



## TECHNICAL MEMORANDUM

**To:** The City of Woodland

**Cc:** Woodland Research Park Owners Group

**From:** Katie Hanten, PE - Cunningham Engineering Corporation

**Date:** 07 January 2020

**Subject:** Woodland Research and Technology Park  
Water Distribution

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### INTRODUCTION:

The proposed Woodland Research and Technology Park (WRTP) will be comprised of 349 developable acres, to be annexed into the City of Woodland. Previous planning documents have identified the area as a portion of the Spring Lake Master Plan Remainder Area and as SP-1A in the 2017 General Plan Update. The property is generally bounded by SR113 on the west, Harry Lorenzo Ave on the east, the westerly projection of Farmers Central Road on the north and CR 25A on the south (with the exception of 48 acres located south of CR 25A). The proposed land-use plan is included herein as Attachment 1.

### EXECUTIVE SUMMARY:

Water use demand factors used for the design of the WRTP water distribution network are based on the City of Woodland Engineering Standards (COWES). The WRTP's backbone infrastructure has been designed to connect to the existing distribution mains in the surrounding developments to convey the domestic water.

### EXISTING CONDITIONS:

#### Existing Facilities

The City of Woodland Public Works Department currently provides municipal water to the boundary of the WRTP. Treated Sacramento River water supplied by the Woodland-Davis Clean Water Agency's Regional Water Treatment Facility (RWTF) is the primary source of potable water. Groundwater is a backup to the surface water supply and will supplement surface water during times of high demand or reduced surface water availability. The City maintains an Urban Water Management Plan (UWMP) that is updated every five years and describes the current and future water uses, sources of supply and its reliability, and existing and planned conservation measures. The 2015 UWMP was adopted by City Council in June 2016. The City

also has a Groundwater Management Plan to manage groundwater resources, which was adopted in 2010. (Dyett & Bhatia, May 2017)

The municipal water supply distribution system consists of 260 miles of transmission and distribution lines, a 3-million-gallon ground level storage tank, and a 400,000-gallon elevated storage tank, which is generally sufficient for peak demands and to regulate The Woodland-Davis Clean Water Agency (WDCWA) Intake Facility at the Sacramento River. Woodland has a dedicated capacity of 18-million gallons per day (mgd) of supply from the water treatment plant. The groundwater supply is filtered naturally by sand and gravel as it passes through the aquifers and receives minimal treatment at each well site (0.2 parts per million liquid chlorine) for disinfection. The City utilizes aquifer storage and recovery (ASR) wells to store treated surface water from excess supply in winter months to supplement supply in peak demand summer months. The ASR wells are also intended to store large quantities of treated surface water to meet peak summer demands and to prepare for future drought conditions. One ASR well was completed in 2013 and two additional wells were completed 2017. Ultimately, four ASR wells are planned for the system. (Dyett & Bhatia, May 2017)

Currently there are six agricultural wells in use on the WRTP: four of them are north of CR 25A and two are to the south. The two wells along SR 113, north of CR 25A, are to be preserved for irrigation of the remaining agricultural land until the final buildout condition. These facilities will be secured and adequate setbacks will be provided. An access road will be maintained along the west boundary of the WRTP, parallel to SR 113, allowing for routine maintenance of the wells.

### **Supply**

The WDCWA diverts up to 45,000 acre-feet of water per year from the Sacramento River. WDCWA has also secured a senior Sacramento River water right for 10,000 acre-feet from the Conaway Preservation Group that is limited to the months of April through October. The WDCWA project included a newly constructed river water intake structure and pipeline that transports “raw” water 5.1 miles from the Sacramento River to a new 30-mgd water treatment plant located 1.4 miles east of Woodland. Groundwater is used to supplement surface water supplies and could account for up to 30 percent of total demand in dry years. Of the 18 wells owned and operated by the City, 70 percent have been in operation for 30 years or longer. The typical life of a well is between 30 and 50 years. (Dyett & Bhatia, May 2017)

### **Adjacent Facilities**

Existing facilities in the general vicinity of the site include the following:

- 30” east-to-west water distribution main in Farmers Central Road corridor, from RWTF to Ashley Avenue.
- 12” east-to-west water transmission main in Farmers Central Road corridor, connecting to above-referenced 30” transmission pipe.
- 12” north-to-south water main in Harry Lorenzo Avenue, connecting to the above-referenced 12” pipe, from Farmers Central Road to ±500’ to the south



- 12” east-to-west water main in Parkland Avenue, assumed to be extended to boundary of WRTP prior to development
- 12” east-to-west water main in Marston Drive
- 8” south-to-north water main in Harry Lorenzo Avenue, connecting to the above-referenced 12” pipe, from Marston Drive to ±1300’ to the north
- 8” east-to-west water main in CR 25A, stubbed at Harry Lorenzo Ave., assumed to be constructed prior to development.

**DEMANDS:**

Water use demand factors used for the WRTP are based on the 2016 City of Woodland Engineering Standards (COWES), Water Demand Coefficients by Land Use Classifications table. The applicable information from this table has been reproduced as Table 1A.

<b>Table 1 – Water Demand Coefficients by Land Use Classification</b>					
<b>WRTP Land Use Code</b>	<b>WRTP Land Use Classification</b>	<b>Equivalent COW Land Use Code</b>	<b>COW Land Use Classification</b>	<b>COW Demand Factor (GPM/Gross-Acre)</b>	<b>COW Demand Factor (GPD/Gross-Acre)</b>
LDR	Low Density Residential	LDR	Low Density Residential	2.2	3,168
MDR	Medium Density Residential	MDR	Medium Density Residential	4.5	6,480
HDR	High Density Residential	None	None	9.0	12,960
CCO	Community Commercial Overlay	GC	General Commercial	1.4	2,016
HC	Highway Commercial	HC	Highway Commercial	1.4	2,016
RTP	Research Tech Park	BP	Business Park	1.0	1,440
RFO	Research Flex Overlay	I	Industrial	1.7	2,448
TO	Tech Overlay	BP	Business Park	1.0	1,440
PP	Pedestrian Promenade	OS	Open Space	1.5	2,160
OS	Open Space	OS	Open Space	1.5	2,160
VCMU	Village Center Mixed Use	PN	Mixed Land Use	2	2,880
VCLDR	Village Center Low Density Residential	LDR	Low Density Residential	2.2	3,168
VCMDR	Village Center Med. Density Residential	MDR	Medium Density Residential	4.5	6,480



In addition to the average day water use, design fire flows were also used for the demand calculations in accordance with City Fire Department and Insurance Services Office, based on the 2016 COWES, Design Fire Flow by Land Use Designation table. The applicable information from this table has been reproduced as Table 2.

<b>Land Use Designation</b>	<b>Fire Flow, GPM</b>
Single Family Residential (Spacing > 10ft)	1,000
Single Family Residential (Spacing less than or equal to 10ft)	1,500
Light Commercial	2,500
Planned Unit & Multiple Dwelling Areas	2,500
Principal Business Districts	3,500
Industrial Areas	4,000
Higher Value Buildings	4,000

With the above demands, the total average day demand is calculated to be 788-gallons per minute (gpm). Applying the peaking factor of 2.2 from the 2016 COWES, the total maximum day demand is calculated to be 1,734 gpm. With the peaking factor of 3.5 from the 2016 COWES, the peak hour demand is calculated to be 2,759 gpm. See Table 3 for additional details. An additional factor was included for the Research and Technology Park/Community Commercial or Research Flex land uses, to account for projected increased water demand by agricultural research and development tenants. A factor of 20% increase was applied to the average demands of these land uses. Applying the design fire flows from Table 2 to the Maximum Day Demands from Table 3, the Unit Fire Flow + Total Max Day Water Demand was found for each of the land uses.

<b>Land Use Designation</b>	<b>Acres</b>	<b>Water Demand Coefficient (gpd/acre)</b>	<b>Add'l R&amp;D Water Use Demand Factor (gpd/acre)<sup>4</sup></b>	<b>Average Day Demand (gpm)</b>	<b>Peaking Factor (Average Day to Max Day)</b>	<b>Maximum Day Demand (gpm)</b>	<b>Peaking Factor (Max Day to Peak Hr)</b>	<b>Peak Hour Demand (gpm)</b>
LDR	74.8	3,168	0	165	2.2	362	3.5	576
MDR	35.5	6,480	0	160	2.2	351	3.5	559
<sup>1</sup> HDR	9.7	12,960	0	87	2.2	192	3.5	305
RTP-TO	69.6	1,440	0	70	2.2	153	3.5	243
<sup>5</sup> RTP -RFO	35.9	2,448	490	61	2.2	135	3.5	215
<sup>2</sup> RTP -CCO	6.8	1,728	144	8	2.2	18	3.5	29
VCMU	3.5	2,880	0	7	2.2	15	3.5	25
VCMDR	16.7	6,480	0	75	2.2	165	3.5	263
VCLDR	13.1	3,168	0	29	2.2	64	3.5	101
<sup>3</sup> HDR-CCO	15.9	7,448	0	83	2.2	182	3.5	289



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HC	8.2	2,016	0	11	2.2	25	3.5	40
PP	0.8	2,160	0	1	2.2	3	3.5	4
OS	10.2	2,160	0	15	2.2	34	3.5	54
VCOS	10.8	2,160	0	16	2.2	36	3.5	57
<b>Total</b>	<b>311.4</b>			<b>788</b>		<b>1734</b>		<b>2759</b>

<sup>1</sup> Demand assumed to be double that of Medium Density Residential.

<sup>2</sup> Land use assumed to be 50% Research and Technology Park and 50% Community Commercial.

<sup>3</sup> Land use assumed to be 50% High Density Residential and 50% Community Commercial.

<sup>4</sup> 20% increase in demand for agricultural research and development tenants in Research Park/Community Commercial and Research Park/Research Flex.

<sup>5</sup> Land use assumed to be 100% Industrial/Agricultural.

Land Use	Acres	Maximum Day Demand (gpm)	Unit Fire Flow (gpm)	Unit Fire Flow + 2,357 gpm (Total Max Day Water Demand) (gpm)
LDR	74.8	362	1,000	2,734
MDR	35.5	351	1,500	3,234
HDR	9.7	192	2,500	4,234
RTP-TO	69.6	153	3,500	5,234
RTP-RFO	35.9	135	4,000	5,734
RTP-CCO	6.8	18	4,000	5,734
VCMU	3.5	15	4,000	5,734
VCMDR	16.7	165	1,500	3,234
VCLDR	13.1	64	1,000	2,734
HDR-CCO	15.9	182	4,000	5,734
HC	8.2	25	4,000	5,734
PP	0.8	3	0	1,734
OS	10.2	34	0	1,734
VCOS	10.8	36	0	1,734
<b>Total</b>	<b>311.4</b>	<b>1734</b>		<b>2,734</b>

<sup>1</sup> Demand based on “Planned Unit & Multiple Dwelling Areas” Land Use Designation from Table 2.

A complete set of calculations has been included herein as Attachment 3.



## **PROPOSED FACILITIES:**

### **Proposed Distribution System**

The preliminary Water Layout, Attachment 2, depicts the backbone infrastructure designed to connect to the existing transmission mains and distribute domestic water throughout the WRTP. The proposed points-of-connection for the system are along the existing 12” main in Harry Lorenzo Avenue: at Fowler Way (future), Parkland Avenue (future extension of existing 12” main) and Marston Drive.

The preliminary network leading from these connections was designed in accordance with the COWES to provide looping of the system, and minimum spacing of 12-inch lines at approximate one-half (1/2) mile intervals. The public water supply pipelines are all located within the right-of-way of public streets or roads, with pipelines larger than 8 inches located in collectors and arterials. Additional pipelines were shown connecting the portion south of CR 25A back to the main network to ensure looping in this branch of the system.

A preliminary Phase 1 boundary for the WRTP is delineated in Attachment 2. Looping will still be achieved, with points-of-connection at Marston Drive and the soon to be installed waterline in CR 25A. Calculations providing confirmation of adequate supply, flow and pressure within the WRTP will be performed by the City of Woodland.

## **ATTACHMENTS:**

1. Proposed Land Use Plan
2. Water Layout
3. Water Demand Calculations

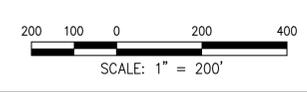
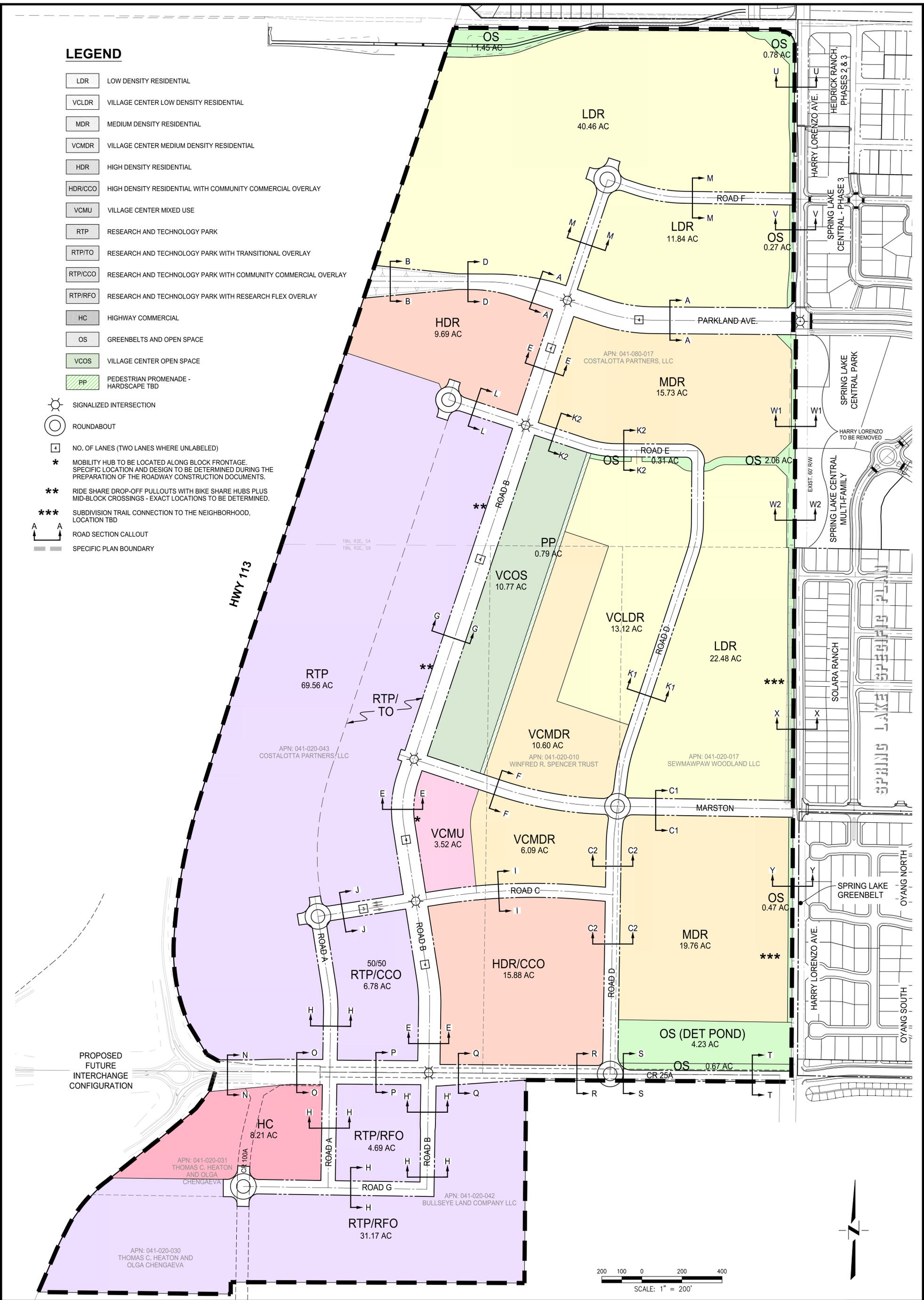
## **REFERENCES:**

1. City of Woodland General Plan Update 2035 (Dyett & Bhatia, May 2017)

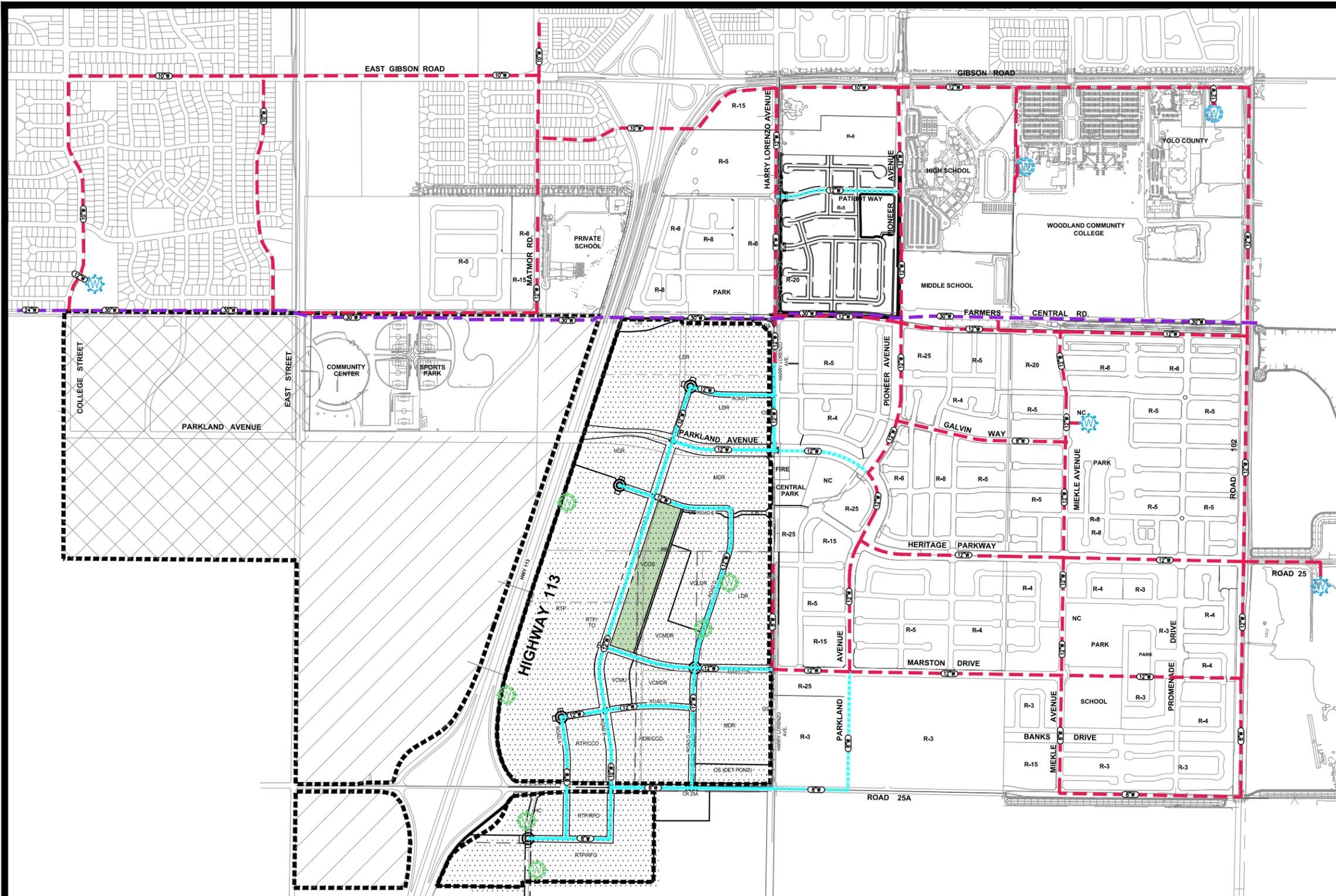


**LEGEND**

- LDR LOW DENSITY RESIDENTIAL
  - VCLDR VILLAGE CENTER LOW DENSITY RESIDENTIAL
  - MDR MEDIUM DENSITY RESIDENTIAL
  - VCMDR VILLAGE CENTER MEDIUM DENSITY RESIDENTIAL
  - HDR HIGH DENSITY RESIDENTIAL
  - HDR/CCO HIGH DENSITY RESIDENTIAL WITH COMMUNITY COMMERCIAL OVERLAY
  - VCMU VILLAGE CENTER MIXED USE
  - RTP RESEARCH AND TECHNOLOGY PARK
  - RTP/TO RESEARCH AND TECHNOLOGY PARK WITH TRANSITIONAL OVERLAY
  - RTP/CCO RESEARCH AND TECHNOLOGY PARK WITH COMMUNITY COMMERCIAL OVERLAY
  - RTP/RFO RESEARCH AND TECHNOLOGY PARK WITH RESEARCH FLEX OVERLAY
  - HC HIGHWAY COMMERCIAL
  - OS GREENBELTS AND OPEN SPACE
  - VCOS VILLAGE CENTER OPEN SPACE
  - PP PEDESTRIAN PROMENADE - HARDSCAPE TBD
- 
- SIGNALIZED INTERSECTION
  - ROUNDABOUT
  - NO. OF LANES (TWO LANES WHERE UNLABELED)
  - \*** MOBILITY HUB TO BE LOCATED ALONG BLOCK FRONTAGE. SPECIFIC LOCATION AND DESIGN TO BE DETERMINED DURING THE PREPARATION OF THE ROADWAY CONSTRUCTION DOCUMENTS.
  - \*\*** RIDE SHARE DROP-OFF PULLOUTS WITH BIKE SHARE HUBS PLUS MID-BLOCK CROSSINGS - EXACT LOCATIONS TO BE DETERMINED.
  - \*\*\*** SUBDIVISION TRAIL CONNECTION TO THE NEIGHBORHOOD, LOCATION TBD
  - ROAD SECTION CALLOUT
  - SPECIFIC PLAN BOUNDARY

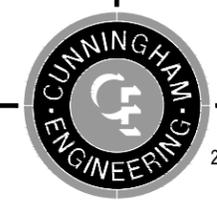


DESIGNED BY: SG DRAWN BY: LE CHECKED BY: SG	<h2 style="margin: 0;">WOODLAND RESEARCH AND TECHNOLOGY PARK</h2> <h3 style="margin: 0;">LAND USE PLAN LAYOUT</h3>	<p style="font-size: small;">Project Planning ■ Civil Engineering ■ Landscape Architecture</p> <p style="font-size: x-small;">Sacramento Office: 2120 20th Street, Suite Three, Sacramento, CA 95818 (916) 455-2026          Davis Office: 2940 Spafford Street, Suite 200, Davis, CA 95618 (530) 758-2026</p>	<table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>REVISIONS</th> <th>BY</th> <th>APPD.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	DATE	REVISIONS	BY	APPD.																SHEET <h1 style="margin: 0;">1</h1> OF <h1 style="margin: 0;">1</h1> DATE: 11/15/2019 PROJECT NO: 1593.03
NO.	DATE	REVISIONS	BY	APPD.																				



- LEGEND:**
- SP-1 BOUNDARY
  - 12" W .. PROPOSED WATER MAIN
  - 10" W .. EXISTING WATER MAIN
  - 12" W .. PROPOSED WATER (NOT YET CONSTRUCTED, ASSUMED TO BE IMPLEMENTED PRIOR TO SP-1A)
  - 30" W .. EXISTING TRANSMISSION WATER MAIN
  - SP-1A
  - SP-1B
  - SP-1C
  - EXISTING WATER WELL (PRIVATE)
  - EXISTING WATER WELL (CITY-OWNED)
  - EXISTING AGRICULTURAL WELL (PRIVATE) (TO BE MAINTAINED IN SERVICE AS LONG AS FEASIBLE FOR AGRICULTURAL SUPPLY WHILE DEVELOPMENT PROGRESSES.)

- NOTES:**
1. WATERLINE SIZING SUBJECT TO CHANGE BASED ON FUTURE DEMAND PROJECTIONS AND WATER MODELING.
  2. ONLY MAINS IN BACKBONE ROADWAYS ARE SHOWN, 8" DISTRIBUTION MAINS TO BE INSTALLED IN APPLICABLE SUBDIVISIONS.



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DECEMBER 2019

**WOODLAND RESEARCH AND TECHNOLOGY PARK (SP-1A)**

**INFRASTRUCTURE STUDY**

**ATTACHMENT 2: WATER LAYOUT**

S:\Projects\1500\1593 Spring Lake Master Plan Remainder Area\AutoCAD\1593-03 PRELIMINARY ENGINEERING\INFRASTRUCTURE STUDY\SHEETS\1593-03-WATER LAYOUT.dwg - WATER 12/18/2019 - 3:04PM Plotted by: katie



**Woodland Research and Technology Park**  
**Water Demand Calculations**  
 Prepared by Cunningham Engineering, KH  
 January 7, 2020

Water Demand Calculation Table															
Land Use Designation (Attachment 1)	COW Land Use Designation	Land Acreage (Net)	Water Demand Coefficient (gpm/acre)	Water Demand Coefficient (gpd/acre)	R&D Water Use Demand Factor (gpd/acre)	Average Day Demand (mgd)	Average Day Demand (gpm)	Peaking Factor (Average Day to Max Day)	Maximum Day Demand (mgd)	Maximum Day Demand (gpm)	Peaking Factor (Max Day to Peak Hr)	Peak Hour Demand (mgd)	Peak Hour Demand (gpm)	Unit Fire Flow (gpm)	Total Max Day Water Demand
LDR	LDR	74.8	2.2	3,168	0	0.24	165	2.2	0.52	362	3.5	0.83	576	1,000	2,734
MDR	MDR	35.5	4.5	6,480	0	0.23	160	2.2	0.51	351	3.5	0.80	559	1,500	3,234
HDR	none	9.7	9.0	12,960	0	0.13	87	2.2	0.28	192	3.5	0.44	305	2,500	4,234
RTP-TO	BP	69.6	1.0	1,440	0	0.10	70	2.2	0.22	153	3.5	0.35	243	3,500	5,234
RTP-RFO	BP/I	35.9	1.7	2,448	490	0.09	61	2.2	0.19	135	3.5	0.31	215	4,000	5,734
RTP-CCO	BP/GC	6.8	1.2	1,728	144	0.01	8	2.2	0.03	18	3.5	0.04	29	4,000	5,734
VCMU	NC/PN	3.5	2.0	2,880	0	0.01	7	2.2	0.02	15	3.5	0.04	25	4,000	5,734
VCMDR	NC/MDR	16.7	4.5	6,480	0	0.11	75	2.2	0.24	165	3.5	0.38	263	1,500	3,234
VCLDR	NC/LDR	13.1	2.2	3,168	0	0.04	29	2.2	0.09	64	3.5	0.15	101	1,000	2,734
HDR-CCO	none	15.9	5.2	7,488	0	0.12	83	2.2	0.26	182	3.5	0.42	289	4,000	5,734
HC	HC	8.2	1.4	2,016	0	0.02	11	2.2	0.04	25	3.5	0.06	40	4,000	5,734
PP	OS	0.8	1.5	2,160	0	0.00	1	2.2	0.00	3	3.5	0.01	4	0	1,734
OS	OS	10.2	1.5	2,160	0	0.02	15	2.2	0.05	34	3.5	0.08	54	0	1,734
VCOS	NC/OS	10.8	1.5	2,160	0	0.02	16	2.2	0.05	36	3.5	0.08	57	0	1,734
<b>Total</b>		<b>311.4</b>				<b>1.14</b>	<b>788</b>		<b>2.50</b>	<b>1734</b>		<b>3.97</b>	<b>2759</b>		