

## Master Utilities Report

### Jamaso

Aurora, Colorado

Project No. 1022-02

#### Submittal:

1<sup>st</sup>: April 23, 2021

2<sup>nd</sup>: September 8, 2021

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## I. Introduction

### A. Site Location

The Jamaso project site is located in the northwest quarter of Section 4, Township 4 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, City of Aurora, County of Arapahoe, State of Colorado. See Exhibit A, below, for a vicinity map of the area.

*Exhibit A – Vicinity Map*



### B. Description of Property

The site is approximately 56.88 acres of land which is bounded by N. Powhatan Road to the west, Foxridge Farm mobile home park, Sable Altura Fire Station #1, and Aurora Water Pumping Station #3 to the north, Sky Ranch Subdivision to the southeast and undeveloped land to the east and south. The proposed site is divided into ten (10) planning areas which account for 5.65 acres of commercial area, 28.45 acres of self-storage area, 6.41 acres of existing oil & gas, 6.12 acres of open-space/ landscape buffer, 0.54 acres of buffer containing an existing emergency access, 3.85 acres of detention area, 4.90 acres of public Right of Way (ROW) for E. 12<sup>th</sup> Avenue, and 0.96 acres to improve the existing Aurora Water Pumping Station #3 access. Currently, the majority of the project site is zoned for Mixed Use – Corridor (MU-C) and will be rezoned to Mixed Use – Airport (MU-A) concurrently. 14.4 acres on the southwest are zoned R-2 (Medium-Density

Residential) which is not allowed this close to oil and gas and will be rezoned to MU-A concurrently.

### C. Existing Infrastructure

Currently, there are existing utilities in N. Powhatan Road. They include a cable television line, fiber optic line, and a 16" waterline in N. Powhatan Road. In addition to the in-ground utilities listed above, there are overhead electric lines to the west of N. Powhatan Road. In the access road for Aurora Pumping Station #3, there is a 16" waterline and a 60" pipeline that conveys raw water and is considered critical infrastructure.

## II. Water Distribution System

### A. Water Design Criteria

Per sheet 05Y of Fire Hydrants from Aurora Water, the site is located within Pressure Zone 4 of the City of Aurora's Water Master Plan. The table below provides the Hydraulic Grade Line (HGL) of Zone 4 and provides elevations with their corresponding pressure range.

Pressure Zone	Static HGL	Site Elev. Range	Static Pressure Range
Zone 4	5850	5615-5585	102-115

As previously mentioned, this site incorporates 5.65 acres of commercial area and 28.45 acres of self-storage area. This site does not include any residential development due to the proximity to existing oil and gas on site.

Per the City of Aurora's Water, Sanitary Sewer & Storm Drainage Infrastructure Standards & Specifications, below is a list of the demand criteria that was used:

- Average Day Demand (ADD) - Commercial = 1500 gpd/acre
- Max Day Peaking Factor = 2.8x
- Max Hour Peaking Factor = 4.5x
- Maximum Day Demand (MDD) - Commercial = 4200 gpd/acre
- Peak Hour Demand (PHD) - Commercial = 6750 gpd/acre
- Fire Flow – Commercial = 2500 gpm
- During Maximum Hour Demand, Maximum Velocity = 3 fps in 8" and 12" WL

### D. Proposed Water System

The proposed water system for Jamaso includes a 12" water main loop from the existing 16" waterline in the Aurora Pumping Station #3 access road to the 16" waterline in N. Powhatan Road. The 12" waterline loop is positioned along the east side of Planning Area 2, through Planning Area 4, and along the north side of Planning Area 7. Water will be distributed through Planning Areas 2, 3, 4, and 8 from the aforementioned 12" loop. There will also be a 12" waterline loop from the proposed E. 12<sup>th</sup> Avenue ROW to the southeast corner of Planning Area 7, then

to the southeast corner of Planning Area 5 before connecting with the 12" waterline in E. 12<sup>th</sup> Avenue adjacent to Planning Area 10. All water mains are to be buried a minimum of 5 ft below the proposed surface elevation. See the Appendix C for a detailed water system map of the project.

## E. Water System Analysis

On-site water demand calculations are provided in Appendix A. Per the City's criteria, the water system was analyzed under the following scenarios:

- Average Day Demand
- Maximum Hour Demand
- Maximum Day Demand plus Fire Flow

### Model Summary

The highest pressure observed for each scenario occurs at Junction J-2, which is the southernmost junction. The lowest pressure observed for each scenario occurs at Junction J-1, which is the northernmost junction. A maximum pressure of 115 psi is reported at junction J-2 during all scenarios. The lowest pressure of 90 psi is reported at junction J-7 during the maximum day demand plus commercial fire flow scenario. During the maximum hour demand scenario, flows meet all the demand criteria. All modelling data is provided in Appendix A.

## III. Sanitary Sewer System

### A. Existing System

The project lies within the First Creek Sanitary Basin. Currently, the closest available sanitary sewer connection is a 12" sanitary sewer approximately two miles away at Prologis Park 70 which is located at E-470 and E. 19<sup>th</sup> Avenue. The Prologis lift station is located to the east of E-470 and is planned to be removed and replaced by a 30" sanitary sewer main which will gravity flow to the existing First Creek lift station.

### B. Sanitary Design Criteria

Per the City of Aurora's Water, Sanitary Sewer & Storm Drainage Infrastructure Standards and Specifications, sanitary loading is defined below:

- Average Day Loading (Commercial) = 1500 gpd/acre
- Equivalent Population per Acre (Commercial) = 22
- Peaking Factor (PF) =  $5 / p^{0.167}$ , where p = population in the thousands
- Maximum Peaking Factor = 4.0
- Minimum Peaking Factor = 1.7
- Maximum Velocity = 10 ft/s

### C. Proposed Sanitary Sewer System

Until such time that sanitary sewer mains are extended closer, the site will be serviced via a septic system which may include sanitary vault(s) and/or septic tank(s) with an associated leach bed, as a temporary measure. Sanitary sewer main will eventually extend within E. 12<sup>th</sup> Avenue from N. Powhaton Road to the east property boundary.

### D. Sanitary Sewer Analysis

There are three commercial planning areas which will produce sanitary flows. These contributions are summarized in the Proposed Sanitary Design table in Appendix A.

## IV. Conclusion

The proposed water systems conform to the Water, Sanitary Sewer & Storm Drainage Infrastructure Standards & Specifications from Aurora Water. The proposed septic system is an acceptable temporary measure until such time as sanitary sewer mains are extended closer to service the project.

## V. References

1. *Water, Sanitary Sewer & Storm Drainage Infrastructure Standards & Specifications*, Aurora Water, January 2020.
2. *Fire Hydrants*, Aurora Water, plot date February 2020.
3. *Aurora Prairie Waters Project Conveyance System Pumping Station 3 Civil Utility Extension – Water CSP excerpt*, plot date September 18, 2007 and prepared by MWH (2007-6046-00).
4. *Jamaso Multi-well Pad Civil Plans*, approved November 13, 2018 and prepared by Lamp Ryneearson & Associates (218185).

# APPENDIX A

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## Demand and Flow Calculations

Jamaso Water Demand Calculations					
Commercial/Self Storage			Average Day Demand (gpd / acre)	Maximum Day Demand (gpd / acre)	Peak Hour Demand (gpd / acre)
			1500	4200	6750
Junction	Planning Area	Contributing Area (acre)	Average Day Demand (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
	PA-1	0.00	0.00	-	-
J-1	PA-2	2.04	2.13	5.95	9.56
J-1	PA-3	3.91	4.07	11.40	18.33
J-1	PA-4	2.00	2.08	5.83	9.38
	PA-5	0.00	0.00	-	-
	PA-5	0.00	0.00	-	-
	PA-6	0.00	0.00	-	-
	PA-7	0.00	0.00	-	-
J-2	PA-8	1.61	1.68	4.70	7.55
Total =			9.96	27.88	44.81



Proposed Sanitary Design				
Planning Area	PA-2	PA-3	PA-4	PA-8
Contributions	2.04 Acres (Commercial)	3.91 Acres (Self Storage)	2.00 Acres (Commercial)	1.61 Acres (Commercial)
Peak Factor (PF)	4.00	4.00	4.00	4.00
Peak Sanitary Flow	0.012 MGD 0.019 cfs	0.023 MGD 0.036 cfs	0.012 MGD 0.019 cfs	0.010 MGD 0.015 cfs

## APPENDIX B

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### Water Hydraulic Computations

# Jamaso Nodal Diagram



**Scenario: ADD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

Label	Elevation (ft)	GIS-IDs	ID	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,587.40	<Collection: 0 items>	48	<Collection: 3 items>	8	5,850.00	114
J-2	5,585.00	<Collection: 0 items>	45	<Collection: 1 item>	2	5,850.00	115
J-3	5,599.00	<Collection: 0 items>	53	<Collection: 0 items>	0	5,850.00	109
J-4	5,589.30	<Collection: 0 items>	55	<Collection: 0 items>	0	5,850.00	113
J-5	5,604.10	<Collection: 0 items>	57	<Collection: 0 items>	0	5,850.00	106
J-6	5,609.20	<Collection: 0 items>	59	<Collection: 0 items>	0	5,850.00	104
J-7	5,614.60	<Collection: 0 items>	62	<Collection: 0 items>	0	5,850.00	102

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**Scenario: ADD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (ft)
52	P-1	R-1	J-1	12.0	PVC	130.0	0.000	5	0.01	0.000	480
51	P-2	J-2	J-1	12.0	PVC	130.0	0.000	3	0.01	0.000	350
46	P-3	R-2	J-2	12.0	PVC	130.0	0.000	5	0.01	0.000	340
54	P-4	J-1	J-3	12.0	PVC	130.0	0.000	0	0.00	0.000	1,180
56	P-5	J-3	J-4	12.0	PVC	130.0	0.000	0	0.00	0.000	760
58	P-6	J-4	J-5	12.0	PVC	130.0	0.000	0	0.00	0.000	1,070
60	P-7	J-5	J-6	12.0	PVC	130.0	0.000	0	0.00	0.000	880
61	P-8	J-6	J-3	12.0	PVC	130.0	0.000	0	0.00	0.000	960
63	P-9	J-6	J-7	12.0	PVC	130.0	0.000	0	0.00	0.000	265

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**Scenario: ADD**  
**Current Time Step: 0.000 h**  
**FlexTable: Reservoir Table**

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ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
30	R-1	5,850.00	<None>	5	5,850.00
44	R-2	5,850.00	<None>	5	5,850.00

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**Scenario: MDD+FF**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

Label	Elevation (ft)	GIS-IDs	ID	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,587.40	<Collection: 0 items>	48	<Collection: 3 items>	23	5,847.77	113
J-2	5,585.00	<Collection: 0 items>	45	<Collection: 1 item>	5	5,848.90	114
J-3	5,599.00	<Collection: 0 items>	53	<Collection: 0 items>	0	5,831.45	101
J-4	5,589.30	<Collection: 0 items>	55	<Collection: 0 items>	0	5,829.84	104
J-5	5,604.10	<Collection: 0 items>	57	<Collection: 0 items>	0	5,827.57	97
J-6	5,609.20	<Collection: 0 items>	59	<Collection: 0 items>	0	5,825.70	94
J-7	5,614.60	<Collection: 0 items>	62	<Collection: 1 item>	2,500	5,822.03	90

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**Scenario: MDD+FF**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (ft)
52	P-1	R-1	J-1	12.0	PVC	130.0	0.000	1,386	3.93	0.005	480
51	P-2	J-2	J-1	12.0	PVC	130.0	0.000	1,137	3.23	0.003	350
46	P-3	R-2	J-2	12.0	PVC	130.0	0.000	1,142	3.24	0.003	340
54	P-4	J-1	J-3	12.0	PVC	130.0	0.000	2,500	7.09	0.014	1,180
56	P-5	J-3	J-4	12.0	PVC	130.0	0.000	909	2.58	0.002	760
58	P-6	J-4	J-5	12.0	PVC	130.0	0.000	909	2.58	0.002	1,070
60	P-7	J-5	J-6	12.0	PVC	130.0	0.000	909	2.58	0.002	880
61	P-8	J-6	J-3	12.0	PVC	130.0	0.000	-1,591	4.51	0.006	960
63	P-9	J-6	J-7	12.0	PVC	130.0	0.000	2,500	7.09	0.014	265

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**Scenario: MDD+FF**  
**Current Time Step: 0.000 h**  
**FlexTable: Reservoir Table**

---

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
30	R-1	5,850.00	<None>	1,386	5,850.00
44	R-2	5,850.00	<None>	1,142	5,850.00

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**Scenario: PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

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Label	Elevation (ft)	GIS-IDs	ID	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	5,587.40	<Collection: 0 items>	48	<Collection: 3 items>	37	5,850.00	114
J-2	5,585.00	<Collection: 0 items>	45	<Collection: 1 item>	8	5,850.00	115
J-3	5,599.00	<Collection: 0 items>	53	<Collection: 0 items>	0	5,850.00	109
J-4	5,589.30	<Collection: 0 items>	55	<Collection: 0 items>	0	5,850.00	113
J-5	5,604.10	<Collection: 0 items>	57	<Collection: 0 items>	0	5,850.00	106
J-6	5,609.20	<Collection: 0 items>	59	<Collection: 0 items>	0	5,850.00	104
J-7	5,614.60	<Collection: 0 items>	62	<Collection: 0 items>	0	5,850.00	102

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**Scenario: PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Length (ft)
52	P-1	R-1	J-1	12.0	PVC	130.0	0.000	23	0.06	0.000	480
51	P-2	J-2	J-1	12.0	PVC	130.0	0.000	15	0.04	0.000	350
46	P-3	R-2	J-2	12.0	PVC	130.0	0.000	22	0.06	0.000	340
54	P-4	J-1	J-3	12.0	PVC	130.0	0.000	0	0.00	0.000	1,180
56	P-5	J-3	J-4	12.0	PVC	130.0	0.000	0	0.00	0.000	760
58	P-6	J-4	J-5	12.0	PVC	130.0	0.000	0	0.00	0.000	1,070
60	P-7	J-5	J-6	12.0	PVC	130.0	0.000	0	0.00	0.000	880
61	P-8	J-6	J-3	12.0	PVC	130.0	0.000	0	0.00	0.000	960
63	P-9	J-6	J-7	12.0	PVC	130.0	0.000	0	0.00	0.000	265

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**Scenario: PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Reservoir Table**

---

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
30	R-1	5,850.00	<None>	23	5,850.00
44	R-2	5,850.00	<None>	22	5,850.00

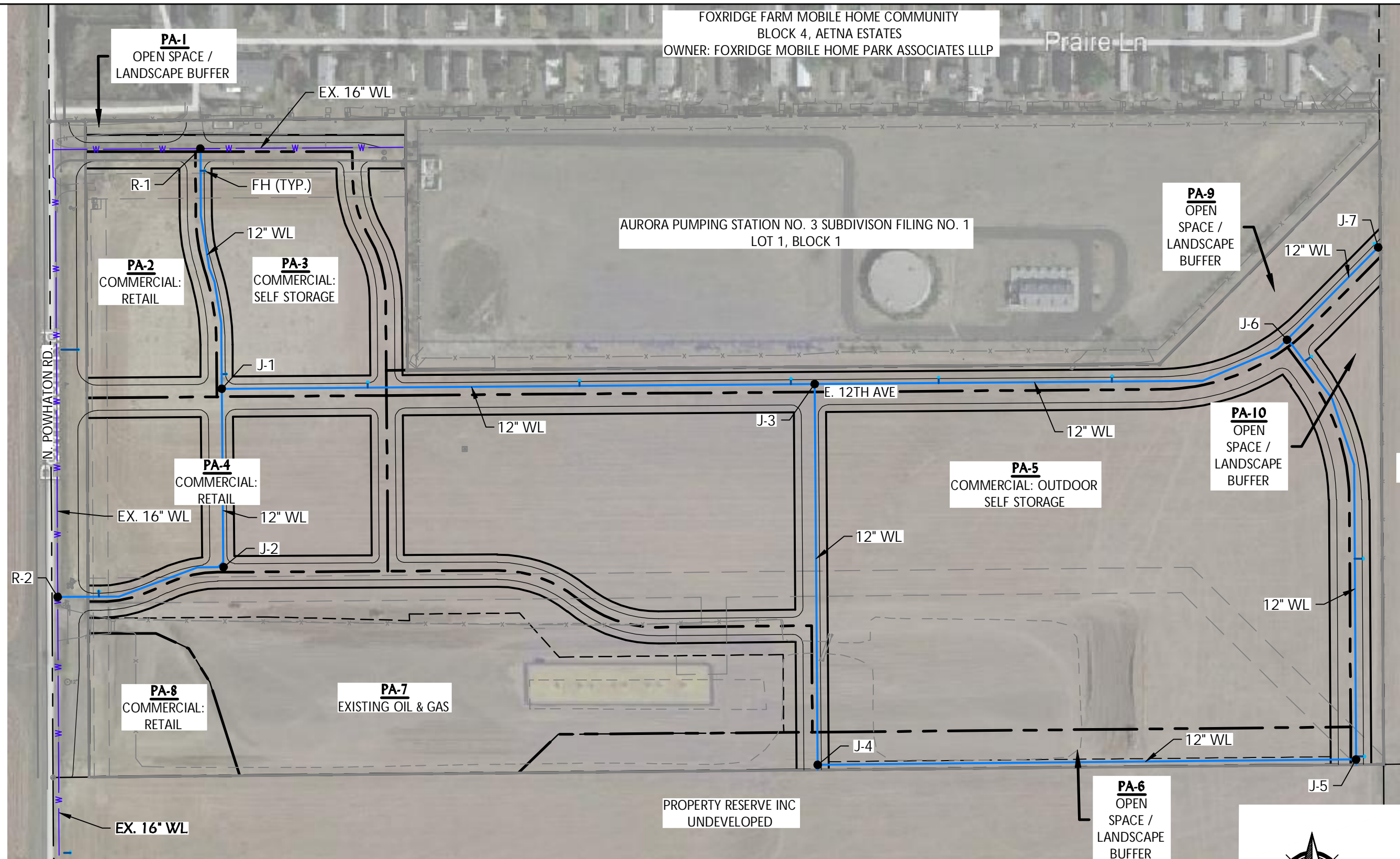
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## APPENDIX C

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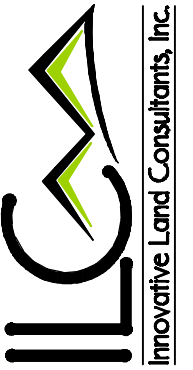
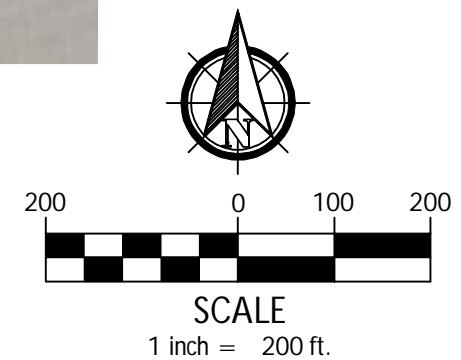
### Water Distribution Map

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### LEGEND

- Proposed Waterline
- Existing Waterline
- Planning Area Boundary



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Jamaso  
Aurora, Colorado  
Water Distribution System Map

Proj. Name:  
Location:  
Plan Set:  
Sheet Name:

Date: August 27, 2021  
Job No.: 1022-02

Scale H: 1" = 200'  
Scale V: N/A

Prepared By: TRP  
Approved By: TRH



Sheet: 1