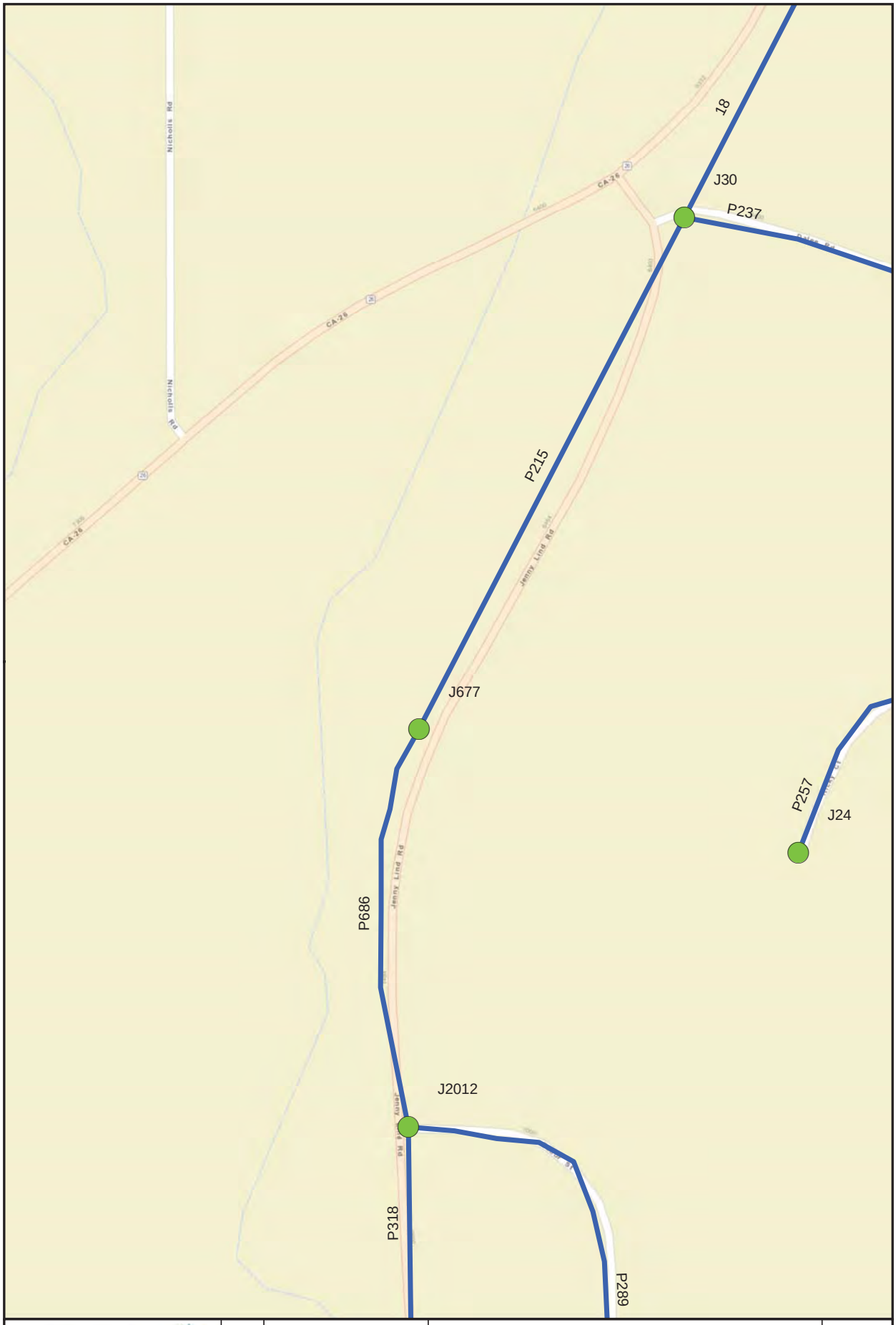

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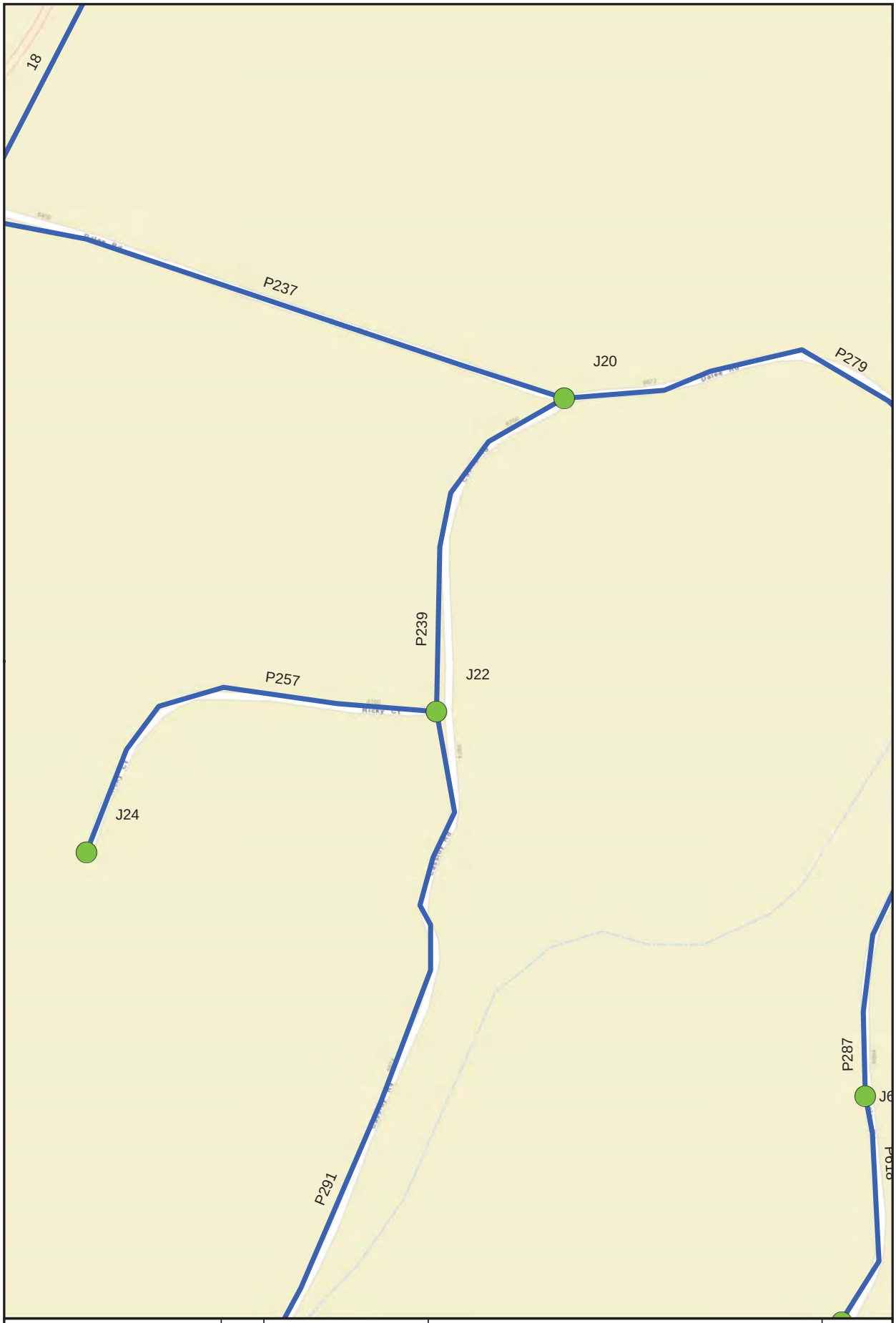

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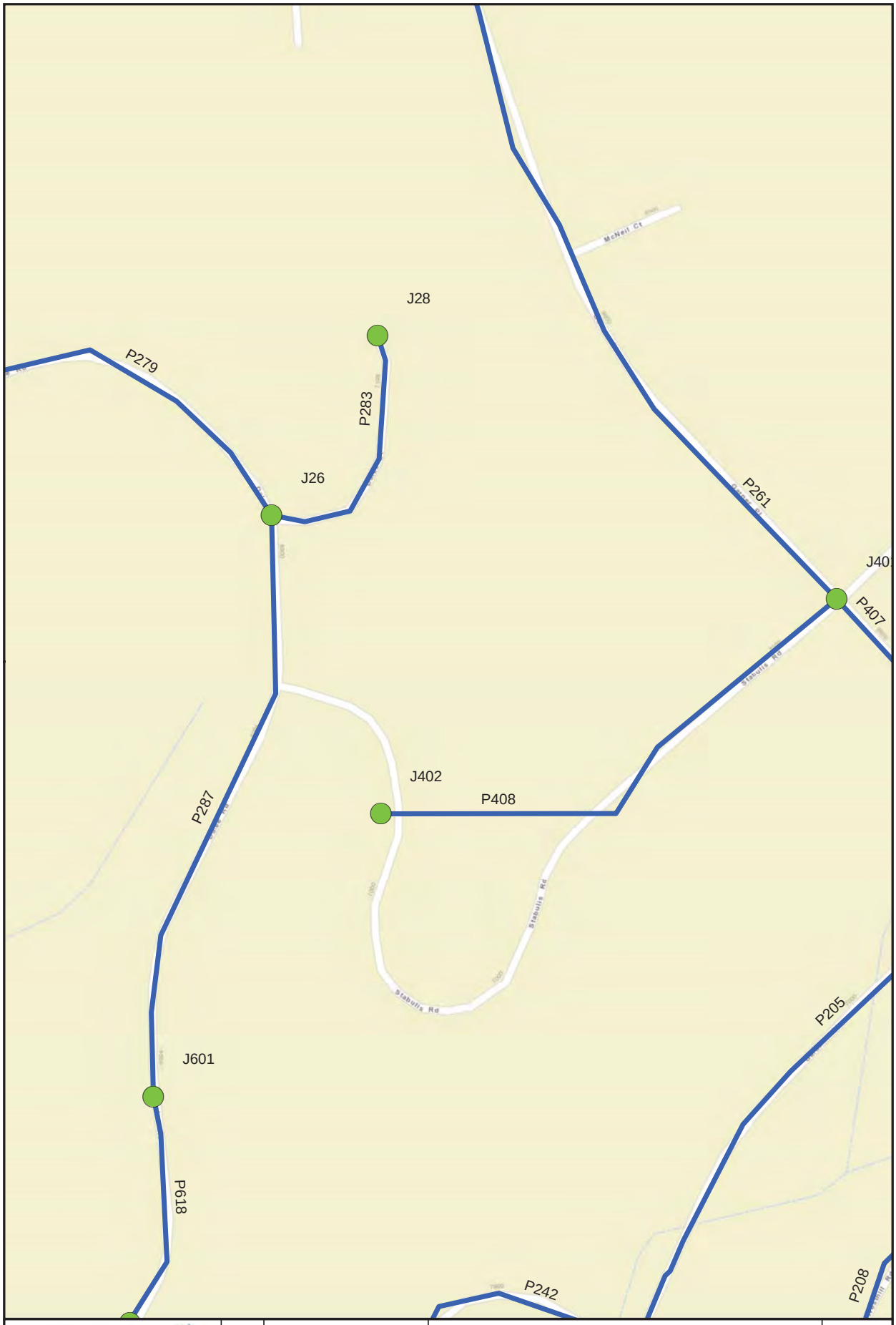

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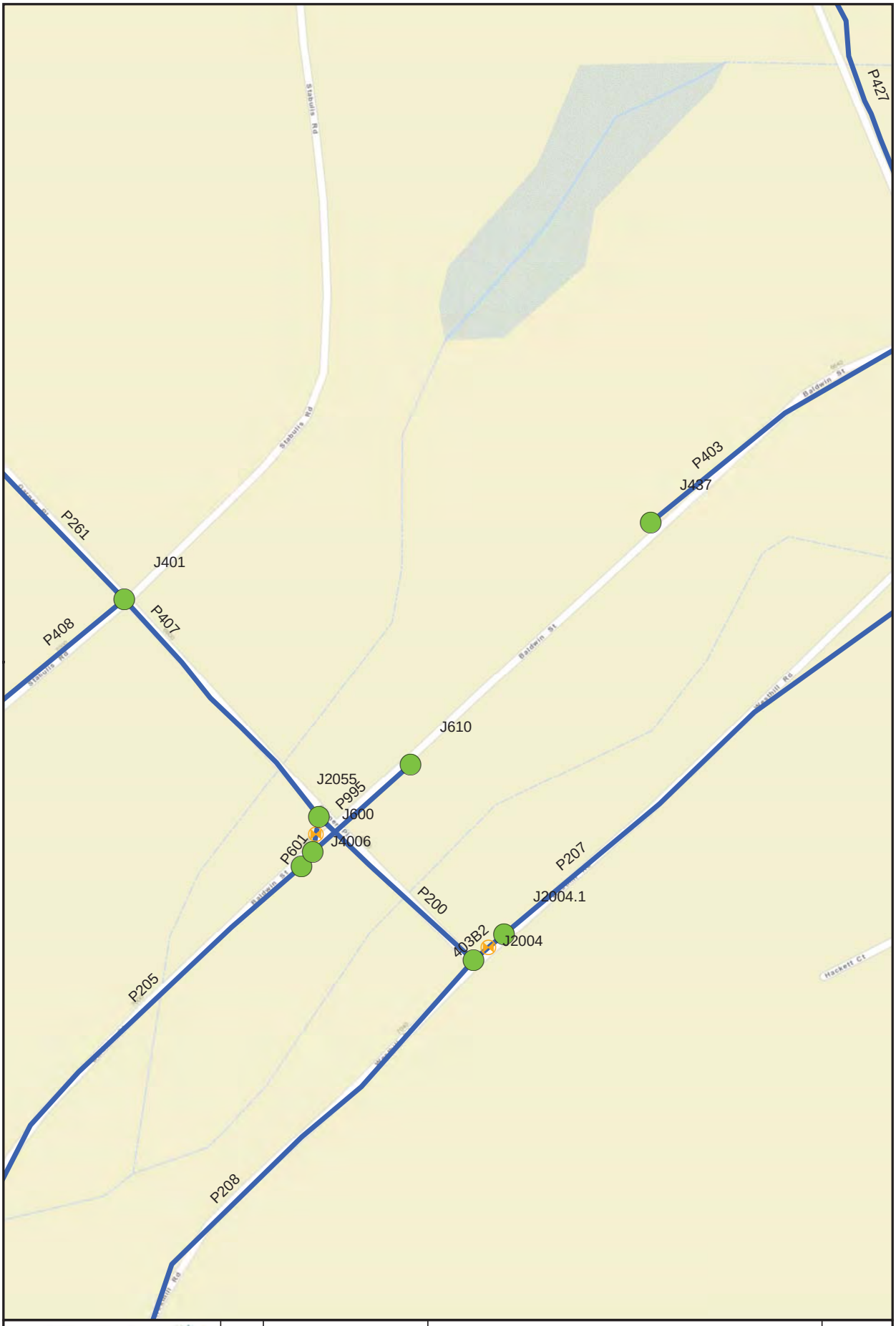

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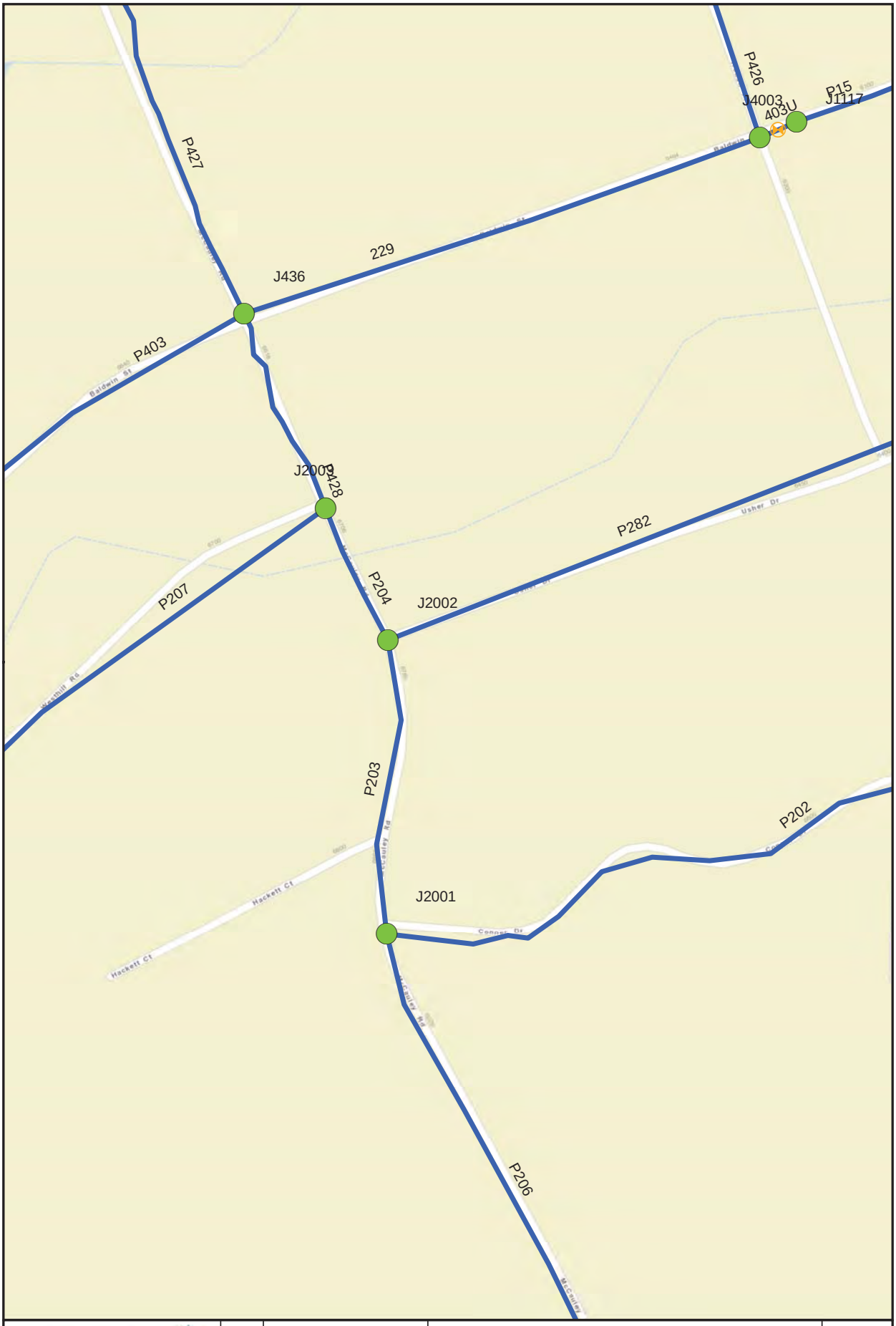

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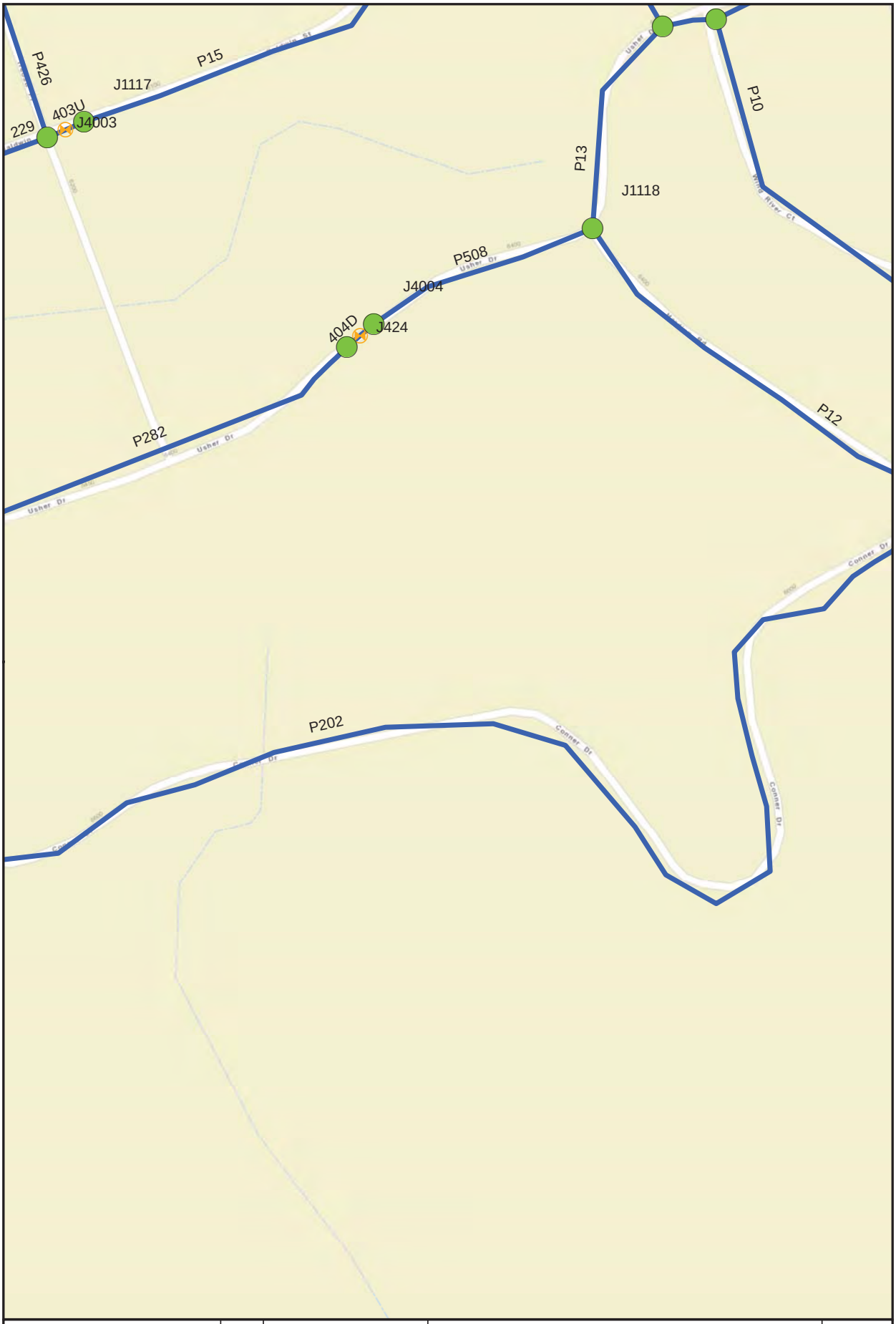

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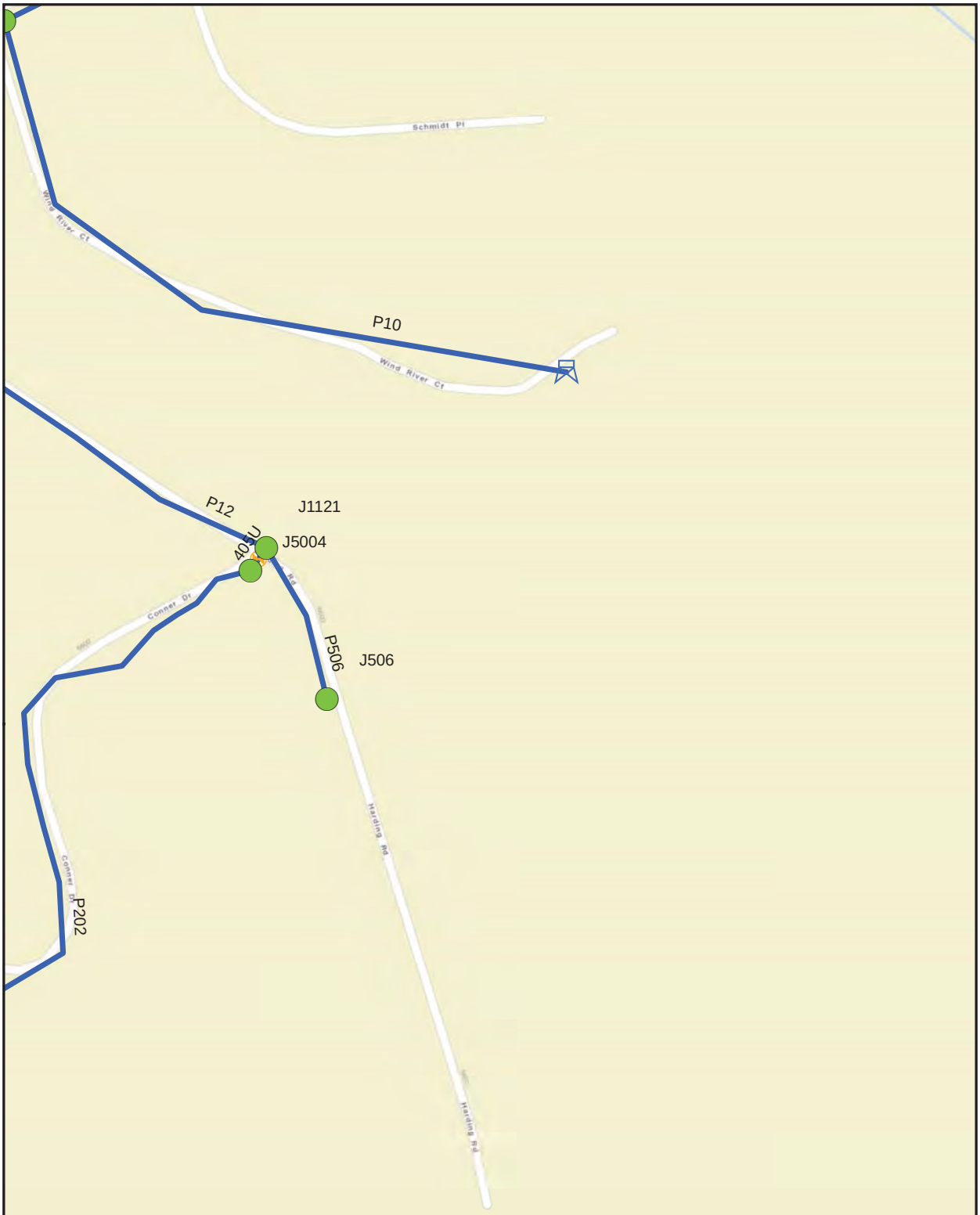

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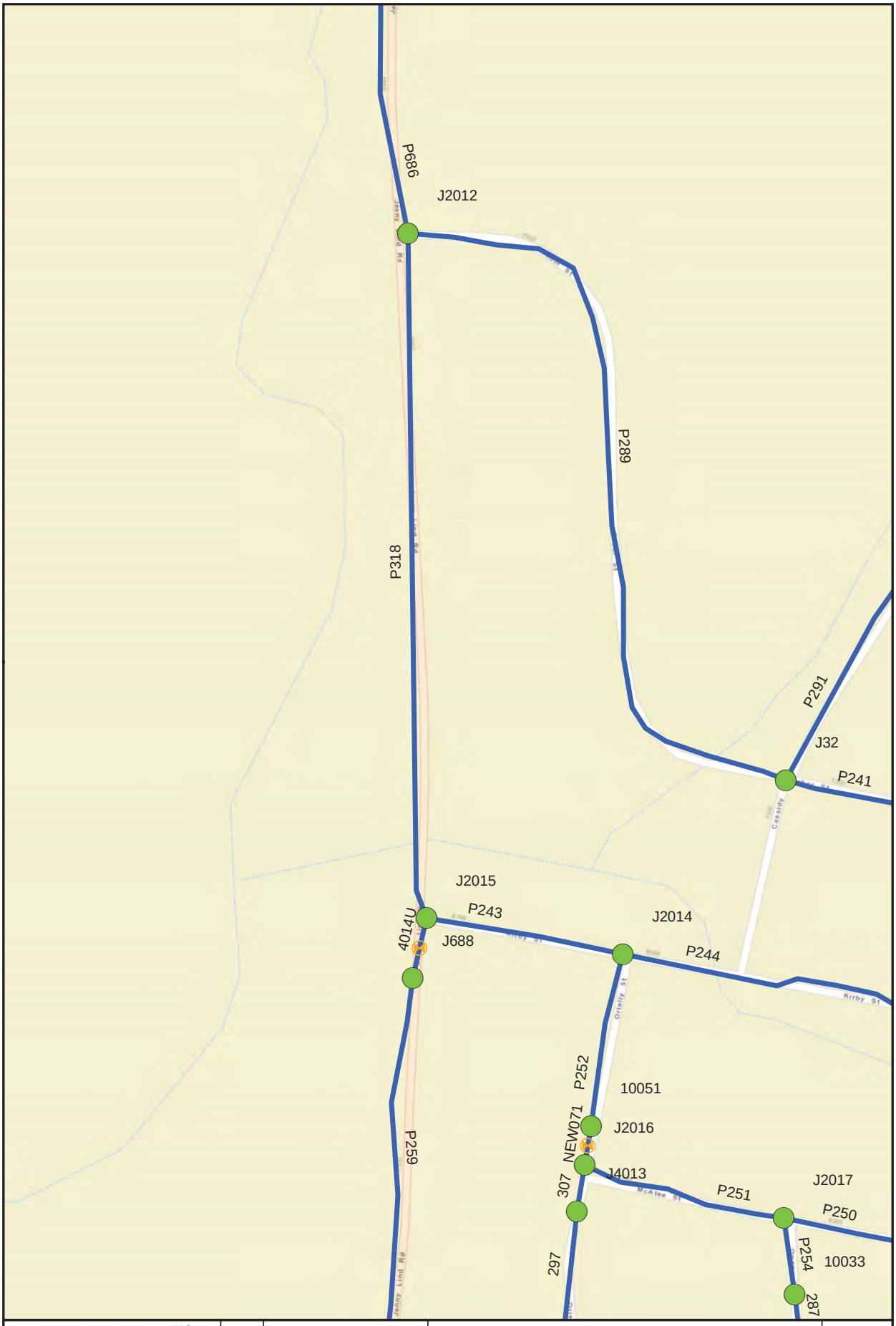

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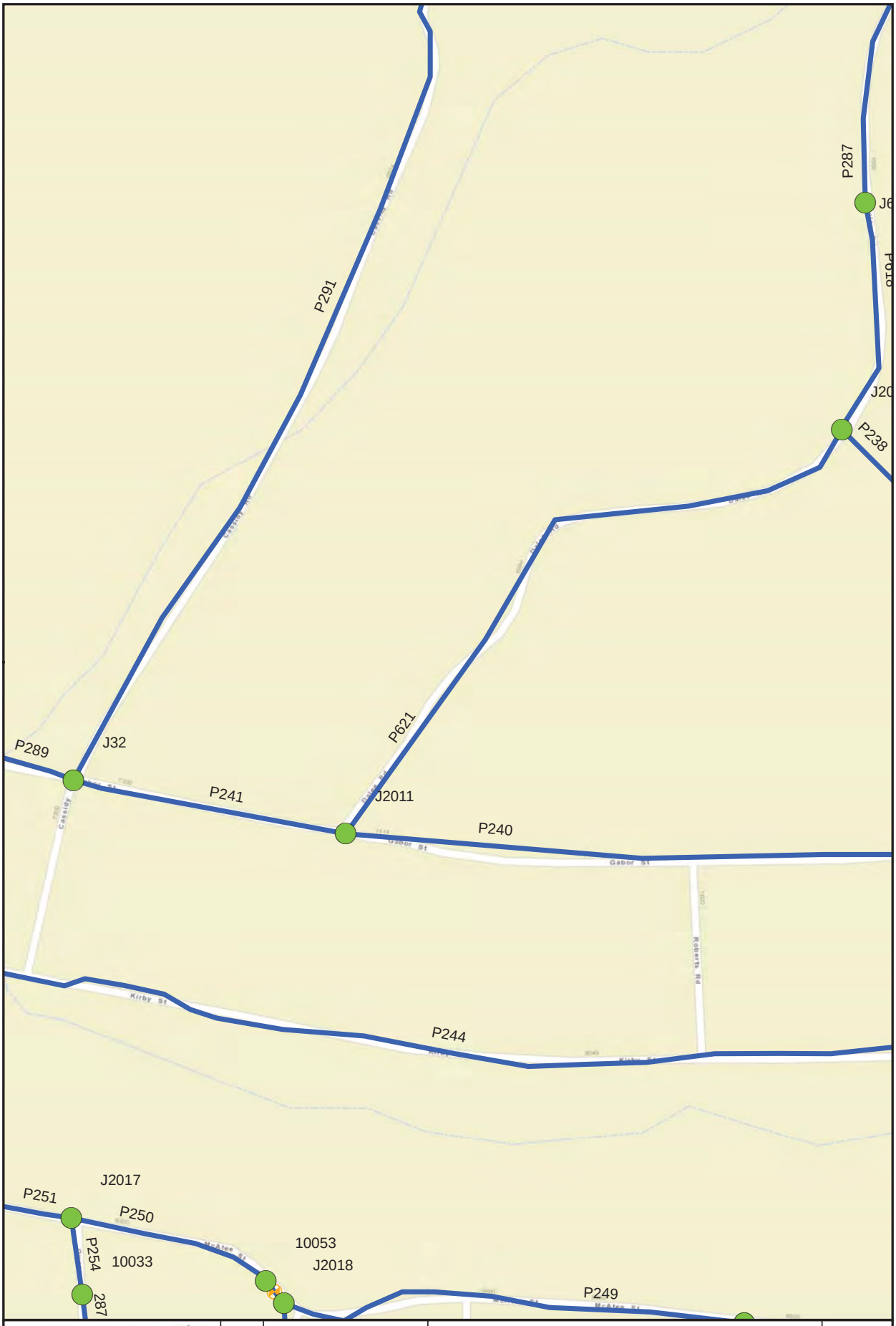

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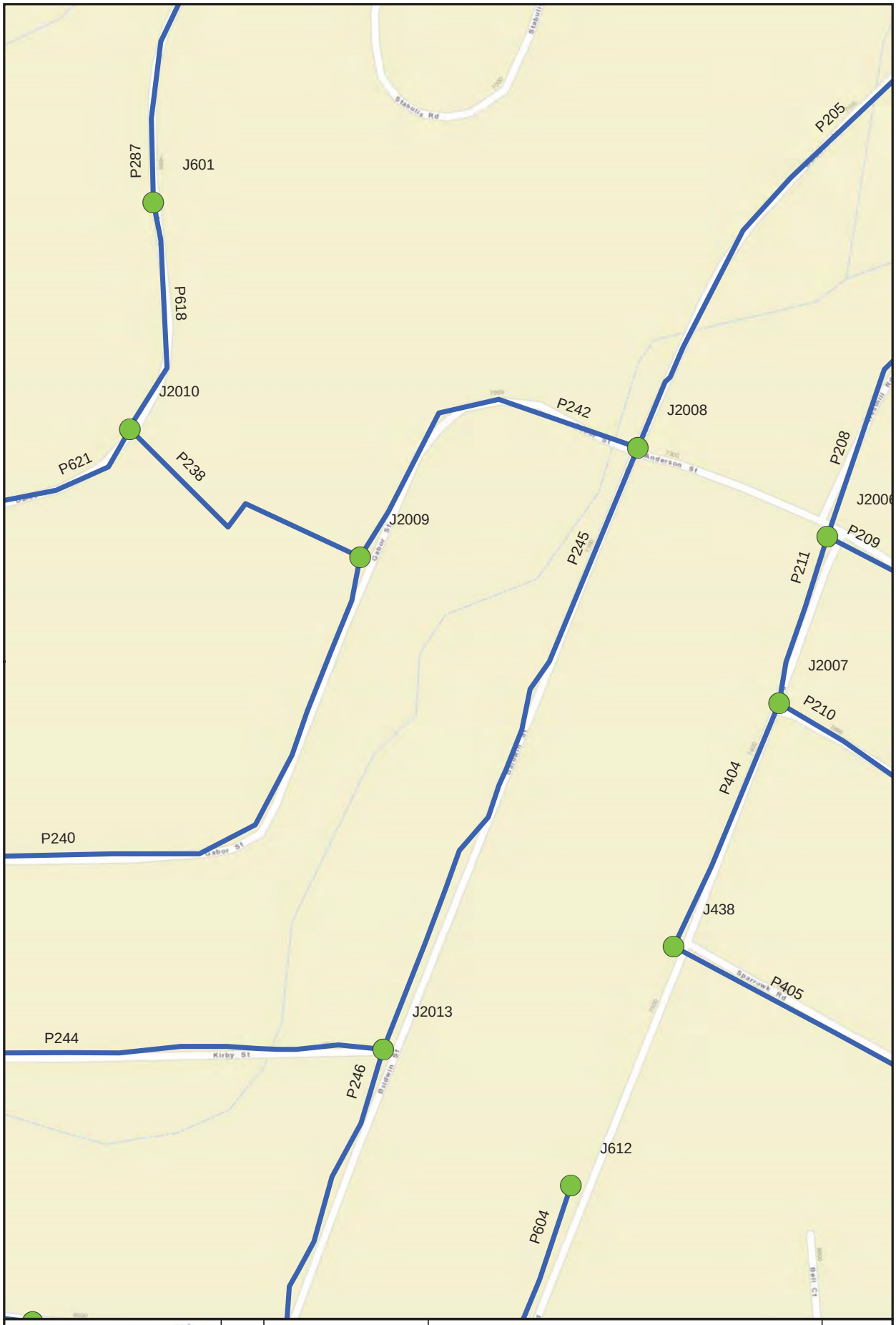

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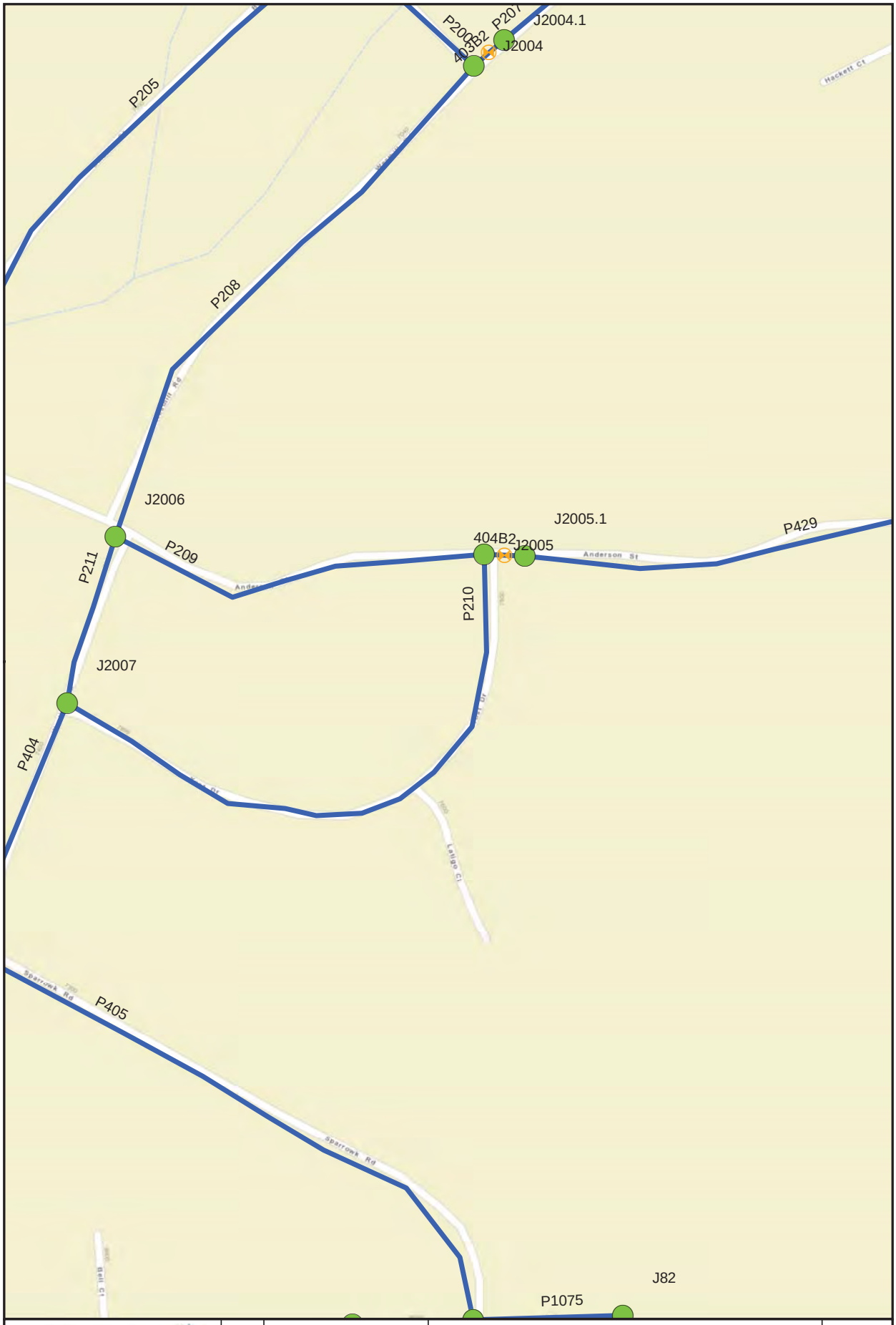

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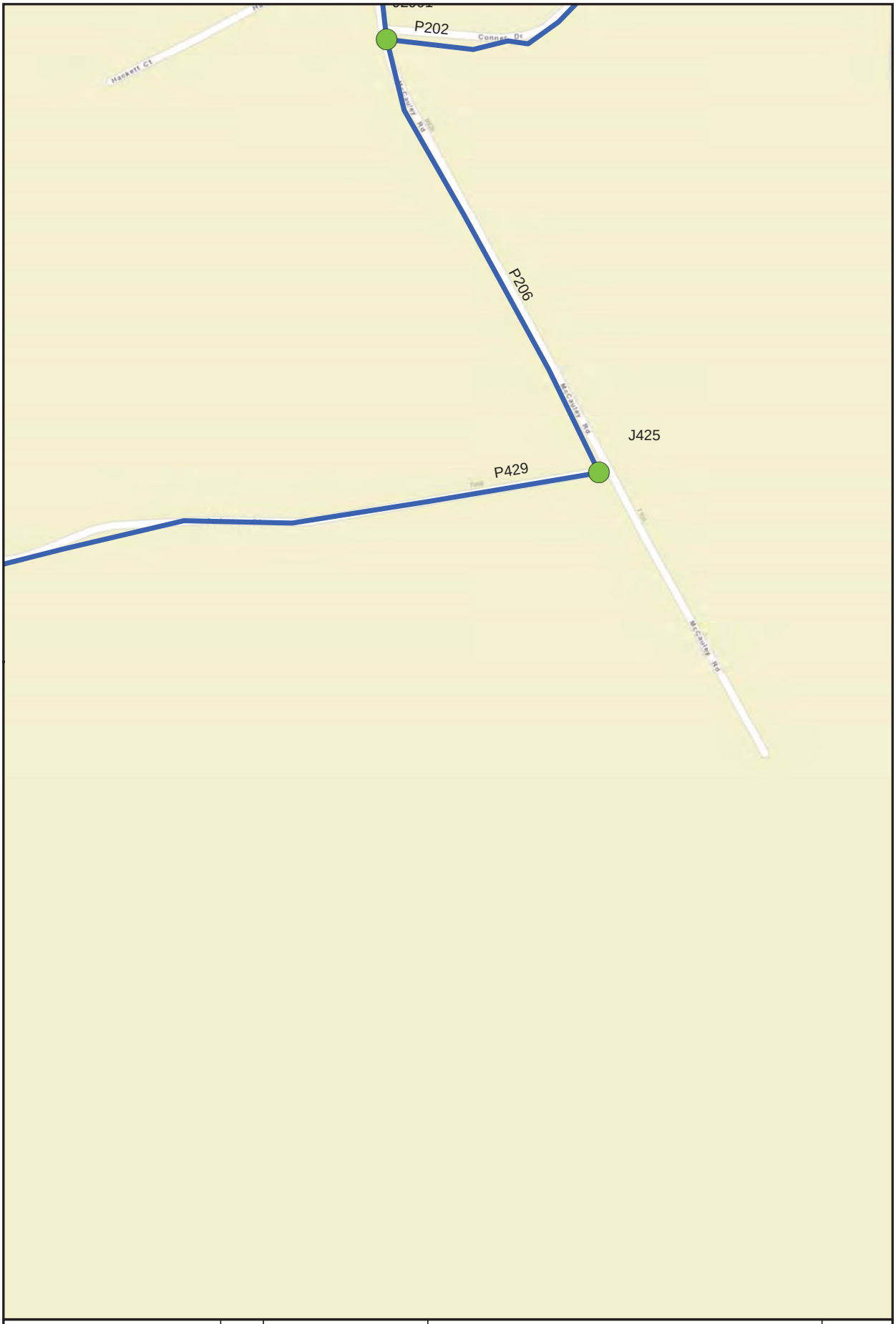

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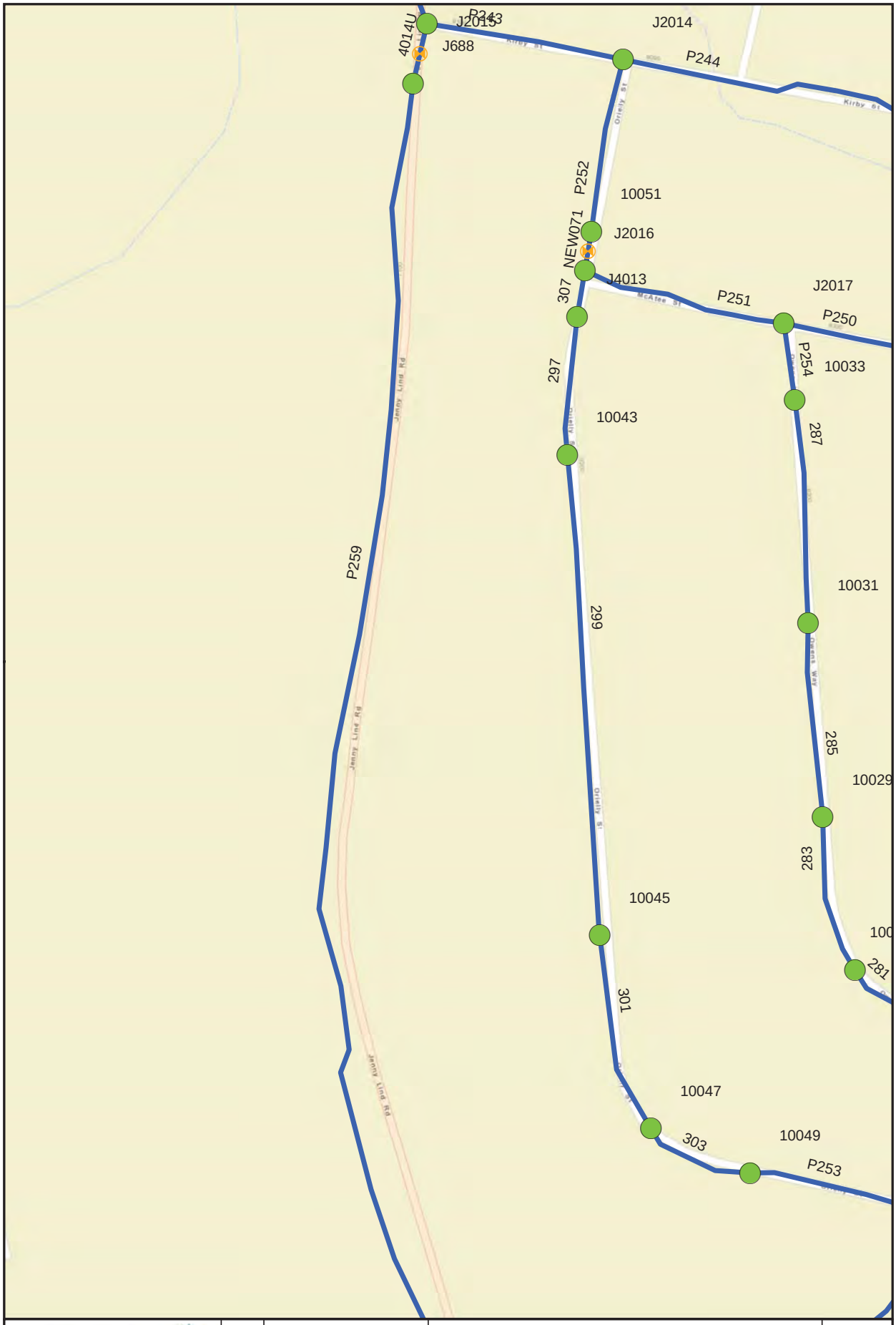

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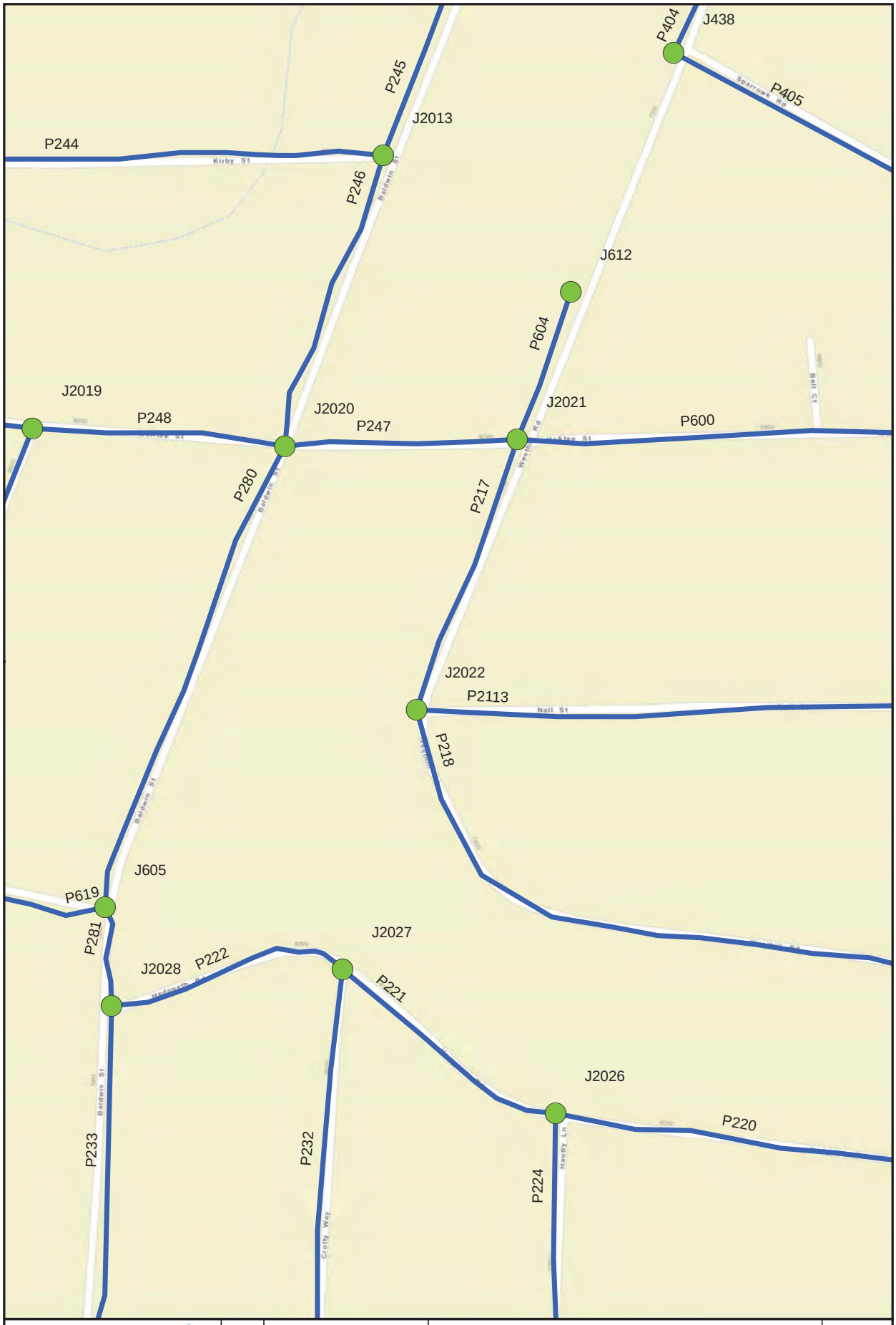

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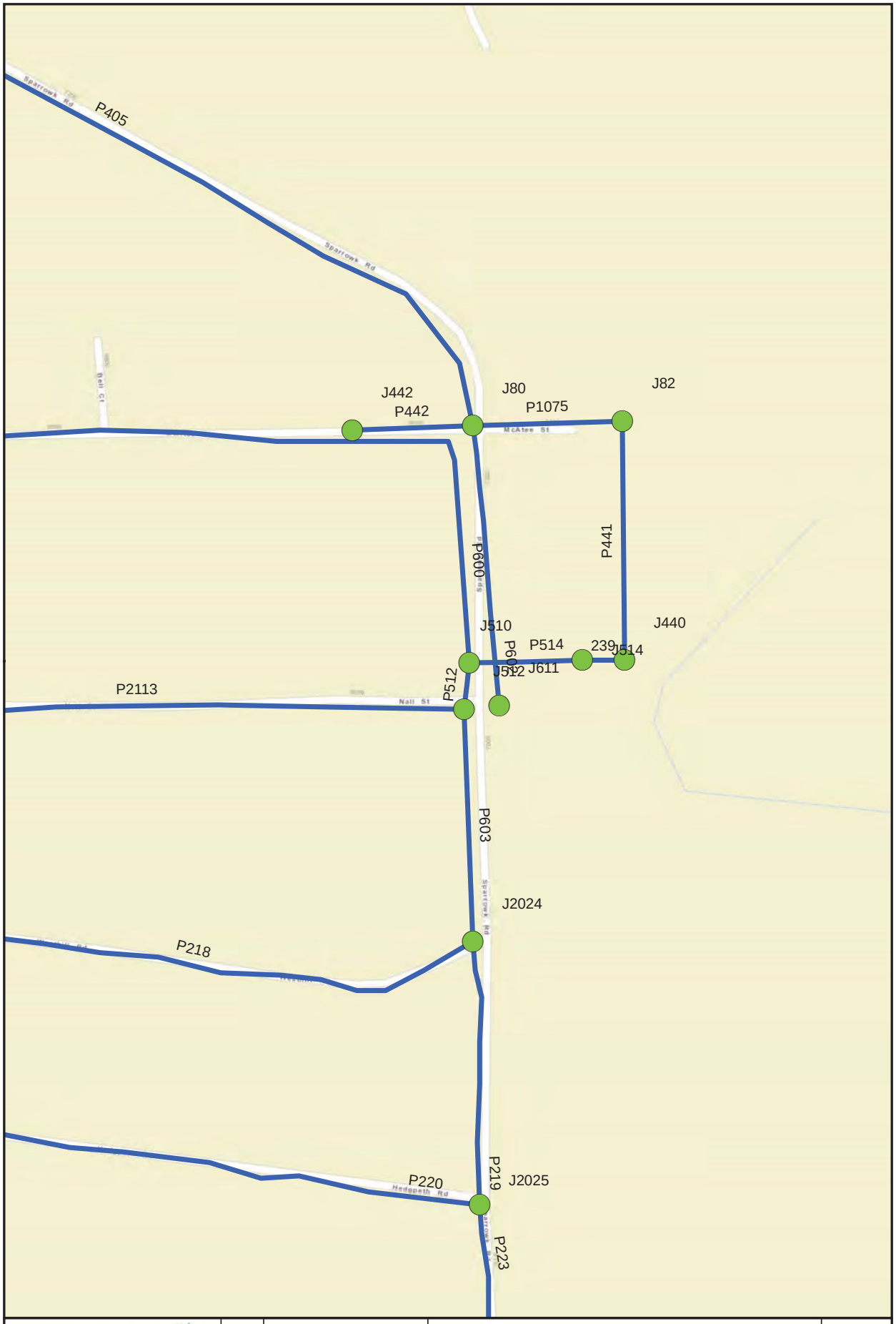

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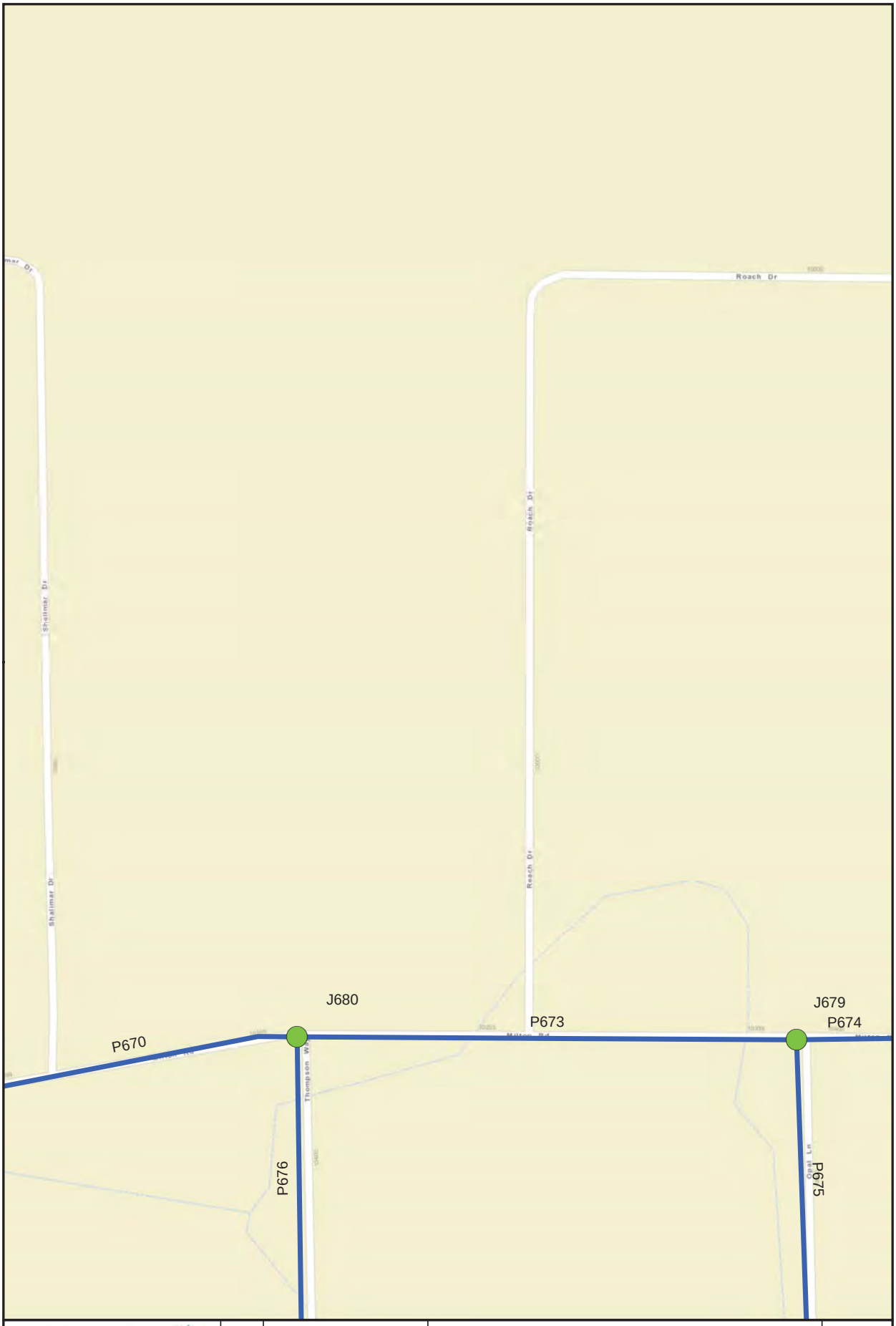

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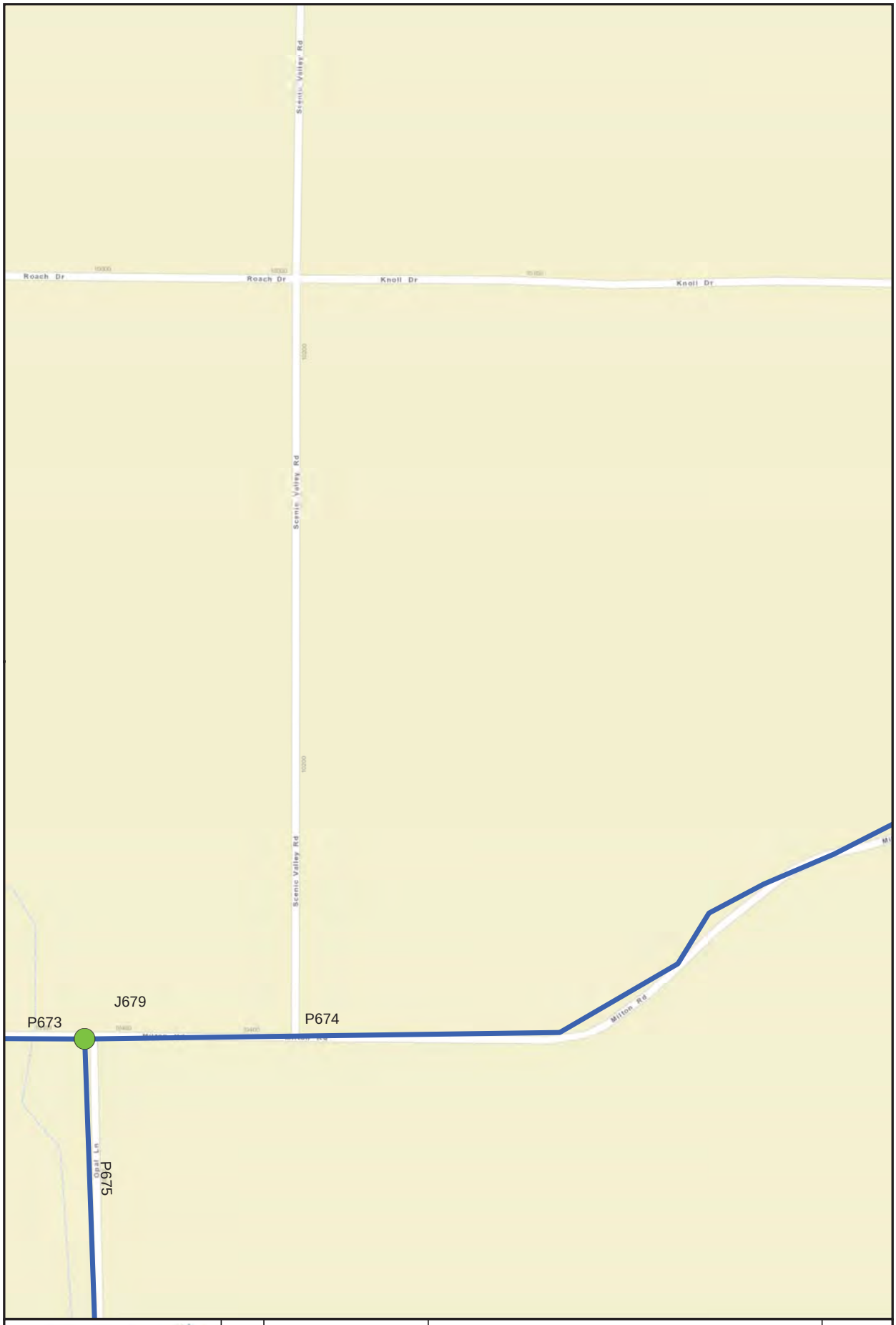

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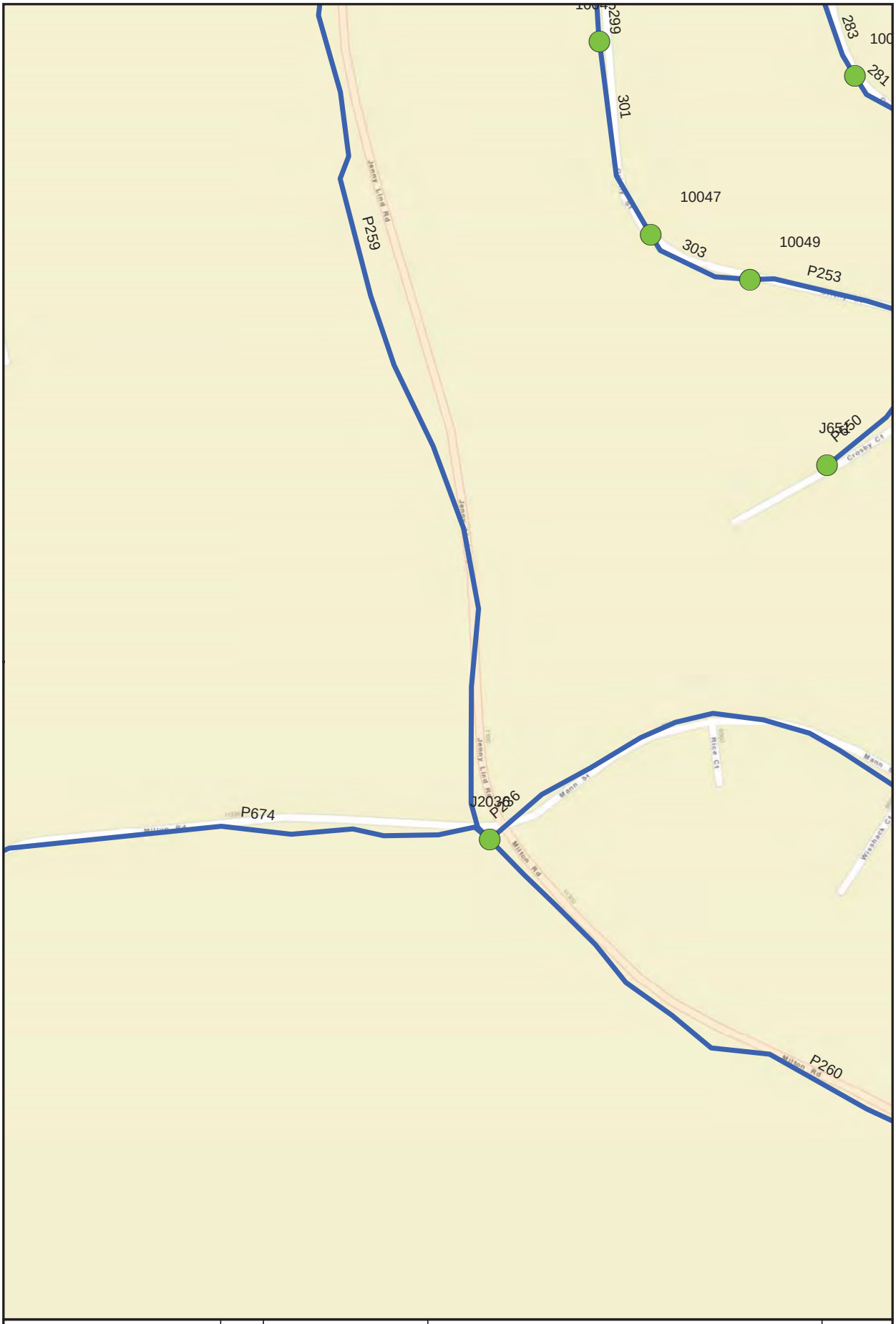

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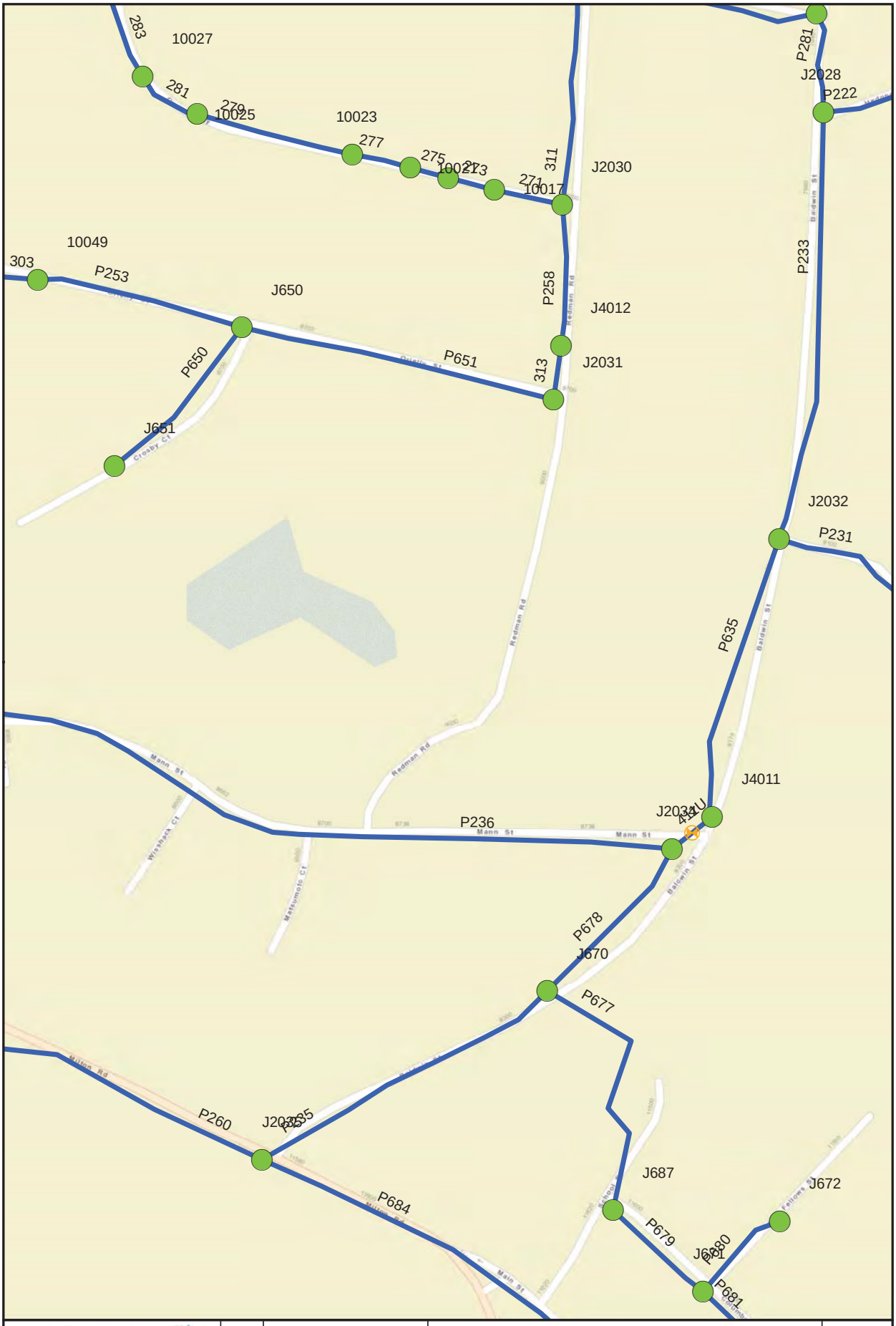

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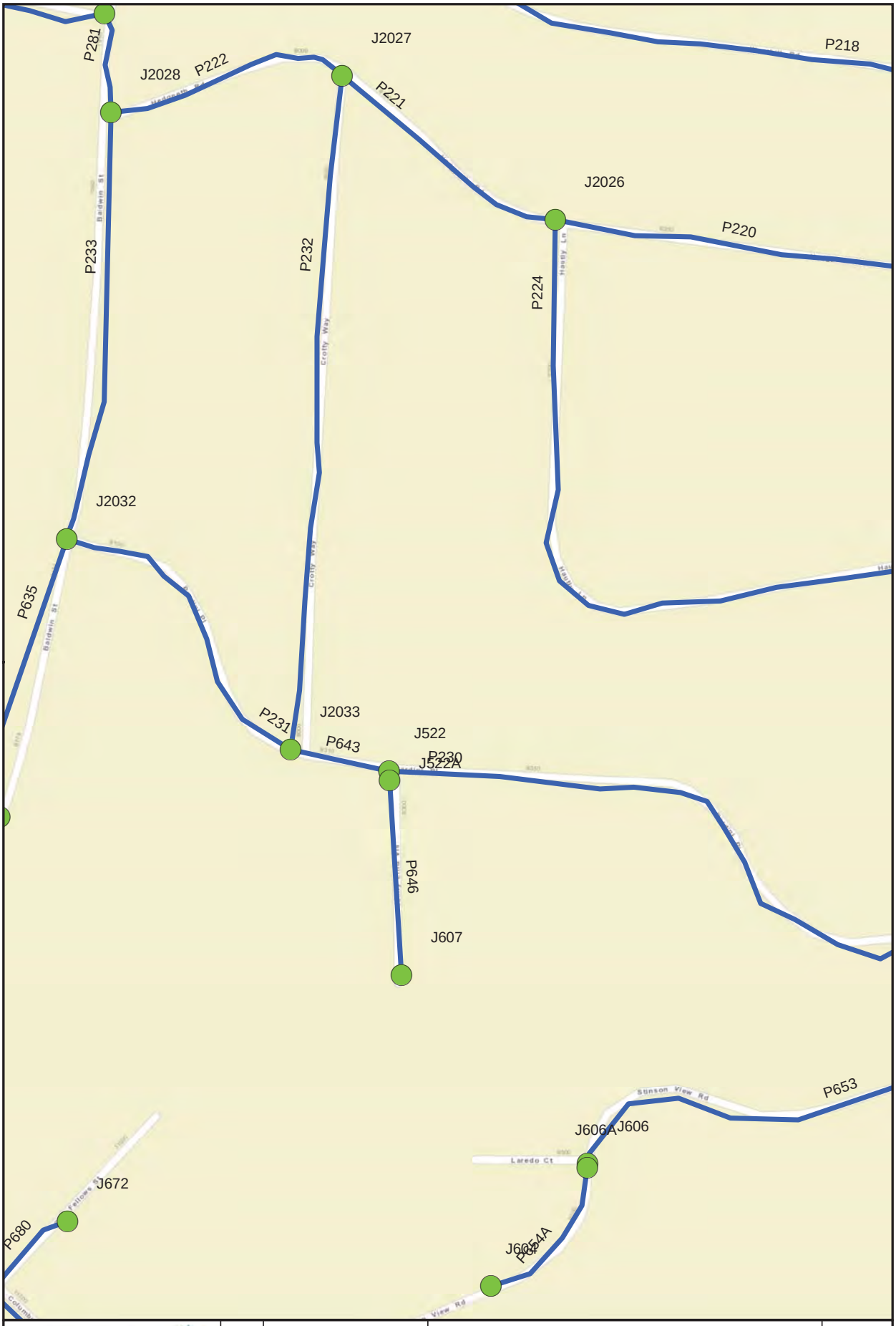

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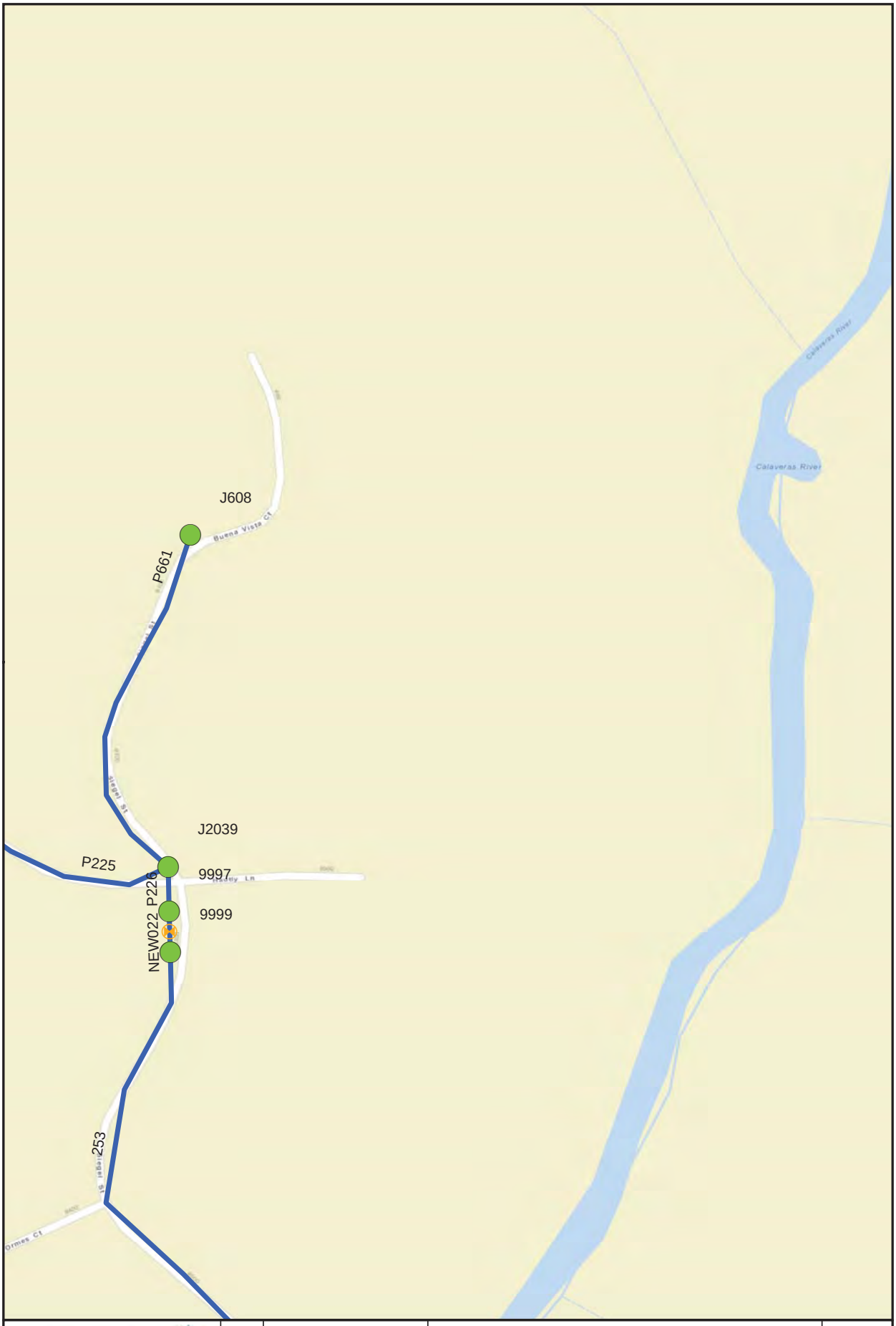

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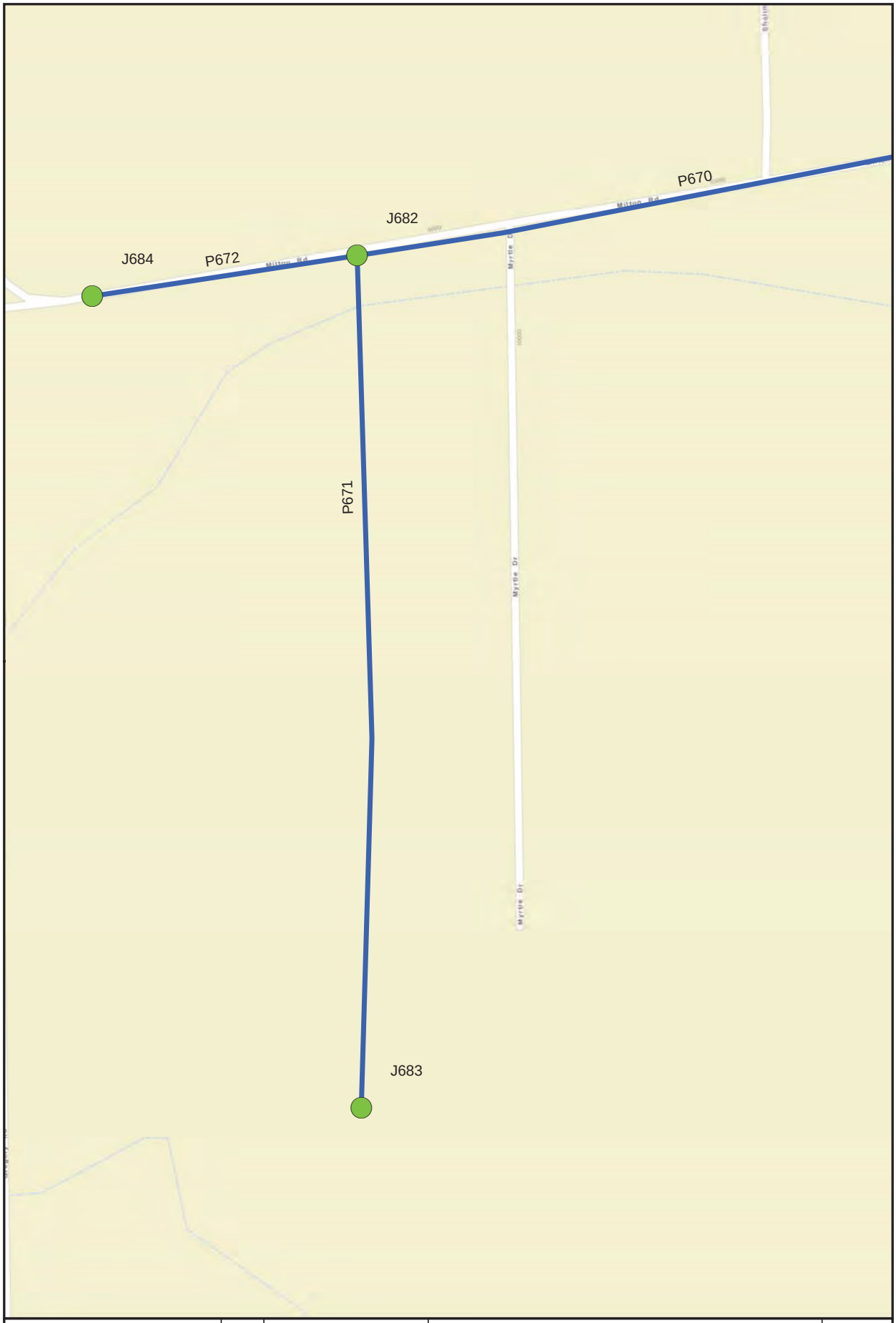

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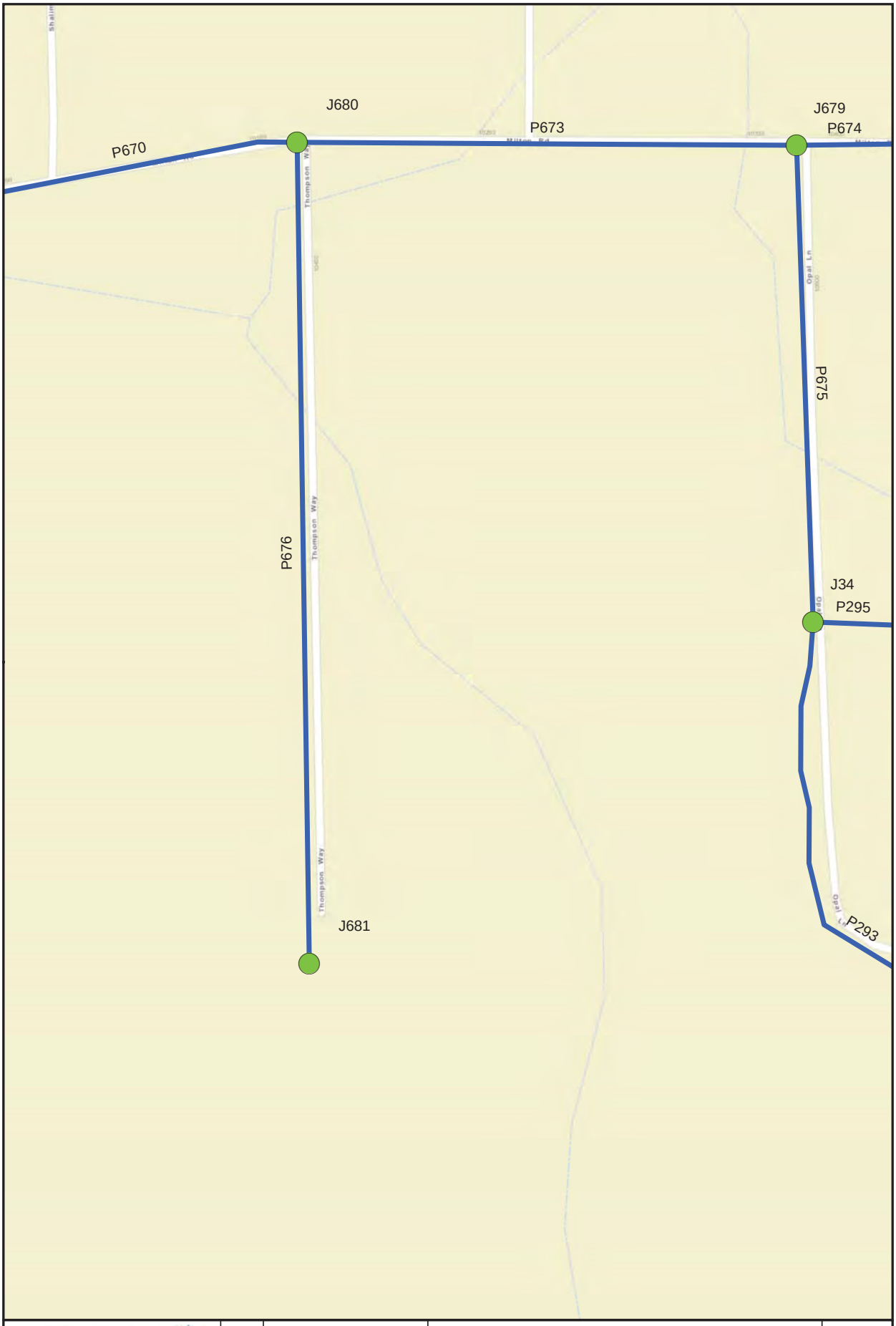

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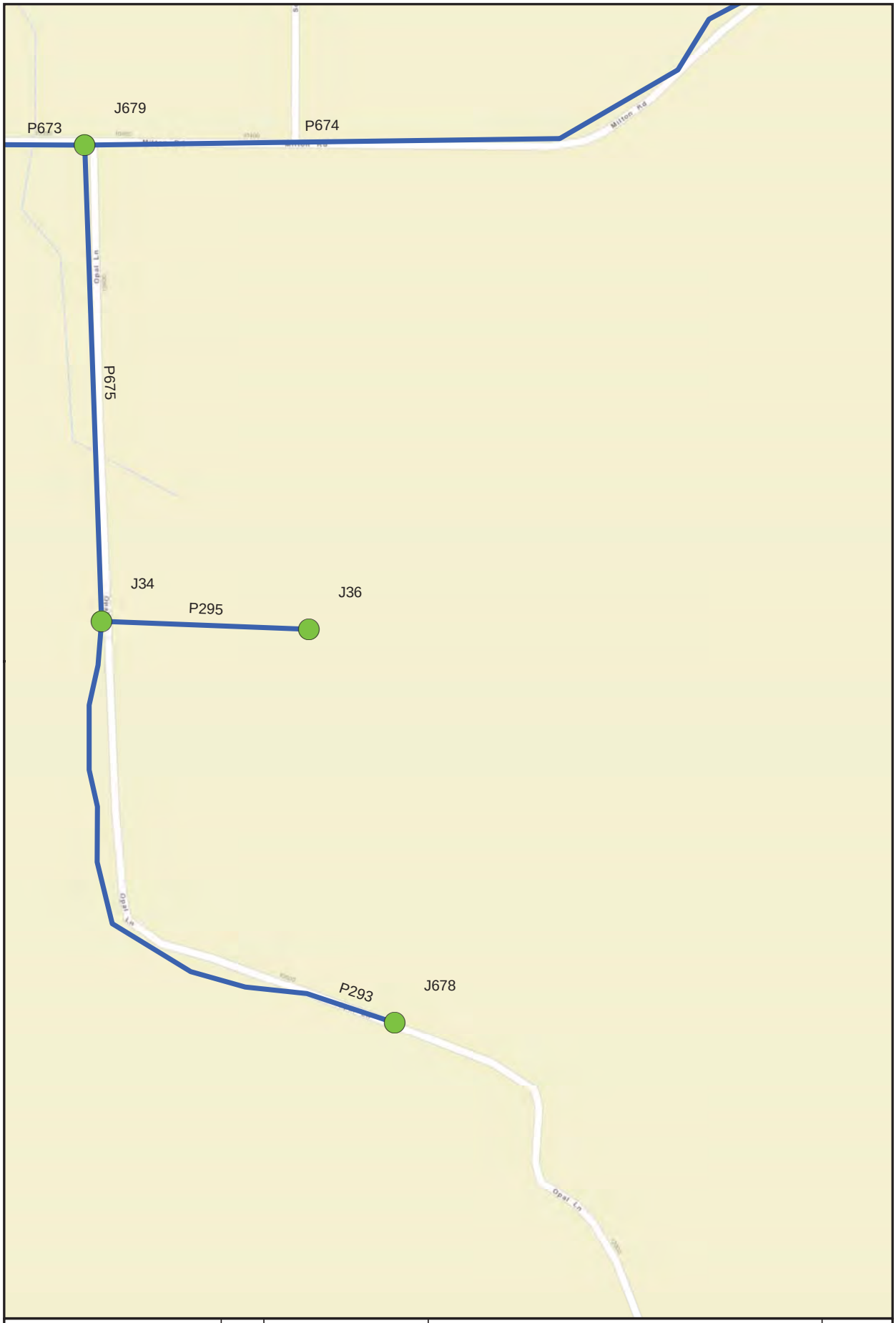

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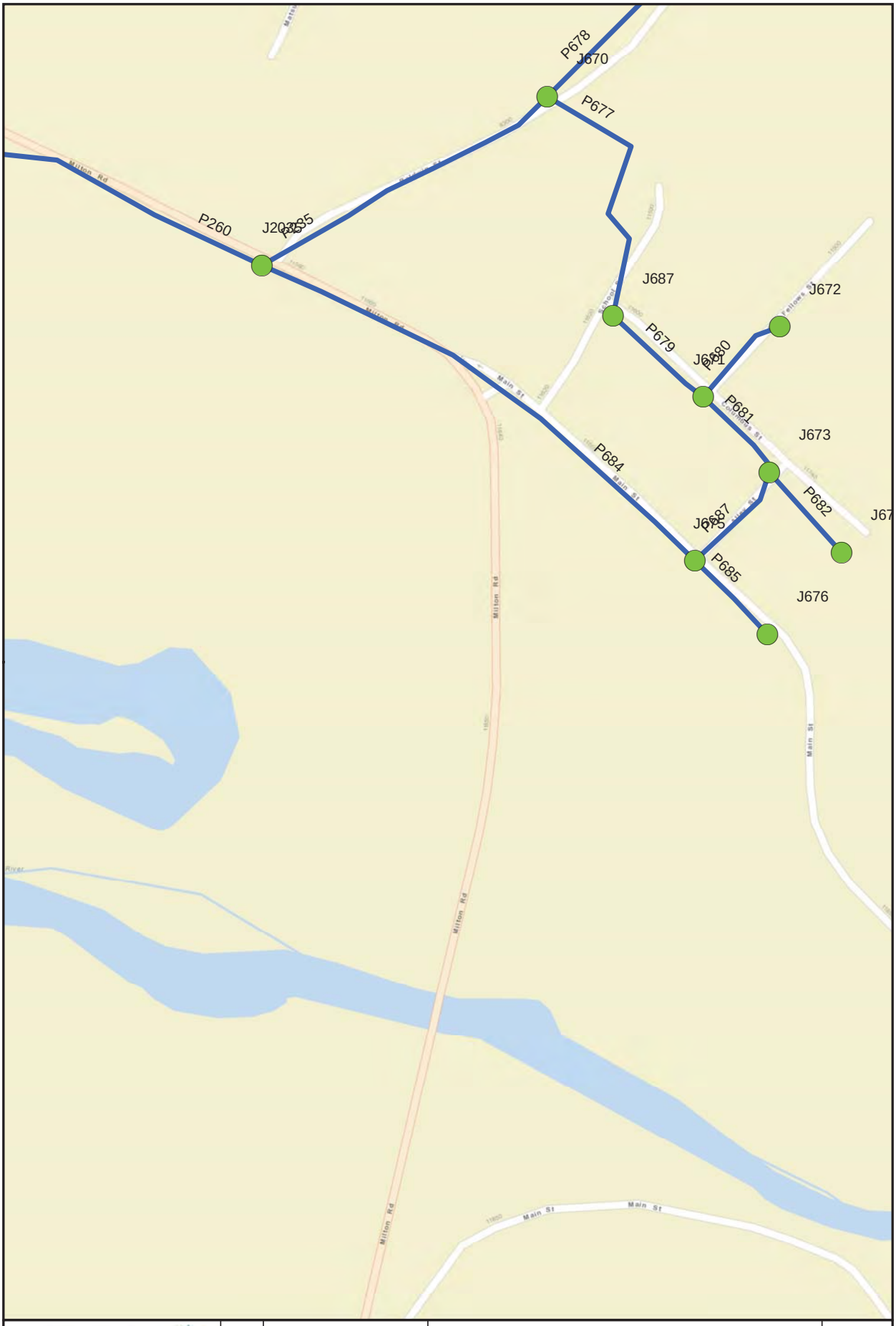

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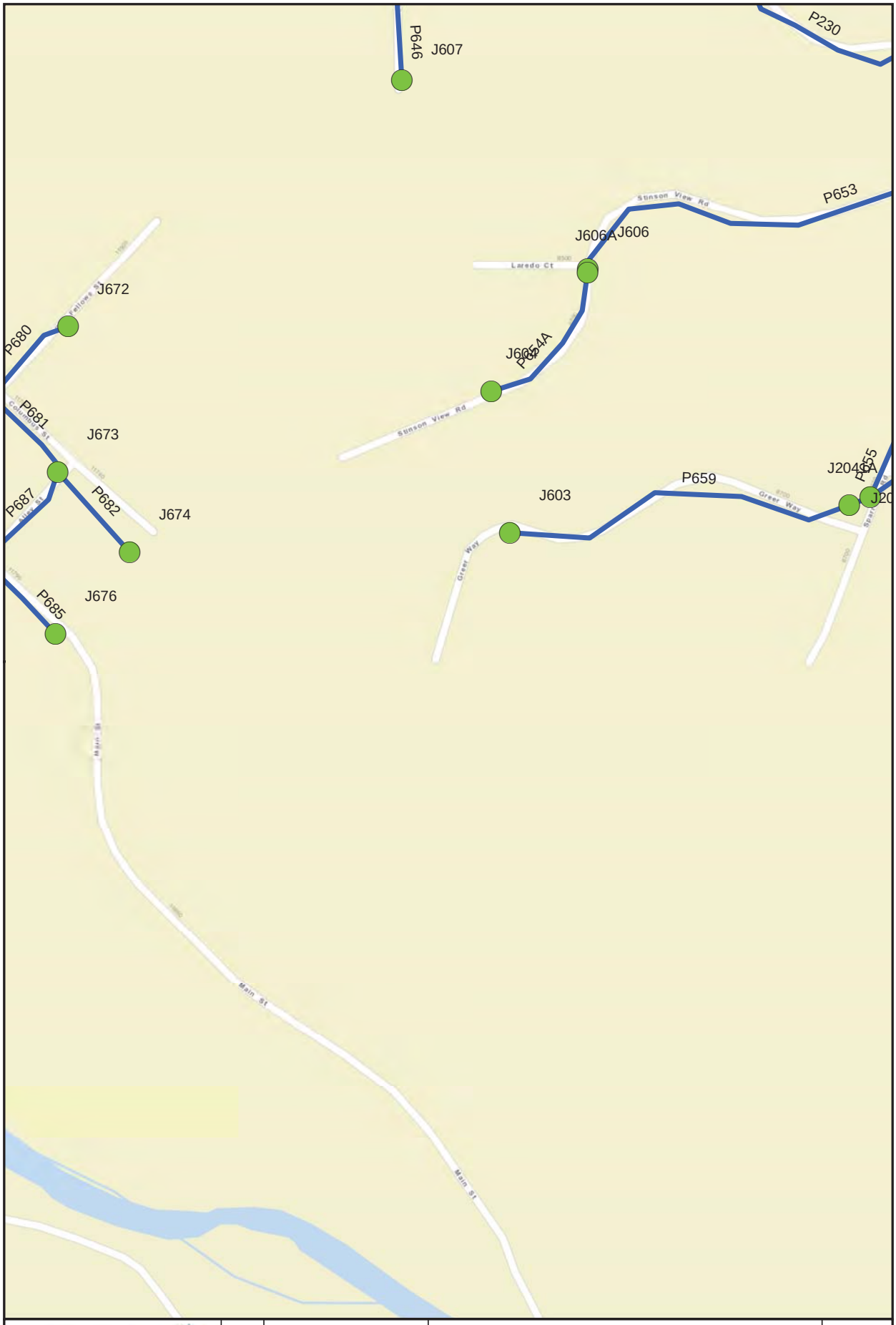

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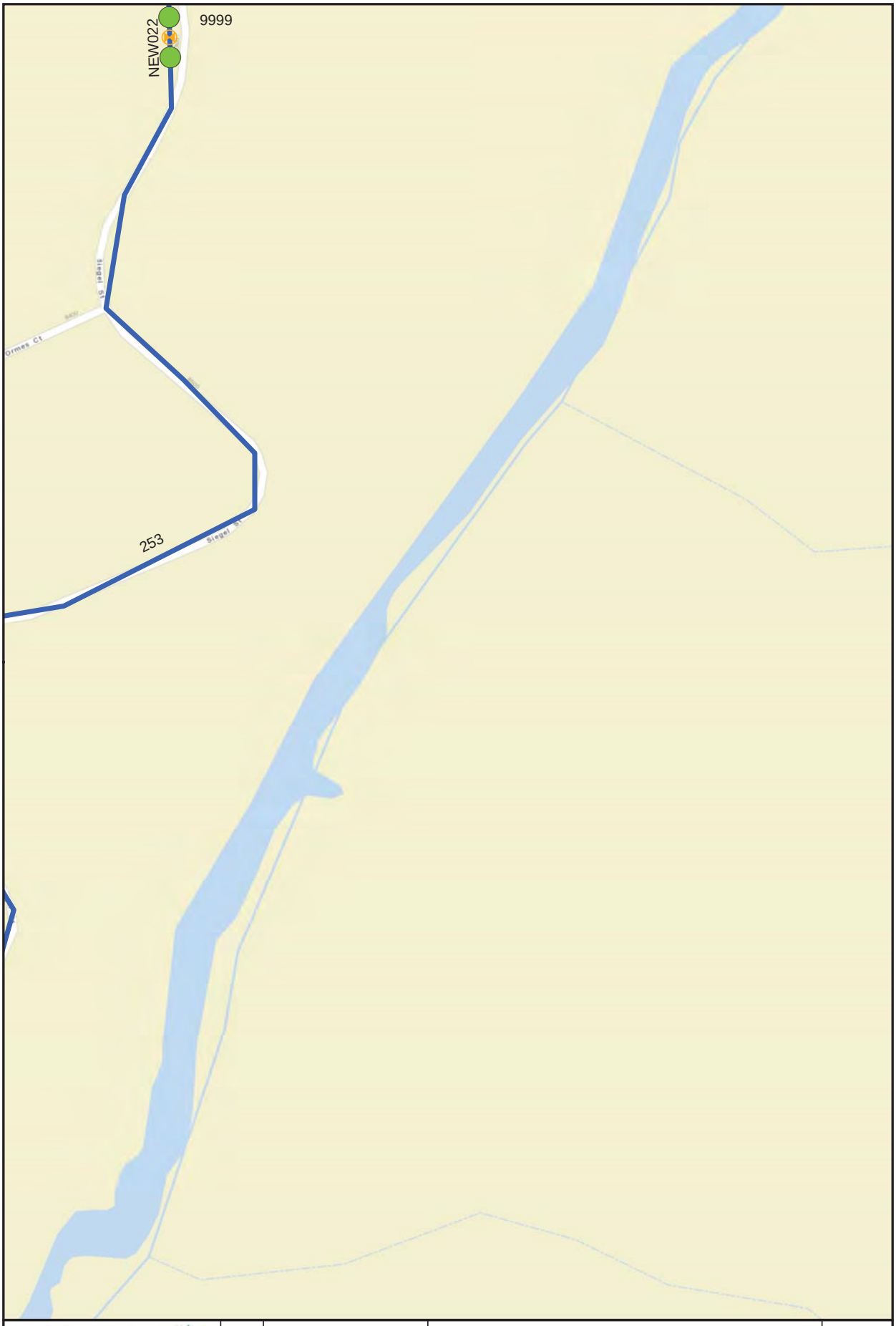

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APPENDIX B

Model Programming

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Tank Modeling Parameters								
Name	ID (Char)	TYPE (Int)	ELEVATION (ft)	MIN_LEVEL (ft)	MAX_LEVEL (ft)	INIT_LEVEL (ft)	DIAMETER (ft)	Allow Overflow (Boolean)
A Tank	T1	0: Cylindrical	698.7	1	30.5	19	108	No
B Tank	T2	0: Cylindrical	897.7	1	30.5	18	78	No
E Tank	T3	0: Cylindrical	810.73	1	19	13	69	No
F Tank	T4	0: Cylindrical	811.08	1	19	13	98	No
602 Tank	T5	0: Cylindrical	820.6	1	17.5	11	40	No

Baseline Pump Modeling Parameters								
ID (Char)	TYPE (Int)	ELEVATION (ft)	DIAMETER (in)	SHUT_HEAD (ft)	DSGN_HEAD (ft)	DSGN_FLOW (gpm)	HIGH_HEAD (ft)	HIGH_FLOW (gpm)
PMP135	2: Exponential 3-Point Curve	616.94	3	850	750	200	550	300
PMP2	2: Exponential 3-Point Curve	708	8	300	138	820	120	900
PMP3	2: Exponential 3-Point Curve	708.34	8	400	341	600	125	925
PMP4	2: Exponential 3-Point Curve	706.82	8	400	341	600	125	925
PMP6	2: Exponential 3-Point Curve	543	10	270	217.9	1,388.00	120	2,000.00
PMP7	2: Exponential 3-Point Curve	543	10	280	224.9	2,082.00	160	2,800.00
PMP8	2: Exponential 3-Point Curve	543	10	280	224.9	2,082.00	160	2,800.00
U7000	2: Exponential 3-Point Curve	617	3	850	750	200	550	300
U7002	2: Exponential 3-Point Curve	708	10	210	138	834	50	1,340.00
U7004	2: Exponential 3-Point Curve	708	8	300	138	834	50	1,340.00
U7006	2: Exponential 3-Point Curve	708	8	560	341	600	220	800
U7008	1: Design Point Curve	708	10	200	300	500	120	1,000.00
U7010	2: Exponential 3-Point Curve	708	8	200	136	834	120	1,000.00

Baseline PRV Model Settings					
ID (Char)	TYPE (Int)	ELEVATION (ft)	DIAMETER (in)	SETTING (Double)	Notes
401	0: Pressure Reducing Valve	546.98	4	75	
4014	0: Pressure Reducing Valve	300.83	8	73	
402	0: Pressure Reducing Valve	617.95	4	36	
403	0: Pressure Reducing Valve	613.78	6	75	
403B	0: Pressure Reducing Valve	453.42	6	99	
404	0: Pressure Reducing Valve	617.64	6	73	
404B	0: Pressure Reducing Valve	495.76	6	75	
405	0: Pressure Reducing Valve	689.51	6	30	
406	0: Pressure Reducing Valve	419.42	6	113	
408	0: Pressure Reducing Valve	408.89	6	65	
409	0: Pressure Reducing Valve	408.84	6	70	
410	0: Pressure Reducing Valve	382.27	4	81	
411	0: Pressure Reducing Valve	347.34	8	55	
415	0: Pressure Reducing Valve	352.57	10	143	
416	0: Pressure Reducing Valve	472	6	73	
420	0: Pressure Reducing Valve	379.38	6	100	
900	0: Pressure Reducing Valve	646.9	6	0	Closed
901	0: Pressure Reducing Valve	640.49	6	0	Closed
902	0: Pressure Reducing Valve	640.44	6	0	Closed
NEW01	0: Pressure Reducing Valve	430.6	4	74	
NEW02	0: Pressure Reducing Valve	481.52	4	44	
NEW03	0: Pressure Reducing Valve	727.09	4	55	
NEW04	0: Pressure Reducing Valve	706.28	4	54	
NEW05	0: Pressure Reducing Valve	607.01	6	79	
NEW06	0: Pressure Reducing Valve	671.46	6	49	
NEW07	0: Pressure Reducing Valve	330.98	6	75	
NEW08	0: Pressure Reducing Valve	392.36	6	48	
NEW09	0: Pressure Reducing Valve	409.33	6	40	

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APPENDIX C

Baseline Node, Pipe, and Fire Flow Reports

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Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
10001	1.63	727.09	954.1	98.36
10003	8.05	727.09	854.02	55
10005	0.79	706.28	949.53	105.4
10007	16.96	706.28	853.87	63.95
10009	1.29	607.01	980.56	161.86
10011	7.72	607.01	789.33	79
10013	2.17	671.46	996	140.63
10015	6.18	671.46	789.27	51.05
10017	1.78	352	502.81	65.35
10019	1.69	350	502.81	66.21
10021	1.21	340	502.82	70.55
10023	1.68	337	502.83	71.85
10025	2.91	327	502.86	76.2
10027	2.74	319	502.88	79.67
10029	5.11	329	502.93	75.36
10031	7.78	344	503	68.9
10033	4.29	334	503.13	73.28
10035	4.77	400	540.1	60.7
10037	5.38	398	540.02	61.54
10039	3.7	403	539.99	59.36
10041	1.25	404	539.97	58.92
10043	9.13	310	503.77	83.96
10045	18.71	276	503.16	98.43
10047	19.75	257	503.02	106.6
10049	4.92	276	503	98.36
10051	2.3	330.98	542.71	91.74
10053	5.1	392.36	503.86	48.31
10055	2.74	409.33	502.8	40.5
9993	1.91	430.6	536.63	45.94
9995	5.4	430.6	536.62	45.94
9997	1.6	481.52	536.23	23.71
9999	31.78	481.52	536.23	23.71
J10	1.56	622	850.86	99.16
J1001	79.99	633.86	828.34	84.27
J1002	1.77	620.65	830.86	91.09
J1002.001	9.2	617.08	831.02	92.7
J1002.004	3.62	615.31	831.24	93.56
J1002.005	1.42	612.24	831.47	94.99
J1002.007	2.14	614.49	831.52	94.04
J1002.010	3.56	620.13	831.23	91.47
J1002.014	2.05	624.09	831.04	89.67
J1002.016	2.81	620.97	831.03	91.02
J1002.019	29.7	624.35	831.01	89.55
J1002.1	5.66	611.77	831.18	95.07
J1002.2	15.64	707.26	831.13	53.67

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1003	4.07	606.58	831.78	97.58
J1004	2.75	611.94	831.79	95.26
J1005	4.55	621.81	831.96	91.06
J1006	3.12	693.41	829.97	59.17
J1007	9.77	614.72	834.94	95.42
J1008	2.26	623.18	836.51	92.44
J1009	5.28	664.06	836.43	74.69
J1010	7.98	670.62	836.38	71.82
J1011	4.33	673.77	834.22	69.52
J1012	7.73	708.15	834.06	54.56
J1013	6.2	715.85	832.63	50.6
J1015	4.19	737.58	833.77	41.68
J1016	2.85	741.06	833.97	40.26
J1017	9.72	662.17	835.49	75.1
J1018	8.68	666.78	836.68	73.62
J1019	5.56	665.31	836.67	74.25
J1020	1.87	645.73	837.57	83.13
J1021	4.03	610.93	838.65	98.67
J1022	3.11	608.47	850.02	104.66
J1023	3.1	612.59	850.86	103.24
J1024	2.35	624.7	850.99	98.05
J1025	6.75	630.06	856.4	98.07
J1026	2.73	600.02	843.36	105.44
J1027	7.88	596.68	843.13	106.79
J1028	6.45	605.2	837.83	100.8
J1029	4.23	595.68	837.37	104.73
J1030	7.92	607.36	836.52	99.29
J1031	4.46	726.11	873.61	63.91
J1033	5.49	616.66	684.79	29.52
J1034	7.18	598.17	661.28	27.34
J1035	8.23	577.15	662.49	36.98
J1036	6.45	546.8	665.1	51.26
J1037	3.36	531.43	656.47	54.18
J1038	11.78	507.24	648.84	61.35
J1039	16.65	531.5	647.34	50.2
J1040	11.82	605.85	646.4	17.57
J1041	18.84	556.73	646.22	38.78
J1042	14.1	533.38	645.34	48.51
J1043	5.99	559.87	644.28	36.57
J1044	9.18	564.85	645.42	34.91
J1045	4.62	561.27	679.64	51.29
J1046	14.61	515.5	669.15	66.58
J1047	8.46	552.19	678.44	54.7
J1048	5.79	627.63	685.57	25.1
J1049	6.55	598.24	682.04	36.31

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1050	8.07	607.94	684.11	33
J1051	3.31	633.21	836.23	87.97
J1052	5.95	619.66	836.13	93.8
J1053	3.68	627.26	682.4	23.89
J1054	6.13	597.82	682.42	36.66
J1056	10.76	613.62	682.57	29.88
J1057	4.8	594.57	682.4	38.06
J1058	8.33	553.92	682.39	55.67
J1060	6.18	578.88	682.39	44.85
J1061	5.9	618.39	789.27	74.04
J1062	8.6	671.46	996	140.63
J1063	16.49	670.33	996.27	141.23
J1064	9.11	622.17	681.66	25.78
J1065	20.16	536.64	678.4	61.43
J1066	6.28	521.59	677.55	67.58
J1067	11.22	484.65	677.17	83.42
J1068	6.53	464.59	633.11	73.02
J1069	31.99	425.15	614.73	82.14
J1070	5.53	440.14	613.42	75.08
J1071	12.42	414.62	604.09	82.1
J1072	25.39	433.41	604.19	74
J1073	17.21	418.51	601.74	79.39
J1074	10.56	406.83	601.26	84.24
J1075	20.74	402.24	596.76	84.28
J1076	8.73	422.93	599.72	76.6
J1077	13.39	393.47	593.43	86.64
J1078	17.13	381.83	588.38	89.5
J1079	24.63	410.28	589.3	77.57
J1080	13.95	550.41	677.35	55
J1081	8.47	607.01	980.57	161.86
J1082	39.26	631.17	972.79	148.02
J1083	5.92	710.77	973.36	113.78
J1084	10.69	718.31	976.6	111.92
J1085	10.79	707.72	975.42	115.99
J1086	13.61	740.4	970.6	99.75
J1087	4.86	739.32	968.68	99.38
J1088	7.73	665.42	971.22	132.5
J1089	6.59	722.42	962.73	104.13
J1090	10.66	616.28	962.71	150.11
J1091	9.35	717.07	959.47	105.03
J1092	7.31	698.32	961.28	113.94
J1093	10.18	682.58	967.23	123.34
J1094	13.14	618.52	967.23	151.1
J1095	9.02	665.16	960.88	128.14
J1096	7.27	727.09	954.49	98.53

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1097	4.37	706.28	949.53	105.4
J1098	13.22	710.45	945.41	101.81
J1099	37.02	613.31	942.4	142.6
J1100	26.18	747.27	943.02	84.82
J1101	13.65	663.75	941.42	120.31
J1102	17.66	687.64	939.49	109.13
J1103	4.93	722.31	944.78	96.39
J1104	11.25	671.12	944.55	118.48
J1105	14.54	620.12	944.04	140.36
J1106	11.6	595.3	939.25	149.03
J1107	10.69	552.32	930.75	163.97
J1108	18.74	550.69	930.08	164.39
J1109	7.92	569.06	920.55	152.3
J111	0.31	698.87	717.48	8.06
J1110	4.38	743.5	943.29	86.57
J1111	1.46	528.11	663.11	58.49
J1112	41.69	559.56	910.34	151.99
J1113	2.7	715.91	944.8	99.18
J1114	29.18	708.49	894.47	80.58
J1115	7.53	695.66	867.8	74.59
J1116	14.02	610.98	881.54	117.23
J1117	12.62	619.32	867.01	107.33
J1118	14.44	652.95	880	98.38
J1120	3.03	572.53	645.1	31.44
J1121	19.88	697.84	879.14	78.56
J1122	55.74	509.5	717.26	90.02
J1123	15.61	422.55	714.2	126.37
J1124	21.18	510.2	715.36	88.89
J1125	9.7	556.95	638.76	35.45
J1126	10.52	558.79	636.5	33.67
J1127	9.29	547.63	636.68	38.58
J1128	5.79	584.27	636.59	22.67
J1129	9.38	578.13	631.77	23.24
J1130	6.73	616.94	917.94	130.42
J1131	13.2	768.69	845.8	33.41
J1133	10.33	565.2	641.18	32.92
J1134	0	793.84	824.36	13.22
J1135	13.28	538.66	644.53	45.87
J1136	7.64	543.35	646.62	44.75
J1137	22.56	552.21	646.84	41.01
J1138	13.21	513.1	646.25	57.69
J1139	5.04	670.56	848.03	76.9
J1141	6.88	715.21	943.3	98.83
J1142	33.17	709.78	951.29	104.65
J1143	6.55	638.77	837.59	86.15

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1144	6.08	678.41	835.51	68.07
J1145	0	705.22	824.67	51.76
J1146	0	736.48	824.51	38.14
J1147	7.15	737.76	825.79	38.14
J1148	1.7	682.21	698.89	7.23
J119	1.86	711.38	1,118.96	176.61
J121	0	543	781.16	103.19
J123	0.08	543	550	3.03
J125	0	543	547.45	1.93
J127	2.8	543	546.65	1.58
J131	0	543	783.44	104.18
J133	1.53	543	784.13	104.48
J16	4.76	592	646.06	23.42
J18	17.35	565	565.49	0.21
J20	18.76	417	547.31	56.46
J2001	38.82	560.25	776.21	93.58
J2002	21.77	531.25	783.08	109.12
J2003	10.07	515.99	775.56	112.47
J2004	10.5	453.42	681.87	98.99
J2004.1	15.18	453.42	758.56	132.22
J2005	14.64	495.76	668.85	75
J2005.1	22.78	495.76	757.58	113.45
J2006	12.1	391.7	668.76	120.05
J2007	13.02	399	664.82	115.18
J2008	14.92	360.71	547.85	81.09
J2009	15.63	378.54	547.09	73.03
J2010	23.02	502.68	546.98	19.2
J2011	22.07	383.46	546.73	70.74
J2012	12.88	309.61	545.2	102.08
J2013	15.67	362.75	543.77	78.44
J2014	4.71	305.73	543.79	103.15
J2015	3.38	299.23	544.1	106.1
J2016	0.82	330.98	504.07	75
J2017	6.12	354.54	503.86	64.7
J2018	0.82	392.36	540.36	64.13
J2019	13.85	455.11	540.66	37.07
J2020	7.71	434.3	541.9	46.62
J2021	10.21	443.48	546.39	44.59
J2022	16.77	434.22	552.7	51.34
J2024	11.55	472.67	553.58	35.06
J2025	21.69	499.19	543.39	19.15
J2026	27.6	439.39	538.95	43.14
J2027	8.54	415.53	538.53	53.29
J2028	6.25	381.22	538.6	68.19
J2029	2.68	409.33	539.96	56.6

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2030	4.1	352.31	502.8	65.21
J2031	7.9	350.63	502.79	65.93
J2032	9.96	361.99	535.76	75.29
J2033	9.68	352.99	536.78	79.64
J2034	5.37	347.34	474.27	55
J2035	16.56	229.78	473.11	105.44
J2036	52.47	226.5	472.04	106.39
J2037	22.85	447.62	538.7	39.46
J2038	6.56	430.6	537.4	46.28
J2039	7.7	481.52	538.09	24.51
J2040	10.64	402.95	535.93	57.62
J2041	42.6	372.34	535.84	70.84
J2041A	9.22	395.79	535.93	60.72
J2042	10.51	429.2	564.15	58.47
J2043	21.34	482.32	564.27	35.51
J2044	5.33	430.76	565.76	58.49
J2045	6.75	430.21	567.13	59.33
J2046	2.79	437.84	566.75	55.86
J2047	10.94	426.01	568.73	61.84
J2048	3.58	410.35	564.14	66.64
J2049	7.28	400.53	568.8	72.91
J2050	12.71	383.53	568.86	80.31
J2052	2.32	370.21	557.67	81.23
J2054	0.64	356.03	574.92	94.85
J2055	2.59	423.72	557.79	58.09
J22	14.02	460	547.17	37.77
J24	14.08	469	547.14	33.86
J26	15.46	527	547.11	8.71
J28	18.14	529	547.08	7.83
J30	24.9	335	548.38	92.46
J32	14.18	327	546.54	95.13
J34	33.57	244	460.18	93.67
J36	22.13	258	452.99	84.49
J38	3.15	691	831.05	60.68
J40	2.23	678	831.06	66.32
J400	3.25	376.91	573.11	85.01
J4001	6.17	546.98	720.04	74.99
J4002	12.06	617.95	701.03	36
J4003	17.65	613.78	786.86	75
J4004	8.07	624.96	871.22	106.7
J4006	11.2	417.18	557.41	60.76
J4008	11.96	408.89	568.76	69.27
J4009	0.32	408.84	568.8	69.31
J401	27.19	410.39	559.08	64.43
J4010	5.93	382.27	569.2	81

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J4011	8.49	351.28	532.72	78.62
J4012	4.78	361.02	502.79	61.43
J4013	3	334.6	503.99	73.4
J4015	1.88	352.57	574.92	96.35
J4016	7.76	427.04	568.76	61.41
J402	17.73	502.08	559.03	24.67
J403	5.47	475.76	564.52	38.46
J404	11.3	590.2	642.06	22.47
J405	23.73	501.07	564.46	27.47
J406	4.4	460.39	564.83	45.25
J407	9.81	471.84	564.82	40.29
J408	4.02	436.69	566.75	56.36
J409	5.51	453.6	565.7	48.57
J410	10.01	429.21	599.71	73.88
J411	47.35	530.35	645.78	50.02
J412	15.45	489.13	663.08	75.37
J413	5.43	540.44	682.39	61.51
J414	5.37	670.96	692.44	9.31
J415	4.49	602.94	692.44	38.78
J416	5.24	689.83	684.79	-2.18
J417	5.5	570.78	681.49	47.97
J418	9.87	473.88	677.16	88.08
J419	10.91	509.88	677.33	72.56
J42	1.94	678	831.06	66.32
J420	6.8	628.41	971.21	148.54
J421	22.85	535.97	786.75	108.66
J422	43.08	536.61	777.33	104.31
J423	5.49	640.44	684.1	18.92
J424	31.12	617.64	786.07	72.98
J425	59.12	610.41	767.41	68.03
J426	12.8	626.85	626.93	0.03
J427	3.93	601.64	626.95	10.97
J428	5.81	590.51	637.72	20.46
J429	20.42	572.14	637.68	28.4
J430	2.79	614.51	850.86	102.41
J431	2.71	698.74	704.54	2.51
J433	2.33	640.49	682.4	18.16
J434	10.25	414.66	568.71	66.75
J435	3.23	646.9	661.28	6.23
J436	20.46	515.53	777.71	113.6
J437	14.17	481.13	777.69	128.5
J438	15.49	394.18	656.19	113.53
J439	5.69	641.36	704.53	27.37
J44	0.82	656	831.08	75.86
J440	0	537	589.31	22.66

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J442	18.82	532.86	635.52	44.48
J46	0.72	656	831.09	75.86
J460	7.58	716.58	848.03	56.96
J461	11.67	730.8	848.03	50.79
J463	5.75	719.89	848.03	55.52
J464	15.92	725.52	848.04	53.09
J465A	12.63	523.63	646.25	53.13
J466	15.07	719.2	848.01	55.81
J48	0.24	656	831.09	75.86
J480	5.61	351.46	556.54	88.86
J481	3.04	399.22	568.8	73.48
J50	1.51	652	831.09	77.6
J500	0	708.34	1,119.14	178
J5004	11.73	689.51	758.75	30
J5008	19.31	777.98	838.71	26.31
J501	0	706.82	1,119.20	178.69
J5010	20.66	741.82	848.1	46.05
J502	6.83	612.75	920.31	133.26
J503	6.13	604.24	789.27	80.17
J504	24.76	512.64	915.04	174.36
J505	22.86	609.26	881.52	117.97
J506	50.75	682.11	879.03	85.32
J507	4.36	691.93	890.07	85.85
J508	9.22	567.3	715.53	64.23
J509	13.44	548.71	915.09	158.75
J510	4.31	529.43	570.92	17.98
J512	7.32	519.04	565.46	20.11
J514	1.9	537.35	584.27	20.33
J52	1.24	654	831.09	76.73
J522	13.16	378.62	536.79	68.54
J522A	4.02	379.38	536.79	68.21
J54	2.54	658	831.09	75
J550	27.86	463.99	715.23	108.86
J551	6.05	482.54	715.35	100.88
J552	57.24	454.22	714.32	112.7
J553	14.24	506.54	714.17	89.97
J554	24.11	436.24	714.18	120.43
J555	30.34	591.94	700.86	47.19
J56	3.85	661	831.09	73.7
J58	4.25	617	918.15	130.49
J60	0	708	877.83	73.59
J600	0.39	419.42	557.78	59.95
J601	20.5	472.26	547.02	32.39
J603	6.72	334.12	535.92	87.44
J604	7.5	297.52	536.03	103.34

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J605	7.01	390.28	539.41	64.62
J606	9.02	337.4	536.03	86.07
J606A	2.29	336.06	536.03	86.65
J607	11.11	336.52	536.78	86.77
J608	62.79	557.25	538.06	-8.32
J609	19.78	414.09	536.12	52.87
J610	7.2	436.35	557.78	52.62
J611	2.11	521.55	635.53	49.39
J612	9.9	452.03	546.38	40.88
J62	1.13	708	877.87	73.6
J621	5.64	636.44	836.13	86.52
J64	0.71	708	1,120.40	178.69
J650	6.74	279.76	502.79	96.64
J651	14.84	283.13	502.78	95.17
J66	0	708	877.8	73.57
J670	9.98	306.1	473.67	72.61
J671	1.87	267.65	473.3	89.11
J672	10.52	298.36	473.29	75.8
J673	2.43	267.97	473.25	88.95
J674	7.39	269.55	473.24	88.26
J675	3.77	249.75	473.21	96.83
J676	1.67	243.75	473.21	99.43
J677	32.34	317.44	546.22	99.13
J678	28.84	275.32	460.01	80.03
J679	67.72	229.65	461.11	100.29
J680	35.95	226.11	460.28	101.47
J681	60.46	262.84	459.42	85.18
J682	34.34	216.32	460.07	105.62
J683	26.98	233.38	459.87	98.14
J684	6.89	223.6	460.07	102.46
J687	6.55	263.66	473.39	90.88
J688	0.37	300.83	472.04	74.18
J70	8.95	425	540.44	50.02
J700	8.88	736.44	834.09	42.31
J701	0.73	712.05	877.73	71.79
J702	6.95	700.46	834.1	57.9
J703	4.74	669.44	834.11	71.35
J704	3.09	731.42	825.79	40.89
J705	3.92	648.28	850.85	87.78
J706	6	696.19	833.96	59.7
J707	9.2	695.67	835.51	60.59
J708	6.37	660.02	836.22	76.35
J709	27.29	646.48	836.11	82.17
J710	5.03	690.18	834.74	62.64
J711	3.81	667.27	834.74	72.56

Baseline PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J712	1.73	622.41	850.78	98.95
J713	1.47	624.62	850.78	97.99
J714	9.82	745.41	834.09	38.42
J715	7.28	691.64	834.09	61.73
J716	4.47	631.53	847.66	93.65
J717	5.03	609.41	833.18	96.96
J718	6.24	611.2	833.71	96.42
J719	6.19	614.13	835.74	96.02
J72	6.21	455	540.41	37.01
J720	5.12	616.72	845.28	99.04
J723	15.22	774.88	824.61	21.55
J724	2.91	754.37	823.72	30.05
J725	1.43	738.62	823.72	36.87
J726	2.39	756.68	823.72	29.05
J727	1.03	737.7	823.72	37.27
J728	0.61	741.16	823.72	35.77
J729	1.85	739.4	823.72	36.54
J730	13.63	786.77	823.72	16.01
J731	6.75	740.48	833.97	40.51
J74	3.92	660	848.03	81.47
J76	8.01	660	646.24	-5.96
J80	7.29	545.81	635.53	38.88
J800	55.72	746.34	845.37	42.91
J801	8.48	776.96	841.8	28.1
J802	18.43	754.46	841.77	37.83
J82	2.62	575.06	617.66	18.46
J84	8.2	600	700.91	43.72
J86	13.89	480	565.54	37.07
J94	4.14	645	682.4	16.21

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
18	J480	J30	1,031.26	6	140	321.74	3.65	8.16	7.92	Open
20	J5010	J464	2,457.92	12	100	64.94	0.18	0.06	0.03	Open
229	J436	J4003	1,292.43	6	130	-281.27	3.19	9.15	7.08	Open
239	J514	J440	109.08	6	130	-774.04	8.78	5.03	46.15	Open
24	J465A	J76	1,115.54	6	130	8.01	0.09	0.01	0.01	Open
241	J2046	416	35.63	6	130	0	0	0	0	Open
243	J606	J606A	9.58	6	130	9.78	0.11	0	0.01	Open
245	J2040	J2041A	57.71	6	130	15.94	0.18	0	0.03	Open
249	9995	J609	715.22	6	130	81.26	0.92	0.51	0.71	Open
253	9999	J2041	4,389.29	6	130	26.49	0.3	0.39	0.09	Open
257	10003	10007	3,814.74	6	130	16.95	0.19	0.15	0.04	Open
259	10005	J1097	106.38	6	130	-0.8	0.01	0	0	Open
263	10009	J1081	71.29	6	130	-27.24	0.31	0.01	0.09	Open
269	10015	J1061	818.83	12	130	-6.18	0.02	0	0	Open
271	10017	J2030	178.81	6	130	18.09	0.21	0.01	0.04	Open
273	10019	10017	121.65	6	130	19.87	0.23	0.01	0.05	Open
275	10021	10019	100.79	6	130	21.55	0.24	0.01	0.06	Open
277	10023	10021	153.08	6	130	22.76	0.26	0.01	0.07	Open
279	10025	10023	411.58	6	130	24.45	0.28	0.03	0.08	Open
281	10027	10025	178.3	6	130	27.35	0.31	0.02	0.09	Open
283	10029	10027	409.25	6	130	30.09	0.34	0.05	0.11	Open
285	10031	10029	500.77	6	130	35.2	0.4	0.08	0.15	Open
287	10033	10031	574.79	6	130	42.99	0.49	0.13	0.22	Open
289	10035	10037	682.69	6	130	31.01	0.35	0.08	0.12	Open
291	10037	10039	281.65	6	130	25.63	0.29	0.02	0.08	Open
293	10039	10041	285.51	6	130	21.93	0.25	0.02	0.06	Open
295	10041	J2029	209.1	6	130	20.68	0.23	0.01	0.06	Open
297	10043	J4013	356.68	6	130	-75.54	0.86	0.22	0.62	Open
299	10045	10043	1,238.08	6	130	-66.4	0.75	0.6	0.49	Open
301	10047	10045	522.45	6	130	-47.69	0.54	0.14	0.26	Open
303	10049	10047	293.5	6	130	-27.94	0.32	0.03	0.1	Open
307	J4013	J2016	119.81	6	130	-78.53	0.89	0.08	0.67	Open
311	10055	J2030	551.73	6	130	-2.74	0.03	0	0	Open
313	J4012	J2031	140.26	6	130	6.46	0.07	0	0.01	Open
4014D	4014	J688	1	8	150	0	0	0	0	Open
4014U	J2015	4014	1	8	150	0	0	0	0	Open
401D	401	J4001	1	4	150	237.42	6.06	0.03	28.63	Open
401U	J1107	401	1	4	150	237.42	6.06	0.03	28.63	Open
402D	402	J4002	1	4	150	50.6	1.29	0	1.65	Open
402U	J502	402	1	4	150	50.6	1.29	0	1.65	Open
403B1	J2004.1	403B	1	6	150	671.42	7.62	0.03	27.22	Open
403B2	403B	J2004	1	6	150	671.42	7.62	0.03	27.22	Open
403D	403	J4003	1	6	150	321.77	3.65	0.01	6.96	Open
403U	J1117	403	1	6	150	321.77	3.65	0.01	6.96	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
404B1	J2005.1	404B	1	6	150	199.2	2.26	0	2.87	Open
404B2	404B	J2005	1	6	150	199.2	2.26	0	2.87	Open
404D	404	J424	1	6	150	865.91	9.83	0.04	43.58	Open
404U	J4004	404	1	6	150	865.91	9.83	0.04	43.58	Open
405D	405	J5004	1	6	150	11.73	0.13	0	0	Open
405U	J1121	405	1	6	150	11.73	0.13	0	0.06	Open
406D	406	J600	1	6	150	276.81	3.14	0.01	5.31	Open
406U	J2055	406	1	6	150	276.81	3.14	0.01	5.25	Open
408D	408	J4008	1	6	150	0	0	0	0	Open
408U	J2048	408	1	6	150	0	0	0	0	Open
409D	409	J4009	1	6	150	0	0	0	0	Open
409U	J434	409	1	6	150	0	0	0	0	Open
410D	410	J4010	1	4	150	70.19	1.79	0	2.99	Open
410U	J400	410	1	4	150	70.19	1.79	0	2.99	Open
411D	411	J2034	1	8	150	435.82	2.78	0	2.99	Open
411U	J4011	411	1	8	150	435.82	2.78	0	2.99	Open
415D	415	J4015	1	10	150	331.54	1.35	0	0.61	Open
415U	J2054	415	1	10	150	331.54	1.35	0	0.61	Open
420D	420	J522A	1	6	150	15.13	0.17	0	0	Open
420U	J522	420	1	6	150	15.14	0.17	0	0.06	Open
900D	900	J435	1	6	150	0	0	0	0	Open
900U	J705	900	1	6	150	0	0	0	0	Open
901D	901	J433	1	6	150	0	0	0	0	Open
901U	J621	901	1	6	150	0	0	0	0	Open
902D	902	J423	1	6	150	0	0	0	0	Open
902U	J1051	902	1	6	150	0	0	0	0	Open
NEW011	9993	NEW01	1	4	150	86.67	2.21	0	4.39	Open
NEW012	NEW01	9995	1	4	150	86.67	2.21	0	4.46	Open
NEW021	9997	NEW02	1	4	150	58.27	1.49	0	2.08	Open
NEW022	NEW02	9999	1	4	150	58.27	1.49	0	2.14	Open
NEW031	10001	NEW03	1	4	150	25	0.64	0	0.43	Open
NEW032	NEW03	10003	1	4	150	25	0.64	0	0.43	Open
NEW041	10005	NEW04	1	4	150	0	0	0	0	Open
NEW042	NEW04	10007	1	4	150	0	0	0	0	Open
NEW051	10009	NEW05	1	6	150	25.94	0.29	0	0.06	Open
NEW052	NEW05	10011	1	6	150	25.94	0.29	0	0.06	Open
NEW061	10013	NEW06	1	6	150	0	0	0	0	Open
NEW062	NEW06	10015	1	6	150	0	0	0	0	Open
NEW071	10051	NEW07	1	6	150	137.84	1.56	0	1.46	Open
NEW072	NEW07	J2016	1	6	150	137.84	1.56	0	1.46	Open
NEW081	J2018	NEW08	1	6	150	0	0	0	0	Open
NEW082	NEW08	10053	1	6	150	0	0	0	0	Open
NEW091	J2029	NEW09	1	6	150	0	0	0	0	Open
NEW092	NEW09	10055	1	6	150	0	0	0	0	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P10	T2	J1114	1,739.74	8	130	804.32	5.13	21.23	12.2	Open
P100	J1072	J1071	821.74	6	130	30.74	0.35	0.1	0.12	Open
P101	J1071	J1074	614.47	6	130	223.21	2.53	2.84	4.61	Open
P102	J1074	J1075	635.12	6	130	281.38	3.19	4.5	7.08	Open
P103	J1075	J1077	631.53	10	130	919.56	3.76	3.33	5.27	Open
P104	J1077	J1078	1,384.58	10	130	752.72	3.07	5.04	3.64	Open
P105	J1077	J1079	1,791.66	6	130	153.45	1.74	4.13	2.3	Open
P106	J1079	J1078	546.2	6	130	128.82	1.46	0.91	1.67	Open
P107	J1076	J1075	1,040.42	10	130	658.93	2.69	2.96	2.85	Open
P1075	J80	J82	384.81	6	130	776.66	8.81	17.87	46.44	Open
P108	J1073	J1076	674.65	10	130	677.67	2.77	2.02	3	Open
P1080	J121	T1	5,067.59	16	130	5,049.06	8.06	63.46	12.52	Open
P1088	T7009	J123	64.18	99	130	5,053.48	0.21	0	0	Open
P109	J1072	J1073	655.18	10	130	763.61	3.12	2.45	3.74	Open
P1090	T1	J111	70.77	18	130	3,244.66	4.09	0.22	3.11	Open
P110	J1073	J1074	926.26	6	130	68.72	0.78	0.48	0.52	Open
P1102	J123	J125	34.97	10	130	3,799.44	15.52	2.55	72.99	Open
P1104	J125	J127	39.97	10	130	1,888.62	7.71	0.8	20	Open
P1106	J133	J131	34.97	10	130	1,884.29	7.7	0.7	19.91	Open
P1108	J131	J121	31.29	10	130	3,795.11	15.5	2.28	72.83	Open
P111	J1038	J1137	1,681.24	10	130	410.74	1.68	1.99	1.19	Open
P112	J1039	J1041	1,424.14	6	130	85.95	0.98	1.12	0.79	Open
P113	J1039	J1040	775.87	8	130	231.3	1.48	0.94	1.21	Open
P114	J1040	J16	450.25	8	130	180.41	1.15	0.34	0.77	Open
P115	J1044	J1042	806.09	6	130	28.07	0.32	0.08	0.1	Open
P116	J1040	J1041	986.01	6	130	39.07	0.44	0.18	0.18	Open
P117	J1044	J1120	683.43	8	130	138.39	0.88	0.32	0.47	Open
P118	J1042	J1043	722.09	6	130	120.17	1.36	1.06	1.47	Open
P119	J1041	J1042	760.36	6	130	106.19	1.2	0.89	1.17	Open
P12	J1118	J1121	1,184.17	6	130	82.37	0.93	0.86	0.73	Open
P120	J1043	J1125	973.08	6	130	249.54	2.83	5.52	5.67	Open
P121	J1125	J1126	1,167.09	6	130	139.8	1.59	2.26	1.94	Open
P122	J1127	J1126	570.65	6	130	52.65	0.6	0.18	0.32	Open
P123	J1125	J1127	1,995.15	6	130	100.04	1.14	2.08	1.04	Open
P124	J1126	J1129	1,494.83	6	130	181.93	2.06	4.72	3.16	Open
P125	J1128	J1129	731.65	6	130	270.51	3.07	4.82	6.59	Open
P126	J1133	J428	546.92	6	130	264.43	3	3.45	6.31	Open
P127	J1135	J1133	1,940.77	6	130	131.33	1.49	3.35	1.73	Open
P128	J1135	J404	1,055.74	6	130	154.73	1.76	2.47	2.34	Open
P129	J1136	J1135	263.51	6	130	299.34	3.4	2.09	7.94	Open
P13	J507	J1118	582	8	130	970.79	6.2	10.06	17.29	Open
P130	J1137	J1136	319.77	10	130	306.99	1.25	0.22	0.69	Open
P131	J1137	J1138	840.43	6	130	81.2	0.92	0.6	0.71	Open
P133	J1139	J460	757.79	10	130	7.58	0.03	0	0	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P135	J10	J1023	967.85	10	130	-4.35	0.02	0	0	Open
P136	J5010	J1131	983.72	8	130	329.75	2.1	2.3	2.34	Open
P137	J5008	T5	1,656.49	6	130	214.61	2.44	7.11	4.29	Open
P139	J1057	J1058	585.02	6	130	7.71	0.09	0.01	0.01	Open
P14	J1112	J1114	2,450.48	8	130	571.29	3.65	15.87	6.48	Open
P140	J1060	J1057	1,215.75	6	130	-5.24	0.06	0.01	0	Open
P141	J1049	J1060	987.59	6	130	-56.15	0.64	0.35	0.36	Open
P143	J1053	J1058	1,397.22	6	130	6.06	0.07	0.01	0.01	Open
P144	J1054	J1053	445.17	6	130	16.2	0.18	0.02	0.04	Open
P145	J1054	J1057	442.22	6	130	17.74	0.2	0.02	0.04	Open
P146	J1056	J1054	818.82	6	130	40.07	0.45	0.16	0.19	Open
P147	J1056	J1060	490.52	6	130	57.09	0.65	0.18	0.37	Open
P148	J1050	J1056	1,277.98	6	130	107.92	1.22	1.53	1.2	Open
P149	J16	J1044	880.33	8	130	175.65	1.12	0.64	0.73	Open
P15	J1116	J1117	1,489.37	6	130	334.39	3.79	14.53	9.75	Open
P150	J1051	J1052	518.22	6	130	38.87	0.44	0.09	0.18	Open
P151	J1048	J1050	977.04	6	130	121.48	1.38	1.46	1.5	Open
P153	J1036	J1111	509.09	6	130	204.48	2.32	2	3.92	Open
P154	J1035	J1036	752.58	6	130	-191.63	2.17	2.62	3.48	Open
P155	J1148	J1033	662.18	6	130	509.71	5.78	14.1	21.29	Open
P156	J621	J1052	651.52	6	130	-5.64	0.06	0	0.01	Open
P157	J1127	J1128	488.26	6	130	38.1	0.43	0.09	0.17	Open
P158	J1031	J1115	416.43	10	130	1,554.99	6.35	5.81	13.95	Open
P16	J507	J1116	720.34	6	130	371.27	4.21	8.53	11.84	Open
P161	J1115	J1025	636.71	10	130	1,779.41	7.27	11.4	17.91	Open
P162	J1025	J1024	431.33	10	130	1,467.67	6	5.41	12.54	Open
P163	J1025	J1027	1,612.93	6	130	304.99	3.46	13.27	8.22	Open
P164	J1026	J1027	564.27	6	130	59.19	0.67	0.22	0.39	Open
P165	J716	J720	423.7	10	130	951.45	3.89	2.38	5.62	Open
P166	J1024	J1023	413.12	10	130	202.71	0.83	0.13	0.32	Open
P167	J1023	J1022	240.98	6	130	191.33	2.17	0.84	3.47	Open
P168	J1022	J1003	2,372.01	6	130	294.14	3.34	18.24	7.69	Open
P169	J1003	J1002.1	1,926.70	12	130	322.67	0.92	0.6	0.31	Open
P169C	J1002.1	J1002.2	1,296.31	6	130	15.64	0.18	0.04	0.03	Open
P17	J555	J1123	4,963.51	6	130	0	0	0	0	Closed
P170	J1002.1	J1002	1,148.46	12	130	301.36	0.85	0.32	0.27	Open
P171	J1002	J1001	3,089.69	12	130	542.02	1.54	2.52	0.82	Open
P171.01	J1002	J1002.001	345.09	10	130	-242.42	0.99	0.15	0.45	Open
P171.02	J1002.001	J1002.004	562.37	10	130	-225.34	0.92	0.22	0.39	Open
P171.05	J1002.004	J1002.005	517.41	10	130	-243.04	0.99	0.23	0.45	Open
P171.07	J1002.005	J1002.007	124.63	10	130	-244.46	1	0.06	0.45	Open
P171.08	J1002.007	J1004	365.77	10	130	-315.18	1.29	0.27	0.73	Open
P171.09	J1002.007	J1002.010	571.03	6	130	68.58	0.78	0.3	0.52	Open
P171.10	J1002.010	J1002.004	272.5	6	130	-14.07	0.16	0.01	0.03	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P171.11	J1002.010	J1002.014	909.45	6	130	41.26	0.47	0.18	0.2	Open
P171.12	J1002.014	J1002.016	156.33	8	130	58.79	0.38	0.02	0.1	Open
P171.13	J1002.016	J1002.001	587.2	8	130	26.28	0.17	0.01	0.02	Open
P171.14	J1002.016	J1002.019	576.2	8	130	29.7	0.19	0.02	0.03	Open
P172	J119	J1063	3,381.68	8	130	1,448.52	9.25	122.69	36.28	Open
P173	J1004	J1003	993.12	10	130	32.6	0.13	0.01	0.01	Open
P174	J1005	J1004	194.86	10	130	350.52	1.43	0.17	0.88	Open
P175	J717	J1005	850.35	10	130	454.06	1.85	1.21	1.43	Open
P176	J1008	J719	267.12	10	130	665.12	2.72	0.77	2.89	Open
P177	J1021	J1008	691.35	10	130	689.95	2.82	2.14	3.1	Open
P178	J1008	J1009	1,265.90	6	130	22.57	0.26	0.08	0.07	Open
P179	J1009	J1010	1,321.22	6	130	17.29	0.2	0.05	0.04	Open
P18	J1108	J1109	966.91	8	130	716.53	4.57	9.53	9.85	Open
P180	J1019	J1010	602.06	8	130	140.35	0.9	0.29	0.48	Open
P182	J1021	J1020	341.43	8	130	388	2.48	1.08	3.16	Open
P183	J1020	J1019	243.03	8	130	424.79	2.71	0.91	3.74	Open
P184	J1020	J1143	437.45	8	130	-38.66	0.25	0.02	0.04	Open
P185	J1028	J1143	495.67	8	130	140.51	0.9	0.24	0.48	Open
P186	J1028	J1029	456.28	8	130	209.33	1.34	0.46	1.01	Open
P187	J1029	J1030	457.35	6	130	137.15	1.56	0.86	1.87	Open
P188	J1030	J1051	1,062.92	6	130	48.55	0.55	0.29	0.27	Open
P189	J1030	J1017	1,470.69	6	130	80.68	0.92	1.03	0.7	Open
P19	J1122	J552	2,319.87	6	130	111.19	1.26	2.94	1.27	Open
P190	J1017	J1016	1,428.16	6	130	101.07	1.15	1.52	1.06	Open
P191	J1016	J1015	254.47	6	130	85.46	0.97	0.2	0.78	Open
P192	J1144	J1015	1,422.64	6	130	109.19	1.24	1.75	1.23	Open
P193	J1144	J1017	254.37	6	130	30.11	0.34	0.03	0.11	Open
P194	J1018	J1144	499.09	6	130	154.57	1.75	1.17	2.34	Open
P195	J1029	J1018	1,357.62	6	130	67.95	0.77	0.69	0.51	Open
P196	J1143	J1018	957.5	6	130	95.31	1.08	0.91	0.95	Open
P197	J1019	J1012	1,518.12	8	130	278.88	1.78	2.61	1.72	Open
P198	J1011	J1012	620.75	8	130	98.82	0.63	0.16	0.25	Open
P199	J1010	J710	743.2	6	130	149.66	1.7	1.64	2.2	Open
P20	J1107	J1108	797.58	8	130	189.84	1.21	0.67	0.84	Open
P200	J2055	J2004	549.27	8	130	0	0	0	0	Closed
P2004	J801	J5008	615.77	6	130	233.92	2.65	3.1	5.03	Open
P2006	J1130	J5010	665.02	4	130	415.36	10.6	69.84	105.02	Open
P202	J5004	J2001	4,409.17	6	130	0	0	0	0	Closed
P203	J2001	J2002	764.27	6	130	-319.92	3.63	6.87	8.99	Open
P204	J2002	J2003	375.28	6	130	493.11	5.6	7.51	20.02	Open
P205	J4006	J2008	1,584.42	6	130	258.02	2.93	9.56	6.03	Open
P206	J2001	J425	1,244.92	6	130	281.1	3.19	8.8	7.07	Open
P207	J2003	J2004.1	1,867.64	8	130	686.6	4.38	17	9.1	Open
P208	J2004	J2006	1,545.67	8	130	660.93	4.22	13.11	8.48	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P209	J2005	J2006	998.39	6	130	26.35	0.3	0.09	0.09	Open
P21	J4001	J1122	564.39	6	130	231.25	2.62	2.78	4.93	Open
P210	J2005	J2007	1,649.87	6	130	158.2	1.8	4.02	2.44	Open
P211	J2006	J2007	445.94	8	130	675.18	4.31	3.94	8.83	Open
P2113	J512	J2022	1,953.26	6	130	269.36	3.06	12.76	6.53	Open
P213	J409	J86	1,331.42	6	130	31.24	0.35	0.16	0.12	Open
P215	J30	J677	1,482.51	6	140	128.82	1.46	2.15	1.45	Open
P217	J2022	J2021	742.22	6	130	310.4	3.52	6.31	8.5	Open
P218	J2022	J2024	2,347.52	6	130	-57.81	0.66	0.89	0.38	Open
P219	J2024	J2025	680.13	6	130	421.79	4.79	10.2	14.99	Open
P22	J1122	J508	3,762.35	6	130	64.32	0.73	1.73	0.46	Open
P220	J2025	J2026	1,659.04	6	130	166.16	1.89	4.43	2.67	Open
P221	J2026	J2027	674.06	6	130	76.42	0.87	0.43	0.63	Open
P222	J2028	J2027	638.63	6	130	30.15	0.34	0.07	0.11	Open
P223	J2025	J2037	931.36	6	130	233.94	2.65	4.69	5.03	Open
P224	J2026	J2037	2,410.11	8	130	62.14	0.4	0.26	0.11	Open
P225	J2037	J2039	1,440.76	8	130	130.37	0.83	0.6	0.42	Open
P226	J2039	9997	4,608.25	6	130	59.88	0.68	1.86	0.4	Open
P227	J2040	J2041	2,583.70	6	130	16.1	0.18	0.09	0.04	Open
P228	J2038	9993	922.24	6	130	88.58	1.01	0.77	0.83	Open
P229	J2037	J2038	642.78	6	130	142.86	1.62	1.3	2.02	Open
P23	J1106	J1107	528.53	6	130	437.95	4.97	8.5	16.07	Open
P230	J522	J2038	2,293.56	6	130	-47.72	0.54	0.61	0.26	Open
P231	J2033	J2032	855.49	6	130	107.77	1.22	1.02	1.2	Open
P232	J2027	J2033	1,738.52	6	130	98.03	1.11	1.75	1.01	Open
P233	J2028	J2032	1,108.75	8	130	346.5	2.21	2.84	2.57	Open
P235	J670	J2035	855.54	8	130	164.87	1.05	0.55	0.65	Open
P236	J2034	J2036	2,466.79	8	130	197.36	1.26	2.23	0.9	Open
P237	J30	J20	1,592.58	8	130	168.02	1.07	1.07	0.67	Open
P238	J2009	J2010	755.02	6	130	34.56	0.39	0.11	0.15	Open
P239	J20	J22	953.18	8	130	72.54	0.46	0.14	0.14	Open
P24	J1105	J1106	597.73	6	130	301.02	3.42	4.8	8.03	Open
P240	J2009	J2011	2,358.98	6	130	35.64	0.4	0.36	0.15	Open
P241	J2011	J32	712.88	6	130	47.72	0.54	0.19	0.26	Open
P242	J2008	J2009	959.21	6	130	85.84	0.97	0.75	0.79	Open
P243	J2015	J2014	512.44	8	130	158.2	1.01	0.31	0.6	Open
P244	J2013	J2014	3,086.61	8	130	-13.35	0.09	0.02	0.01	Open
P245	J2008	J2013	1,689.14	6	130	157.26	1.78	4.07	2.41	Open
P246	J2013	J2020	796.68	6	130	154.94	1.76	1.87	2.35	Open
P247	J2021	J2020	597.97	6	130	290.29	3.29	4.49	7.51	Open
P248	J2020	J2019	651.85	6	130	138.58	1.57	1.24	1.91	Open
P249	J2019	J70	713.65	6	130	51.77	0.59	0.22	0.31	Open
P25	J1091	J1105	3,333.66	6	130	223.6	2.54	15.43	4.63	Open
P250	J2017	10053	605.82	6	130	5.09	0.06	0	0	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P251	J2016	J2017	533.4	6	130	58.49	0.66	0.21	0.39	Open
P252	J2014	10051	551.8	6	130	140.14	1.59	1.08	1.95	Open
P253	J650	10049	2,951.45	6	130	-23.02	0.26	0.2	0.07	Open
P254	J2017	10033	2,827.92	6	130	47.27	0.54	0.74	0.26	Open
P255	J2018	10035	1,664.19	6	130	35.78	0.41	0.26	0.16	Open
P256	J2019	J2029	1,193.72	6	130	72.96	0.83	0.69	0.58	Open
P257	J22	J24	1,146.73	6	130	14.08	0.16	0.03	0.03	Open
P258	J2030	J4012	363.81	6	130	11.25	0.13	0.01	0.02	Open
P259	J2036	J688	4,332.12	8	130	0.37	0	0	0	Open
P26	J1091	J1142	959.94	8	130	662.58	4.23	8.18	8.52	Open
P260	J2035	J2036	1,526.05	8	130	172.36	1.1	1.07	0.7	Open
P261	J2042	J401	2,229.77	8	130	324.33	2.07	5.06	2.27	Open
P262	J2043	J2042	583.9	6	130	43.23	0.49	0.13	0.22	Open
P263	J2044	J406	772.7	6	130	107.98	1.23	0.93	1.2	Open
P264	J2045	J2044	622.28	6	130	150.07	1.7	1.38	2.21	Open
P265	J408	J2042	1,368.21	8	130	295.18	1.88	2.61	1.91	Open
P266	J2048	J2042	576.36	6	130	-3.57	0.04	0	0	Open
P267	J2047	J4008	779.18	6	130	0	0	0	0	Closed
P268	J4009	J481	65.56	6	130	-0.32	0	0	0	Open
P269	J2049	J4008	1,617.60	6	130	11.96	0.14	0.03	0.02	Open
P27	J1142	J1104	1,951.36	6	130	190.94	2.17	6.74	3.45	Open
P270	J2049	J2052	453.94	6	130	0	0	0	0	Closed
P271	J2050	J481	964.27	6	130	22.61	0.26	0.06	0.07	Open
P272	J4016	J2050	1,019.88	6	130	-28.94	0.33	0.11	0.1	Open
P273	J2047	J4016	544.77	6	130	-21.19	0.24	0.03	0.06	Open
P274	J408	J2046	518.42	6	130	2.79	0.03	0	0	Open
P275	J400	J2045	1,385.15	8	130	458.8	2.93	5.98	4.31	Open
P276	J4010	J2050	739.49	6	130	64.26	0.73	0.34	0.46	Open
P277	J2052	J4015	1,816.14	6	130	-329.66	3.74	17.25	9.5	Open
P278	J1078	J2054	2,862.03	10	130	864.42	3.53	13.46	4.7	Open
P279	J20	J26	1,270.64	8	130	76.72	0.49	0.2	0.16	Open
P28	J1142	J1103	1,642.66	8	130	438.47	2.8	6.52	3.97	Open
P280	J2020	J605	1,278.03	8	130	298.94	1.91	2.49	1.95	Open
P281	J605	J2028	261.45	8	130	382.9	2.44	0.81	3.09	Open
P282	J424	J2002	229	8	130	834.79	5.33	2.99	13.07	Open
P283	J26	J28	679.78	6	130	18.14	0.21	0.03	0.04	Open
P285	J1031	J1115	1,172.94	6	130	231.95	2.63	5.81	4.95	Open
P287	J26	J601	1,561.24	8	130	43.11	0.28	0.08	0.05	Open
P289	J32	J2012	2,035.94	6	130	77.98	0.88	1.34	0.66	Open
P29	J1104	J1105	567.49	6	130	91.96	1.04	0.51	0.89	Open
P291	J32	J22	2,724.41	6	130	-44.44	0.5	0.63	0.23	Open
P293	J34	J678	1,566.15	6	130	28.84	0.33	0.16	0.1	Open
P295	J34	J36	533.74	2	130	22.13	2.26	7.19	13.46	Open
P297	J1002.014	J38	677.35	8	130	-19.57	0.12	0.01	0.01	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P299	J38	J40	609.25	8	130	-22.73	0.15	0.01	0.02	Open
P30	J1103	J1104	540.92	6	130	60.8	0.69	0.22	0.41	Open
P300	J1012	J1013	495.29	8	130	369.97	2.36	1.43	2.9	Open
P301	J1015	J1013	332.36	6	130	190.47	2.16	1.14	3.44	Open
P302	J1147	J723	1,435.34	12	130	544	1.54	1.18	0.82	Open
P303	J723	T3	882.31	12	130	603.75	1.71	0.88	1	Open
P304	J1145	J723	3,077.81	12	130	74.98	0.21	0.06	0.02	Open
P305	J1006	J1145	3,069.48	8	130	279.7	1.79	5.3	1.73	Open
P306	J1146	J1145	1,241.63	12	130	-204.72	0.58	0.17	0.13	Open
P307	J1134	J1146	1,108.54	12	130	-204.72	0.58	0.15	0.13	Open
P308	T4	J1134	231.53	12	130	-666.75	1.89	0.28	1.2	Open
P309	J1001	J1134	6,572.51	12	130	462.03	1.31	3.99	0.61	Open
P31	J1104	J1106	2,444.78	6	130	148.53	1.69	5.3	2.17	Open
P310	J1005	J1006	1,947.97	6	130	98.98	1.12	1.99	1.02	Open
P311	J1007	J1006	1,542.38	6	130	183.83	2.09	4.97	3.22	Open
P312	J1013	J1147	1,116.89	8	130	554.24	3.54	6.84	6.12	Open
P313	J1023	J705	1,528.40	6	130	3.92	0.04	0	0	Open
P314	J712	J1022	649.79	6	130	105.92	1.2	0.75	1.16	Open
P315	J1027	J1028	483.15	6	130	356.29	4.04	5.3	10.97	Open
P316	J1035	J1034	376.78	6	130	183.4	2.08	1.21	3.21	Open
P317	J1120	J1043	447.59	6	130	135.36	1.54	0.82	1.83	Open
P318	J2012	J2015	1,763.11	8	130	161.58	1.03	1.1	0.62	Open
P319	J1144	J707	475.56	6	130	9.2	0.1	0.01	0.01	Open
P32	J1103	J1141	454.78	8	130	393.93	2.51	1.48	3.25	Open
P321	J40	J42	120.91	6	130	1.94	0.02	0	0	Open
P323	J40	J44	773.41	8	130	-26.9	0.17	0.02	0.02	Open
P325	J44	J46	208.71	8	130	-27.72	0.18	0	0.02	Open
P327	J46	J48	132.42	8	130	0.24	0	0	0	Open
P329	J46	J50	194.45	8	130	-28.68	0.18	0	0.03	Open
P33	J1141	J1102	1,255.54	8	130	379.12	2.42	3.81	3.03	Open
P331	J50	J52	141.54	6	130	7.63	0.09	0	0.01	Open
P333	J52	J54	147.78	6	130	2.54	0.03	0	0	Open
P335	J52	J56	408.35	6	130	3.85	0.04	0	0	Open
P337	J50	J1002.010	802.07	6	130	-37.82	0.43	0.14	0.17	Open
P339	J430	J10	1,211.84	10	130	-2.79	0.01	0	0	Open
P34	J1102	J1108	1,583.40	8	130	545.42	3.48	9.41	5.94	Open
P341	J427	U7000	84.05	6	1,300.00	213.01	2.42	0	0.06	Open
P343	U7000	J58	32.26	6	130	213.01	2.42	0.14	4.23	Open
P345	J58	J1130	50.61	6	130	208.76	2.37	0.21	4.08	Open
P347	J111	U7006	52.99	8	130	480.6	3.07	0.25	4.7	Open
P349	U7006	J64	43.83	6	130	480.6	5.45	0.84	19.09	Open
P35	J1101	J1102	597.56	6	130	183.96	2.09	1.93	3.22	Open
P351	J64	J119	75.63	6	130	479.89	5.45	1.44	19.04	Open
P353	J111	U7002	63.58	10	130	562.78	2.3	0.14	2.12	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P355	U7002	J60	24.56	10	130	562.78	2.3	0.05	2.12	Open
P357	J60	J701	45.14	10	130	562.78	2.3	0.1	2.12	Open
P359	J111	U7004	84.11	10	130	561.8	2.29	0.18	2.12	Open
P36	J1099	J1101	897.75	6	130	102.83	1.17	0.99	1.1	Open
P361	U7004	J62	25.68	10	130	561.8	2.29	0.05	2.12	Open
P363	J62	J701	63.81	10	130	560.67	2.29	0.13	2.11	Open
P365	J66	J701	28.48	10	150	668.68	2.73	0.06	2.24	Open
P367	416	J4016	52.01	6	130	0	0	0	0	Open
P37	J1100	J1101	1,697.65	6	130	94.78	1.08	1.6	0.94	Open
P373	J70	J2018	499.7	6	130	36.61	0.42	0.08	0.16	Open
P375	J70	J72	620.78	4	130	6.21	0.16	0.03	0.04	Open
P377	J1139	J463	555.13	10	130	-16.53	0.07	0	0	Open
P379	J1137	J460	801.05	10	130	0	0	0	0	Closed
P38	J1100	J1099	2,081.84	6	130	50.7	0.58	0.62	0.3	Open
P381	J74	J1139	509.09	6	130	-3.92	0.04	0	0	Open
P383	J76	V8002	47.47	6	130	0	0	0	0	Open
P385	V8002	J74	32.39	6	130	0	0	0	0	Open
P39	J1098	J1099	3,565.79	6	130	89.15	1.01	3.01	0.84	Open
P395	J84	J555	467.52	6	130	30.34	0.34	0.05	0.11	Open
P40	J1110	J1141	425.03	6	130	-7.93	0.09	0	0.01	Open
P400	J406	J403	330.66	6	130	93.78	1.06	0.31	0.93	Open
P401	J403	J405	822.58	6	130	23.73	0.27	0.06	0.07	Open
P402	J404	J1133	433.55	6	130	143.43	1.63	0.88	2.03	Open
P403	J436	J437	953.44	6	130	14.17	0.16	0.03	0.03	Open
P404	J2007	J438	682.43	8	130	820.37	5.24	8.64	12.66	Open
P405	J438	J80	1,690.34	8	130	804.87	5.14	20.66	12.22	Open
P406	J2054	J400	319.24	8	130	532.24	3.4	1.81	5.68	Open
P407	J401	J2055	750.52	8	130	279.4	1.78	1.29	1.72	Open
P408	J401	J402	1,403.49	6	130	17.73	0.2	0.06	0.04	Open
P409	J406	J407	324.18	6	130	9.81	0.11	0	0.01	Open
P41	J1110	J1100	95.56	6	130	171.66	1.95	0.27	2.84	Open
P410	J403	J2043	533.54	6	130	64.58	0.73	0.25	0.46	Open
P411	J2047	J434	1,130.43	6	130	10.25	0.12	0.02	0.02	Open
P412	J2045	J408	190.7	8	130	301.98	1.93	0.38	1.99	Open
P413	J2044	J409	331.67	6	130	36.76	0.42	0.05	0.16	Open
P414	J1076	J410	586.2	6	130	10.01	0.11	0.01	0.01	Open
P416	J1138	J411	1,801.65	6	130	47.35	0.54	0.47	0.26	Open
P417	J1111	J412	671.15	6	130	15.45	0.18	0.02	0.03	Open
P418	J1050	J423	728.22	6	130	5.49	0.06	0	0	Open
P419	J1058	J413	545.51	6	130	5.43	0.06	0	0	Open
P42	J1113	J1110	552.47	6	130	168.12	1.91	1.51	2.73	Open
P420	J414	J1048	487.29	10	130	1,563.84	6.39	6.87	14.1	Open
P421	J414	J415	565.33	6	130	4.49	0.05	0	0	Open
P422	J1033	J416	601.05	8	130	5.24	0.03	0	0	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P423	J417	J1045	168.91	8	130	758.11	4.84	1.85	10.94	Open
P424	J1067	J418	1,141.52	6	130	9.87	0.11	0.02	0.01	Open
P425	J1080	J419	850.07	6	130	10.91	0.12	0.01	0.02	Open
P426	J4003	J421	1,628.55	6	130	22.85	0.26	0.11	0.07	Open
P427	J436	J422	1,736.24	6	130	43.08	0.49	0.38	0.22	Open
P428	J2003	J436	553.06	6	130	-203.56	2.31	2.15	3.89	Open
P429	J425	J2005.1	2,151.61	6	130	221.98	2.52	9.83	4.57	Open
P43	J1113	J1103	411.14	6	130	21.2	0.24	0.02	0.06	Open
P430	J427	J426	888.78	6	130	12.8	0.15	0.02	0.02	Open
P431	J1129	J427	293.85	6	130	443.06	5.03	4.83	16.42	Open
P432	J428	J1128	217.61	6	130	238.2	2.7	1.13	5.2	Open
P433	J428	J429	797.16	6	130	20.42	0.23	0.04	0.05	Open
P435	J431	J1148	235.15	10	130	2,085.10	8.52	5.65	24.02	Open
P436	J431	J439	673.08	6	130	5.69	0.06	0	0.01	Open
P437	T1	J431	543.85	10	130	2,093.50	8.55	13.16	24.2	Open
P438	J1053	J94	80.09	6	130	6.47	0.07	0	0.01	Open
P439	J1034	J435	820.31	6	130	3.23	0.04	0	0	Open
P44	J1098	J1113	174.76	6	130	192.02	2.18	0.61	3.49	Open
P441	J82	J440	614.31	6	130	774.04	8.78	28.35	46.15	Open
P442	J80	J442	310.22	6	130	18.82	0.21	0.01	0.05	Open
P45	J1097	J1098	534.8	6	130	294.39	3.34	4.12	7.7	Open
P46	J1096	10001	4,311.06	6	130	26.64	0.3	0.39	0.09	Open
P460	J461	J466	686.64	6	130	15.07	0.17	0.02	0.03	Open
P461	J463	J464	141.33	6	130	-22.28	0.25	0.01	0.06	Open
P463	J464	J461	485.54	8	130	26.74	0.17	0.01	0.02	Open
P47	J1096	J1097	623.01	6	130	299.56	3.4	4.96	7.96	Open
P48	J1095	J1096	658.98	6	130	333.47	3.78	6.39	9.7	Open
P480	J2052	J480	120.71	6	130	327.35	3.71	1.13	9.38	Open
P481	J481	J2049	107.94	6	130	19.25	0.22	0.01	0.05	Open
P49	J1092	J1095	778.25	6	130	68.29	0.77	0.4	0.51	Open
P495	J94	J433	131.31	6	130	2.33	0.03	0	0	Open
P50	J1094	J1095	940.31	6	130	274.19	3.11	6.35	6.75	Open
P500	J1109	J502	661.16	6	130	57.43	0.65	0.25	0.37	Open
P501	J1088	J420	396.81	6	130	6.8	0.08	0	0.01	Open
P502	J1061	J503	640.99	12	130	6.13	0.02	0	0	Open
P503	J509	J504	717.91	6	130	24.76	0.28	0.06	0.08	Open
P504	J1109	J509	661.71	8	130	651.17	4.16	5.46	8.25	Open
P505	J1116	J505	303.21	6	130	22.86	0.26	0.02	0.07	Open
P506	J1121	J506	386.95	6	130	50.75	0.58	0.11	0.3	Open
P507	J1114	J507	138.91	8	130	1,346.43	8.59	4.4	31.69	Open
P508	J1118	J4004	617.46	8	130	873.99	5.58	8.79	14.23	Open
P509	J509	J1112	644.14	8	130	612.98	3.91	4.75	7.38	Open
P51	J1094	J1093	1,011.02	6	130	4.61	0.05	0	0	Open
P510	J501	J119	50.42	8	130	485.18	3.1	0.24	4.79	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P511	J500	J119	37.77	8	130	485.3	3.1	0.18	4.79	Open
P512	J510	J512	119.98	6	130	767.83	8.71	5.46	45.47	Open
P514	J514	J510	290.69	6	130	772.14	8.76	13.36	45.94	Open
P52	J1093	J1092	847.71	6	130	279.86	3.18	5.95	7.01	Open
P53	J1092	J1091	461.51	6	130	204.26	2.32	1.81	3.91	Open
P531	J430	J1120	365.7	6	130	0	0	0	0	Closed
P533	J86	J18	1,372.40	6	130	17.35	0.2	0.06	0.04	Open
P54	J1089	J1091	353.44	8	130	691.26	4.41	3.26	9.22	Open
P55	J1089	J1090	1,369.44	6	130	10.66	0.12	0.02	0.02	Open
P550	J508	J1124	495.27	6	130	55.09	0.63	0.17	0.35	Open
P551	J1124	J550	1,322.00	6	130	27.86	0.32	0.13	0.1	Open
P552	J552	J553	725.07	4	130	14.24	0.36	0.15	0.2	Open
P553	J1123	J554	273.23	6	130	24.11	0.27	0.02	0.07	Open
P554	J4002	J84	677.84	6	130	38.54	0.44	0.12	0.18	Open
P555	J1124	J551	855.4	6	130	6.05	0.07	0	0.01	Open
P556	J552	J1123	638.41	6	130	39.72	0.45	0.12	0.19	Open
P56	J1087	J1089	616.38	8	130	708.5	4.52	5.95	9.65	Open
P57	J1082	J1094	732.59	6	130	291.94	3.31	5.56	7.58	Open
P58	J1082	J1083	1,542.95	6	130	-57.47	0.65	0.58	0.37	Open
P59	J1081	J1082	1,156.00	6	130	273.72	3.11	7.78	6.73	Open
P60	J1061	10011	1,432.23	6	130	-18.22	0.21	0.06	0.04	Open
P600	J510	J2021	2,229.59	6	130	0	0	0	0	Closed
P601	J600	J4006	57.61	6	130	269.22	3.05	0.38	6.53	Open
P602	J80	J611	722.67	6	130	2.11	0.02	0	0	Open
P603	J512	J2024	597.5	6	130	491.14	5.57	11.88	19.88	Open
P604	J2021	J612	403.43	6	130	9.9	0.11	0.01	0.01	Open
P61	J1062	10013	1,017.36	12	130	2.17	0.01	0	0	Open
P618	J601	J2010	613.73	6	130	22.61	0.26	0.04	0.07	Open
P619	J2029	J605	635.48	6	130	90.97	1.03	0.56	0.88	Open
P62	J1062	J1081	1,827.24	6	130	309.43	3.51	15.44	8.45	Open
P621	J2010	J2011	1,781.01	6	130	34.15	0.39	0.25	0.14	Open
P63	J1063	J1062	869.2	12	130	320.21	0.91	0.27	0.31	Open
P635	J2032	J4011	747.04	8	130	444.31	2.84	3.04	4.07	Open
P64	J1063	J1084	1,491.26	8	130	838.75	5.35	19.67	13.19	Open
P643	J2033	J522	258.4	6	130	-19.42	0.22	0.01	0.05	Open
P646	J522A	J607	501.53	6	130	11.11	0.13	0.01	0.02	Open
P65	J1084	J1083	307.16	6	130	348.84	3.96	3.24	10.55	Open
P650	J650	J651	485.93	6	130	14.84	0.17	0.01	0.03	Open
P651	J2031	J650	821.85	6	130	-1.44	0.02	0	0	Open
P653	J609	J606	1,838.81	6	130	18.8	0.21	0.09	0.05	Open
P654A	J606A	J604	424.98	6	130	7.5	0.09	0	0.01	Open
P655	J609	J2040	856.84	6	130	42.68	0.48	0.18	0.22	Open
P659	J2041A	J603	926.61	6	130	6.72	0.08	0.01	0.01	Open
P66	J1083	J1093	843.54	6	130	285.44	3.24	6.14	7.28	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P661	J608	J2039	960.75	10	130	-62.79	0.26	0.04	0.04	Open
P67	J1084	J1085	253.98	8	130	479.23	3.06	1.19	4.68	Open
P670	J680	J682	1,703.96	8	130	68.21	0.44	0.22	0.13	Open
P671	J682	J683	2,192.14	6	130	26.98	0.31	0.2	0.09	Open
P672	J682	J684	688.13	8	130	6.89	0.04	0	0	Open
P673	J679	J680	1,282.58	8	130	164.62	1.05	0.83	0.65	Open
P674	J2036	J679	5,024.95	8	130	316.88	2.02	10.93	2.17	Open
P675	J679	J34	1,224.38	6	130	84.53	0.96	0.94	0.76	Open
P676	J680	J681	2,108.79	6	130	60.46	0.69	0.87	0.41	Open
P677	J670	J687	719.92	6	130	58.24	0.66	0.28	0.38	Open
P678	J2034	J670	489.44	8	130	233.09	1.49	0.6	1.23	Open
P679	J687	J671	311.3	6	130	51.69	0.59	0.1	0.31	Open
P68	J1085	J1086	1,073.79	8	130	468.44	2.99	4.82	4.48	Open
P680	J671	J672	273.32	6	130	10.52	0.12	0	0.02	Open
P681	J671	J673	265.79	6	130	39.3	0.45	0.05	0.18	Open
P682	J673	J674	276.75	6	130	7.39	0.08	0	0.01	Open
P684	J2035	J675	1,358.92	6	130	-24.04	0.27	0.1	0.07	Open
P685	J675	J676	265.47	6	130	1.67	0.02	0	0	Open
P686	J2012	J677	1,047.71	6	130	-96.47	1.09	1.02	0.98	Open
P687	J673	J675	303.5	6	130	29.48	0.33	0.03	0.11	Open
P69	J1086	J1087	452.27	8	130	454.83	2.9	1.92	4.25	Open
P70	J1088	J1087	418.97	6	130	258.54	2.93	2.54	6.06	Open
P700	J702	J700	911.02	6	130	7.06	0.08	0.01	0.01	Open
P701	J703	J700	1,270.27	6	130	11.64	0.13	0.02	0.02	Open
P702	J710	J711	446.9	6	130	3.81	0.04	0	0	Open
P703	J702	J715	220.69	6	130	7.28	0.08	0	0.01	Open
P704	J703	J702	297.09	6	130	21.29	0.24	0.02	0.06	Open
P705	J1147	J704	352.82	6	130	3.09	0.04	0	0	Open
P706	J1011	J703	595.47	6	130	37.67	0.43	0.1	0.17	Open
P707	J710	J1011	266.76	6	130	140.82	1.6	0.52	1.97	Open
P708	J1016	J731	188.11	6	130	6.75	0.08	0	0.01	Open
P709	J1016	J706	548.45	6	130	6	0.07	0	0.01	Open
P71	J1063	J1088	3,738.36	6	130	273.07	3.1	25.05	6.7	Open
P710	J1051	J708	363.82	6	130	6.37	0.07	0	0.01	Open
P711	J1052	J709	863.34	8	130	27.29	0.17	0.02	0.02	Open
P712	J712	J713	166.67	6	130	1.47	0.02	0	0	Open
P713	J700	J714	249.08	6	130	9.82	0.11	0	0.01	Open
P714	J1024	J716	414.9	10	130	1,153.49	4.71	3.33	8.03	Open
P715	J718	J717	948.55	6	130	71.91	0.82	0.54	0.57	Open
P716	J718	J717	505.44	10	130	387.18	1.58	0.54	1.06	Open
P717	J1007	J718	818.67	10	130	465.34	1.9	1.22	1.49	Open
P718	J719	J1007	341.91	10	130	594.24	2.43	0.8	2.35	Open
P719	J719	J1007	1,725.47	6	130	64.7	0.73	0.8	0.47	Open
P720	J716	J720	646.73	6	130	197.57	2.24	2.38	3.68	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P721	J720	J1026	243.66	10	130	1,143.90	4.67	1.93	7.9	Open
P722	J1026	J1021	659.45	10	130	1,081.99	4.42	4.7	7.13	Open
P723	J1024	J712	174.91	6	130	109.12	1.24	0.21	1.23	Open
P724	J728	J727	270.52	8	130	4.85	0.03	0	0	Open
P725	J727	J726	226.77	8	130	2.39	0.02	0	0	Open
P726	J727	J725	198.89	8	130	1.43	0.01	0	0	Open
P727	J724	J728	124.84	8	130	7.3	0.05	0	0	Open
P728	J728	J729	135.77	6	130	1.85	0.02	0	0	Open
P729	T3	J730	425.8	8	130	23.84	0.15	0.01	0.02	Open
P73	J1064	J1065	2,411.03	8	130	244.92	1.56	3.25	1.35	Open
P730	J730	J724	1,310.21	8	130	4.17	0.03	0	0	Open
P731	J730	J724	659.73	8	130	6.04	0.04	0	0	Open
P732	J701	J1031	227.31	10	130	1,791.40	7.32	4.12	18.13	Open
P74	J1048	J1049	427.19	10	130	1,171.94	4.79	3.53	8.26	Open
P75	J1049	J1047	621.58	10	130	967.52	3.95	3.6	5.79	Open
P76	J1047	J1065	2,276.96	8	130	21.25	0.14	0.03	0.01	Open
P77	J1065	J1066	624.38	8	130	246	1.57	0.85	1.36	Open
P78	J1066	J1080	2,441.09	8	130	54.69	0.35	0.21	0.08	Open
P79	J1080	J1067	1,583.37	6	130	29.84	0.34	0.18	0.11	Open
P80	J1066	J1067	474.45	8	130	185.04	1.18	0.38	0.8	Open
P800	J1131	J800	1,209.62	6	130	55.72	0.63	0.43	0.35	Open
P801	J801	J802	787.58	6	130	18.43	0.21	0.04	0.05	Open
P802	J1131	J801	649.01	6	130	260.83	2.96	4	6.16	Open
P81	J1067	J1046	2,258.24	6	130	193.79	2.2	8.02	3.55	Open
P82	J1046	J1111	482.27	10	130	1,467.92	6	6.05	12.54	Open
P83	J1047	J1046	941.96	10	130	1,288.74	5.26	9.28	9.85	Open
P84	J1049	J1064	784.28	10	130	254.02	1.04	0.38	0.49	Open
P85	J1045	J1036	1,056.96	6	130	402.56	4.57	14.54	13.75	Open
P86	J1045	J1047	457.49	8	130	350.93	2.24	1.2	2.63	Open
P87	J1033	J417	655.76	8	130	498.98	3.18	3.31	5.04	Open
P88	J1048	J417	645.75	6	130	264.63	3	4.08	6.32	Open
P89	J1148	J414	452.06	10	130	1,573.70	6.43	6.45	14.27	Open
P90	J1033	J1035	714.43	6	130	0	0	0	0	Closed
P91	J1034	J1037	1,669.83	6	130	172.99	1.96	4.81	2.88	Open
P92	J1037	J1038	406.67	10	130	1,825.11	7.46	7.63	18.77	Open
P93	J1111	J1037	423.37	10	130	1,655.49	6.76	6.63	15.67	Open
P94	J1038	J1039	623.39	8	130	333.91	2.13	1.49	2.4	Open
P95	J1038	J1068	2,258.09	10	130	1,068.68	4.37	15.73	6.97	Open
P96	J1068	J1069	2,668.39	10	130	1,062.14	4.34	18.38	6.89	Open
P97	J1069	J1072	2,472.44	10	130	819.74	3.35	10.54	4.26	Open
P98	J1069	J1070	317.12	6	130	210.42	2.39	1.31	4.14	Open
P99	J1070	J1071	2,368.44	6	130	204.9	2.32	9.32	3.94	Open
P995	J610	J600	337.3	6	130	-7.2	0.08	0	0.01	Open
MP131A	J1138	J465A	188.11	10	150	20.64	0.08	0	0	Open

Baseline PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
MP135	J427	PMP135	1	6	150	213.32	2.42	0	3.23	Open
MP135	PMP135	J1130	1	6	150	213.32	2.42	0	3.23	Open
PMP21	J111	PMP2	1	10	150	668.68	2.73	0	2.26	Open
PMP22	PMP2	J66	20.62	10	150	668.68	2.73	0.05	2.24	Open
PMP31	J111	PMP3	1	8	150	485.3	3.1	0	3.66	Open
PMP32	PMP3	J500	1	8	150	485.3	3.1	0	3.66	Open
PMP41	J111	PMP4	1	8	150	485.18	3.1	0	3.66	Open
PMP42	PMP4	J501	1	8	150	485.18	3.1	0	3.66	Open
PMP61	J123	PMP6	1	10	150	1,253.96	5.12	0.01	7.2	Open
PMP62	PMP6	J121	1	10	150	1,253.96	5.12	0.01	7.2	Open
PMP71	J125	PMP7	1	10	150	1,910.81	7.81	0.02	15.69	Open
PMP72	PMP7	J131	1	10	150	1,910.81	7.81	0.02	15.69	Open
PMP81	J127	PMP8	1	10	150	1,885.82	7.7	0.02	15.26	Open
PMP82	PMP8	J133	1	10	150	1,885.82	7.7	0.02	15.32	Open

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
10001	1,001.09	645.78	10001	20	773.25	645.83
10003	1,005.37	983.57	10003	20	773.25	983.61
10005	1,000.53	1,705.62	10005	20	752.44	1,705.62
10007	1,011.30	1,752.15	10003	18.39	769.53	1,732.78
10009	1,000.86	2,048.52	10009	20	653.17	2,048.52
10011	1,005.15	2,436.44	J1100	0.3	747.95	
10013	1,001.45	2,454.06	J1100	-0.01	747.24	2,138.94
10015	1,004.12	2,473.61	J1100	-1.25	744.4	2,140.86
10017	1,001.19	1,127.99	J608	-48.18	446.06	
10019	1,001.13	1,116.99	J608	-47.24	448.23	
10021	1,000.80	1,138.44	J608	-49.07	444	
10023	1,001.12	1,130.49	J608	-48.35	445.65	
10025	1,001.94	1,125.35	J608	-47.82	446.88	
10027	1,001.83	1,137.47	J608	-48.85	444.52	121.13
10029	1,003.41	1,085.96	J608	-44.38	454.84	
10031	1,005.19	1,026.29	J608	-39.31	466.53	125.30
10033	1,002.86	1,049.45	J608	-41.35	461.82	124.24
10035	1,003.18	838.79	J608	-30.17	487.61	113.19
10037	1,003.59	875.36	J608	-33.31	480.38	113.44
10039	1,002.47	876.34	J608	-33.54	479.84	112.24
10041	1,000.84	910.87	J608	-35.46	475.42	110.52
10043	1,006.09	1,268.52	J608	-59.32	420.35	129.69
10045	1,012.48	1,228.24	J608	-55.37	429.47	135.44
10047	1,013.16	1,250.02	J608	-57.26	425.11	
10049	1,003.28	1,178.75	J608	-51.96	437.34	
10051	1,001.53	1,113.80	J608	-42.96	458.1	125.14
10053	1,003.40	1,032.85	J608	-39.97	465	
10055	1,001.82	988.12	J608	-37.46	470.8	
9993	1,001.28	629.13	J608	-18.5	514.55	104.87
9995	1,003.60	659.14	J608	-21.53	507.56	107.19
9997	1,001.07	312.71	J608	4.38	567.36	97.97
9999	1,021.19	410.89	J608	-0.74	555.54	232.64
J10	1,501.04	4,347.67	J10	20	668.16	4,347.67
J1001	1,553.33	5,995.59	J1002.2	14.17	739.96	5,510.91
J1002	1,501.18	6,390.40	J1002.2	-13.66	675.74	4,416.93
J1002.001	1,006.14	6,147.78	J1002.2	-6.8	691.57	4,502.79
J1002.004	1,002.42	6,009.22	J1002.2	-3.28	699.69	4,545.23
J1002.005	1,000.95	6,149.21	J1002.2	-5	695.71	4,579.12
J1002.007	1,001.43	6,230.37	J1002.2	-6.12	693.15	4,594.49
J1002.010	1,002.37	4,691.40	J38	6.1	705.08	3,999.25
J1002.014	1,001.36	4,270.89	J38	-5.91	677.35	3,248.40
J1002.016	1,001.87	4,443.13	J38	-4.73	680.08	3,418.40
J1002.019	1,519.80	3,000.78	J1002.019	20	670.51	3,000.78
J1002.1	1,503.77	6,141.28	J1002.2	-21.38	657.91	3,997.00

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J1002.2	1,010.43	844.92	J1002.2	20	753.42	844.98
J1003	1,502.71	6,239.83	J1002.2	-12.23	679.05	4,366.43
J1004	1,001.83	6,731.01	J1002.2	-12.79	677.75	4,695.14
J1005	1,003.04	6,548.72	J1002.2	-5.46	694.67	4,863.88
J1006	1,002.08	2,783.66	J1006	20	739.57	2,783.66
J1007	1,506.51	7,034.40	J723	18.3	817.11	4,866.56
J1008	1,001.51	7,078.02	J723	18.14	816.74	4,743.53
J1009	1,003.52	2,123.05	J1009	20	710.22	2,123.05
J1010	1,005.32	3,888.08	J714	10.17	768.87	3,079.41
J1011	1,002.88	3,281.76	J714	-11.07	719.87	1,835.06
J1012	1,005.15	3,594.69	J714	5.78	758.76	2,576.05
J1013	1,004.14	3,693.27	J714	15.41	780.98	3,248.84
J1015	1,002.79	1,885.01	J1016	19.71	786.56	1,869.60
J1016	1,001.90	1,426.41	J1016	20	787.22	1,426.41
J1017	1,006.48	2,835.70	J1016	9.15	762.17	2,189.21
J1018	1,005.79	2,993.64	J1016	18.69	784.19	2,889.07
J1019	1,003.70	5,160.29	J714	-3.32	737.76	3,338.54
J1020	1,001.25	6,263.50	J714	-9.4	723.71	3,769.05
J1021	1,002.69	7,894.47	J714	-17.03	706.1	4,417.81
J1022	1,502.07	4,946.59	J1022	20	654.63	4,946.59
J1023	1,502.07	6,572.70	J714	10.11	768.75	5,239.49
J1024	1,501.57	7,557.87	J714	1.52	748.91	5,212.90
J1025	1,504.50	7,703.65	J714	4.51	755.82	5,504.75
J1026	1,001.82	7,959.72	J714	-11.72	718.36	4,687.45
J1027	1,005.25	4,912.34	J1016	16.26	778.58	4,490.01
J1028	1,004.30	5,319.80	J1016	-2.82	734.55	3,542.45
J1029	1,002.82	4,613.94	J1016	1.96	745.59	3,270.52
J1030	1,005.28	2,907.95	J708	-2.88	653.38	2,401.47
J1031	1,002.97	5,646.19	J1031	20	772.27	5,646.20
J1033	1,003.66	1,057.01	J94	10.78	669.88	262.52
J1034	1,004.78	645.33	J427	12.34	630.11	200.34
J1035	1,005.49	926.41	J427	7.25	618.37	205.95
J1036	1,004.30	1,670.09	J427	-6.33	587.03	217.23
J1037	1,002.24	1,937.98	J427	-17.69	560.81	185.84
J1038	1,007.86	2,070.94	J427	-26.25	541.06	170.16
J1039	1,011.10	1,395.04	J427	-13.24	571.08	160.36
J1040	1,007.88	357.19	J427	15.15	636.61	149.49
J1041	1,012.56	914.77	J427	-1.01	599.32	152.53
J1042	1,009.40	1,102.29	J427	-9.74	579.16	142.43
J1043	1,003.99	799.43	J427	-1.14	599	128.87
J1044	1,006.12	808.76	J427	0.76	603.38	139.86
J1045	1,003.08	2,251.99	J94	-8.56	625.23	238.8
J1046	1,009.74	2,635.96	J427	-24.9	544.17	243.34
J1047	1,005.64	2,464.90	J94	-13.55	613.74	233.91

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J1048	1,003.86	932.21	J94	11.84	672.33	243.48
J1049	1,004.36	1,590.72	J94	0.58	646.35	223.08
J1050	1,005.38	823.18	J94	8.21	663.94	200.65
J1051	1,002.21	1,199.60	J708	8.38	679.37	1,075.69
J1052	1,003.96	1,058.13	J709	8.37	665.81	958.84
J1053	1,002.45	402.13	J94	12.31	673.42	143.71
J1054	1,004.08	759.91	J94	-0.3	644.32	155.75
J1056	1,007.17	707.72	J94	6.84	660.78	178.74
J1057	1,003.20	781.95	J94	-0.73	643.33	156.39
J1058	1,005.55	982.91	J94	-12.96	615.1	154.33
J1060	1,004.12	1,128.05	J94	-7.73	627.17	178.35
J1061	1,003.94	2,702.82	J1100	-17.29	707.36	2,140.46
J1062	1,005.73	2,533.80	J1100	-5.12	735.46	2,143.22
J1063	1,010.99	2,601.12	J1100	-9.16	726.13	2,149.95
J1064	1,006.07	855.23	J94	12.06	672.84	225.91
J1065	1,013.44	2,149.21	J94	-7.96	626.63	239.97
J1066	1,004.18	2,048.01	J94	-6.16	630.79	231.62
J1067	1,007.48	2,314.26	J94	-10.89	619.86	235.37
J1068	1,004.36	1,912.46	J427	-17.91	560.3	174.95
J1069	1,021.32	1,797.81	J427	-11.89	574.2	202.69
J1070	1,003.68	1,461.61	J427	-3.98	592.47	186.17
J1071	1,008.28	1,565.85	J427	-5.15	589.76	196.88
J1072	1,016.92	1,569.41	J427	-4.99	590.11	205.32
J1073	1,011.48	1,597.97	J427	-6.02	587.75	201.67
J1074	1,007.04	1,582.16	J427	-5.67	588.55	197.76
J1075	1,013.83	1,602.59	J427	-6.08	587.6	207.87
J1076	1,005.82	1,536.74	J427	-4.35	591.6	197.57
J1077	1,008.93	1,586.26	J427	-5.74	588.39	205.72
J1078	1,011.42	1,565.33	J427	-5.04	590.02	212.62
J1079	1,016.42	1,349.14	J427	1.3	604.64	217.09
J1080	1,009.30	1,311.16	J94	5.98	658.81	236.92
J1081	1,005.65	2,128.16	J1100	18.24	789.36	2,098.70
J1082	1,026.17	2,328.00	J1100	4.1	756.73	2,078.58
J1083	1,003.95	2,085.81	J1100	17.48	787.62	2,045.04
J1084	1,007.13	2,181.54	J1100	12.53	776.19	2,061.08
J1085	1,007.19	2,206.68	J1100	10.51	771.53	2,054.23
J1086	1,009.07	1,964.02	J1086	20	786.56	1,964.03
J1087	1,003.24	1,986.03	J1087	20	785.48	1,986.03
J1088	1,005.16	2,086.03	J1087	15.78	775.73	2,024.91
J1089	1,004.39	2,089.28	J1100	14.57	780.9	2,002.78
J1090	1,007.10	1,433.05	J1090	20	662.44	1,433.06
J1091	1,006.23	2,141.10	J1100	10.31	771.06	1,990.25
J1092	1,004.87	2,123.95	J1100	12.12	775.23	2,000.31
J1093	1,006.79	2,138.59	J1100	13.05	777.39	2,028.16

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J1094	1,008.76	2,417.99	J1100	-5.57	734.42	2,031.88
J1095	1,006.01	2,188.37	10001	0.49	728.23	1,939.46
J1096	1,004.85	1,700.93	10001	20	773.25	1,700.93
J1097	1,002.91	1,815.99	10005	20	752.44	1,815.99
J1098	1,008.81	1,960.43	J1100	14.38	780.46	1,876.37
J1099	1,024.68	2,189.43	J1100	-6.42	732.46	1,832.51
J1100	1,017.46	1,740.44	J1100	20	793.43	1,740.45
J1101	1,009.10	2,111.11	J1100	0.42	748.25	1,839.78
J1102	1,011.78	2,186.51	J1100	1.43	750.57	1,922.29
J1103	1,003.29	2,037.17	J1100	10.77	772.13	1,899.69
J1104	1,007.50	2,233.48	J1100	1.55	750.84	1,955.01
J1105	1,009.69	2,376.16	J1100	-7.59	729.75	1,966.19
J1106	1,007.74	2,494.41	J1100	-16.55	709.07	1,975.05
J1107	1,007.13	2,765.72	J1100	-34.4	667.87	2,026.70
J1108	1,012.49	2,975.49	J1100	-47.57	637.47	2,070.83
J1109	1,005.28	2,910.74	J1100	-25.06	689.44	2,242.71
J111	1,000.21	-47,253.44	J64	195.25	1,158.60	61,582,868.00
J1110	1,002.92	1,791.26	J1100	19.06	791.26	1,777.69
J1111	1,000.98	2,207.73	J427	-19.76	556.04	208
J1112	1,027.79	3,100.66	J1100	-12.3	718.88	2,554.06
J1113	1,001.80	1,978.52	J1100	12	774.97	1,860.83
J1114	1,019.45	2,558.12	J1114	20	754.65	2,558.16
J1115	1,005.02	6,301.20	J1031	18.68	769.23	6,184.80
J1116	1,009.35	1,757.90	J1117	16.38	657.12	1,724.71
J1117	1,008.41	1,104.35	J1117	20	665.48	1,104.36
J1118	1,009.62	2,258.71	J1121	0.37	698.7	1,935.87
J1120	1,002.02	687.88	J427	4	610.86	132.85
J1121	1,013.26	1,033.80	J1121	20	744	1,033.80
J1122	1,037.16	1,965.15	J508	-5.4	554.84	1,524.06
J1123	1,010.41	909.85	J553	1.37	509.7	794.82
J1124	1,014.12	613.26	J508	2.14	572.24	506.69
J1125	1,006.47	655.18	J427	-1.96	597.12	101.41
J1126	1,007.02	579.41	J427	-0.64	600.17	93.34
J1127	1,006.19	692.95	J427	-5.47	589.01	93.42
J1128	1,003.86	372.64	J427	8.94	622.28	90.83
J1129	1,006.25	329.32	J427	7.92	619.91	76.99
J1130	1,004.48	1,199.97	J427	3.42	609.53	706.93
J1131	1,008.80	610.6	J801	17.78	818	546.97
J1133	1,006.89	650.25	J427	1.07	604.11	114.35
J1134	1,000.00	-6,290.42	J94	22.37	696.63	11,921.92
J1135	1,008.85	1,067.67	J427	-9.87	578.85	137.15
J1136	1,005.10	1,216.54	J427	-8.61	581.76	150.72
J1137	1,015.04	1,148.96	J427	-5.41	589.15	162.76
J1138	1,008.80	909.31	J427	1.41	604.9	156.53

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J1139	1,003.36	1,017.06	J801	-4.99	765.45	545.09
J1141	1,004.59	2,046.77	J1100	8.72	767.39	1,881.28
J1142	1,022.12	2,122.42	J1100	10.13	770.64	1,970.79
J1143	1,004.37	5,210.25	J1016	0.04	741.15	3,611.49
J1144	1,004.05	2,791.76	J1016	12.62	770.18	2,315.77
J1145	1,000.00	7,565.85	J723	16.04	811.91	4,198.02
J1146	1,000.00	6,254.22	J723	19.69	820.31	5,765.22
J1147	1,004.77	4,258.75	J723	16.95	814.01	2,434.44
J1148	1,001.13	-3,183.06	J723	21.61	824.76	406.81
J119	1,001.24	3,394.71	J1100	8.55	766.99	3,151.33
J121	1,000.01	16,801.36	J121	20	589.16	16,801.43
J123	1,000.05	-2,413,669.00	J723	21.61	824.76	
J125	1,000.01	-21,151.27	J723	21.61	824.76	
J127	1,001.86	-14,226.59	J723	21.61	824.76	
J131	1,000.00	16,463.39	J131	20	589.16	16,463.46
J133	1,001.02	15,605.31	J133	20	589.16	15,605.36
J16	1,003.17	516.66	J427	10.53	625.94	141.8
J18	1,011.57	132.19	J18	20	611.16	132.19
J20	1,012.51	979.18	J608	-28.95	490.43	144.33
J2001	1,025.88	1,585.72	J425	-1.92	605.98	1,395.08
J2002	1,014.51	2,747.11	J1121	-13.32	667.11	2,001.43
J2003	1,006.71	2,476.47	J82	-0.51	573.88	
J2004	1,007.00	2,445.88	J608	-25.3	498.86	1,588.04
J2004.1	1,010.12	2,107.02	J608	10.4	581.25	1,641.43
J2005	1,009.76	1,897.16	J608	-1.99	552.66	1,172.37
J2005.1	1,015.19	844.22	J2005.1	20	541.92	844.23
J2006	1,008.06	2,628.73	J608	-51.11	439.28	1,191.79
J2007	1,008.68	2,515.78	J608	-48.61	445.05	995.32
J2008	1,009.95	1,280.91	J608	-51.29	438.87	141.68
J2009	1,010.42	1,137.49	J608	-41.11	462.38	141.66
J2010	1,015.35	519.72	J608	0.15	557.6	146.56
J2011	1,014.71	1,082.76	J608	-36.59	472.81	145.16
J2012	1,008.58	1,405.54	J608	-62.92	412.03	135.3
J2013	1,010.44	1,257.50	J608	-56.38	427.13	132.73
J2014	1,003.14	1,411.04	J608	-66.46	403.87	126.75
J2015	1,002.25	1,430.67	J608	-67.52	401.42	126.49
J2016	1,000.55	1,311.49	J608	-63.51	410.67	
J2017	1,004.08	1,196.85	J608	-53.45	433.88	126.2
J2018	1,000.55	871.42	J608	-33.05	480.97	110.92
J2019	1,009.23	713.02	J608	-19.66	511.88	120.14
J2020	1,005.14	876.89	J608	-31.87	483.7	118.49
J2021	1,006.81	824.56	J608	-26.39	496.35	122.24
J2022	1,011.18	904.36	J608	-30.88	485.99	129.73
J2024	1,007.70	709.34	J608	-17.14	517.7	125.5

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J2025	1,014.46	501.7	J608	-5.34	544.93	121.16
J2026	1,018.40	789.98	J608	-29.93	488.18	121.97
J2027	1,005.69	917.68	J608	-38.54	468.31	111.05
J2028	1,004.17	1,135.55	J608	-53.22	434.43	111.51
J2029	1,001.78	928.6	J608	-36.09	473.96	111.4
J2030	1,002.74	1,160.47	J608	-50.83	439.93	121.12
J2031	1,005.27	1,084.82	J608	-44.14	455.37	124.06
J2032	1,006.64	1,164.78	J608	-56.88	425.98	113.04
J2033	1,006.45	1,165.83	J608	-58.71	421.76	111.85
J2034	1,003.58	511,080.38	J608	-13,741,534.00	###########	287.3
J2035	1,011.04	1,633.82	J608	-97.26	332.79	
J2036	1,534.98	1,692.11	J608	-100.06	326.32	
J2037	1,015.24	735.23	J608	-27.6	493.54	116.56
J2038	1,004.38	756.67	J608	-29.5	489.17	107.96
J2039	1,005.13	514.09	J608	-12.82	527.66	102.04
J2040	1,007.09	670.48	J608	-22.84	504.55	110.68
J2041	1,028.40	715.91	J608	-25.84	497.61	131.99
J2041A	1,006.15	683.74	J608	-24.14	501.53	109.74
J2042	1,007.01	919.46	J608	-12.87	527.54	167.52
J2043	1,014.23	665.51	J608	-1.15	554.58	175.3
J2044	1,003.55	888.37	J18	-38.22	476.79	166.1
J2045	1,004.50	987.71	J608	-16.4	519.41	170.18
J2046	1,001.86	813.33	J608	-8.1	538.55	166.74
J2047	1,007.29	866.58	J608	-10.32	533.43	172.16
J2048	1,002.38	858.84	J608	-10.19	533.73	162.9
J2049	1,004.86	1,113.47	J608	-23.92	502.04	169.73
J2050	1,008.48	1,247.50	J608	-28.34	491.84	173.35
J2052	1,001.54	1,213.03	J608	-40.42	463.97	146.71
J2054	1,000.43	1,479.67	J608	-28.34	491.84	179.81
J2055	1,001.73	782.4	J608	-6.71	541.77	150.16
J22	1,009.34	734.17	J608	-12.57	528.24	140.74
J24	1,009.39	543.94	J608	-1.46	553.88	140.79
J26	1,010.31	366.41	J608	8.38	576.58	141.95
J28	1,012.09	315.94	J608	11.14	582.97	143.74
J30	1,016.60	1,359.86	J608	-54.84	430.68	149.54
J32	1,009.46	1,297.49	J608	-52.63	435.78	139.24
J34	1,022.38	855.87	J608	-27.84	493.01	126.2
J36	1,014.75	116.02	J36	20	304.16	116.02
J38	1,002.10	2,532.37	J38	20	737.16	2,532.37
J40	1,001.49	2,470.36	J42	20	724.16	2,470.36
J400	1,002.16	1,364.97	J608	-28.34	491.84	178.78
J4001	1,004.12	2,760.04	J1100	-34.18	668.38	2,023.70
J4002	1,008.04	1,752.52	J4002	20	664.11	1,752.53
J4003	1,011.77	1,638.40	J1117	17.65	660.05	1,615.84

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J4004	1,005.38	2,150.10	J1121	11.22	723.74	1,971.55
J4006	1,007.47	1,030.69	J608	-27.41	494	155.14
J4008	1,007.97	1,043.96	J608	-19.12	513.12	172.85
J4009	1,000.21	1,076.46	J608	-22.48	505.36	165.09
J401	1,018.12	872.98	J608	-10.11	533.91	169.1
J4010	1,003.95	1,343.97	J608	-28.34	491.84	168.83
J4011	1,005.66	1,137.45	J608	-54.33	431.87	112.07
J4012	1,003.19	1,064.66	J608	-42.67	458.77	122.9
J4013	1,002.00	1,260.49	J608	-58.89	421.34	
J4015	1,001.25	1,655.56	J608	-55.53	429.09	180.63
J4016	1,005.17	1,006.49	J608	-17.32	517.27	170.05
J402	1,011.82	429.56	J608	7.77	575.19	162.79
J403	1,003.64	674.04	J608	-1.95	552.75	165.2
J404	1,007.53	407.08	J427	10.94	626.89	119.49
J405	1,015.82	491.32	J608	5.72	570.44	177.38
J406	1,002.93	738.49	J608	-4.72	546.35	164.85
J407	1,006.54	648.92	J608	-0.79	555.43	168.46
J408	1,002.68	942.14	J608	-14.2	524.48	167.56
J409	1,003.68	732.56	J18	-28.31	499.66	158.81
J410	1,006.67	1,126.27	J427	4.18	611.28	198.42
J411	1,031.57	552.75	J427	11.46	628.08	179.29
J412	1,010.30	1,363.70	J427	-0.62	600.2	217.33
J413	1,003.62	867.17	J94	-6.66	629.63	152.4
J414	1,003.58	-1,298.32	J723	21.61	824.76	306.61
J415	1,002.99	895.92	J94	14.46	678.37	306.02
J416	1,003.49	-1,145.42	J723	21.61	824.76	262.38
J417	1,003.67	2,104.86	J94	-5.6	632.06	245.56
J418	1,006.58	1,171.99	J94	8.04	663.55	234.47
J419	1,007.27	1,046.24	J94	9.83	667.69	234.9
J42	1,001.29	2,017.62	J42	20	724.16	2,017.62
J420	1,004.53	1,832.23	J420	20	674.57	1,832.24
J421	1,015.24	1,150.42	J421	20	582.13	1,150.37
J422	1,028.72	1,111.62	J422	20	582.77	1,111.51
J423	1,003.66	225.51	J94	19.61	690.26	198.92
J424	1,020.75	2,219.70	J1121	8.86	718.29	1,987.25
J425	1,039.41	876.02	J425	20	656.57	876.03
J426	1,008.53	-149.66	J723	21.61	824.76	67.93
J427	1,002.62	62.02	J427	20	647.8	62.02
J428	1,003.88	328.23	J427	11.4	627.95	95.5
J429	1,013.61	408.17	J427	8.54	621.34	105.24
J430	1,001.86	3,397.99	J430	20	660.67	3,397.99
J431	1,001.80	-4,777.95	J723	21.61	824.76	561.78
J433	1,001.55	209.04	J94	18.28	687.18	139.58
J434	1,006.83	731.05	J608	-4.23	547.49	171.71

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J435	1,002.16	-145.71	J723	21.61	824.76	197.71
J436	1,013.64	2,185.72	J1117	8.06	637.92	2,007.93
J437	1,009.45	1,538.83	J437	20	527.29	1,538.83
J438	1,010.33	2,364.23	J608	-50.59	440.49	671.85
J439	1,003.80	553.84	J439	20	687.52	553.84
J44	1,000.55	2,574.68	J44	20	702.16	2,574.68
J440	1,000.00	483.01	J608	6.15	571.44	160.35
J442	1,012.54	858.03	J608	7.36	574.24	347.78
J46	1,000.48	2,552.56	J56	19.83	706.76	2,548.12
J460	1,005.05	817.75	J801	7.94	795.28	546.78
J461	1,007.78	783.34	J801	9.98	799.99	549.51
J463	1,003.83	827.34	J801	7.32	793.85	545.56
J464	1,010.61	843.86	J801	6.76	792.56	552.34
J465A	1,008.42	847.58	J427	3.12	608.84	156.14
J466	1,010.05	704.26	J801	14.04	809.37	551.78
J48	1,000.16	2,414.76	J48	20	702.16	2,414.76
J480	1,003.74	1,284.92	J608	-45.66	451.88	147.26
J481	1,002.03	1,130.92	J608	-25.06	499.41	166.9
J50	1,001.00	2,582.09	J56	16.1	698.16	2,484.70
J500	1,000.00	3,396.83	J1100	8.64	767.22	3,154.87
J5004	1,007.82	1,058.70	J1121	16.45	735.79	1,028.37
J5008	1,012.87	554.31	J5008	20	824.14	554.31
J501	1,000.00	3,401.55	J1100	8.51	766.9	3,156.47
J5010	1,013.77	799.7	J801	9.42	798.7	555.5
J502	1,004.55	1,775.91	J4002	17.75	658.91	
J503	1,004.09	2,721.13	J1100	-18.61	704.32	2,140.61
J504	1,016.50	2,083.19	J504	20	558.8	2,083.19
J505	1,015.24	1,559.39	J505	20	655.42	1,559.39
J506	1,033.83	1,004.17	J506	20	728.27	1,004.17
J507	1,002.91	2,472.82	J1121	15.35	733.27	2,378.40
J508	1,006.15	498.72	J508	20	613.46	498.72
J509	1,008.96	3,065.34	J1100	-23.61	692.79	2,383.28
J510	1,002.87	443.09	J608	4.63	567.95	137.16
J512	1,004.88	492.47	J608	0.83	559.17	133.67
J514	1,001.26	452.08	J608	6.67	572.65	153.23
J52	1,000.83	2,083.24	J56	16.97	700.16	2,021.49
J522	1,008.78	1,037.31	J608	-46.63	449.63	113.95
J522A	1,002.68	1,027.86	J608	-46.31	450.37	107.86
J54	1,001.70	1,755.82	J54	20	704.16	1,755.82
J550	1,018.57	627.99	J508	0.27	567.93	511.14
J551	1,004.03	608.32	J508	1.21	570.09	496.6
J552	1,038.16	961.24	J553	-2.7	500.31	822.58
J553	1,009.49	470.84	J553	20	552.7	470.84
J554	1,016.07	853.26	J553	11.69	533.53	800.48

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J555	1,020.23	844.98	J555	20	638.1	844.98
J56	1,002.57	1,423.06	J56	20	707.16	1,423.06
J600	1,000.26	1,016.43	J608	-26.76	495.48	148.67
J601	1,013.67	673.1	J608	-8.68	537.21	145.15
J603	1,004.48	741.74	J608	-29.78	488.53	108.07
J604	1,005.00	731.64	J608	-28.64	491.16	108.59
J605	1,004.67	1,104.54	J608	-49.4	443.23	113.49
J606	1,006.01	691.95	J608	-24.6	500.47	109.6
J606A	1,001.52	689.37	J608	-24.78	500.06	105.11
J607	1,007.41	1,042.71	J608	-47.27	448.15	112.58
J608	1,041.86	137.89	J608	20	603.41	137.89
J609	1,013.19	678.95	J608	-22.76	504.73	116.78
J610	1,004.80	845.74	J608	-15.83	520.72	153.21
J611	1,001.41	785.11	J608	9.17	578.41	336.65
J612	1,006.60	701.71	J608	-17.1	517.77	122.04
J621	1,003.76	854.07	J621	20	682.6	854.1
J650	1,004.49	1,222.10	J608	-55.81	428.45	
J651	1,009.89	1,092.91	J608	-44.35	454.9	135.1
J670	1,006.65	1,374.52	J608	-71.93	391.26	113.06
J671	1,001.25	1,331.25	J608	-68.31	399.59	
J672	1,007.02	1,155.44	J608	-51.79	437.73	113.42
J673	1,001.62	1,321.17	J608	-67.33	401.87	
J674	1,004.92	1,226.99	J608	-58.35	422.58	
J675	1,002.51	1,375.53	J608	-72.38	390.22	
J676	1,001.11	1,296.63	J608	-65.08	407.06	107.52
J677	1,021.56	1,307.67	J608	-52.46	436.18	149.94
J678	1,019.23	604.71	J608	-10.23	533.64	125.63
J679	1,045.15	1,128.91	J608	-45.72	451.72	151.55
J680	1,023.97	1,048.45	J608	-40.75	463.22	
J681	1,040.30	678.7	J608	-13.95	525.05	146.71
J682	1,022.89	996.33	J608	-36.74	472.46	
J683	1,017.99	691.18	J608	-16.8	518.48	124.39
J684	1,004.59	934.58	J608	-33.76	479.33	
J687	1,004.36	1,370.28	J608	-71.71	391.75	
J688	1,000.25	1,498.00	J608	-78.53	376	
J700	1,005.92	721.79	J714	16.11	782.6	642.3
J701	1,000.49	6,567.91	J1031	15.6	762.12	6,153.55
J702	1,004.63	1,088.41	J714	3.16	752.69	729.71
J703	1,003.16	1,445.66	J714	-12.92	715.58	781.69
J704	1,002.06	1,325.46	J704	20	777.58	1,325.48
J705	1,502.62	1,099.06	J705	20	694.44	1,099.06
J706	1,004.00	1,197.87	J706	20	742.35	1,197.87
J707	1,006.13	1,342.56	J707	20	741.83	1,342.56
J708	1,004.24	953.11	J708	20	706.18	953.12

Baseline MDD plus Fire Flow Report						
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)	Design Flow (gpm)
J709	1,018.19	919.99	J709	20	692.64	920
J710	1,003.35	2,548.11	J714	13.36	776.25	2,100.20
J711	1,002.54	1,579.53	J711	20	713.43	1,579.53
J712	1,501.16	4,590.94	J713	19.04	668.57	4,559.89
J713	1,500.98	2,983.10	J713	20	670.78	2,983.10
J714	1,006.55	578.8	J714	20	791.57	578.81
J715	1,004.86	1,026.18	J714	6.5	760.41	729.93
J716	1,502.98	7,124.58	J714	2.49	751.15	4,995.99
J717	1,003.35	6,561.08	J723	19.06	818.86	5,225.22
J718	1,004.16	6,580.43	J723	18.94	818.59	5,111.80
J719	1,504.13	7,125.06	J723	18.15	816.77	4,799.58
J720	1,003.41	7,468.93	J714	-3.55	737.22	4,826.38
J723	1,510.15	2,303.44	J723	20	821.04	2,303.44
J724	1,001.94	1,395.93	J726	19	800.53	1,318.49
J725	1,000.95	1,316.12	J726	14.79	790.82	1,027.95
J726	1,001.59	927.83	J726	20	802.84	927.83
J727	1,000.69	1,460.46	J726	11.78	783.86	1,027.69
J728	1,000.41	1,626.07	J726	13.28	787.32	1,201.83
J729	1,001.23	1,259.37	J726	19.2	800.99	1,202.66
J730	1,509.09	-1,101.56	J723	21.61	824.76	
J731	1,004.50	1,104.67	J731	20	786.64	1,104.67
J80	1,004.86	897.37	J608	5.93	570.94	340.09
J800	1,037.15	557.15	J800	20	792.5	557.15
J801	1,005.65	535.54	J801	20	823.12	535.54
J802	1,012.29	568.1	J801	19.13	821.12	542.18
J82	1,001.75	345.56	J608	16.96	596.4	235.58
J94	1,002.76	140.79	J94	20	691.16	140.79

APPENDIX D

Buildout Node, Pipe, and Fire Flow Reports

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Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
10001	2.11	727.09	932.06	88.81
10003	11.74	727.09	854.02	55
10005	1.59	706.28	929.03	96.52
10007	24.87	706.28	853.72	63.89
10009	1.95	607.01	953.65	150.2
10011	13.39	607.01	789.33	79
10013	2.63	671.46	965.32	127.33
10015	9.57	671.46	789.14	50.99
10017	1.9	352	501.66	64.85
10019	1.81	350	501.68	65.72
10021	1.97	340	501.69	70.06
10023	3.62	337	501.71	71.37
10025	4.06	327	501.78	75.73
10027	4.24	319	501.81	79.21
10029	6.84	329	501.91	74.92
10031	9.5	344	502.07	68.49
10033	4.57	334	502.32	72.93
10035	5.46	400	634.51	101.61
10037	5.86	398	634.29	102.38
10039	3.98	403	634.22	100.19
10041	3.11	404	634.15	99.72
10043	13.15	310	503.53	83.86
10045	24.47	276	502.45	98.12
10047	22.57	257	502.2	106.24
10049	5.47	276	502.13	97.98
10051	3.94	330.98	644.42	135.81
10053	6.89	392.36	503.69	48.24
10055	2.93	409.33	501.64	40
9993	2.31	430.6	621.47	82.71
9995	13.87	430.6	601.38	74
9997	2.48	481.52	628.82	63.82
9999	37.76	481.52	593.54	48.54
J10	41.86	622	831.04	90.58
J100	0	0	831.03	360.09
J1001	264.37	633.86	825.02	82.83
J1002	55.78	620.65	826.9	89.37
J1002.001	9.62	617.08	826.91	90.92
J1002.004	7.76	615.31	827.16	91.79
J1002.005	3.73	612.24	827.54	93.29
J1002.007	3.04	614.49	827.63	92.35
J1002.010	4.61	620.13	827	89.64
J1002.014	5.4	624.09	826.49	87.7
J1002.016	15.41	620.97	826.52	89.07
J1002.019	60.42	624.35	826.46	87.58
J1002.1	16.8	611.77	827.59	93.51

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1002.2	24.51	707.26	827.49	52.1
J1003	15.75	606.58	828.94	96.35
J1004	4.48	611.94	828.1	93.66
J1005	8.02	621.81	828.11	89.39
J1006	41.29	693.41	826.57	57.7
J1007	12.77	614.72	828.71	92.72
J1008	3.04	623.18	829.17	89.26
J1009	12.33	664.06	828.96	71.45
J1010	8.25	670.62	828.86	68.57
J1011	4.92	673.77	826.87	66.34
J1012	10.77	708.15	826.86	51.44
J1013	6.72	715.85	826.1	47.77
J1015	4.99	737.58	827.02	38.75
J1016	3.36	741.06	827.02	37.25
J1017	12.48	662.17	827.91	71.82
J1018	11.96	666.78	829.44	70.48
J1019	5.86	665.31	829.11	70.98
J102	96.97	709	825.92	50.66
J1020	1.94	645.73	829.6	79.67
J1021	4.54	610.93	829.89	94.87
J1022	20.57	608.47	831.08	96.46
J1023	16.43	612.59	831.23	94.74
J1024	2.74	624.7	833.34	90.4
J1025	12.85	630.06	834.27	88.48
J1026	3.16	600.02	831.36	100.24
J1027	9.95	596.68	831.63	101.8
J1028	6.8	605.2	830.97	97.83
J1029	6.35	595.68	830.34	101.68
J1030	11.06	607.36	829.15	96.1
J1031	5.44	726.11	836.65	47.9
J1033	8.67	616.66	711.84	41.24
J1034	11.86	598.17	701.53	44.79
J1035	11.17	577.15	703.35	54.68
J1036	10.82	546.8	702.03	67.26
J1037	6.25	531.43	694.76	70.77
J1038	13.44	507.24	692.79	80.4
J1039	19.99	531.5	692.26	69.66
J104	69.35	717	825.89	47.18
J1040	14.59	605.85	691.81	37.25
J1041	25.21	556.73	691.53	58.41
J1042	20.45	533.38	691.08	68.33
J1043	12.18	559.87	688.05	55.54
J1044	20.01	564.85	690.84	54.59
J1045	5.57	561.27	707.21	63.23
J1046	22.24	515.5	699.69	79.81

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1047	14.19	552.19	705.26	66.33
J1048	8.17	627.63	711.62	36.39
J1049	9.64	598.24	710.43	48.61
J1050	16.83	607.94	710.9	44.61
J1051	3.81	633.21	828.66	84.69
J1052	10.94	619.66	828.5	90.49
J1053	5.72	627.26	710.28	35.97
J1054	9.23	597.82	710.3	48.74
J1056	15.63	613.62	710.39	41.93
J1057	9.62	594.57	710.29	50.14
J1058	9.71	553.92	710.27	67.75
J1060	11.98	578.88	710.37	56.98
J1061	13.82	618.39	789.14	73.99
J1062	11.08	671.46	965.32	127.33
J1063	22.77	670.33	965.52	127.91
J1064	14.1	622.17	710.19	38.14
J1065	33.84	536.64	705.32	73.09
J1066	17.21	521.59	704.51	79.26
J1067	19.17	484.65	704.21	95.13
J1068	24.57	464.59	684.54	95.3
J1069	52.12	425.15	675.36	108.42
J1070	19.63	440.14	674.66	101.62
J1071	37.11	414.62	670.6	110.92
J1072	52.8	433.41	670.71	102.82
J1073	19.38	418.51	669.81	108.89
J1074	15.22	406.83	669.62	113.87
J1075	13.7	402.24	668.17	115.23
J1076	11.62	422.93	669.12	106.67
J1077	17.59	393.47	667.11	118.57
J1078	12.74	381.83	665.62	122.96
J1079	68.28	410.28	665.64	110.65
J1080	30.01	550.41	704.27	66.67
J1081	11.53	607.01	953.67	150.21
J1082	48.08	631.17	949.07	137.75
J1083	11.76	710.77	951.08	104.13
J1084	12.89	718.31	955.79	102.9
J1085	18.51	707.72	953.51	106.5
J1086	18.23	740.4	944.12	88.27
J1087	7.25	739.32	940.27	87.07
J1088	10.84	665.42	942.47	120.05
J1089	10.02	722.42	937.28	93.1
J1090	31.91	616.28	927.75	134.96
J1091	13.78	717.07	936.66	95.15
J1092	10	698.32	938.56	104.09
J1093	15.17	682.58	944.26	113.39

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1094	19.82	618.52	944.23	141.13
J1095	11.97	665.16	938.3	118.35
J1096	8.15	727.09	932.83	89.15
J1097	7.19	706.28	929.03	96.52
J1098	16.41	710.45	925.97	93.39
J1099	52.5	613.31	923.01	134.19
J1100	35.5	747.27	923.78	76.48
J1101	22.52	663.75	922.18	111.98
J1102	27.72	687.64	920.61	100.95
J1103	7.4	722.31	925.65	88.11
J1104	16.57	671.12	925.09	110.05
J1105	31.14	620.12	923.84	131.6
J1106	16.49	595.3	918.44	140.02
J1107	12.08	552.32	916.04	157.6
J1108	28.42	550.69	912.58	156.81
J1109	14.38	569.06	910.43	147.91
J111	0.82	698.87	717.21	7.95
J1110	5.28	743.5	924.09	78.25
J1111	3.73	528.11	696.56	72.99
J1112	55.19	559.56	909.03	151.43
J1113	4.14	715.91	925.61	90.86
J1114	38.66	708.49	907	86.01
J1115	10	695.66	835.74	60.7
J1116	15.98	610.98	905.65	127.68
J1117	16.89	619.32	905.6	124.04
J1118	17.13	652.95	901.87	107.86
J1120	10.66	572.53	690.03	50.91
J1121	25.02	697.84	900.62	87.86
J1122	69.41	509.5	742.8	101.09
J1123	21.49	422.55	715.69	127.02
J1124	30.31	510.2	798.05	124.72
J1125	15.19	556.95	684.5	55.27
J1126	15.4	558.79	678.79	51.99
J1127	14.23	547.63	678.78	56.83
J1128	6.17	584.27	677.44	40.37
J1129	12.57	578.13	672.88	41.05
J1130	7.17	616.94	856.33	103.73
J1131	16.83	768.69	847.6	34.19
J1133	14.85	565.2	681.48	50.39
J1134	19.73	793.84	824.19	13.15
J1135	17.49	538.66	684.08	63.01
J1136	8.43	543.35	685.59	61.63
J1137	13.51	552.21	687.43	58.59
J1138	16.97	513.1	686.1	74.96
J1139	8.23	670.56	853.85	79.42

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1141	12.73	715.21	924.12	90.52
J1142	43.91	709.78	935	97.59
J1143	7.2	638.77	830.68	83.15
J1144	6.67	678.41	827.91	64.78
J1145	100.87	705.22	824.64	51.75
J1146	56.94	736.48	824.35	38.08
J1147	11.36	737.76	825.5	38.02
J1148	3.44	682.21	714.98	14.2
J119	2.03	711.38	983.5	117.91
J12	21.66	623	830.6	89.95
J121	0.23	543	732.34	82.04
J123	1.13	543	550	3.03
J125	0.69	543	545.77	1.2
J127	9.24	543	544.43	0.62
J131	0.13	543	736.11	83.67
J133	1.8	543	737.26	84.17
J14	67.23	639	830.62	83.03
J16	15.35	592	691.65	43.18
J18	99.03	565	693.02	55.47
J20	35.59	417	650.01	100.97
J2001	44.92	560.25	795.71	102.03
J2002	25.63	531.25	800.84	116.81
J2003	13.6	515.99	799.02	122.64
J2004	11.93	453.42	681.89	99
J2004.1	17.11	453.42	783.86	143.18
J2005	17.23	495.76	668.85	75
J2005.1	34.64	495.76	784.58	125.14
J2006	14.08	391.7	669.71	120.46
J2007	17.31	399	662.93	114.36
J2008	21	360.71	668.73	133.47
J2009	23	378.54	656	120.22
J2010	32.17	502.68	652.16	64.77
J2011	38.87	383.46	651.61	116.19
J2012	21.34	309.61	647.87	146.57
J2013	22.33	362.75	646.52	122.96
J2014	7.73	305.73	646.37	147.6
J2015	6.19	299.23	646.69	150.55
J2016	1.44	330.98	504.07	75
J2017	7.44	354.54	503.69	64.63
J2018	1.31	392.36	635.17	105.21
J2019	19.54	455.11	635.89	78.33
J2020	10.78	434.3	638.9	88.65
J2021	14.06	443.48	646.97	88.17
J2022	20.16	434.22	643.7	90.77
J2024	24.66	472.67	637.03	71.22

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J2025	26.81	499.19	635.81	59.2
J2026	38.49	439.39	629.87	82.53
J2027	11.68	415.53	629.64	92.77
J2028	9.41	381.22	630.44	107.99
J2029	3.48	409.33	634.11	97.4
J2030	4.38	352.31	501.65	64.71
J2031	13.46	350.63	501.62	65.42
J2032	16.9	361.99	624.33	113.67
J2033	10.47	352.99	625.62	118.13
J2034	9.74	347.34	474.27	55
J2035	20.2	229.78	472.08	104.99
J2036	80.9	226.5	469.92	105.47
J2037	30.1	447.62	629.23	78.69
J2038	9.47	430.6	625.68	84.53
J2039	11.28	481.52	628.82	63.83
J2040	19.2	402.95	596.87	84.03
J2041	59.83	372.34	594.3	96.17
J2041A	11.76	395.79	596.87	87.13
J2042	14.16	429.2	661.22	100.53
J2043	28.3	482.32	661.18	77.5
J2044	19.49	430.76	661.74	100.08
J2045	15.96	430.21	661.72	100.31
J2046	3.84	437.84	661.65	96.98
J2047	15.58	426.01	651.63	97.76
J2048	4.73	410.35	661.22	108.7
J2049	11.19	400.53	651.75	108.85
J2050	16.04	383.53	651.64	116.17
J2052	3.08	370.21	652.17	122.18
J2054	0.88	356.03	662.43	132.76
J2055	2.84	423.72	660.92	102.78
J22	35.84	460	649.92	82.29
J24	44.36	469	649.65	78.28
J26	20.04	527	650.2	53.38
J28	28.94	529	650.12	52.48
J30	21.93	335	650.04	136.51
J32	28.82	327	650.05	139.98
J34	37.68	244	447.43	88.14
J36	35.1	258	430.54	74.76
J38	15.25	691	826.08	58.53
J40	4.66	678	826.09	64.17
J400	19.45	376.91	662.27	123.64
J4001	6.69	546.98	742.79	84.85
J4002	13.99	617.95	701	35.99
J4003	25.6	613.78	795.12	78.57
J4004	10.92	624.96	897.88	118.26

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J4006	15.35	417.18	668.6	108.94
J4008	17.91	408.89	651.64	105.18
J4009	0.34	408.84	651.7	105.23
J401	39.07	410.39	660.92	108.55
J4010	7.13	382.27	651.64	116.72
J4011	9.27	351.28	618.55	115.81
J4012	5.1	361.02	501.62	60.92
J4013	3.86	334.6	503.92	73.37
J4015	2	352.57	662.43	134.26
J4016	9.27	427.04	651.63	97.31
J402	28.75	502.08	660.78	68.76
J403	6.42	475.76	661.19	80.35
J404	21.04	590.2	682.22	39.87
J405	40.86	501.07	661.02	69.31
J406	7.38	460.39	661.3	87.05
J407	11.17	471.84	661.29	82.09
J408	6.5	436.69	661.65	97.48
J409	30.64	453.6	662.11	90.35
J410	12.65	429.21	669.11	103.95
J411	70.94	530.35	685.11	67.06
J412	18.83	489.13	696.53	89.87
J413	9.56	540.44	710.27	73.59
J414	6.53	670.96	713.36	18.37
J415	8.61	602.94	713.35	47.84
J416	8.49	689.83	711.83	9.53
J417	6.52	570.78	708.76	59.79
J418	19.65	473.88	704.15	99.78
J419	12.11	509.88	704.25	84.22
J42	7.8	678	826.09	64.17
J420	10.88	628.41	942.47	136.08
J421	51.96	535.97	794.61	112.07
J422	83.27	536.61	794.67	111.82
J423	6.63	640.44	710.9	30.53
J424	42.47	617.64	802.26	80
J425	71.81	610.41	789.72	77.7
J426	15.15	626.85	671.79	19.47
J427	4.29	601.64	671.81	30.41
J428	7.18	590.51	678.56	38.15
J429	25.93	572.14	678.49	46.08
J430	26.11	614.51	831.03	93.82
J431	3.5	698.74	715.8	7.39
J433	3.17	640.49	710.28	30.24
J434	13.39	414.66	651.69	102.7
J435	8.34	646.9	701.52	23.67
J436	31.74	515.53	795.96	121.51

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J437	53.54	481.13	795.65	136.28
J438	19.35	394.18	658.05	114.34
J439	9.01	641.36	715.79	32.25
J44	34.05	656	826.12	73.71
J440	36.73	537	646.94	47.64
J442	23.82	532.86	654.19	52.57
J46	1.2	656	826.15	73.72
J460	9.73	716.58	853.85	59.48
J461	18.59	730.8	853.85	53.32
J463	9.31	719.89	853.85	58.05
J464	21.28	725.52	853.87	55.61
J465A	18.98	523.63	686.1	70.4
J466	21.86	719.2	853.81	58.32
J48	11.37	656	826.15	73.72
J480	7.04	351.46	651.9	130.18
J481	3.24	399.22	651.71	109.4
J50	2.71	652	826.18	75.47
J500	0.06	708.34	983.91	119.41
J5004	14.06	689.51	758.75	30
J5008	59.83	777.98	840.3	27
J501	0.08	706.82	984.05	120.12
J5010	30.38	741.82	854	48.61
J502	11.35	612.75	906.2	127.15
J503	9.43	604.24	789.14	80.12
J504	34.16	512.64	909.57	171.99
J505	29.52	609.26	905.62	128.41
J506	61.75	682.11	900.45	94.61
J507	7.73	691.93	905.97	92.74
J508	13.12	567.3	798.86	100.34
J509	14.92	548.71	909.67	156.4
J510	4.59	529.43	644.73	49.96
J512	9.06	519.04	643.54	53.94
J514	2.33	537.35	646.33	47.22
J52	1.6	654	826.18	74.61
J522	14.23	378.62	625.6	107.02
J522A	6.09	379.38	610.17	100
J54	4.85	658	826.18	72.87
J550	81.96	463.99	797.09	144.33
J551	15.91	482.54	798.02	136.7
J552	68.26	454.22	718.92	114.69
J553	41.6	506.54	717.84	91.56
J554	19.21	436.24	715.68	121.08
J555	74.75	591.94	698.08	45.99
J56	7.25	661	826.18	71.57
J58	4.91	617	857.01	103.99

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J60	0.08	708	837.43	56.08
J600	0.42	419.42	668.6	107.97
J601	29.74	472.26	650.77	77.35
J603	11.72	334.12	596.85	113.84
J604	8.96	297.52	598.38	130.36
J605	9.47	390.28	632.56	104.98
J606	12.95	337.4	598.39	113.09
J606A	4.22	336.06	598.39	113.67
J607	15.95	336.52	610.15	118.56
J608	92.11	557.25	628.75	30.98
J609	39.16	414.09	598.55	79.92
J610	10.21	436.35	668.59	100.63
J611	2.45	521.55	654.21	57.48
J612	11.7	452.03	651.06	86.24
J62	1.37	708	837.52	56.12
J621	8.95	636.44	828.5	83.22
J64	1.16	708	984.26	119.7
J650	8.75	279.76	501.62	96.13
J651	31.45	283.13	501.56	94.65
J66	0.04	708	837.29	56.02
J670	14.52	306.1	473.14	72.38
J671	2.6	267.65	472.48	88.75
J672	11.69	298.36	472.48	75.45
J673	2.58	267.97	472.39	88.57
J674	8.21	269.55	472.38	87.89
J675	6.67	249.75	472.31	96.44
J676	1.76	243.75	472.31	99.04
J677	11.52	317.44	648.72	143.54
J678	35.56	275.32	447.19	74.47
J679	80.43	229.65	448.91	95
J680	57.34	226.11	446.94	95.69
J681	65.84	262.84	445.93	79.33
J682	53.23	216.32	446.14	99.58
J683	53.5	233.38	445.42	91.88
J684	32.43	223.6	446.11	96.42
J687	7.63	263.66	472.66	90.56
J688	1.97	300.83	469.92	73.27
J70	12.65	425	635.37	91.15
J700	37.47	736.44	825.93	38.77
J701	0.82	712.05	837.18	54.22
J702	7.51	700.46	826.1	54.44
J703	5.76	669.44	826.2	67.92
J704	5.04	731.42	825.5	40.76
J705	16.93	648.28	831.17	79.25
J706	16.95	696.19	827	56.68

Buildout PHD Node Report				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J707	11.02	695.67	827.9	57.3
J708	8.98	660.02	828.66	73.07
J709	31.37	646.48	828.48	78.86
J710	5.56	690.18	827.33	59.43
J711	8.47	667.27	827.32	69.35
J712	2.01	622.41	832.84	91.18
J713	2.26	624.62	832.84	90.22
J714	45.01	745.41	825.87	34.86
J715	8.18	691.64	826.09	58.26
J716	4.72	631.53	832.51	87.08
J717	11.11	609.41	828.34	94.86
J718	11.42	611.2	828.45	94.13
J719	6.89	614.13	828.94	93.08
J72	9.36	455	635.31	78.13
J720	5.48	616.72	831.83	93.21
J723	35.68	774.88	824.75	21.61
J724	6.46	754.37	823.7	30.04
J725	1.96	738.62	823.69	36.86
J726	5.58	756.68	823.69	29.04
J727	2.07	737.7	823.69	37.26
J728	1.05	741.16	823.69	35.76
J729	9.58	739.4	823.69	36.52
J730	22.12	786.77	823.7	16
J731	43.13	740.48	826.98	37.48
J74	4.33	660	853.85	84
J76	18.37	660	686.05	11.29
J78	0	617	801.55	79.97
J80	10.19	545.81	654.21	46.97
J800	69.89	746.34	846.95	43.59
J801	11.89	776.96	843.78	28.95
J802	23.24	754.46	843.72	38.68
J82	3.81	575.06	651.37	33.06
J84	25.66	600	697.4	42.2
J86	100.65	480	664.51	79.95
J88	0	480	686.31	89.39
J94	5.56	645	710.28	28.28
J98	0	592	830.6	103.38

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
18	J480	J30	1,031.26	6	140	144.72	1.64	1.86	1.8	Open
20	J5010	J464	2,457.92	12	100	93.33	0.26	0.13	0.05	Open
229	J436	J4003	1,292.43	6	130	77.56	0.88	0.84	0.65	Open
239	J514	J440	109.08	6	130	-247.4	2.81	0.61	5.58	Open
24	J465A	J76	1,115.54	6	130	18.36	0.21	0.05	0.05	Open
241	J2046	416	35.63	6	130	0	0	0	0	Open
243	J606	J606A	9.58	6	130	13.18	0.15	0	0.03	Open
245	J2040	J2041A	57.71	6	130	23.48	0.27	0	0.07	Open
249	9995	J609	715.22	6	130	205.55	2.33	2.83	3.96	Open
253	9999	J2041	4,389.29	6	130	-37.76	0.43	0.75	0.17	Open
257	10003	10007	3,814.74	6	130	24.87	0.28	0.3	0.08	Open
259	10005	J1097	106.38	6	130	-1.59	0.02	0	0	Open
263	10009	J1081	71.29	6	130	-48.15	0.55	0.02	0.27	Open
269	10015	J1061	818.83	12	130	-9.57	0.03	0	0	Open
271	10017	J2030	178.81	6	130	27.82	0.32	0.02	0.1	Open
273	10019	10017	121.65	6	130	29.72	0.34	0.01	0.11	Open
275	10021	10019	100.79	6	130	31.52	0.36	0.01	0.12	Open
277	10023	10021	153.08	6	130	33.5	0.38	0.02	0.14	Open
279	10025	10023	411.58	6	130	37.12	0.42	0.07	0.17	Open
281	10027	10025	178.3	6	130	41.17	0.47	0.04	0.2	Open
283	10029	10027	409.25	6	130	45.41	0.52	0.1	0.24	Open
285	10031	10029	500.77	6	130	52.25	0.59	0.16	0.31	Open
287	10033	10031	574.79	6	130	61.75	0.7	0.25	0.43	Open
289	10035	10037	682.69	6	130	53.6	0.61	0.22	0.33	Open
291	10037	10039	281.65	6	130	47.73	0.54	0.07	0.27	Open
293	10039	10041	285.51	6	130	43.75	0.5	0.06	0.23	Open
295	10041	J2029	209.1	6	130	40.64	0.46	0.04	0.2	Open
297	10043	J4013	356.68	6	130	-103.71	1.18	0.4	1.12	Open
299	10045	10043	1,238.08	6	130	-90.56	1.03	1.07	0.87	Open
301	10047	10045	522.45	6	130	-66.09	0.75	0.25	0.48	Open
303	10049	10047	293.5	6	130	-43.52	0.49	0.07	0.22	Open
307	J4013	J2016	119.81	6	130	-107.57	1.22	0.14	1.19	Open
311	10055	J2030	551.73	6	130	-2.72	0.03	0	0	Open
313	J4012	J2031	140.26	6	130	15.62	0.18	0	0.03	Open
4014D	4014	J688	1	8	150	0	0	0	0	Open
4014U	J2015	4014	1	8	150	0	0	0	0	Open
401D	401	J4001	1	4	150	0	0	0	0	Open
401U	J1107	401	1	4	150	0	0	0	0	Open
402D	402	J4002	1	4	150	254.72	6.5	0.03	32.59	Open
402U	J502	402	1	4	150	254.9	6.51	0.03	32.59	Open
403B1	J2004.1	403B	1	12	150	1,857.10	5.27	0.01	6.1	Open
403B2	403B	J2004	1	12	150	1,857.10	5.27	0.01	6.1	Open
403D	403	J4003	1	6	150	0	0	0	0	Open
403U	J1117	403	1	6	150	0	0	0	0	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
404B1	J2005.1	404B	1	10	150	121.91	0.5	0	0.12	Open
404B2	404B	J2005	1	10	150	121.91	0.5	0	0.06	Open
404D	404	J424	1	14	150	2,475.30	5.16	0	4.94	Open
404U	J4004	404	1	14	150	2,475.21	5.16	0	4.94	Open
405D	405	J5004	1	6	150	14.06	0.16	0	0	Open
405U	J1121	405	1	6	150	14.06	0.16	0	0	Open
406D	406	J600	1	6	150	0	0	0	0	Open
406U	J2055	406	1	6	150	0	0	0	0	Open
408D	408	J4008	1	6	150	0	0	0	0	Open
408U	J2048	408	1	6	150	0	0	0	0	Open
410D	410	J4010	1	4	150	0	0	0	0	Open
410U	J400	410	1	4	150	0	0	0	0	Open
411D	411	J2034	1	8	150	619.59	3.95	0.01	5.77	Open
411U	J4011	411	1	8	150	619.59	3.95	0.01	5.8	Open
415D	415	J4015	1	10	150	250.94	1.03	0	0.37	Open
415U	J2054	415	1	10	150	250.94	1.03	0	0.37	Open
420D	420	J522A	1	6	150	22.05	0.25	0	0.06	Open
420U	J522	420	1	6	150	22.05	0.25	0	0.06	Open
900D	900	J435	1	6	150	0	0	0	0	Open
900U	J705	900	1	6	150	0	0	0	0	Open
901D	901	J433	1	6	150	0	0	0	0	Open
901U	J621	901	1	6	150	0	0	0	0	Open
902D	902	J423	1	6	150	0	0	0	0	Open
902U	J1051	902	1	6	150	0	0	0	0	Open
NEW011	9993	NEW01	1	6	150	219.43	2.49	0	3.42	Open
NEW012	NEW01	9995	1	6	150	219.42	2.49	0	3.42	Open
NEW021	9997	NEW02	1	4	150	0	0	0	0	Open
NEW022	NEW02	9999	1	4	150	0	0	0	0	Open
NEW031	10001	NEW03	1	4	150	36.61	0.93	0	0.85	Open
NEW032	NEW03	10003	1	4	150	36.61	0.93	0	0.85	Open
NEW041	10005	NEW04	1	4	150	0	0	0	0	Open
NEW042	NEW04	10007	1	4	150	0	0	0	0	Open
NEW051	10009	NEW05	1	6	150	46.21	0.52	0	0.18	Open
NEW052	NEW05	10011	1	6	150	46.21	0.52	0	0.18	Open
NEW061	10013	NEW06	1	6	150	0	0	0	0	Open
NEW062	NEW06	10015	1	6	150	0	0	0	0	Open
NEW071	10051	NEW07	1	6	150	189.66	2.15	0	2.56	Open
NEW072	NEW07	J2016	1	6	150	189.67	2.15	0	2.62	Open
NEW081	J2018	NEW08	1	6	150	0	0	0	0	Open
NEW082	NEW08	10053	1	6	150	0	0	0	0	Open
NEW091	J2029	NEW09	1	6	150	0.21	0	0	0	Open
NEW092	NEW09	10055	1	6	150	0.21	0	0	0	Open
P10	T2	J1114	1,739.74	14	130	2,165.53	4.51	8.7	5	Open
P100	J1072	J1071	821.74	6	130	32.19	0.37	0.11	0.13	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P101	J1071	J1074	614.47	6	130	125.82	1.43	0.98	1.6	Open
P102	J1074	J1075	635.12	6	130	152.69	1.73	1.45	2.28	Open
P103	J1075	J1077	631.53	10	130	495.6	2.02	1.06	1.68	Open
P104	J1077	J1078	1,384.58	10	130	390.3	1.59	1.49	1.08	Open
P105	J1077	J1079	1,791.66	6	130	87.72	1	1.47	0.82	Open
P106	J1079	J1078	546.20	6	130	19.44	0.22	0.03	0.05	Open
P107	J1076	J1075	1,040.42	10	130	356.62	1.46	0.95	0.91	Open
P1075	J80	J82	384.81	6	130	287.95	3.27	2.85	7.39	Open
P108	J1073	J1076	674.65	10	130	380.89	1.56	0.7	1.03	Open
P1080	J121	T1	5,067.59	24	130	6,643.03	4.71	14.64	2.89	Open
P1088	T7009	J123	64.18	99	130	6,656.25	0.28	0	0	Open
P109	J1072	J1073	655.18	10	130	442.36	1.81	0.89	1.36	Open
P1090	T1	J111	70.77	18	130	5,011.40	6.32	0.49	6.96	Open
P110	J1073	J1074	926.26	6	130	42.09	0.48	0.19	0.21	Open
P1102	J123	J125	34.97	10	130	4,993.97	20.4	4.23	121.09	Open
P1104	J125	J127	39.97	10	130	2,487.91	10.16	1.33	33.32	Open
P1106	J133	J131	34.97	10	130	2,476.87	10.12	1.16	33.04	Open
P1108	J131	J121	31.29	10	130	4,982.11	20.35	3.77	120.56	Open
P111	J1038	J1137	1,681.24	14	130	1,697.37	3.54	5.36	3.19	Open
P112	J1039	J1041	1,424.14	10	130	259.35	1.06	0.72	0.51	Open
P113	J1039	J1040	775.87	10	130	277.63	1.13	0.45	0.57	Open
P114	J1040	J16	450.25	10	130	213.95	0.87	0.16	0.35	Open
P115	J1044	J1042	806.09	6	130	-50.49	0.57	0.24	0.29	Open
P116	J1040	J1041	986.01	6	130	49.08	0.56	0.28	0.28	Open
P117	J1044	J1120	683.43	8	130	229.09	1.46	0.81	1.19	Open
P118	J1042	J1043	722.09	6	130	212.28	2.41	3.04	4.2	Open
P119	J1041	J1042	760.36	10	130	283.22	1.16	0.45	0.6	Open
P12	J1118	J1121	1,184.17	6	130	100.83	1.14	1.25	1.06	Open
P120	J1043	J1125	973.08	8	130	418.52	2.67	3.54	3.64	Open
P121	J1125	J1126	1,167.09	6	130	230.58	2.62	5.72	4.9	Open
P122	J1127	J1126	570.65	6	130	-9.88	0.11	0.01	0.01	Open
P123	J1125	J1127	1,995.15	6	130	172.75	1.96	5.73	2.87	Open
P124	J1126	J1129	1,494.83	6	130	205.3	2.33	5.91	3.95	Open
P125	J1128	J1129	731.65	12	130	1,625.91	4.61	4.56	6.24	Open
P126	J1133	J428	546.92	12	130	1,496.80	4.25	2.93	5.35	Open
P127	J1135	J1133	1,940.77	12	130	708.83	2.01	2.6	1.34	Open
P128	J1135	J404	1,055.74	12	130	823.85	2.34	1.87	1.77	Open
P129	J1136	J1135	263.51	12	130	1,550.17	4.4	1.5	5.71	Open
P13	J507	J1118	582.00	14	130	2,604.09	5.43	4.1	7.04	Open
P130	J1137	J1136	319.77	12	130	1,558.60	4.42	1.84	5.77	Open
P131	J1137	J1138	840.43	6	130	125.25	1.42	1.33	1.58	Open
P133	J1139	J460	757.79	10	130	9.73	0.04	0	0	Open
P135	J10	J1023	967.85	10	130	-156.86	0.64	0.19	0.2	Open
P136	J5010	J1131	983.72	12	130	1,663.42	4.72	6.4	6.5	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P137	J5008	T5	1,656.49	12	130	1,481.75	4.2	8.7	5.25	Open
P139	J1057	J1058	585.02	6	130	16.02	0.18	0.02	0.04	Open
P14	J1112	J1114	2,450.48	12	130	547.35	1.55	2.03	0.83	Open
P140	J1060	J1057	1,215.75	6	130	22.47	0.25	0.08	0.07	Open
P141	J1049	J1060	987.59	6	130	20.48	0.23	0.05	0.06	Open
P143	J1053	J1058	1,397.22	6	130	3.24	0.04	0	0	Open
P144	J1054	J1053	445.17	6	130	17.69	0.2	0.02	0.04	Open
P145	J1054	J1057	442.22	6	130	3.18	0.04	0	0	Open
P146	J1056	J1054	818.82	6	130	30.1	0.34	0.09	0.11	Open
P147	J1056	J1060	490.52	6	130	13.96	0.16	0.01	0.03	Open
P148	J1050	J1056	1,277.98	6	130	59.69	0.68	0.51	0.4	Open
P149	J16	J1044	880.33	8	130	198.61	1.27	0.81	0.92	Open
P15	J1116	J1117	1,489.37	6	130	16.89	0.19	0.06	0.04	Open
P150	J1051	J1052	518.22	6	130	51.26	0.58	0.16	0.3	Open
P151	J1048	J1050	977.04	6	130	83.15	0.94	0.72	0.74	Open
P153	J1036	J1111	509.09	6	130	352.19	4	5.47	10.74	Open
P154	J1035	J1036	752.58	6	130	132.41	1.5	1.32	1.75	Open
P155	J1148	J1033	662.18	10	130	868.79	3.55	3.14	4.75	Open
P156	J621	J1052	651.52	6	130	-8.95	0.1	0.01	0.01	Open
P157	J1127	J1128	488.26	6	130	168.4	1.91	1.34	2.74	Open
P158	J1031	J1115	416.43	18	130	2,684.48	3.38	0.91	2.19	Open
P16	J507	J1116	720.34	6	130	62.4	0.71	0.31	0.44	Open
P161	J1115	J1025	636.71	18	130	2,759.81	3.48	1.47	2.3	Open
P162	J1025	J1024	431.33	16	130	1,957.13	3.12	0.93	2.16	Open
P163	J1025	J1027	1,612.93	12	130	789.83	2.24	2.64	1.64	Open
P164	J1026	J1027	564.27	6	130	-66.08	0.75	0.27	0.48	Open
P165	J716	J720	423.70	12	130	776.17	2.2	0.67	1.59	Open
P166	J1024	J1023	413.12	10	130	902.03	3.68	2.1	5.09	Open
P167	J1023	J1022	240.98	14	130	711.82	1.48	0.15	0.64	Open
P168	J1022	J1003	2,372.01	14	130	858.66	1.79	2.14	0.9	Open
P169	J1003	J1002.1	1,926.70	12	130	499.8	1.42	1.35	0.7	Open
P169C	J1002.1	J1002.2	1,296.31	6	130	24.51	0.28	0.1	0.08	Open
P17	J555	J1123	4,963.51	6	130	-193.73	2.2	17.62	3.55	Open
P170	J1002.1	J1002	1,148.46	12	130	458.5	1.3	0.69	0.6	Open
P171	J1002	J1001	3,089.69	12	130	462.99	1.31	1.88	0.61	Open
P171.01	J1002	J1002.001	345.09	10	130	-60.27	0.25	0.01	0.03	Open
P171.02	J1002.001	J1002.004	562.37	10	130	-237.58	0.97	0.24	0.43	Open
P171.05	J1002.004	J1002.005	517.41	10	130	-317.51	1.3	0.38	0.74	Open
P171.07	J1002.005	J1002.007	124.63	10	130	-321.23	1.31	0.09	0.75	Open
P171.08	J1002.007	J1004	365.77	10	130	-427.35	1.75	0.47	1.28	Open
P171.09	J1002.007	J1002.010	571.03	6	130	103.07	1.17	0.63	1.1	Open
P171.10	J1002.010	J1002.004	272.5	6	130	-72.17	0.82	0.16	0.57	Open
P171.11	J1002.010	J1002.014	909.45	6	130	71.81	0.81	0.51	0.56	Open
P171.12	J1002.014	J1002.016	156.33	8	130	-91.85	0.59	0.03	0.22	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P171.13	J1002.016	J1002.001	587.2	8	130	-167.69	1.07	0.39	0.67	Open
P171.14	J1002.016	J1002.019	576.2	8	130	60.42	0.39	0.06	0.1	Open
P173	J1004	J1003	993.12	10	130	-343.11	1.4	0.84	0.85	Open
P174	J1005	J1004	194.86	10	130	88.72	0.36	0.01	0.07	Open
P175	J717	J1005	850.35	10	130	182.97	0.75	0.23	0.27	Open
P176	J1008	J719	267.12	10	130	342.06	1.4	0.23	0.84	Open
P177	J1021	J1008	691.35	10	130	381.69	1.56	0.72	1.04	Open
P178	J1008	J1009	1,265.90	6	130	36.59	0.42	0.21	0.16	Open
P179	J1009	J1010	1,321.22	6	130	24.26	0.28	0.1	0.08	Open
P18	J1108	J1109	966.91	12	130	932.25	2.64	2.15	2.23	Open
P180	J1019	J1010	602.06	8	130	128.85	0.82	0.25	0.41	Open
P181	J12	J14	789.76	8	100	-21.66	0.14	0.02	0.02	Open
P182	J1021	J1020	341.43	12	130	547.16	1.55	0.28	0.83	Open
P183	J1020	J1019	243.03	12	130	883.87	2.51	0.49	2.02	Open
P184	J1020	J1143	437.45	8	130	-338.65	2.16	1.08	2.46	Open
P185	J1028	J1143	495.67	12	130	458.22	1.3	0.3	0.6	Open
P186	J1028	J1029	456.28	8	130	248.78	1.59	0.63	1.39	Open
P187	J1029	J1030	457.35	6	130	164.06	1.86	1.19	2.61	Open
P188	J1030	J1051	1,062.92	6	130	64.04	0.73	0.49	0.46	Open
P189	J1030	J1017	1,470.69	6	130	88.96	1.01	1.23	0.84	Open
P19	J1122	J552	2,319.87	6	130	344.29	3.91	23.88	10.29	Open
P190	J1017	J1016	1,428.16	6	130	75.6	0.86	0.89	0.62	Open
P191	J1016	J1015	254.47	6	130	12.15	0.14	0.01	0.02	Open
P192	J1144	J1015	1,422.64	8	130	161.97	1.03	0.89	0.63	Open
P193	J1144	J1017	254.37	6	130	-0.88	0.01	0	0	Open
P194	J1018	J1144	499.09	6	130	178.78	2.03	1.53	3.06	Open
P195	J1029	J1018	1,357.62	6	130	78.37	0.89	0.9	0.66	Open
P196	J1143	J1018	957.5	6	130	112.37	1.28	1.24	1.29	Open
P197	J1019	J1012	1,518.12	12	130	749.17	2.13	2.25	1.48	Open
P198	J1011	J1012	620.75	8	130	21.97	0.14	0.01	0.02	Open
P199	J1010	J710	743.20	6	130	144.85	1.64	1.54	2.07	Open
P20	J1107	J1108	797.58	8	130	460.06	2.94	3.46	4.34	Open
P200	J2055	J2004	549.27	8	130	0	0	0	0	Closed
P2004	J801	J5008	615.77	12	130	1,541.58	4.37	3.48	5.65	Open
P201	J14	J10	1,262.49	8	100	-88.89	0.57	0.42	0.34	Open
P202	J5004	J2001	4,409.17	6	130	0	0	0	0	Closed
P203	J2001	J2002	764.27	6	130	-273.29	3.1	5.13	6.71	Open
P204	J2002	J2003	375.28	14	130	2,133.91	4.45	1.83	4.87	Open
P205	J4006	J2008	1,584.42	6	130	-25.98	0.29	0.14	0.09	Open
P206	J2001	J425	1,244.92	6	130	228.36	2.59	5.99	4.81	Open
P207	J2003	J2004.1	1,867.64	12	130	1,874.21	5.32	15.15	8.11	Open
P208	J2004	J2006	1,545.67	12	130	1,845.17	5.23	12.18	7.88	Open
P209	J2005	J2006	998.39	6	130	-90.24	1.02	0.86	0.86	Open
P21	J4001	J1122	564.39	6	130	-6.69	0.08	0	0.01	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P210	J2005	J2007	1,649.87	6	130	194.92	2.21	5.92	3.59	Open
P211	J2006	J2007	445.94	8	130	905.87	5.78	6.78	15.21	Open
P2113	J512	J2022	1,953.26	6	130	-25.66	0.29	0.16	0.08	Open
P213	J409	J86	1,331.42	6	130	-134.38	1.52	2.4	1.8	Open
P215	J30	J677	1,482.51	6	140	98.98	1.12	1.32	0.89	Open
P217	J2022	J2021	742.22	6	130	-217.68	2.47	3.27	4.4	Open
P218	J2022	J2024	2,347.52	6	130	171.86	1.95	6.67	2.84	Open
P22	J1122	J508	3,762.35	6	130	-420.39	4.77	56.07	14.9	Open
P220	J2025	J2026	1,659.04	6	130	194.6	2.21	5.94	3.58	Open
P221	J2026	J2027	674.06	6	130	54.67	0.62	0.23	0.34	Open
P222	J2028	J2027	638.63	6	130	110.72	1.26	0.8	1.26	Open
P223	J2025	J2037	931.36	6	130	280.79	3.19	6.57	7.06	Open
P224	J2026	J2037	2,410.11	8	130	101.44	0.65	0.64	0.26	Open
P225	J2037	J2039	1,440.76	8	130	105.88	0.68	0.41	0.29	Open
P226	J2039	9997	4,608.25	6	130	2.48	0.03	0.01	0	Open
P227	J2040	J2041	2,583.70	6	130	97.59	1.11	2.58	1	Open
P228	J2038	9993	922.24	6	130	221.74	2.52	4.2	4.56	Open
P229	J2037	J2038	642.78	6	130	246.26	2.79	3.56	5.53	Open
P23	J1106	J1107	528.53	8	130	472.15	3.01	2.4	4.55	Open
P230	J522	J2038	2,293.56	6	130	-15.05	0.17	0.07	0.03	Open
P231	J2033	J2032	855.49	6	130	122.01	1.38	1.29	1.51	Open
P232	J2027	J2033	1,738.52	6	130	153.71	1.74	4.02	2.31	Open
P233	J2028	J2032	1,108.75	8	130	523.74	3.34	6.11	5.51	Open
P235	J670	J2035	855.54	8	130	233.77	1.49	1.06	1.24	Open
P236	J2034	J2036	2,466.79	8	130	282.82	1.81	4.34	1.76	Open
P237	J30	J20	1,592.58	8	130	23.82	0.15	0.03	0.02	Open
P238	J2009	J2010	755.02	6	130	235.34	2.67	3.84	5.09	Open
P239	J20	J22	953.18	8	130	61.09	0.39	0.1	0.1	Open
P24	J1105	J1106	597.73	6	130	320.84	3.64	5.4	9.03	Open
P240	J2009	J2011	2,358.98	6	130	136.66	1.55	4.39	1.86	Open
P241	J2011	J32	712.88	6	130	149.37	1.69	1.56	2.19	Open
P242	J2008	J2009	959.21	6	130	395	4.48	12.74	13.28	Open
P243	J2015	J2014	512.44	8	130	161.37	1.03	0.32	0.62	Open
P244	J2013	J2014	3,086.61	8	130	39.96	0.26	0.15	0.05	Open
P245	J2008	J2013	1,689.14	6	130	393.01	4.46	22.22	13.15	Open
P246	J2013	J2020	796.68	6	130	330.72	3.75	7.61	9.56	Open
P247	J2021	J2020	597.97	6	130	398.38	4.52	8.07	13.49	Open
P248	J2020	J2019	651.85	6	130	223.34	2.53	3.01	4.62	Open
P249	J2019	J70	713.65	6	130	82.38	0.93	0.52	0.73	Open
P25	J1091	J1105	3,333.66	6	130	202.27	2.3	12.82	3.84	Open
P250	J2017	10053	605.82	6	130	6.89	0.08	0	0.01	Open
P251	J2016	J2017	533.4	6	130	80.65	0.92	0.37	0.7	Open
P252	J2014	10051	551.80	6	130	193.6	2.2	1.96	3.54	Open
P253	J650	10049	2,951.45	6	130	-38.05	0.43	0.51	0.17	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P254	J2017	10033	2,827.92	6	130	66.32	0.75	1.38	0.49	Open
P255	J2018	10035	1,664.19	6	130	59.05	0.67	0.65	0.39	Open
P256	J2019	J2029	1,193.72	6	130	121.42	1.38	1.78	1.49	Open
P257	J22	J24	1,146.73	6	130	44.36	0.5	0.27	0.23	Open
P258	J2030	J4012	363.81	6	130	20.72	0.24	0.02	0.06	Open
P259	J2036	J688	4,332.12	8	130	1.97	0.01	0	0	Open
P26	J1091	J1142	959.94	12	130	812.08	2.3	1.65	1.72	Open
P260	J2035	J2036	1,526.05	8	130	251.17	1.6	2.16	1.41	Open
P261	J2042	J401	2,229.77	8	130	70.66	0.45	0.3	0.13	Open
P262	J2043	J2042	583.9	6	130	-22.04	0.25	0.04	0.06	Open
P263	J2044	J406	772.70	6	130	72.09	0.82	0.44	0.57	Open
P264	J2045	J2044	622.28	6	130	-12.15	0.14	0.01	0.02	Open
P265	J408	J2042	1,368.21	8	130	111.59	0.71	0.43	0.31	Open
P266	J2048	J2042	576.36	6	130	-4.73	0.05	0	0	Open
P267	J2047	J4008	779.18	6	130	-5.53	0.06	0	0	Open
P269	J2049	J4008	1,617.60	6	130	23.45	0.27	0.11	0.07	Open
P27	J1142	J1104	1,951.36	6	130	235.1	2.67	9.91	5.08	Open
P270	J2049	J2052	453.94	6	130	-94.09	1.07	0.42	0.93	Open
P271	J2050	J481	964.27	6	130	-23.17	0.26	0.07	0.07	Open
P272	J4016	J2050	1,019.88	6	130	0	0	0	0	Closed
P273	J2047	J4016	544.77	6	130	9.27	0.11	0.01	0.01	Open
P274	J408	J2046	518.42	6	130	3.84	0.04	0	0	Open
P275	J400	J2045	1,385.15	8	130	125.73	0.8	0.54	0.39	Open
P276	J4010	J2050	739.49	6	130	-7.13	0.08	0.01	0.01	Open
P277	J2052	J4015	1,816.14	6	130	-248.93	2.82	10.25	5.65	Open
P278	J1078	J2054	2,862.03	10	130	397	1.62	3.19	1.11	Open
P279	J20	J26	1,270.64	8	130	-72.86	0.47	0.18	0.14	Open
P28	J1142	J1103	1,642.66	8	130	533.06	3.4	9.36	5.7	Open
P280	J2020	J605	1,278.03	8	130	494.97	3.16	6.35	4.97	Open
P281	J605	J2028	261.45	8	130	643.87	4.11	2.11	8.08	Open
P282	J424	J2002	229.00	14	130	2,432.83	5.07	1.42	6.21	Open
P283	J26	J28	679.78	6	130	28.94	0.33	0.07	0.1	Open
P285	J1031	J1115	1,172.94	6	130	85.34	0.97	0.91	0.78	Open
P287	J26	J601	1,561.24	8	130	-121.85	0.78	0.58	0.37	Open
P289	J32	J2012	2,035.94	6	130	101.45	1.15	2.18	1.07	Open
P29	J1104	J1105	567.49	6	130	149.71	1.7	1.25	2.2	Open
P291	J32	J22	2,724.41	6	130	19.11	0.22	0.13	0.05	Open
P293	J34	J678	1,566.15	6	130	35.56	0.4	0.24	0.15	Open
P295	J34	J36	533.74	2	130	35.1	3.58	16.88	31.63	Open
P297	J1002.014	J38	677.35	8	130	158.26	1.01	0.41	0.6	Open
P299	J38	J40	609.25	8	130	-23.31	0.15	0.01	0.02	Open
P30	J1103	J1104	540.92	6	130	98.97	1.12	0.55	1.02	Open
P300	J1012	J1013	495.29	12	130	760.37	2.16	0.76	1.53	Open
P301	J1015	J1013	332.36	6	130	169.13	1.92	0.92	2.76	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P302	J1147	J723	1,435.34	16	130	906.38	1.45	0.75	0.52	Open
P303	J723	T3	882.31	12	130	656.12	1.86	1.02	1.16	Open
P304	J1145	J723	3,077.81	16	130	-214.57	0.34	0.11	0.04	Open
P305	J1006	J1145	3,069.48	8	130	161.85	1.03	1.92	0.63	Open
P306	J1146	J1145	1,241.63	12	130	-275.54	0.78	0.29	0.23	Open
P307	J1134	J1146	1,108.54	12	130	-218.6	0.62	0.17	0.15	Open
P308	T4	J1134	231.53	12	130	-397.49	1.13	0.11	0.46	Open
P309	J1001	J1134	6,572.51	12	130	198.62	0.56	0.83	0.13	Open
P31	J1104	J1106	2,444.78	6	130	167.8	1.9	6.65	2.72	Open
P310	J1005	J1006	1,947.97	6	130	86.23	0.98	1.54	0.79	Open
P311	J1007	J1006	1,542.38	6	130	116.9	1.33	2.15	1.39	Open
P312	J1013	J1147	1,116.89	16	130	922.78	1.47	0.6	0.54	Open
P313	J1023	J705	1,528.40	6	130	16.93	0.19	0.06	0.04	Open
P314	J712	J1022	649.79	6	130	167.42	1.9	1.76	2.71	Open
P315	J1027	J1028	483.15	12	130	713.8	2.02	0.66	1.36	Open
P316	J1035	J1034	376.78	6	130	228.43	2.59	1.81	4.82	Open
P317	J1120	J1043	447.59	6	130	218.42	2.48	1.98	4.43	Open
P318	J2012	J2015	1,763.11	8	130	167.56	1.07	1.18	0.67	Open
P319	J1144	J707	475.56	6	130	11.02	0.13	0.01	0.02	Open
P32	J1103	J1141	454.78	8	130	399.81	2.55	1.52	3.34	Open
P321	J40	J42	120.91	6	130	7.8	0.09	0	0.01	Open
P323	J40	J44	773.41	8	130	-35.78	0.23	0.03	0.04	Open
P325	J44	J46	208.71	8	130	-69.83	0.45	0.03	0.13	Open
P327	J46	J48	132.42	8	130	11.37	0.07	0	0	Open
P329	J46	J50	194.45	8	130	-82.4	0.53	0.03	0.18	Open
P33	J1141	J1102	1,255.54	8	130	363.28	2.32	3.52	2.8	Open
P331	J50	J52	141.54	6	130	13.7	0.16	0	0.03	Open
P333	J52	J54	147.78	6	130	4.85	0.06	0	0	Open
P335	J52	J56	408.35	6	130	7.25	0.08	0	0.01	Open
P337	J50	J1002.010	802.07	6	130	-98.81	1.12	0.82	1.02	Open
P339	J430	J10	1,211.84	10	130	-26.11	0.11	0.01	0.01	Open
P34	J1102	J1108	1,583.40	8	130	500.61	3.2	8.03	5.07	Open
P341	J427	U7000	84.05	6	100	401.82	4.56	1.87	22.28	Open
P343	U7000	J58	32.26	6	100	401.82	4.56	0.72	22.28	Open
P345	J58	J1130	50.61	6	130	396.92	4.5	0.68	13.4	Open
P347	J111	U7006	52.99	8	130	724.16	4.62	0.53	10.05	Open
P349	U7006	J64	43.83	8	130.00	724.16	4.62	0.44	10.05	Open
P35	J1101	J1102	597.56	6	130	165.04	1.87	1.58	2.64	Open
P351	J64	J119	75.63	8	130	723	4.61	0.76	10.02	Open
P353	J111	U7002	63.58	10	130	947.67	3.87	0.35	5.58	Open
P355	U7002	J60	24.56	10	130	947.67	3.87	0.14	5.58	Open
P357	J60	J701	45.14	10	130	947.6	3.87	0.25	5.58	Open
P359	J111	U7004	84.11	10	130	930.63	3.8	0.45	5.39	Open
P36	J1099	J1101	897.75	6	130	93.17	1.06	0.82	0.91	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P361	U7004	J62	25.68	10	130	930.63	3.8	0.14	5.39	Open
P363	J62	J701	63.81	10	130	929.27	3.8	0.34	5.38	Open
P365	J66	J701	28.48	10	150	899.22	3.67	0.11	3.88	Open
P367	416	J4016	52.01	6	130	0	0	0	0	Open
P37	J1100	J1101	1,697.65	6	130	94.4	1.07	1.59	0.94	Open
P373	J70	J2018	499.7	6	130	60.37	0.69	0.2	0.41	Open
P375	J70	J72	620.78	4	130	9.36	0.24	0.06	0.09	Open
P377	J1139	J463	555.13	10	130	-22.28	0.09	0	0.01	Open
P379	J1137	J460	801.05	10	130	0	0	0	0	Closed
P38	J1100	J1099	2,081.84	6	130	57.13	0.65	0.77	0.37	Open
P381	J74	J1139	509.09	6	130	-4.33	0.05	0	0	Open
P383	J76	V8002	47.47	6	130	0	0	0	0	Open
P385	V8002	J74	32.39	6	130	0	0	0	0	Open
P387	J2006	J2008	537.89	12	130	834.98	2.37	0.98	1.81	Open
P389	J1090	V8004	12.46	8	130	561.7	3.59	0.08	6.27	Open
P39	J1098	J1099	3,565.79	6	130	88.54	1	2.97	0.83	Open
P391	J78	J508	427.81	8	130	561.69	3.59	2.69	6.28	Open
P393	V8004	J78	12.84	8	130	561.69	3.59	0.08	6.28	Open
P395	J84	J555	467.52	6	130	-118.97	1.35	0.67	1.44	Open
P397	J84	J18	1,829.60	8	130	334.06	2.13	4.39	2.4	Open
P40	J1110	J1141	425.03	6	130	-23.8	0.27	0.03	0.07	Open
P400	J406	J403	330.66	6	130	53.54	0.61	0.11	0.33	Open
P401	J403	J405	822.58	6	130	40.86	0.46	0.16	0.2	Open
P402	J404	J1133	433.55	12	130	802.82	2.28	0.73	1.69	Open
P403	J436	J437	953.44	6	130	53.54	0.61	0.31	0.33	Open
P404	J2007	J438	682.43	10	130	1,083.48	4.43	4.88	7.15	Open
P405	J438	J80	1,690.34	8	130	324.4	2.07	3.84	2.27	Open
P406	J2054	J400	319.24	8	130	145.18	0.93	0.16	0.51	Open
P407	J401	J2055	750.52	8	130	2.84	0.02	0	0	Open
P408	J401	J402	1,403.49	6	130	28.75	0.33	0.15	0.1	Open
P409	J406	J407	324.18	6	130	11.17	0.13	0.01	0.02	Open
P41	J1110	J1100	95.56	6	130	187.02	2.12	0.32	3.33	Open
P410	J403	J2043	533.54	6	130	6.26	0.07	0	0.01	Open
P411	J2047	J434	1,130.43	6	130	-19.31	0.22	0.06	0.05	Open
P412	J2045	J408	190.7	8	130	121.93	0.78	0.07	0.37	Open
P413	J2044	J409	331.67	6	130	-103.74	1.18	0.37	1.12	Open
P414	J1076	J410	586.20	6	130	12.65	0.14	0.01	0.02	Open
P415	J88	J18	1,322.13	6	130	-235.03	2.67	6.71	5.08	Open
P416	J1138	J411	1,801.65	6	130	70.94	0.8	0.99	0.55	Open
P417	J1111	J412	671.15	6	130	18.83	0.21	0.03	0.05	Open
P418	J1050	J423	728.22	6	130	6.63	0.08	0	0.01	Open
P419	J1058	J413	545.51	6	130	9.56	0.11	0.01	0.01	Open
P42	J1113	J1110	552.47	6	130	168.5	1.91	1.51	2.74	Open
P420	J414	J1048	487.29	16	130	2,557.61	4.08	1.73	3.55	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P421	J414	J415	565.33	6	130	8.61	0.1	0.01	0.01	Open
P422	J1033	J416	601.05	8	130	8.49	0.05	0	0	Open
P423	J417	J1045	168.91	8	130	691.43	4.41	1.56	9.22	Open
P424	J1067	J418	1,141.52	6	130	19.65	0.22	0.06	0.05	Open
P425	J1080	J419	850.07	6	130	12.11	0.14	0.02	0.02	Open
P426	J4003	J421	1,628.55	6	130	51.96	0.59	0.51	0.31	Open
P427	J436	J422	1,736.24	6	130	83.27	0.94	1.29	0.74	Open
P428	J2003	J436	553.06	6	130	246.11	2.79	3.06	5.53	Open
P429	J425	J2005.1	2,151.61	6	130	156.55	1.78	5.15	2.39	Open
P43	J1113	J1103	411.14	6	130	-26.89	0.31	0.04	0.09	Open
P430	J427	J426	888.78	6	130	15.15	0.17	0.03	0.03	Open
P431	J1129	J427	293.85	14	130	1,818.65	3.79	1.06	3.62	Open
P432	J428	J1128	217.61	12	130	1,463.69	4.15	1.12	5.13	Open
P433	J428	J429	797.16	6	130	25.93	0.29	0.07	0.09	Open
P434	J1120	V8022	33.38	6	130	0.00	0	0	0	Closed
P435	J431	J1148	235.15	18	130	3,444.98	4.34	0.82	3.48	Open
P436	J431	J439	673.08	6	130	9.01	0.1	0.01	0.01	Open
P437	T1	J431	543.85	18	130	3,457.50	4.36	1.9	3.5	Open
P438	J1053	J94	80.09	6	130	8.73	0.1	0	0.01	Open
P439	J1034	J435	820.31	6	130	8.34	0.09	0.01	0.01	Open
P44	J1098	J1113	174.76	6	130	145.75	1.65	0.37	2.1	Open
P441	J82	J440	614.31	6	130	284.14	3.22	4.43	7.21	Open
P442	J80	J442	310.22	6	130	23.82	0.27	0.02	0.07	Open
P447	J88	V8008	25.69	6	130	235.03	2.67	0.13	5.08	Open
P449	V8008	J86	24.37	6	130	235.03	2.67	0.12	5.08	Open
P45	J1097	J1098	534.8	6	130	250.7	2.84	3.06	5.72	Open
P46	J1096	10001	4,311.06	6	130	38.72	0.44	0.78	0.18	Open
P460	J461	J466	686.64	6	130	21.86	0.25	0.04	0.06	Open
P461	J463	J464	141.33	6	130	-31.59	0.36	0.02	0.12	Open
P463	J464	J461	485.54	8	130	40.45	0.26	0.02	0.05	Open
P467	J621	V8012	84.47	12	130	0	0	0	0	Open
P469	V8012	J433	80.64	12	130	0	0	0	0	Open
P47	J1096	J1097	623.01	6	130	259.49	2.94	3.8	6.1	Open
P471	J427	U7008	63.95	10	130	733.12	2.99	0.22	3.47	Open
P475	J427	U7010	80.26	10	130	261.72	1.07	0.04	0.51	Open
P477	U7008	J1130	80.38	10	130	733.12	2.99	0.28	3.47	Open
P479	U7010	J1130	93.95	10	130	261.72	1.07	0.05	0.51	Open
P48	J1095	J1096	658.98	6	130	306.36	3.48	5.47	8.29	Open
P480	J2052	J480	120.71	6	130	151.76	1.72	0.27	2.26	Open
P481	J481	J2049	107.94	6	130	-59.46	0.67	0.04	0.4	Open
P483	J434	J4009	78.03	6	130	-32.7	0.37	0.01	0.13	Open
P485	J4009	J481	70.43	6	130	-33.04	0.37	0.01	0.13	Open
P487	J2024	J2025	709.31	10	130	502.2	2.05	1.22	1.72	Open
P489	J438	J612	668.64	8	130	739.73	4.72	6.99	10.45	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P49	J1092	J1095	778.25	6	130	53.91	0.61	0.26	0.33	Open
P491	J1051	V8014	61.68	6	130	0	0	0	0	Open
P493	V8014	J423	79.5	6	130	0	0	0	0	Open
P495	J94	J433	131.31	6	130	3.17	0.04	0	0	Open
P497	J1130	J5010	664.9	14	130	1,787.13	3.72	2.33	3.51	Open
P499	J1063	J119	3,404.65	14	130	#######	4.65	17.98	5.28	Open
P50	J1094	J1095	940.31	6	130	264.43	3	5.94	6.31	Open
P500	J1109	J502	661.16	6	130	266.25	3.02	4.23	6.39	Open
P501	J1088	J420	396.81	6	130	10.88	0.12	0.01	0.02	Open
P502	J1061	J503	640.99	12	130	9.43	0.03	0	0	Open
P503	J509	J504	717.91	6	130	34.16	0.39	0.1	0.14	Open
P504	J1109	J509	661.71	12	130	651.62	1.85	0.76	1.15	Open
P505	J1116	J505	303.21	6	130	29.52	0.34	0.03	0.11	Open
P506	J1121	J506	386.95	6	130	61.75	0.7	0.17	0.43	Open
P507	J1114	J507	138.91	14	130	2,674.22	5.57	1.03	7.4	Open
P508	J1118	J4004	617.46	14	130	2,486.13	5.18	3.99	6.46	Open
P509	J509	J1112	644.14	12	130	602.53	1.71	0.64	0.99	Open
P51	J1094	J1093	1,011.02	6	130	-13.41	0.15	0.03	0.03	Open
P510	J501	J119	50.42	8	130	754.23	4.81	0.55	10.83	Open
P511	J500	J119	37.77	8	130	754.48	4.82	0.41	10.84	Open
P512	J510	J512	119.98	6	130	338.4	3.84	1.2	9.97	Open
P514	J514	J510	290.69	6	130	245.07	2.78	1.59	5.49	Open
P519	J98	J12	869.73	8	130	0	0	0	0	Open
P52	J1093	J1092	847.71	6	130	273.67	3.11	5.7	6.73	Open
P523	J98	V8020	36.61	8	130	0	0	0	0	Open
P525	V8020	J16	38.91	8	130	0	0	0	0	Open
P527	J100	J430	297.30	6	130	0	0	0	0	Open
P529	V8022	J100	33.4	6	130	0	0	0	0	Open
P53	J1092	J1091	461.51	6	130	209.76	2.38	1.9	4.11	Open
P535	J38	J102	1,084.53	12	100	166.32	0.47	0.16	0.15	Open
P537	J102	J104	880.61	12	100	69.35	0.2	0.03	0.03	Open
P54	J1089	J1091	353.44	12	130	818.36	2.32	0.62	1.75	Open
P55	J1089	J1090	1,369.44	8	130	593.6	3.79	9.52	6.95	Open
P550	J508	J1124	495.27	6	130	128.18	1.45	0.82	1.65	Open
P551	J1124	J550	1,322.00	6	130	81.96	0.93	0.95	0.72	Open
P552	J552	J553	725.07	4	130	41.6	1.06	1.07	1.48	Open
P553	J1123	J554	273.23	6	130	19.21	0.22	0.01	0.05	Open
P554	J4002	J84	677.84	6	130	240.74	2.73	3.6	5.31	Open
P555	J1124	J551	855.4	6	130	15.91	0.18	0.03	0.03	Open
P556	J552	J1123	638.41	6	130	234.43	2.66	3.23	5.05	Open
P56	J1087	J1089	616.38	12	130	1,421.98	4.03	3	4.86	Open
P57	J1082	J1094	732.59	6	130	270.84	3.07	4.84	6.6	Open
P58	J1082	J1083	1,542.95	6	130	-112.85	1.28	2.01	1.3	Open
P59	J1081	J1082	1,156.00	6	130	206.07	2.34	4.6	3.98	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P60	J1061	10011	1,432.23	6	130	-32.81	0.37	0.19	0.13	Open
P600	J510	J2021	2,229.59	6	130	-97.92	1.11	2.24	1	Open
P601	J600	J4006	57.61	6	130	-10.63	0.12	0	0.02	Open
P602	J80	J611	722.67	6	130	2.45	0.03	0	0	Open
P603	J512	J2024	597.5	6	130	355	4.03	6.51	10.9	Open
P604	J2021	J612	403.43	8	130	-728.04	4.65	4.09	10.15	Open
P61	J1062	10013	1,017.36	12	130	2.63	0.01	0	0	Open
P618	J601	J2010	613.73	6	130	-151.58	1.72	1.38	2.25	Open
P619	J2029	J605	635.48	6	130	158.37	1.8	1.55	2.44	Open
P62	J1062	J1081	1,827.24	6	130	265.76	3.02	11.65	6.37	Open
P621	J2010	J2011	1,781.01	6	130	51.58	0.59	0.55	0.31	Open
P63	J1063	J1062	869.2	12	130	279.46	0.79	0.21	0.24	Open
P635	J2032	J4011	747.04	8	130	628.86	4.01	5.78	7.74	Open
P64	J1063	J1084	1,491.26	12	130	1,666.40	4.73	9.73	6.53	Open
P643	J2033	J522	258.4	6	130	21.23	0.24	0.02	0.06	Open
P646	J522A	J607	501.53	6	130	15.95	0.18	0.02	0.03	Open
P65	J1084	J1083	307.16	6	130	426.86	4.84	4.71	15.33	Open
P650	J650	J651	485.93	6	130	31.45	0.36	0.06	0.12	Open
P651	J2031	J650	821.85	6	130	2.16	0.02	0	0	Open
P653	J609	J606	1,838.81	6	130	26.13	0.3	0.16	0.09	Open
P654A	J606A	J604	424.98	6	130	8.96	0.1	0.01	0.01	Open
P655	J609	J2040	856.84	6	130	140.27	1.59	1.67	1.95	Open
P659	J2041A	J603	926.61	6	130	11.72	0.13	0.02	0.02	Open
P66	J1083	J1093	843.54	6	130	302.25	3.43	6.82	8.09	Open
P661	J608	J2039	960.75	10	130	-92.11	0.38	0.07	0.07	Open
P67	J1084	J1085	253.98	10	130	1,226.65	5.01	2.28	8.99	Open
P670	J680	J682	1,703.96	8	130	139.17	0.89	0.81	0.47	Open
P671	J682	J683	2,192.14	6	130	53.5	0.61	0.72	0.33	Open
P672	J682	J684	688.13	8	130	32.43	0.21	0.02	0.03	Open
P673	J679	J680	1,282.58	8	130	262.35	1.67	1.97	1.53	Open
P674	J2036	J679	5,024.95	8	130	451.11	2.88	21.01	4.18	Open
P675	J679	J34	1,224.38	6	130	108.33	1.23	1.48	1.21	Open
P676	J680	J681	2,108.79	6	130	65.84	0.75	1.01	0.48	Open
P677	J670	J687	719.92	6	130	78.74	0.89	0.48	0.67	Open
P678	J2034	J670	489.44	8	130	327.04	2.09	1.13	2.31	Open
P679	J687	J671	311.3	6	130	71.12	0.81	0.17	0.55	Open
P68	J1085	J1086	1,073.79	10	130	1,208.14	4.94	9.39	8.74	Open
P680	J671	J672	273.32	6	130	11.69	0.13	0.01	0.02	Open
P681	J671	J673	265.79	6	130	56.82	0.64	0.1	0.37	Open
P682	J673	J674	276.75	6	130	8.21	0.09	0	0.01	Open
P684	J2035	J675	1,358.92	6	130	-37.6	0.43	0.23	0.17	Open
P685	J675	J676	265.47	6	130	1.76	0.02	0	0	Open
P686	J2012	J677	1,047.71	6	130	-87.46	0.99	0.85	0.81	Open
P687	J673	J675	303.5	6	130	46.03	0.52	0.08	0.25	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P69	J1086	J1087	452.27	10	130	1,189.91	4.86	3.84	8.5	Open
P70	J1088	J1087	418.97	6	130	239.32	2.72	2.2	5.25	Open
P700	J702	J700	911.02	6	130	39.68	0.45	0.17	0.19	Open
P701	J703	J700	1,270.27	6	130	42.8	0.49	0.28	0.22	Open
P702	J710	J711	446.9	6	130	8.47	0.1	0	0.01	Open
P703	J702	J715	220.69	6	130	8.18	0.09	0	0.01	Open
P704	J703	J702	297.09	6	130	55.37	0.63	0.1	0.35	Open
P705	J1147	J704	352.82	6	130	5.04	0.06	0	0	Open
P706	J1011	J703	595.47	6	130	103.94	1.18	0.67	1.12	Open
P707	J710	J1011	266.76	6	130	130.83	1.48	0.46	1.72	Open
P708	J1016	J731	188.11	6	130	43.13	0.49	0.04	0.22	Open
P709	J1016	J706	548.45	6	130	16.95	0.19	0.02	0.04	Open
P71	J1063	J1088	3,738.36	6	130	261.05	2.96	23.05	6.17	Open
P710	J1051	J708	363.82	6	130	8.98	0.1	0	0.01	Open
P711	J1052	J709	863.34	8	130	31.37	0.2	0.03	0.03	Open
P712	J712	J713	166.67	6	130	2.26	0.03	0	0	Open
P713	J700	J714	249.08	6	130	45.01	0.51	0.06	0.24	Open
P714	J1024	J716	414.90	12	130	880.67	2.5	0.83	2	Open
P715	J718	J717	948.55	6	130	30.4	0.34	0.11	0.11	Open
P716	J718	J717	505.44	10	130	163.68	0.67	0.11	0.22	Open
P717	J1007	J718	818.67	10	130	205.5	0.84	0.27	0.33	Open
P718	J719	J1007	341.91	10	130	302.26	1.23	0.23	0.67	Open
P719	J719	J1007	1,725.47	6	130	32.91	0.37	0.23	0.13	Open
P720	J716	J720	646.73	6	130	99.78	1.13	0.67	1.04	Open
P721	J720	J1026	243.66	12	130	870.47	2.47	0.48	1.96	Open
P722	J1026	J1021	659.45	12	130	933.39	2.65	1.47	2.23	Open
P723	J1024	J712	174.91	6	130	171.69	1.95	0.5	2.84	Open
P724	J728	J727	270.52	8	130	9.6	0.06	0	0	Open
P725	J727	J726	226.77	8	130	5.58	0.04	0	0	Open
P726	J727	J725	198.89	8	130	1.96	0.01	0	0	Open
P727	J724	J728	124.84	8	130	20.23	0.13	0	0.01	Open
P728	J728	J729	135.77	6	130	9.58	0.11	0	0.01	Open
P729	T3	J730	425.8	8	130	48.8	0.31	0.03	0.07	Open
P73	J1064	J1065	2,411.03	8	130	304.39	1.94	4.87	2.02	Open
P730	J730	J724	1,310.21	8	130	10.90	0.07	0.01	0	Open
P731	J730	J724	659.73	8	130	15.78	0.1	0.01	0.01	Open
P732	J701	J1031	227.31	18	130	2,775.26	3.5	0.53	2.33	Open
P74	J1048	J1049	427.19	16	130	2,247.95	3.59	1.2	2.8	Open
P75	J1049	J1047	621.58	12	130	1,899.33	5.39	5.17	8.32	Open
P76	J1047	J1065	2,276.96	8	130	-30.22	0.19	0.06	0.03	Open
P77	J1065	J1066	624.38	8	130	240.34	1.53	0.81	1.3	Open
P78	J1066	J1080	2,441.09	8	130	59.45	0.38	0.24	0.1	Open
P79	J1080	J1067	1,583.37	6	130	17.33	0.2	0.06	0.04	Open
P80	J1066	J1067	474.45	8	130	163.69	1.04	0.3	0.64	Open

Buildout PHD Pipe Report										
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)	Status
P800	J1131	J800	1,209.62	6	130	69.89	0.79	0.65	0.54	Open
P801	J801	J802	787.58	6	130	23.24	0.26	0.06	0.07	Open
P802	J1131	J801	649.01	12	130	1,576.70	4.47	3.82	5.89	Open
P81	J1067	J1046	2,258.24	6	130	142.19	1.61	4.52	2	Open
P82	J1046	J1111	482.27	14	130	2,490.58	5.19	3.13	6.48	Open
P83	J1047	J1046	941.96	14	130	2,370.62	4.94	5.57	5.92	Open
P84	J1049	J1064	784.28	12	130	318.49	0.9	0.24	0.3	Open
P85	J1045	J1036	1,056.96	6	130	230.6	2.62	5.18	4.9	Open
P86	J1045	J1047	457.49	8	130	455.27	2.91	1.95	4.25	Open
P87	J1033	J417	655.76	8	130	479.61	3.06	3.07	4.68	Open
P88	J1048	J417	645.75	6	130	218.34	2.48	2.86	4.43	Open
P89	J1148	J414	452.06	16	130	2,572.75	4.11	1.62	3.59	Open
P90	J1033	J1035	714.43	6	130	372.02	4.22	8.49	11.88	Open
P91	J1034	J1037	1,669.83	6	130	208.24	2.36	6.77	4.06	Open
P92	J1037	J1038	406.67	16	130	3,022.19	4.82	1.97	4.84	Open
P93	J1111	J1037	423.37	16	130	2,820.20	4.5	1.8	4.26	Open
P94	J1038	J1039	623.39	12	130	556.97	1.58	0.53	0.86	Open
P95	J1038	J1068	2,258.09	10	130	754.41	3.08	8.25	3.66	Open
P96	J1068	J1069	2,668.39	10	130	729.84	2.98	9.17	3.44	Open
P97	J1069	J1072	2,472.44	10	130	527.35	2.15	4.66	1.88	Open
P98	J1069	J1070	317.12	6	130	150.37	1.71	0.7	2.22	Open
P99	J1070	J1071	2,368.44	6	130	130.74	1.48	4.06	1.71	Open
P995	J610	J600	337.3	6	130	-10.21	0.12	0.01	0.02	Open
MP131A	J1138	J465A	188.11	10	150	37.35	0.15	0	0.01	Open
PMP135	J427	PMP135	1	6	150	402.55	4.57	0.01	10.56	Open
PMP135	PMP135	J1130	1	6	150	402.55	4.57	0.01	10.56	Open
PMP21	J111	PMP2	1	10	150	899.26	3.67	0	3.91	Open
PMP22	PMP2	J66	20.62	10	150	899.26	3.67	0.08	3.88	Open
PMP31	J111	PMP3	1	10	150	754.54	3.08	0	2.81	Open
PMP32	PMP3	J500	1	8	150	754.54	4.82	0.01	8.3	Open
PMP41	J111	PMP4	1	8	150	754.31	4.81	0.01	8.3	Open
PMP42	PMP4	J501	1	8	150	754.31	4.81	0.01	8.3	Open
PMP61	J123	PMP6	1	10	150	1,661.16	6.79	0.01	12.08	Open
PMP62	PMP6	J121	1	10	150	1,661.16	6.79	0.01	12.08	Open
PMP71	J125	PMP7	1	10	150	2,505.37	10.23	0.03	25.88	Open
PMP72	PMP7	J131	1	10	150	2,505.37	10.23	0.03	25.88	Open
PMP81	J127	PMP8	1	10	150	2,478.67	10.13	0.03	25.39	Open
PMP82	PMP8	J133	1	10	150	2,478.67	10.13	0.03	25.39	Open

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
10001	1,001.41	657.54	10001	20	773.25
10003	1,007.83	1,032.92	10003	20	773.25
10005	1,001.06	2,271.40	10005	20	752.44
10007	1,016.58	2,367.74	10007	20	752.44
10009	1,001.30	2,543.28	10009	20	653.17
10011	1,008.93	3,318.85	10011	20	653.17
10013	1,001.75	3,970.43	J1086	17.53	780.86
10015	1,006.38	4,038.44	J1086	15.08	775.21
10017	1,001.27	2,107.44	J608	0.15	557.6
10019	1,001.21	1,965.63	J608	4.16	566.86
10021	1,001.31	1,957.32	J608	4.53	567.71
10023	1,002.41	1,857.99	J608	7.3	574.09
10025	1,002.71	1,718.20	J608	11.21	583.13
10027	1,002.82	1,712.00	J608	11.49	583.77
10029	1,004.56	1,548.63	J608	15.75	593.59
10031	1,006.33	1,390.47	J608	19.39	602.01
10033	1,003.05	1,434.89	J608	18.71	600.42
10035	1,003.64	1,573.58	J608	8.14	576.03
10037	1,003.91	1,709.53	J608	3.87	566.18
10039	1,002.66	1,782.66	J608	1.32	560.31
10041	1,002.08	1,936.39	J608	-4.08	547.83
10043	1,008.76	2,387.88	J608	1.95	561.74
10045	1,016.31	1,827.20	J608	17.57	597.8
10047	1,015.05	1,798.43	J608	17.47	597.58
10049	1,003.65	1,648.87	J608	19.47	602.17
10051	1,002.63	2,017.73	J608	19.78	602.9
10053	1,004.59	6,568,808.00	J608	-2,123,144.50	-4,899,384.00
10055	1,001.95	118,603.84	J608	-2,645.74	-5,548.78
9993	1,001.54	1,082.61	J608	9.91	580.12
9995	1,009.25	11,149.36	J608	-3,686.12	-7,949.84
9997	1,001.66	485.88	9997	20	527.68
9999	1,025.17	716.64	9999	20	527.68
J10	1,527.90	4,997.91	J723	19.57	820.05
J1001	1,676.25	6,694.75	J723	19.33	819.5
J1002	1,537.18	8,319.79	J723	16.48	812.91
J1002.001	1,006.41	7,813.08	J104	-20.68	669.27
J1002.004	1,005.18	7,589.97	J723	17.03	814.18
J1002.005	1,002.49	7,838.29	J723	16.54	813.05
J1002.007	1,002.03	8,025.47	J723	16.23	812.33
J1002.010	1,003.08	5,306.90	J104	-2.82	710.5
J1002.014	1,003.60	4,655.06	J104	-17.5	676.6
J1002.016	1,010.28	4,899.26	J104	-15.95	680.19
J1002.019	1,540.28	3,109.03	J104	19.25	761.42
J1002.1	1,511.20	8,134.81	J723	16.4	812.73

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J1002.2	1,016.34	846.83	J1002.2	20	753.42
J1003	1,510.50	9,803.98	J723	13.3	805.57
J1004	1,002.98	8,934.65	J723	14.61	808.59
J1005	1,005.34	8,326.08	J723	15.42	810.47
J1006	1,027.52	2,794.88	J1006	20	739.57
J1007	1,508.52	8,173.55	J723	14.85	809.14
J1008	1,002.03	8,699.86	J723	13.73	806.56
J1009	1,008.22	2,141.12	J1009	20	710.22
J1010	1,005.50	4,783.39	J723	19.01	818.75
J1011	1,003.28	4,079.68	J714	-11.25	719.45
J1012	1,007.18	8,067.42	J723	12.36	803.4
J1013	1,004.48	8,624.35	J723	9.84	797.59
J1015	1,003.33	2,229.45	J1016	19.17	785.3
J1016	1,002.24	1,463.85	J1016	20	787.22
J1017	1,008.32	3,161.91	J1016	8.58	760.86
J1018	1,007.98	3,461.65	J1018	20	712.94
J1019	1,003.90	9,925.39	J723	9.99	797.94
J1020	1,001.29	10,980.19	J723	8.18	793.76
J1021	1,003.03	12,202.32	J723	6.03	788.79
J1022	1,513.71	10,483.94	J723	11.67	801.8
J1023	1,510.95	10,400.80	J723	11.78	802.06
J1024	1,501.83	12,193.90	J723	8.11	793.6
J1025	1,508.57	12,082.46	J723	8.56	794.64
J1026	1,002.11	11,959.26	J723	7.54	792.29
J1027	1,006.63	10,724.65	J723	9.89	797.71
J1028	1,004.53	10,130.91	J723	10.87	799.96
J1029	1,004.23	6,171.02	J723	17.49	815.24
J1030	1,007.37	3,161.59	J708	-2.92	653.29
J1031	1,003.63	7,271.14	J723	16.84	813.74
J1033	1,005.78	5,059.23	J426	12.78	656.34
J1034	1,007.91	1,628.33	J426	16.34	664.56
J1035	1,007.45	2,696.95	J426	13.62	658.29
J1036	1,007.21	3,600.60	J426	9.84	649.56
J1037	1,004.17	8,838.35	J426	-25.86	567.16
J1038	1,008.96	9,356.18	J426	-35.9	543.99
J1039	1,013.32	6,980.31	J426	-16.48	588.81
J1040	1,009.73	2,171.52	J426	10.52	651.12
J1041	1,016.81	4,417.13	J426	2.76	633.22
J1042	1,013.63	4,491.76	J426	0.69	628.45
J1043	1,008.12	2,460.68	J426	2.31	632.18
J1044	1,013.34	3,466.75	J426	7.76	644.77
J1045	1,003.71	7,095.37	J426	11.92	654.36
J1046	1,014.82	10,754.29	J426	-31.59	553.95
J1047	1,009.46	11,142.50	J426	-16.13	589.62

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J1048	1,005.45	7,953.65	J426	10.68	651.5
J1049	1,006.43	11,180.47	J426	2.72	633.13
J1050	1,011.22	2,288.83	J708	18.27	702.19
J1051	1,002.54	1,201.59	J708	8.38	679.37
J1052	1,007.29	1,058.15	J709	8.37	665.81
J1053	1,003.81	1,519.13	J94	14.14	677.63
J1054	1,006.16	1,921.18	J94	8.84	665.4
J1056	1,010.42	1,824.82	J94	16.86	683.92
J1057	1,006.41	1,843.41	J94	12.81	674.55
J1058	1,006.47	1,788.06	J94	7.04	661.24
J1060	1,007.99	2,373.48	J94	7.25	661.74
J1061	1,009.21	4,312.51	J1086	4.64	751.11
J1062	1,007.39	4,282.19	J1086	5.72	753.59
J1063	1,015.18	4,600.43	J1086	-4.96	728.96
J1064	1,009.40	4,018.79	J426	14.53	660.37
J1065	1,022.56	3,824.36	J426	12.66	656.07
J1066	1,011.47	3,174.61	J426	13.96	659.06
J1067	1,012.78	3,356.10	J426	13.35	657.65
J1068	1,016.38	4,019.40	J426	12.72	656.2
J1069	1,034.75	3,106.24	J426	10.82	651.82
J1070	1,013.09	2,323.23	J426	14.19	659.59
J1071	1,024.74	2,476.65	J426	13.86	658.84
J1072	1,035.20	2,693.24	J426	13.03	656.93
J1073	1,012.92	2,715.85	J426	12.93	656.69
J1074	1,010.15	2,544.91	J426	13.62	658.29
J1075	1,009.14	2,718.57	J426	13.09	657.07
J1076	1,007.75	2,616.16	J426	13.4	657.78
J1077	1,011.72	2,702.90	J426	13.29	657.52
J1078	1,008.49	2,667.92	J426	13.6	658.23
J1079	1,045.52	2,086.06	J426	15.94	663.64
J1080	1,020.00	1,816.47	J426	17.33	666.85
J1081	1,007.69	2,697.41	10009	20	653.17
J1082	1,032.05	3,278.89	J1082	20	677.33
J1083	1,007.84	3,301.90	J1083	20	756.93
J1084	1,008.59	3,993.46	J1086	14.18	773.11
J1085	1,012.34	4,055.25	J1086	10.26	764.07
J1086	1,012.15	3,650.21	J1086	20	786.56
J1087	1,004.83	3,690.69	J1087	20	785.48
J1088	1,007.23	2,961.80	J1088	20	711.58
J1089	1,006.68	3,891.54	J1087	15.3	774.63
J1090	1,021.27	2,995.36	J1090	20	662.44
J1091	1,009.19	3,978.13	J1087	13.86	771.3
J1092	1,006.67	3,360.78	J1092	20	744.48
J1093	1,010.11	3,192.00	J1093	20	728.74

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J1094	1,013.22	3,542.18	J1094	20	664.68
J1095	1,007.98	3,259.02	10001	10.75	751.91
J1096	1,005.43	2,330.73	10001	20	773.25
J1097	1,004.80	2,552.83	10005	20	752.44
J1098	1,010.94	3,124.06	J1098	20	756.61
J1099	1,035.00	3,121.15	J1099	20	659.47
J1100	1,023.67	2,808.06	J1100	20	793.43
J1101	1,015.01	3,285.45	J1101	20	709.91
J1102	1,018.48	4,036.13	J1100	12.28	775.62
J1103	1,004.93	3,831.78	J1100	14.32	780.32
J1104	1,011.04	3,985.62	J1104	20	717.28
J1105	1,020.76	4,001.70	J1105	20	666.28
J1106	1,010.99	4,722.68	J1100	16.91	786.3
J1107	1,008.06	5,374.73	J1100	-0.12	746.98
J1108	1,018.95	7,177.89	J1100	-43.46	646.96
J1109	1,009.58	7,436.38	J1100	-33.02	671.08
J111	1,000.55	-49,114.73	J426	21.45	676.35
J1110	1,003.52	3,003.51	J1110	20	789.66
J1111	1,002.49	9,398.14	J426	-27.17	564.14
J1112	1,036.79	8,577.83	J1100	-31.96	673.51
J1113	1,002.76	3,338.85	J1113	20	762.07
J1114	1,025.77	10,270.40	J1114	20	754.65
J1115	1,006.67	8,964.19	J723	14.31	807.91
J1116	1,010.66	2,229.36	J1117	16.37	657.11
J1117	1,011.26	1,225.13	J1117	20	665.48
J1118	1,011.42	9,589.62	J1121	0.29	698.52
J1120	1,007.11	2,180.44	J426	7.51	644.17
J1121	1,016.68	1,320.94	J1121	20	744
J1122	1,046.28	3,347.34	J1122	20	555.66
J1123	1,014.33	1,649.39	J553	3.34	514.25
J1124	1,020.21	2,198.75	J1124	20	556.36
J1125	1,010.12	2,181.82	J426	2.28	632.12
J1126	1,010.27	1,866.99	J426	2.33	632.22
J1127	1,009.49	2,172.63	J426	-1.79	622.72
J1128	1,004.12	1,946.53	J426	0.11	627.11
J1129	1,008.38	1,789.26	J426	-1.42	623.57
J1130	1,004.78	7,708.92	J426	-6.51	611.82
J1131	1,011.22	3,508.58	J426	16.9	665.85
J1133	1,009.90	2,845.81	J426	-8.47	607.31
J1134	1,013.16	-6,692.15	J426	21.45	676.35
J1135	1,011.66	4,596.90	J426	-19.64	581.53
J1136	1,005.62	4,782.22	J426	-17.84	585.69
J1137	1,009.01	4,997.48	J426	-14.45	593.49
J1138	1,011.31	1,292.48	J426	13.78	658.64

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J1139	1,005.49	2,279.01	J426	17.71	667.73
J1141	1,008.49	3,758.90	J1100	14.35	780.38
J1142	1,029.27	4,020.50	J1087	16.3	776.94
J1143	1,004.80	8,757.76	J723	13.47	805.98
J1144	1,004.45	3,393.26	J1016	7.21	757.71
J1145	1,067.25	9,903.77	J723	9.41	796.59
J1146	1,012.69	6,908.70	J723	18.88	818.46
J1147	1,007.57	7,601.97	J723	11.76	802.02
J1148	1,002.29	-10,444.68	J723	21.93	825.48
J119	1,001.35	4,193.01	J1086	12.99	770.38
J12	1,014.44	1,535.57	J12	20	669.16
J121	1,000.16	30,881.58	J121	20	589.16
J123	1,000.76	-2,414,065.25	J426	21.45	676.35
J125	1,000.46	-22,328.23	J426	21.45	676.35
J127	1,006.16	-15,043.15	J426	21.45	676.35
J131	1,000.09	26,284.15	J131	20	589.16
J133	1,001.20	22,017.50	J133	20	589.16
J14	1,544.82	1,835.13	J14	20	685.16
J16	1,010.23	3,928.56	J426	8.14	645.64
J18	1,066.02	1,171.06	J18	20	611.16
J20	1,023.73	2,610.99	J28	-22.03	478.15
J2001	1,029.95	1,867.45	J425	-2.03	605.72
J2002	1,017.09	11,102.67	J1121	-14.28	664.89
J2003	1,009.06	10,832.17	J1121	-8.58	678.04
J2004	1,007.95	-27,733.08	J82	-45.07	471.04
J2004.1	1,011.41	7,785.96	J82	7.26	591.81
J2005	1,011.49	2,942.02	J2005	20	541.92
J2005.1	1,023.09	880.40	J2005.1	20	541.92
J2006	1,009.39	7,888.20	J82	-60.82	434.7
J2007	1,011.54	5,930.05	J82	-55.71	446.48
J2008	1,014.00	7,875.59	J82	-59.99	436.62
J2009	1,015.33	3,148.95	J28	-13.18	498.58
J2010	1,021.45	1,843.61	J2010	20	548.84
J2011	1,025.91	2,608.31	J28	-0.97	526.76
J2012	1,014.22	3,298.32	J28	-6.49	514.02
J2013	1,014.88	3,625.14	J608	-23.78	502.38
J2014	1,005.16	3,272.49	J608	-1.58	553.6
J2015	1,004.13	3,287.23	J608	0	557.24
J2016	1,000.96	-125.65	J608	-1,251.13	-2,330.19
J2017	1,004.96	2,759.94	J608	-11.27	531.25
J2018	1,000.88	1,640.39	J608	6.38	571.98
J2019	1,013.03	1,829.37	J608	1.55	560.82
J2020	1,007.19	2,688.66	J608	-25.1	499.33
J2021	1,009.38	3,150.26	J608	-28.17	492.25

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J2022	1,013.44	2,320.23	J608	-12.2	529.1
J2024	1,016.44	1,931.32	J608	-14.47	523.86
J2025	1,017.87	1,643.93	J608	-4.06	547.89
J2026	1,025.66	1,949.01	J608	-23.62	502.73
J2027	1,007.78	2,127.41	J608	-26.9	495.17
J2028	1,006.27	2,920.66	J608	-40.79	463.12
J2029	1,002.32	2,098.78	J608	-10.12	533.89
J2030	1,002.92	2,376.84	J608	-6.31	542.68
J2031	1,008.97	1,722.25	J608	12	584.94
J2032	1,011.26	2,620.45	J608	-31.13	485.42
J2033	1,006.98	2,372.08	J608	-30.82	486.11
J2034	1,006.49	128,658.03	J608	-2,844.69	-6,007.93
J2035	1,013.47	3,298.59	J608	-37.03	471.79
J2036	1,553.94	3,583.87	J608	-41.63	461.18
J2037	1,020.06	1,804.04	J608	-27.63	493.48
J2038	1,006.32	1,604.53	J608	-12.88	527.53
J2039	1,007.52	1,181.43	J608	-12.83	527.64
J2040	1,012.80	1,058.46	J608	8.53	576.94
J2041	1,039.89	1,042.85	J608	8.81	577.58
J2041A	1,007.84	1,061.07	J608	8.2	576.18
J2042	1,009.44	1,713.20	J426	17.96	668.29
J2043	1,018.87	1,355.57	J426	19.09	670.91
J2044	1,012.99	1,875.38	J426	17.66	667.6
J2045	1,010.64	1,953.82	J426	17.13	666.38
J2046	1,002.56	1,419.09	J426	18.8	670.25
J2047	1,010.38	2,394.15	J426	17.79	667.9
J2048	1,003.15	1,396.76	J426	18.91	670.49
J2049	1,007.46	2,871.13	J426	16.8	665.62
J2050	1,010.69	2,507.12	J426	17.39	666.98
J2052	1,002.06	3,213.19	J426	16.47	664.86
J2054	1,000.59	2,579.71	J426	14.35	659.96
J2055	1,001.90	1,266.68	J426	19.3	671.38
J22	1,023.89	2,013.37	J28	9.19	550.2
J24	1,029.57	1,041.16	J24	20	515.16
J26	1,013.36	1,477.67	J28	19.12	573.12
J28	1,019.30	911.25	J28	20	575.16
J30	1,014.62	3,417.81	J28	-38.86	439.32
J32	1,019.21	2,908.29	J28	-13.18	498.59
J34	1,025.12	804.82	J678	6.38	290.04
J36	1,023.40	113.26	J36	20	304.16
J38	1,010.16	2,553.10	J104	8.7	737.07
J40	1,003.11	2,481.17	J104	14.4	750.23
J400	1,012.96	2,420.78	J426	15.11	661.72
J4001	1,004.46	5,662.69	J1100	-6.12	733.15

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J4002	1,009.32	2,403.65	J4002	20	664.11
J4003	1,017.06	2,138.84	J426	14.51	660.34
J4004	1,007.28	9,067.54	J1121	10.79	722.74
J4006	1,010.23	2,574.07	J426	19.3	671.39
J4008	1,011.94	-1,495.17	J426	-1,394,490.63	-3,217,676.25
J4009	1,000.23	2,639.62	J426	17.24	666.63
J401	1,026.04	1,416.98	J426	18.92	670.51
J4010	1,004.75	796.76	J402	-15,805.59	-35,975.16
J4011	1,006.18	2,277.42	J608	-16.31	519.6
J4012	1,003.40	1,741.41	J608	11.02	582.67
J4013	1,002.58	2,804.52	J608	-9.37	535.62
J4015	1,001.34	3,480.86	J426	14.28	659.8
J4016	1,006.18	2,245.50	J402	14.41	535.34
J402	1,019.16	750.6	J402	20	548.24
J403	1,004.28	1,363.71	J426	19.04	670.79
J404	1,014.02	2,131.07	J426	2.03	631.54
J405	1,027.24	943.22	J405	20	547.23
J406	1,004.92	1,466.90	J426	18.75	670.12
J407	1,007.45	1,231.13	J426	19.46	671.75
J408	1,004.33	1,866.01	J426	17.41	667.02
J409	1,020.43	1,720.25	J426	18.38	669.28
J410	1,008.44	1,653.36	J426	17.25	666.66
J411	1,047.29	701.1	J426	17.67	667.63
J412	1,012.56	1,784.55	J426	14.84	661.09
J413	1,006.37	1,350.85	J413	20	586.6
J414	1,004.35	-1,761.92	J723	21.93	825.48
J415	1,005.74	1,233.05	J415	20	649.1
J416	1,005.66	-1,322.23	J723	21.93	825.48
J417	1,004.34	6,372.85	J426	8.92	647.44
J418	1,013.10	1,358.12	J426	18.34	669.17
J419	1,008.08	1,237.58	J426	18.65	669.9
J42	1,005.20	2,000.73	J42	20	724.16
J420	1,007.25	2,252.35	J420	20	674.57
J421	1,034.64	1,270.68	J421	20	582.13
J422	1,055.51	1,217.11	J422	20	582.77
J423	1,004.42	1,601.15	J708	16.99	699.22
J424	1,028.31	9,302.03	J1121	8.18	716.72
J425	1,047.87	947.73	J425	20	656.57
J426	1,010.10	105.98	J426	20	673.01
J427	1,002.86	1,114.99	J426	9.07	647.78
J428	1,004.79	1,845.42	J426	2.59	632.84
J429	1,017.29	873.60	J426	13.99	659.14
J430	1,017.41	3,602.54	J430	20	660.67
J431	1,002.33	-17,928.57	J723	21.93	825.48

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J433	1,002.11	1,309.42	J94	19.13	689.15
J434	1,008.93	2,518.30	J426	17.51	667.26
J435	1,005.56	257.22	J435	20	693.06
J436	1,021.16	3,530.39	J422	10.6	561.08
J437	1,035.69	1,811.64	J437	20	527.29
J438	1,012.90	5,144.25	J82	-57.87	441.51
J439	1,006.01	730.67	J439	20	687.52
J44	1,022.70	2,616.91	J104	15.91	753.73
J440	1,024.49	1,402.21	J82	13.89	607.13
J442	1,015.88	1,231.73	J82	17.45	615.33
J46	1,000.80	2,573.68	J104	17.32	756.98
J460	1,006.48	1,592.17	J426	18.08	668.57
J461	1,012.39	1,742.49	J426	17.98	668.34
J463	1,006.21	1,834.26	J426	17.94	668.24
J464	1,014.19	2,487.13	J426	17.48	667.19
J465A	1,012.66	1,222.11	J426	14.23	659.69
J466	1,014.57	1,017.40	J426	18.9	670.47
J48	1,007.58	2,430.52	J48	20	702.16
J480	1,004.69	3,266.22	J426	16.64	665.25
J481	1,002.16	2,820.32	J426	16.85	665.74
J50	1,001.81	2,608.90	J104	17.53	757.46
J500	1,000.04	4,169.30	J1086	14.04	772.8
J5004	1,009.37	1,312.18	J426	-598.84	-755.18
J5008	1,039.89	3,163.77	J426	19.34	671.47
J501	1,000.05	4,166.86	J1086	14.19	773.16
J5010	1,020.25	4,525.18	J426	11.94	654.41
J502	1,007.56	2,315.11	J502	20	658.91
J503	1,006.29	4,234.98	J1086	7.38	757.43
J504	1,022.78	2,657.97	J504	20	558.8
J505	1,019.68	1,875.93	J505	20	655.42
J506	1,041.16	1,224.58	J506	20	728.27
J507	1,005.15	10,246.75	J1121	16.44	735.79
J508	1,008.75	3,281.77	J508	20	613.46
J509	1,009.95	8,139.57	J1100	-38.38	658.7
J510	1,003.06	1,578.52	J608	10.65	581.84
J512	1,006.04	1,674.19	J608	6.13	571.39
J514	1,001.55	1,389.18	J82	14.88	609.39
J52	1,001.07	2,074.67	J56	16.97	700.16
J522	1,009.49	1,956.71	J608	-19.67	511.86
J522A	1,004.06	47,645.15	J608	-2,204.54	-4,530.53
J54	1,003.24	1,739.32	J54	20	704.16
J550	1,054.64	1,441.49	J550	20	510.15
J551	1,010.60	1,591.92	J551	20	528.7
J552	1,045.50	1,635.78	J553	-2.89	499.87

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J553	1,027.73	547.55	J553	20	552.7
J554	1,012.81	1,434.84	J554	20	482.4
J555	1,049.84	1,125.72	J555	20	638.1
J56	1,004.83	1,405.03	J56	20	707.16
J600	1,000.28	2,547.28	J426	19.26	671.29
J601	1,019.82	1,933.69	J28	6.48	543.95
J603	1,007.81	1,027.16	J608	9.66	579.53
J604	1,005.97	953.58	J608	13.16	587.63
J605	1,006.31	2,941.92	J608	-37.42	470.89
J606	1,008.63	934.76	J608	14	589.56
J606A	1,002.81	930.42	J608	13.94	589.43
J607	1,010.64	1,657.53	J608	-6.26	542.8
J608	1,061.41	654.89	J608	20	603.41
J609	1,026.10	1,132.33	J608	6.59	572.47
J610	1,006.81	1,836.15	J610	20	482.51
J611	1,001.63	1,027.27	J611	20	567.71
J612	1,007.80	3,259.00	J608	-23.47	503.08
J621	1,005.97	849.79	J621	20	682.6
J650	1,005.84	1,803.15	J608	12.01	584.98
J651	1,020.97	1,383.82	J651	20	329.29
J670	1,009.68	2,842.97	J608	-24.34	501.09
J671	1,001.74	2,120.98	J608	-6.3	542.71
J672	1,007.79	1,586.79	J608	6.25	571.68
J673	1,001.72	2,080.33	J608	-5.39	544.81
J674	1,005.48	1,733.91	J608	1.74	561.27
J675	1,004.45	2,173.06	J608	-7.3	540.4
J676	1,001.17	1,862.00	J608	-0.97	555.01
J677	1,007.68	2,660.93	J28	2.06	533.75
J678	1,023.71	568.40	J678	20	321.48
J679	1,053.62	1,198.74	J678	-0.14	274.99
J680	1,038.23	1,062.63	J681	3.88	271.79
J681	1,043.89	637.77	J681	20	309
J682	1,035.49	975.67	J683	12.46	262.14
J683	1,035.67	658.05	J683	20	279.54
J684	1,021.62	906.48	J684	20	269.76
J687	1,005.09	2,246.60	J608	-9.06	536.34
J688	1,001.31	31,476.72	J608	257.03	1,150.44
J700	1,024.98	696.79	J714	16.1	782.57
J701	1,000.55	8,028.31	J723	15.83	811.42
J702	1,005.01	1,059.91	J714	2.69	751.62
J703	1,003.84	1,443.06	J714	-12.99	715.44
J704	1,003.36	1,358.81	J704	20	777.58
J705	1,511.29	1,080.36	J705	20	694.44
J706	1,011.30	1,201.06	J706	20	742.35

Buildout MDD plus Fire Flow Report					
ID	Total Demand (gpm)	Available Flow at Hydrant (gpm)	Critical Node ID	Critical Node Pressure (psi)	Critical Node Head (ft)
J707	1,007.35	1,390.50	J707	20	741.83
J708	1,005.98	951.09	J708	20	706.18
J709	1,020.91	916.58	J709	20	692.64
J710	1,003.71	2,843.19	J714	18.09	787.16
J711	1,005.64	1,619.67	J711	20	713.43
J712	1,501.34	5,247.79	J723	19.14	819.05
J713	1,501.50	3,088.29	J713	20	670.78
J714	1,030.00	554.75	J714	20	791.57
J715	1,005.45	1,001.32	J714	5.74	758.66
J716	1,503.15	10,923.54	J723	10.11	798.22
J717	1,007.41	7,580.05	J723	16.23	812.33
J718	1,007.62	7,507.66	J723	16.21	812.3
J719	1,504.59	8,453.09	J723	14.27	807.82
J720	1,003.65	11,258.51	J723	9.21	796.14
J723	1,523.79	3,065.14	J723	20	821.04
J724	1,004.30	1,383.74	J726	19	800.53
J725	1,001.30	1,307.12	J726	14.76	790.74
J726	1,003.72	920.47	J726	20	802.84
J727	1,001.38	1,450.15	J726	11.78	783.86
J728	1,000.70	1,612.73	J726	13.27	787.32
J729	1,006.38	1,254.32	J726	19.15	800.88
J730	1,514.75	-1,112.54	J426	21.45	676.35
J731	1,028.76	1,113.81	J731	20	786.64
J80	1,006.79	1,530.28	J82	9.35	596.65
J800	1,046.59	708.81	J800	20	792.5
J801	1,007.93	3,057.99	J426	18.64	669.86
J802	1,015.49	772.02	J802	20	800.62
J82	1,002.54	930.7	J82	20	621.22
J94	1,003.71	455.74	J94	20	691.16

Design Flow (gpm)
657.54
1,032.92
2,271.40
2,367.75
2,543.28
3,318.72
3,904.55
3,909.27
1,305.22
1,309.59
1,313.15
1,319.14
1,331.08
1,335.72
1,347.15
1,360.67
1,370.99
1,137.01
1,131.21
1,126.29
1,120.59
1,652.47
1,690.68
1,649.66
1,617.01
2,002.47
1,182.04
1,139.56
802.24
789.13
485.88
714.76
4,535.84
5,804.43
5,078.93
4,763.30
4,869.35
4,797.61
4,775.79
3,759.93
2,834.12
3,029.78
3,059.81
4,921.54

Design Flow (gpm)
846.86
4,711.11
4,685.39
4,631.75
2,794.88
4,290.92
4,194.76
2,141.12
3,871.80
2,207.63
3,517.66
3,294.20
2,172.04
1,463.85
2,380.72
3,461.65
3,904.44
3,969.44
4,061.72
4,537.32
4,518.88
4,329.78
4,341.95
4,188.58
4,175.50
4,124.03
4,030.89
2,592.70
4,391.29
1,226.62
477.57
559.81
518.24
382.91
356.98
350.45
337.02
338.32
326.05
267.2
320.29
779.75
498.71
709.44

Design Flow (gpm)
1,360.85
1,162.31
2,167.77
1,075.02
956.91
1,118.58
1,281.20
1,649.33
1,318.27
1,247.66
1,718.67
3,912.20
3,910.19
3,918.36
1,098.25
720.15
649.29
635.05
446.83
660.82
684.12
812.61
825.92
825.07
823.16
858.45
837.17
884.53
914.37
936.13
654.88
2,697.41
3,278.89
3,301.91
3,841.70
3,806.42
3,650.21
3,690.69
2,961.80
3,770.22
2,995.36
3,818.96
3,360.80
3,192.01

Design Flow (gpm)
3,542.18
3,065.05
2,330.72
2,552.83
3,124.06
3,121.15
2,808.06
3,285.45
3,806.12
3,666.43
3,985.62
4,001.70
4,607.99
4,639.60
5,059.25
5,476.10
3,003.52
414.3
6,332.54
3,338.85
10,270.42
4,373.27
2,188.89
1,225.14
8,304.66
296.22
1,320.98
3,347.34
1,461.42
2,198.81
227.31
184.45
183.4
170.67
150.64
468.81
755.29
204.89
229.99
239.95
266.43
268.73

Design Flow (gpm)
516.84
3,596.74
3,921.93
4,097.13
2,493.14
3,988.90
5,627.68
3,177.06
2,689.56
4,005.31
1,535.57
30,882.08
26,284.46
22,017.68
1,835.13
333.58
1,171.06
1,681.76
1,575.19
8,396.51
8,545.68
6,183.22
2,942.05
880.41
4,021.37
2,217.25
3,998.53
2,156.61
1,843.59
2,004.11
2,387.60
1,723.87
2,124.02
2,191.89
1,809.33
1,486.50
1,140.11
1,167.05
1,245.41
1,451.53

Design Flow (gpm)
1,242.61
993.55
965.19
887.81
928.15
1,016.55
1,115.20
1,299.71
1,367.81
986.27
942
986.92
1,145.22
1,273.13
800.5
625.22
770.01
772.52
765.06
1,034.53
1,046.27
1,070.68
1,024.70
1,019.46
1,337.12
1,028.25
1,384.15
1,266.21
1,450.89
951.48
1,026.99
1,727.19
1,041.17
1,455.93
911.24
1,919.72
2,013.01
709.08
113.27
2,094.23
2,227.50
975.93

Design Flow (gpm)
2,403.55
8,342.28
2,079.40
1,365.39
1,051.14
3,690.32
981.18
1,348.02
1,777.04
1,145.01
1,291.58
750.6
1,035.56
214.98
943.24
1,040.29
1,042.81
1,021.24
1,126.32
837.86
304.71
424.37
1,350.85
1,809.17
1,233.06
1,226.48
882.15
635.37
642.95
2,000.73
2,252.36
1,270.68
1,217.12
1,476.61
8,363.41
947.73
105.98
140.39
178.46
190.97
3,602.55
3,555.59

Design Flow (gpm)
1,276.43
1,370.64
257.22
3,364.65
1,811.64
1,766.01
730.67
2,413.66
1,152.82
1,123.85
2,436.46
517.84
523.75
517.57
525.55
270.07
525.93
2,430.52
1,511.70
1,371.14
2,479.49
4,008.85
2,402.95
4,010.48
531.61
2,315.60
3,909.28
2,657.97
1,875.98
1,224.59
9,962.54
3,281.81
5,847.44
1,225.38
1,183.17
1,169.67
2,009.98
929.15
923.72
1,739.32
1,441.50
1,591.97
1,397.83

Design Flow (gpm)
547.55
1,434.84
1,125.72
1,405.03
2,032.40
1,593.56
765.03
773.87
1,063.33
776.53
770.71
930.3
654.9
794.01
1,836.15
1,027.27
1,594.24
849.81
1,429.21
1,383.83
1,091.11
1,091.97
1,098.03
1,095.60
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1,102.65
1,099.38
2,121.23
568.4
1,002.40
925.47
637.77
921.51
658.05
906.5
1,091.04
2,110.92
612.79
4,400.59
679.79
739.79
1,358.87
1,080.38
1,201.08

Design Flow (gpm)
1,390.54
951.10
916.59
2,659.78
1,619.67
4,357.65
3,088.29
554.75
680.23
4,285.96
4,477.41
4,419.09
4,244.35
4,234.32
3,065.18
1,306.27
1,017.31
920.48
1,017.38
1,188.48
1,194.16
1,113.82
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1,249.36

APPENDIX E

Recommended Projects

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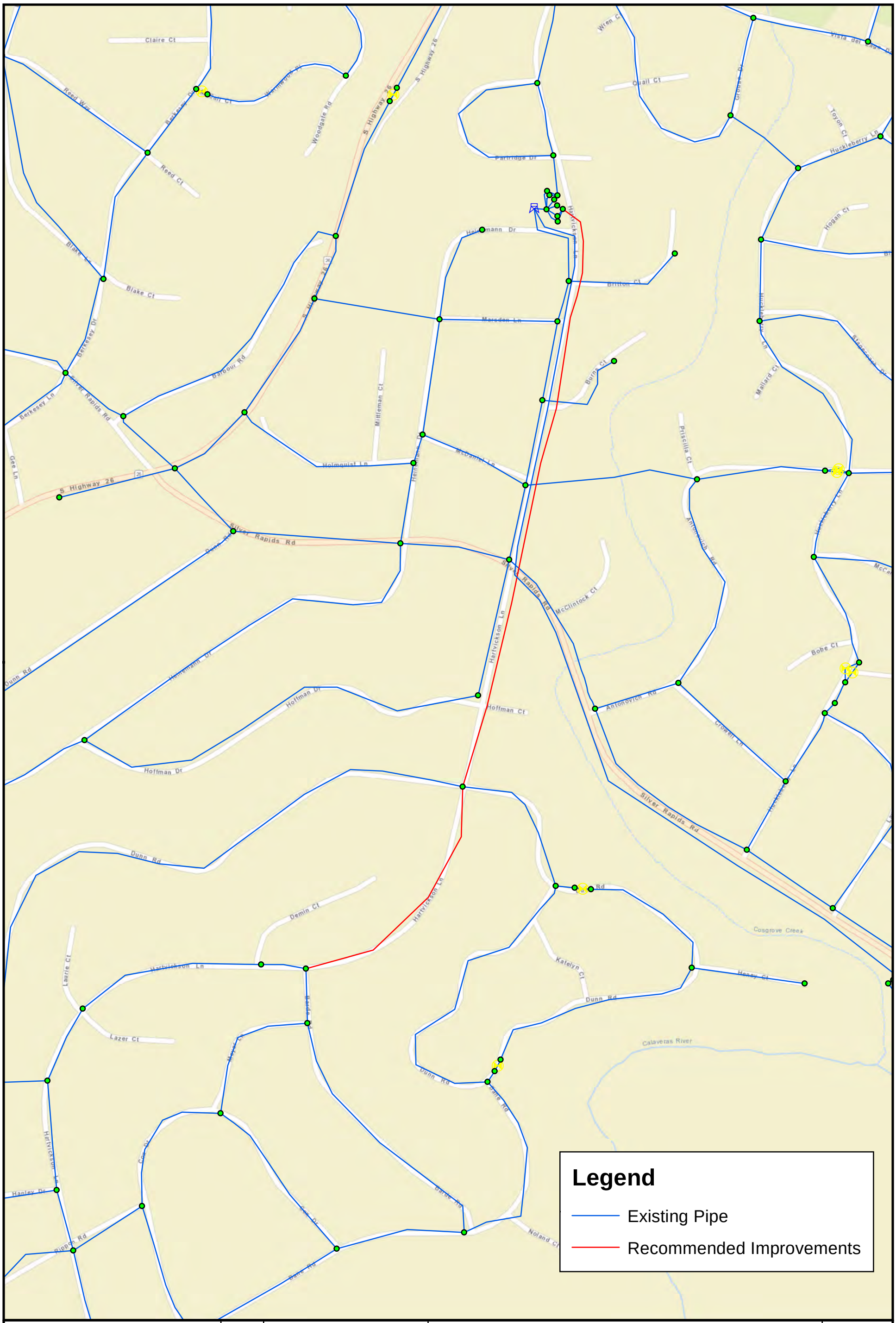


PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 500 Feet

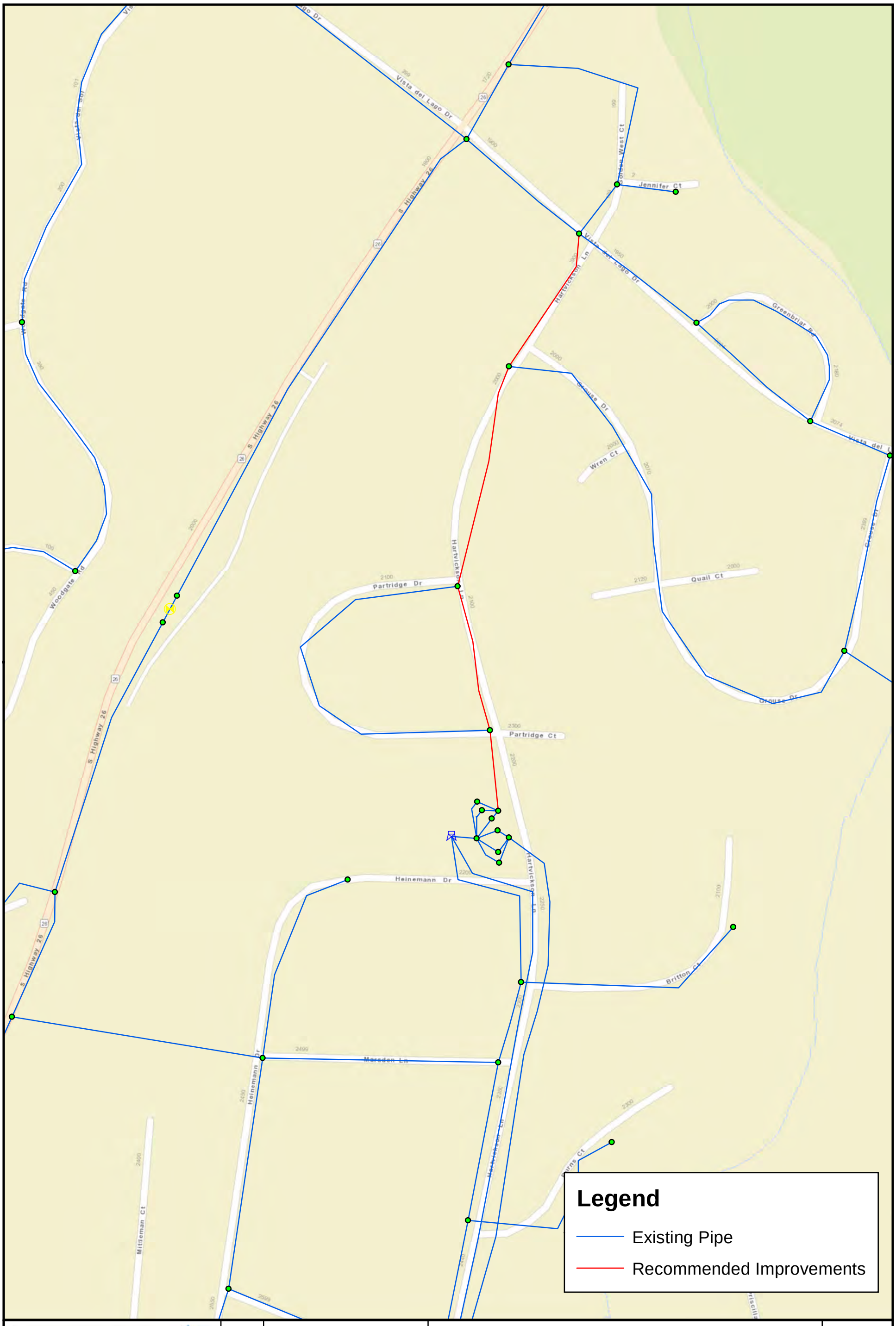
1" = 500 ft

Jenny Lind Water Master Plan

AB Transmission Main

FIGURE

E-1



PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 250 Feet

1" = 250 ft

Jenny Lind Water Master Plan

E&F Transmission Main

FIGURE

E-2

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 250 Feet

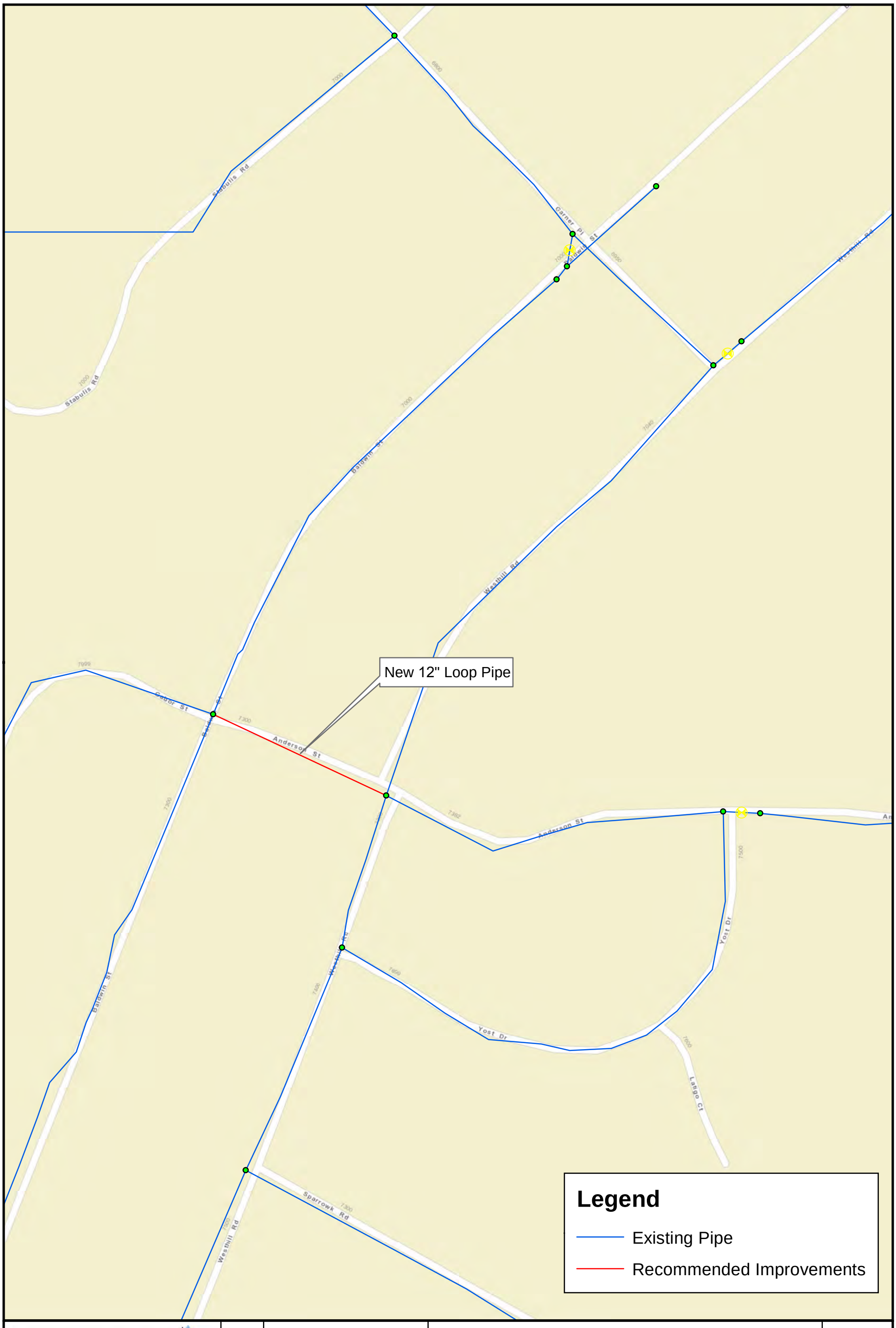
1" = 250 ft

Jenny Lind Water Master Plan

Westhill Rd Loop

FIGURE

E-3



PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 250 Feet

1" = 250 ft

Jenny Lind Water Master Plan

Anderson St Loop

FIGURE

E-4

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 250 Feet

1" = 250 ft

Jenny Lind Water Master Plan

Hanley Dr Loop

FIGURE

E-5

New PRV

Legend

Existing Pipe

Recommended Improvements

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

1180 Iron Point Rd., Suite 260
Folsom, CA 95630

Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 500 Feet

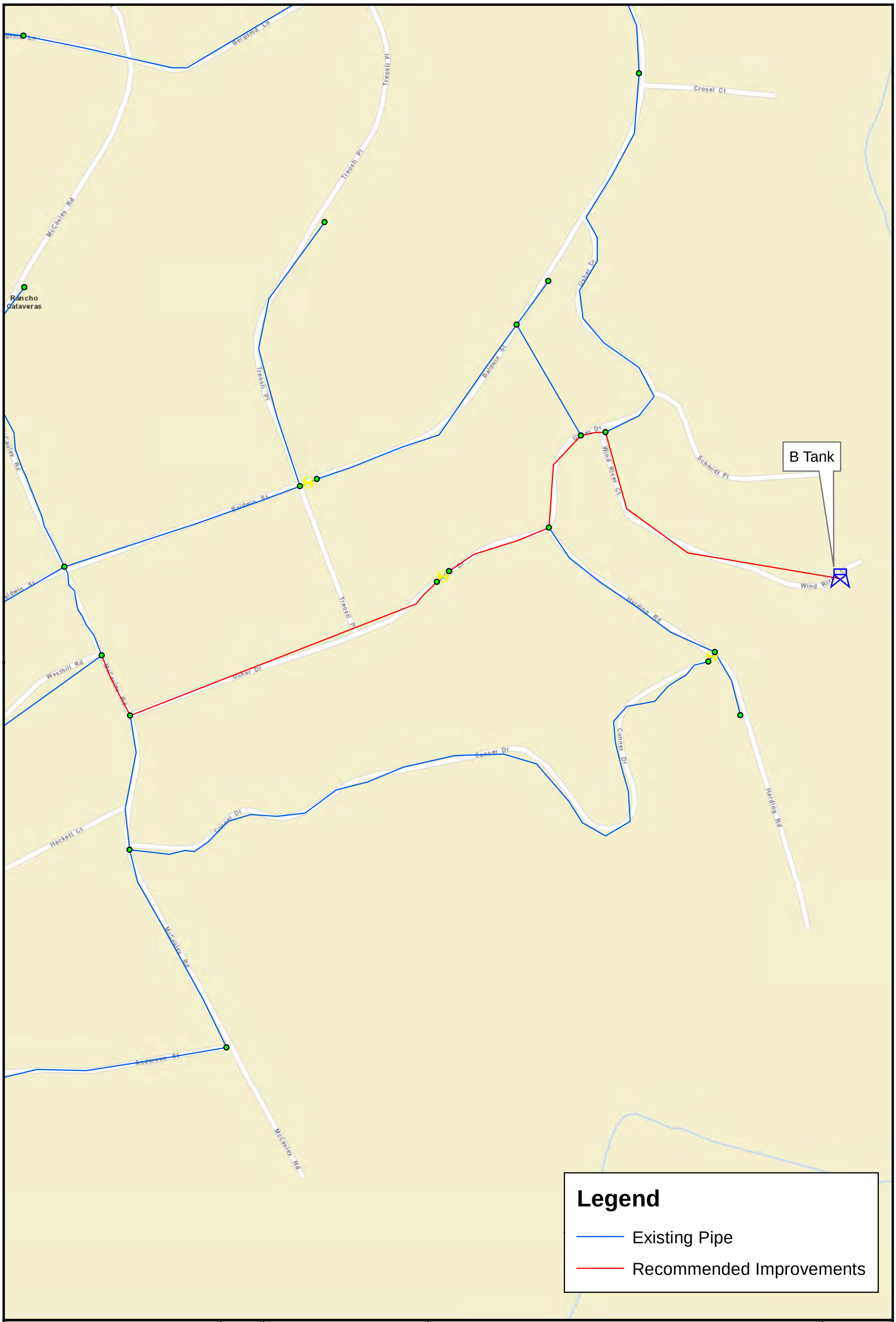
1" = 500 ft

Jenny Lind Water Master Plan

Bergsma Ln Loop

FIGURE

E-6



PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 500 Feet

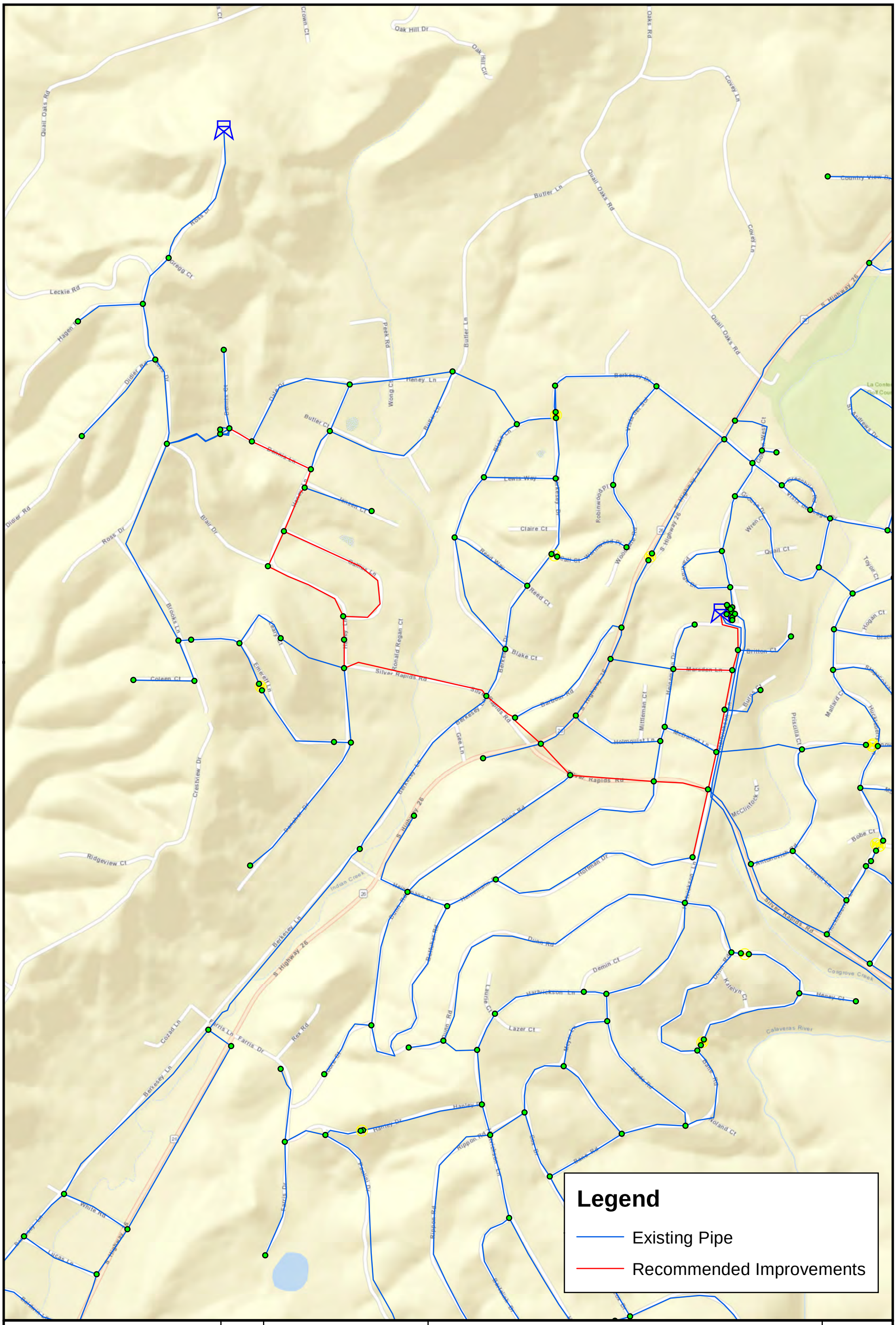
1" = 500 ft

Jenny Lind Water Master Plan

Lower B Zone Improvements

FIGURE

E-7



PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd., Suite 260
Folsom, CA 95630
Phone: (916) 608-2212
Fax: (916) 608-2232

N

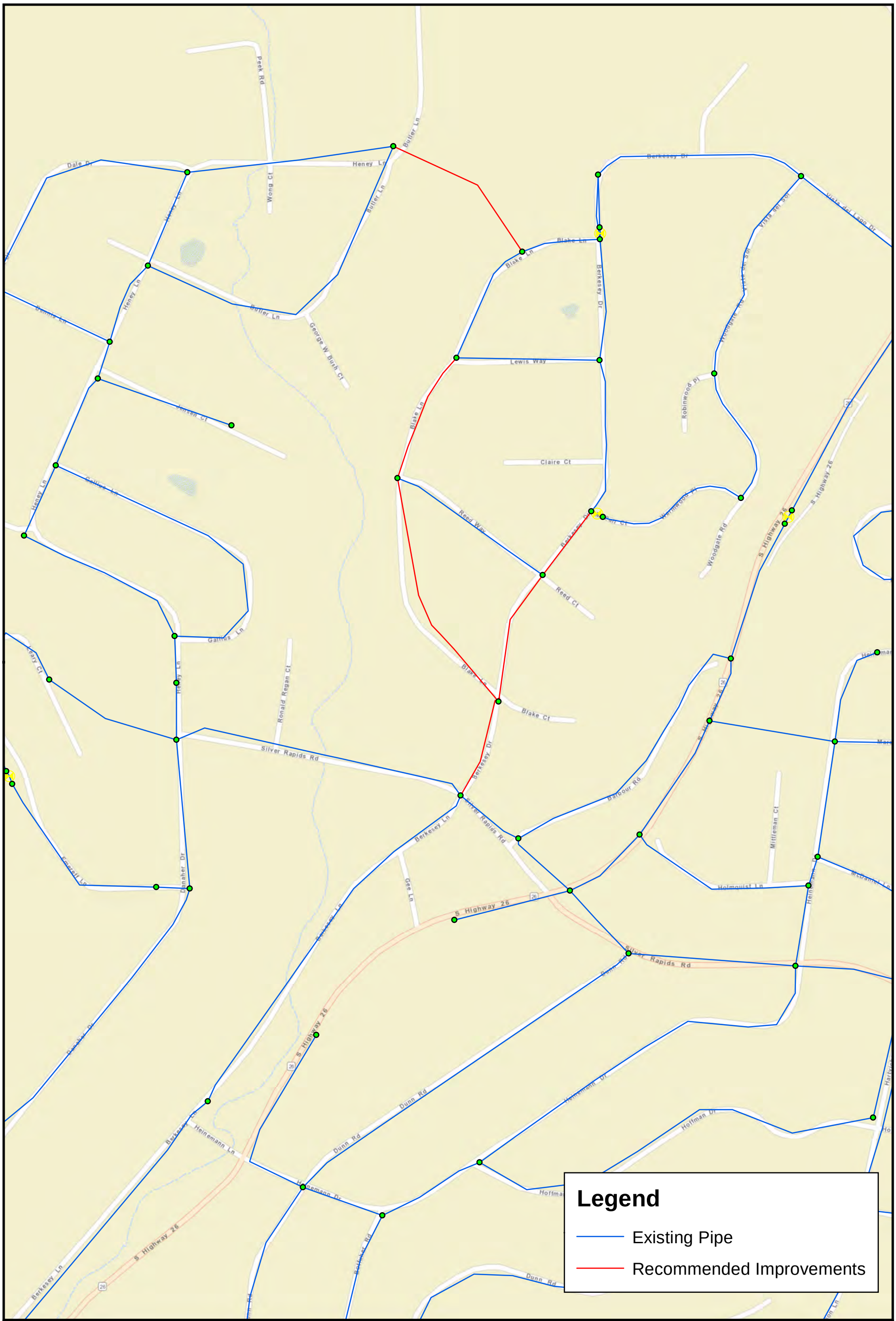
0 1,000 Feet

1" = 1000 ft

Jenny Lind Water Master Plan

A1 Transmission Main

FIGURE E-8



Legend

- Existing Pipe
- Recommended Improvements

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING

1180 Iron Point Rd., Suite 260
Folsom, CA 95630

Phone: (916) 608-2212
Fax: (916) 608-2232

N

0 500 Feet

1" = 500 ft

Jenny Lind Water Master Plan

A1 Zone Improvements

FIGURE

E-9