Wildcat Industrial Park Public Water & Sewer Impact Analysis

57.7+/- Acre Development Project

Analysis Completed December 2, 2019

Public Water & Sewer Impact Analysis

Prepared by Civil Design & Engineering, Inc. for The City of Flagstaff Utilities Department

Mayor

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Council

Jamie Whelan
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City Manager

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Public Works Director

Andy Bertelsen

Christine Laguna, P.E.
Arizona Registrant # 29327

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I. INTRODUCTION

The Wildcat Industrial Park is an existing mining facility for materials used in construction and landscaping applications. The owner proposed rezoning form Rural Residential to Heavy Industrial, allowing portions of the site to be leased out for construction yards. The project is located on Coconino County parcels 113-07-004, 113-07-003J, and 113-07-003L, which are in Section 9, Township 21N, Range 8E, Gila and Salt River Base & Meridian. This parcel is on Route 66, east of the El Paso Flagstaff Road (Figure 1).

The proposed development lies within the City of Flagstaff urban growth boundary and has the ability to be served by City water and sewer utilities.

The Wildcat Industrial Park project Site Plan (Exhibit 1) was provided to the City by Mogollon Engineering and has been used as the basis for this preliminary analysis.

The criteria used herein to estimate the project's water demand is from the City of Flagstaff Engineering Design Standards (COF EDS), Chapter 13-09, effective October 2017. This Water and Sewer Impact Analysis (WSIA) is considered valid for two years from its completion date, which is 12/2/2019.

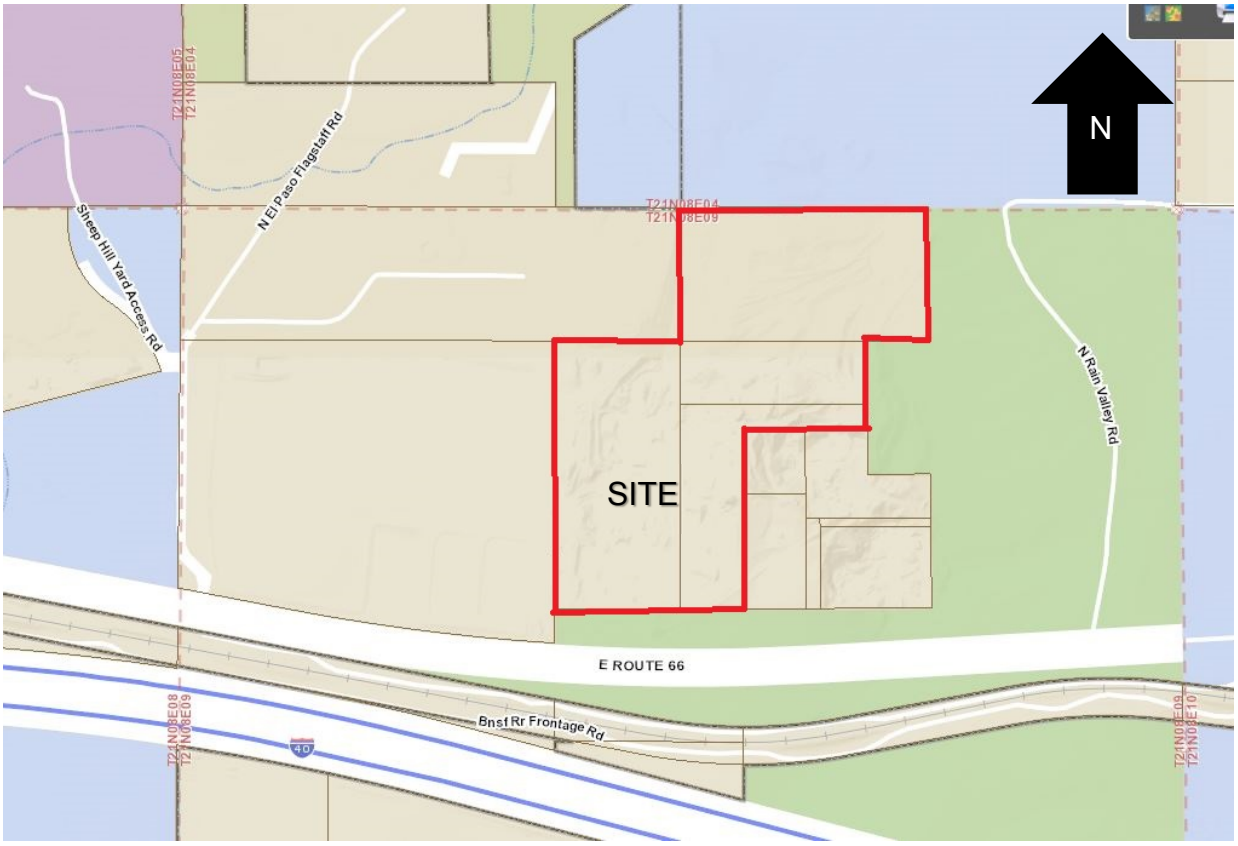


Figure 1 – Vicinity Map. Not to scale.

II. ANALYSIS SUMMARY

On-site modifications:

Sewer: The buildings that exist on site will be serviced by individual septic systems for each building. Sewer analysis will not be included in this report

Water: It is assumed that there is currently no infrastructure in the ground to support this development, so all on-site systems will have to be designed and built.

Off-site modifications:

Sewer: Sewer is not being extended to this facility at this time. According to R18-9-A309 of the Arizona Administrative Code, the developer is not required to connect to a collection system if the cost of doing so is prohibitive. In this case the sewer line would need to extend about 4,000 feet at a depth of 30 feet. The current existing buildings have individual septic systems that will serve this facility. Any additional structures requiring sewer will be required to apply for on-site septic permits.

Water: The City of Flagstaff is extending water service from Test Drive to El Paso Flagstaff Road and then north to the Wildcat Wastewater Treatment Facility. It is the Owner's responsibility to extend a looped system from the intersection of El Paso Flagstaff Road and Route 66 to the Wildcat Industrial Park property. This looped waterline will then provide service lines and hydrant lines to the Wildcat Industrial Park. The site of the required extension will be 8" C-900 PVC. Public utility easements for the extension must be dedicated to the City of Flagstaff. Permits from ADOT shall be obtained by the developer for construction in ADOT right of way.

III. WATER SYSTEM ANALYSIS

A. EXISTING WATER SYSTEM

The City of Flagstaff will be constructing a 12" DIP waterline. This waterline will extend a connection location to the intersection of El Paso Flagstaff Road and Route 66. These waterlines are within the City of Flagstaff Zone "B" water pressure system limits and meet the minimum pressure requirements stated in the City of Flagstaff Engineering Standards. High pressures have been noted on site, which require the developer to install pressure-reducing valves after the meter.

The proposed development falls within the City of Flagstaff pressure Zone “B” with elevations as high as 6794’. The building on this development could have multiple stories with water and sewer fixture heights up to 60 feet above ground level. This analysis provides the water pressure at the proposed taps and the developer’s Architect/Engineer (A/E) shall confirm adequate water pressure at the highest points of water demand.

B. PROPOSED WATERLINE EXTENSIONS

The developer is proposing a looped waterline extension with an 8” waterline. This loop will run from El Paso Flagstaff Road to the property frontage, at which point two dead end lines will be installed. One will run east to service two buildings, and the other will run north to service another building. These two dead end lines will have fire hydrants installed, for fire protection.

C. WATER SYSTEM DEMANDS

The following quantifies the anticipated water demands for the project.

Water System Demand

Industrial Applications
Area = 57.7 acres

Average Daily Demand = 2,000 gpad x 57.7 acres = 115,400 gpd

Peak Daily Demand = 5,000 gpad x 57.7 acres = 288,500 gpd

Fire Flow for Industrial Areas = 1,500 gpm

D. WATER SYSTEM ANALYSIS RESULTS

Bentley WaterGEMS software was used for simulations of peak daily and fire flow.

The analysis area used was based on the area estimated to be impacted by the proposed Wildcat Industrial Park development and includes both junction demand nodes possibly impacted by the additional demands and locations that may need to

supply fire flows. This area spans approximately 6,000' to the northwest and 5,000' to the west to include higher elevations. See Exhibit 4.

Results of the computer analysis (Appendix A) for peak daily flow indicate a range in pressures off-site in the project vicinity from 103.07 psi (J-14201) to 171.59 psi (J-4810). The rest of the nodes are consistent given the elevations of the junction nodes within the analyzed boundary. J-113 (Wildcat Industrial Park) is at an elevation 6792.00, whereas J-4810 is lower at 6740.00. The peak daily flow condition yields a pressure on the project site of 148.64 psi. The lowest pressure associated with peak domestic flows, 103.07 psi, occurs at J-14201, which is above the City Engineering Standards' minimum pressure of 40 psi (COF EDS 13-9).

Based on the computer simulation of fire flow, residual pressures in the project vicinity are projected to remain above 20 psi (COF EDS 13-9) or higher during fire flow scenarios of 1500 gpm or less. The onsite junctions at the project location satisfy these constraints.

It is the developer's responsibility to design, acquire adequate right-of-way for, and construct all on-site and connecting water infrastructure in accordance with all applicable City, State, and Federal rules and regulations.

IV. SEWER SYSTEM ANALYSIS

A. EXISTING SEWER SYSTEM

The nearest sewer manhole is located just east of Test Drive. Due to the distance from this project to the existing sewer collection system, the owner proposes the use of on-site septic. The existing buildings on-site will be serviced by individual septic systems. As previously stated, R18-9-A309 of the Arizona Administrative Code states the developer is not required to connect to a collection system if the cost of doing so is prohibitive. In this case the sewer line would need to extend about 4,000 feet at a depth of 30'. A public sewer analysis will not be necessary for this report.

V. CONCLUSIONS & REQUIREMENTS

Water service to all adjacent homes and businesses must be maintained during construction and tapping for this project.

The findings of this analysis indicate that the completion of the project will comply with public water and sewer infrastructure requirements as outlined in the current City of

Flagstaff Engineering Standards as long as all on-site infrastructure is designed and constructed per the Engineering Standards and as stipulated herein. Deviations from the intent shown on the developer's provided preliminary drawings, and/or further development beyond what was shown on the preliminary drawings will require additional review and must gain full Development Review Board Approval. It should be noted that the City of Flagstaff Engineering Standards (Chapter 13 of the City of Flagstaff Code) are the only documents used for this analysis. This WSIA does not guarantee conformance to any other codes, standards, or specifications similar to, but not limited to, IBC, IFC, IRC …etc.

The location(s) of any required fire hydrants related to this project is(are) left to the discretion of the City of Flagstaff Fire Department in accordance with City of Flagstaff Engineering Standards and current Fire Codes. Approval by the City Engineer shall also be obtained.

Water computer analyses were done with Bentley Systems WaterGEMS software. The existing City of Flagstaff master water model was modified to incorporate the estimated infrastructure and flows that will be required by this development.

All existing utility information is based on the City of Flagstaff GIS data and other information contained within the WaterGEMS & SewerCAD master models or provided by the City of Flagstaff engineering staff. The developer's A/E should confirm the City water system supply pipe sizes, materials, and locations as part of their design for connection to the COF water systems.

If the developer changes their plans for development resulting in changes to development size, use, area of commercial space, number or type of residential units, population, etc., that could render invalid the assumptions made as a basis for the forecasts made in this Water and Sewer Impact Analysis. If such changes are made, then the developer must apply for updated analysis and provide the proposed changes to the City of Flagstaff for review and consideration.

This WSIA is considered valid for two years from its completion date, 12/2/2019, which is the date of the engineer's seal on the cover sheet and table of contents of this WSIA. All water and sewer utility lines and treatment plant capacity reservations as a result of this study will expire at that time.

CITY OF FLAGSTAFF

CITY OF FLAGSTAFF

SCALE: 1"=100'

0 50 100 200

NEW 3/4" WATER METER

20' NEW P.U.E.

Ex. Septic

Yard 15

Yard 14

Yard 13

Yard 12

Yard 11

NEW 8" WATER LINE BY RE ASSET

Yard 10

Yard 9

Yard 8

SUBJECT PARCEL

Yard 6

Yard 5

Yard 1

Yard 2

Yard 3

Yard 4

Ex. Septic

NEW 3/4" WATER METERS

NEW P.U.E.

NEW 8" WATER LINE BY RE ASSET

NEW P.U.E.

NEW 8" LOOPED WATER LINE BY RE ASSET

CITY OF FLAGSTAFF

NEW WATER LINE BY THE C.O.F. TO BE CONSTRUCTED IN 2021.

CONNECT TO EXISTING WATER

NEW 8" LOOPED WATER LINE BY RE ASSET UPON COMPLETION OF THE CITY WATER MAIN.

PRELIMINARY
NOT FOR CONSTRUCTION OR RECORDING

ROUTE 66

EXHIBIT 1 - SITE PLAN

COF PROJECT # N/A

WILDCAT INDUSTRIAL PARK
WATER ALIGNMENT

9/03/19

MES# 18295

Mogollon Inc
ENGINEERING
&SURVEYING
411 W. Santa Fe Avenue
Flagstaff, Arizona 86001
Phone: 928-214-0214

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
23950
KYLE V. HOUSER
ARIZONA U.S.A.

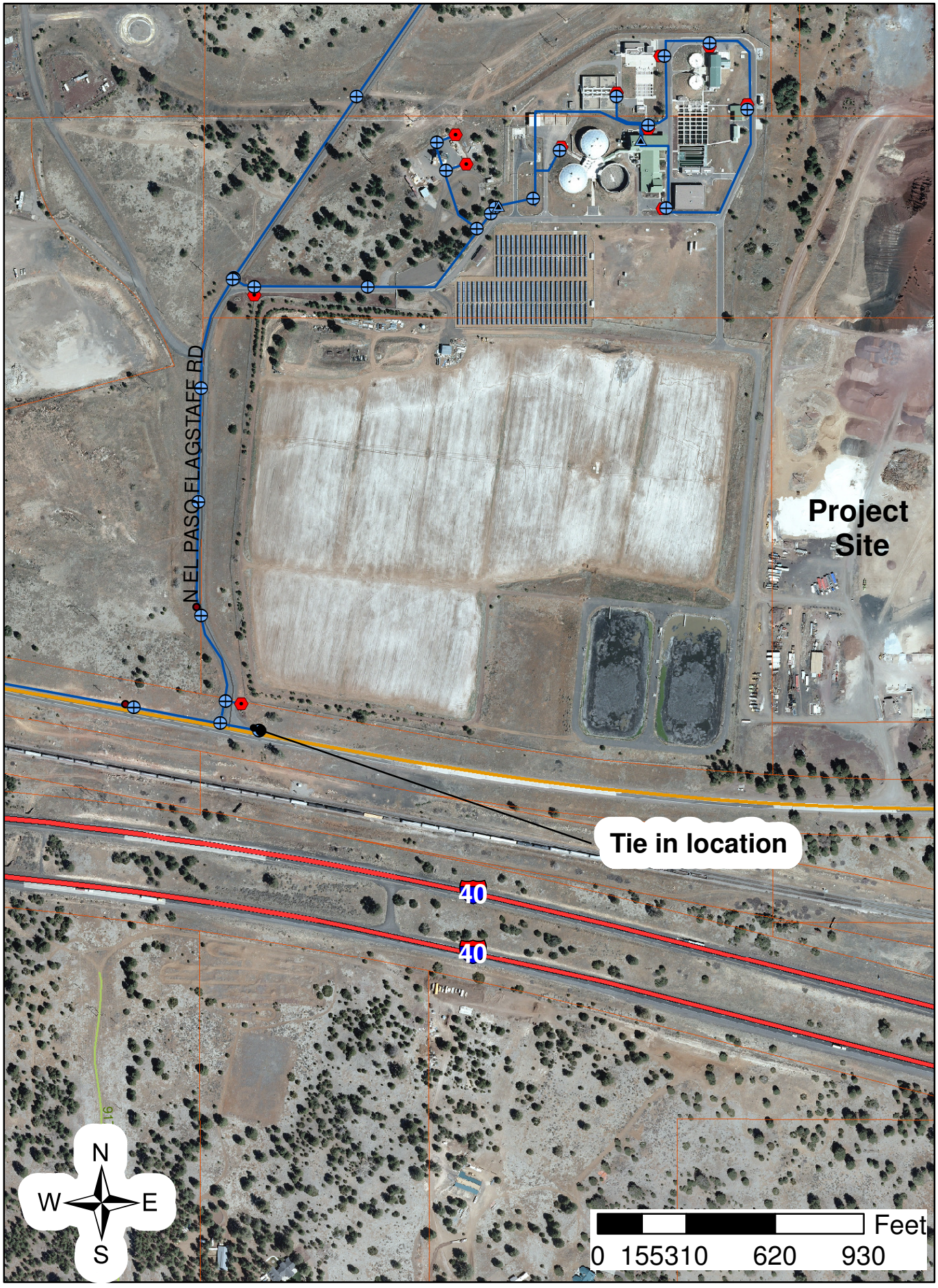
PRELIMINARY
NOT FOR CONSTRUCTION OR RECORDING

DATE: 9/03/19
DESIGNED BY:
DRAWN BY:
CHECKED BY: KVH

REVISIONS:

PROJECT NO. 18295
FN: SHEET1-REF1
VERT SCALE: N/A
HOR SCALE: 1"=100'

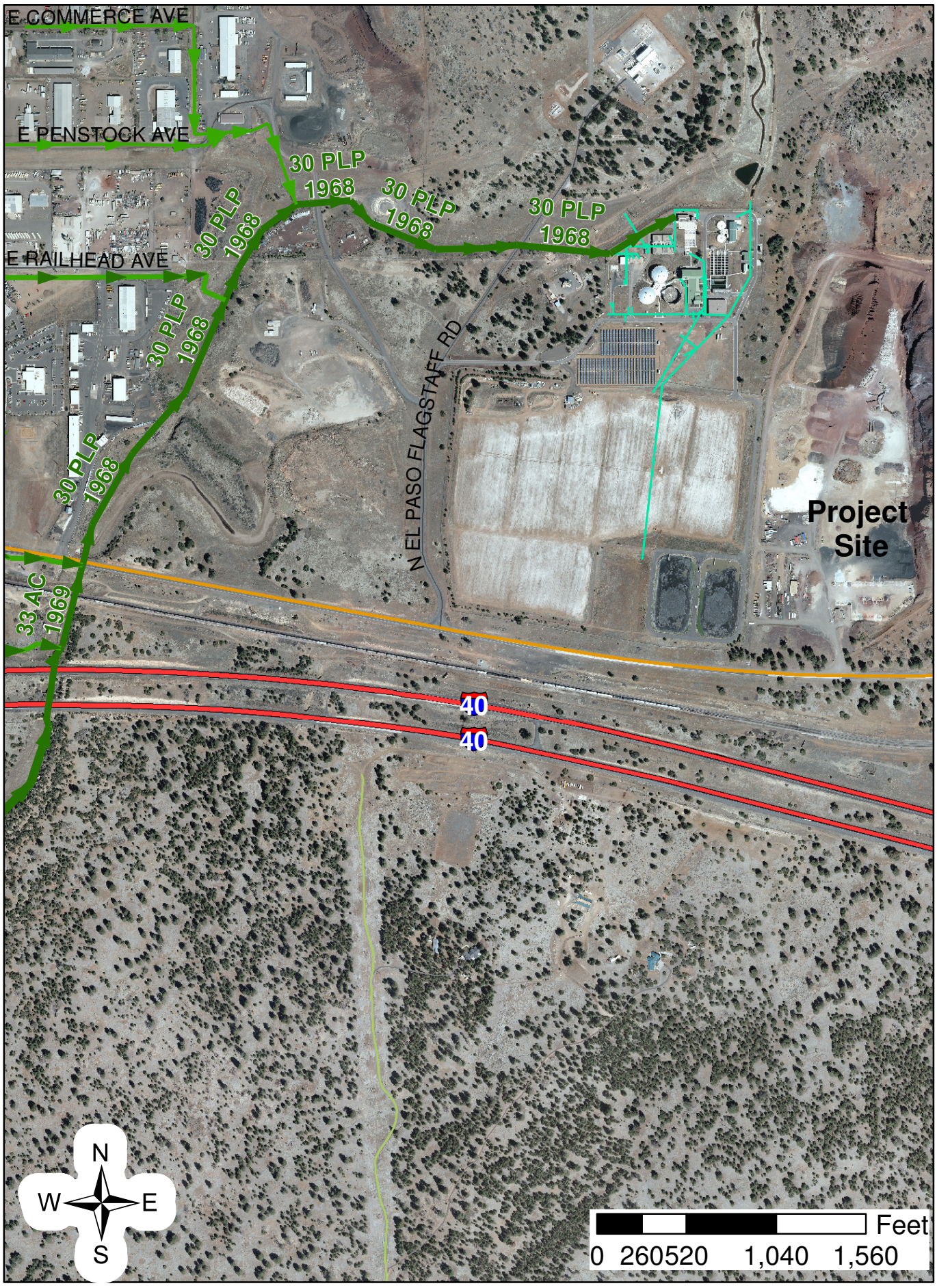
City of Flagstaff - Water Services



GIS Water Atlas Map

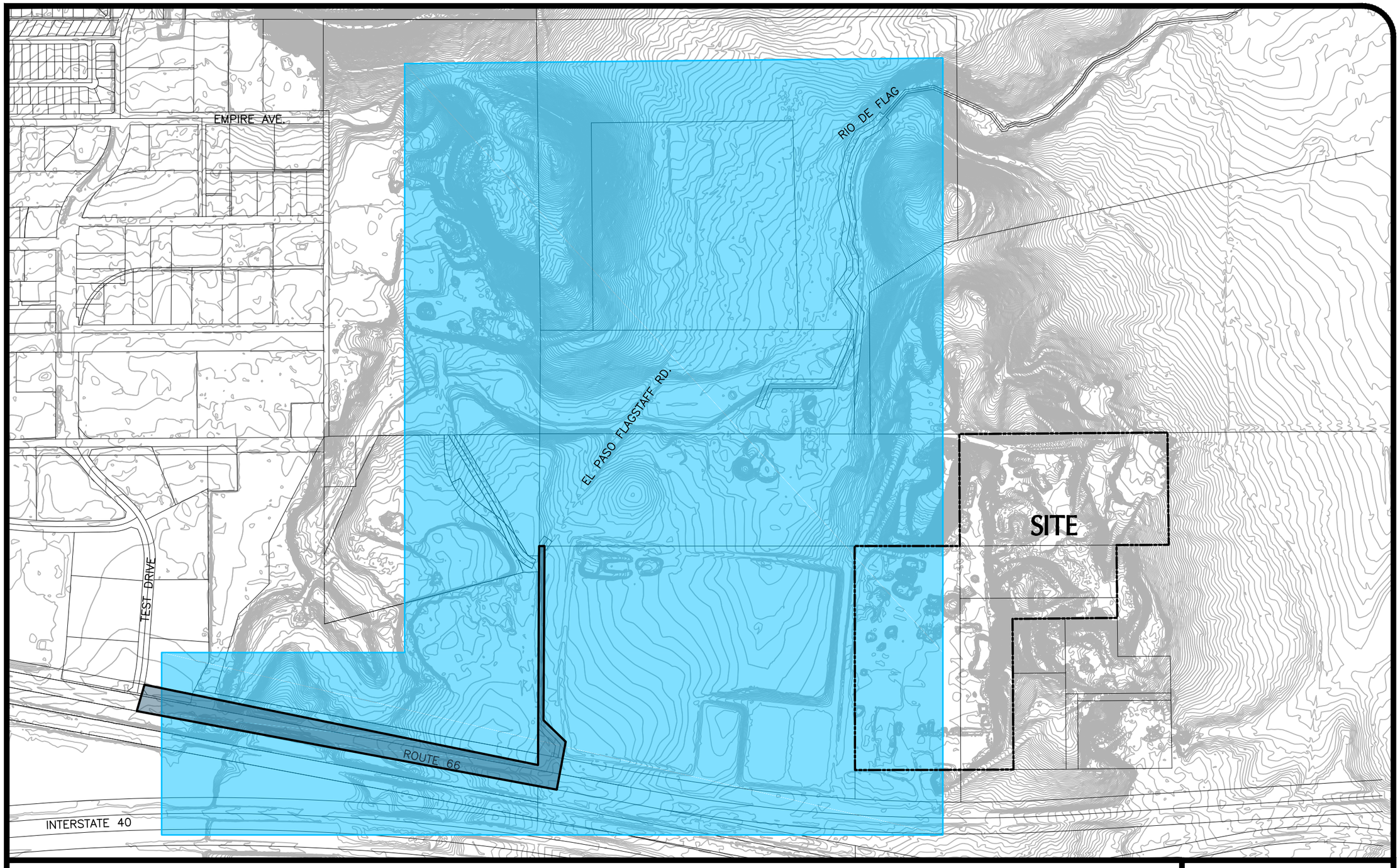
Exhibit 2

City of Flagstaff - Water Services



GIS Sewer Atlas Map

Exhibit 3



ANALYSIS AREA

PORTION OF WATERLINE TO BE INSTALLED BY C.O.F.

EXHIBIT 4 – ANALYSIS AREA

SCALE: 1" = 600'

0 300 600 1200 1800

N

CD&E

ENGINEERING ▪ SURVEY

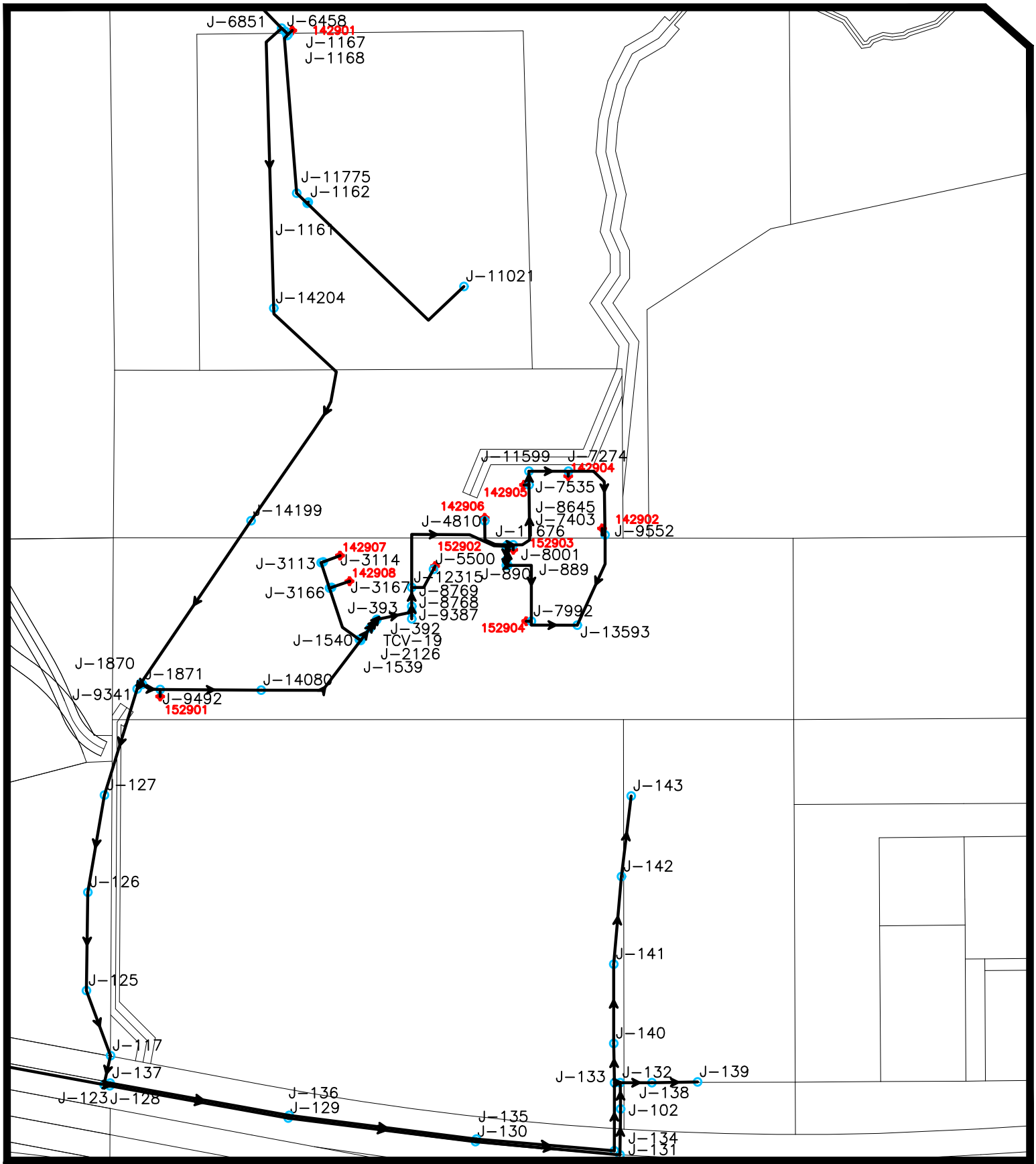


EXHIBIT 5 – WaterGEMS Analysis

SCALE: 1" = 500'

0 250 500 1000 1500

N

CD&E

ENGINEERING ▪ SURVEY

Wildcat Industrial Park
Peak Day Domestic Flows and Pressures

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-14201	6902.00	B	0.00	102.98	7140.02
J-125	6794.60	B	0.00	147.68	7135.94
J-6851	6796.93	B	0.00	147.89	7138.74
J-126	6793.00	B	0.00	148.38	7135.96
J-6458	6795.52	B	0.00	148.50	7138.74
J-143	6792.00	B	48.61	148.56	7135.36
J-1168	6794.63	B	0.00	148.88	7138.74
J-1167	6794.10	B	0.00	149.11	7138.74
J-142	6790.00	B	0.00	149.43	7135.39
J-141	6790.00	B	0.00	149.45	7135.42
J-140	6790.00	B	0.00	149.46	7135.45
J-127	6790.50	B	0.00	149.48	7135.99
J-124	6790.40	B	0.00	149.49	7135.92
J-128	6789.15	B	0.00	150.02	7135.90
J-137	6789.15	B	0.00	150.02	7135.90
J-123	6788.71	B	0.00	150.22	7135.91
J-139	6788.00	B	48.61	150.31	7135.40
J-132	6788.00	B	0.00	150.33	7135.46
J-133	6788.00	B	0.00	150.33	7135.46
J-129	6788.00	B	0.00	150.46	7135.77
J-14204	6789.93	B	0.00	150.47	7137.71
J-138	6786.00	B	48.61	151.18	7135.42
J-136	6782.00	B	0.00	153.06	7135.76
J-9341	6782.07	B	8.27	153.14	7136.02
J-9492	6781.51	B	0.00	153.39	7136.04
J-1870	6781.17	B	0.00	153.54	7136.04
J-1871	6780.75	B	0.00	153.72	7136.04
J-134	6780.00	B	0.00	153.81	7135.51
J-130	6780.00	B	0.00	153.86	7135.63
J-14080	6778.32	B	0.40	154.77	7136.03
J-131	6776.00	B	0.00	155.55	7135.52
J-135	6776.00	B	0.00	155.59	7135.62
J-122	6773.51	B	0.00	156.79	7135.91
J-2546	6771.39	B	0.00	157.71	7135.91
J-2545	6771.37	B	0.00	157.72	7135.91
J-4743	6771.02	B	0.00	157.87	7135.91
J-121	6770.96	B	0.00	157.90	7135.91
J-4744	6770.84	B	0.00	157.95	7135.91
J-1540	6765.96	B	0.00	160.11	7136.03
J-1539	6765.93	B	0.00	160.13	7136.03
J-3166	6765.17	B	0.00	160.45	7136.03
J-3167	6764.92	B	0.00	160.56	7136.03

Wildcat Industrial Park
Peak Day Domestic Flows and Pressures

J-2126	6764.16	B	0.00	160.89	7136.03
J-392	6763.10	B	0.00	161.35	7136.03
J-393	6762.98	B	0.00	161.40	7136.03
J-3113	6761.45	B	0.00	162.06	7136.03
J-3114	6761.30	B	0.00	162.13	7136.03
J-13593	6758.60	B	15.79	163.29	7136.01
J-9387	6758.13	B	0.00	163.50	7136.02
J-8768	6757.08	B	0.00	163.95	7136.02
J-8769	6756.33	B	0.00	164.28	7136.02
J-9552	6755.41	B	0.00	164.67	7136.01
J-890	6753.51	B	0.00	165.49	7136.02
J-889	6753.45	B	0.00	165.52	7136.02
J-7992	6753.38	B	0.00	165.55	7136.01
J-8001	6753.24	B	0.00	165.61	7136.02
J-12315	6753.20	B	0.00	165.63	7136.02
J-5500	6752.15	B	0.00	166.09	7136.02
J-11676	6750.34	B	0.00	166.86	7136.02
J-7403	6750.17	B	0.00	166.94	7136.02
J-8645	6748.57	B	0.00	167.63	7136.02
J-7274	6748.00	B	0.00	167.88	7136.02
J-14199	6746.16	B	0.00	168.99	7136.75
J-7535	6742.56	B	0.00	170.23	7136.02
J-11599	6741.94	B	0.00	170.50	7136.02
J-4810	6740.00	B	0.00	171.34	7136.02

Wildcat Industrial Park
Fire Flow Report

Label	Zone	Fire Flow Iterations	Is Fire Flow Run Balanced?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (Zone)
142901	B	3	TRUE	TRUE	1500	3500.00	39.84	181701
142902	B	4	TRUE	TRUE	1500	2294.69	20.00	181701
142904	B	4	TRUE	TRUE	1500	2363.32	20.00	181701
142905	B	3	TRUE	TRUE	1500	2408.79	20.00	181701
142906	B	3	TRUE	TRUE	1500	2410.31	20.01	181701
142907	B	4	TRUE	TRUE	1500	2746.30	20.01	181701
142908	B	4	TRUE	TRUE	1500	2794.73	20.01	181701
152834	B	3	TRUE	TRUE	1500	3500.00	133.18	181701
152901	B	3	TRUE	TRUE	1500	3500.00	88.92	181701
152902	B	4	TRUE	TRUE	1500	2821.37	20.00	181701
152903	B	3	TRUE	TRUE	1500	2422.87	20.02	181701
152904	B	3	TRUE	TRUE	1500	2373.98	20.01	181701
J-121	B	3	TRUE	TRUE	1500	3500.00	136.39	181701
J-122	B	3	TRUE	TRUE	1500	3500.00	129.61	181701
J-123	B	3	TRUE	TRUE	1500	3500.00	117.53	181701
J-124	B	3	TRUE	TRUE	1500	3500.00	116.08	181701
J-125	B	3	TRUE	TRUE	1500	3500.00	112.65	181701
J-126	B	3	TRUE	TRUE	1500	3500.00	111.11	181701
J-127	B	3	TRUE	TRUE	1500	3500.00	110.01	181701
J-128	B	3	TRUE	TRUE	1500	3500.00	115.02	181701
J-129	B	3	TRUE	TRUE	1500	3500.00	73.41	181701
J-130	B	3	TRUE	TRUE	1500	3500.00	55.24	181701
J-131	B	3	TRUE	TRUE	1500	3500.00	49.23	181701
J-132	B	3	TRUE	TRUE	1500	3500.00	42.66	181701
J-133	B	3	TRUE	TRUE	1500	3500.00	42.68	181701
J-134	B	3	TRUE	TRUE	1500	3500.00	47.61	181701
J-135	B	3	TRUE	TRUE	1500	3500.00	56.83	181701
J-136	B	3	TRUE	TRUE	1500	3500.00	75.81	181701
J-137	B	3	TRUE	TRUE	1500	3500.00	114.84	181701
J-138	B	3	TRUE	TRUE	1500	3500.00	29.31	181701
J-139	B	4	TRUE	TRUE	1500	3337.92	20.00	181701
J-140	B	3	TRUE	TRUE	1500	3500.00	24.62	181701
J-141	B	6	TRUE	TRUE	1500	3102.32	20.89	181701
J-142	B	6	TRUE	TRUE	1500	2751.06	20.89	181701
J-143	B	3	TRUE	TRUE	1500	2510.11	20.03	181701
J-392	B	4	TRUE	TRUE	1500	3157.82	20.00	181701
J-393	B	5	TRUE	TRUE	1500	3154.23	20.00	181701
J-889	B	21	TRUE	TRUE	1500	2475.30	22.26	181701
J-890	B	21	TRUE	TRUE	1500	2478.43	22.24	181701
J-1167	B	3	TRUE	TRUE	1500	3500.00	49.16	181701

Wildcat Industrial Park
Fire Flow Report

J-1168	B	3	TRUE	TRUE	1500	3500.00	46.13	181701
J-1539	B	8	TRUE	TRUE	1500	3384.38	20.03	181701
J-1540	B	5	TRUE	TRUE	1500	3375.23	20.00	181701
J-1870	B	3	TRUE	TRUE	1500	3500.00	110.35	181701
J-1871	B	3	TRUE	TRUE	1500	3500.00	109.75	181701
J-2126	B	4	TRUE	TRUE	1500	3314.85	20.01	181701
J-2545	B	3	TRUE	TRUE	1500	3500.00	142.01	181701
J-2546	B	3	TRUE	TRUE	1500	3500.00	138.62	181701
J-3113	B	4	TRUE	TRUE	1500	3007.12	20.01	181701
J-3114	B	4	TRUE	TRUE	1500	2976.27	20.00	142907
J-3166	B	4	TRUE	TRUE	1500	3092.69	20.00	181701
J-3167	B	4	TRUE	TRUE	1500	3058.75	20.00	181701
J-4743	B	3	TRUE	TRUE	1500	3500.00	141.89	181701
J-4744	B	3	TRUE	TRUE	1500	3500.00	141.85	181701
J-4810	B	3	TRUE	TRUE	1500	2433.24	20.00	181701
J-5500	B	4	TRUE	TRUE	1500	2864.65	20.00	181701
J-6458	B	3	TRUE	TRUE	1500	3500.00	50.42	181701
J-6851	B	3	TRUE	TRUE	1500	3500.00	51.79	181701
J-7274	B	3	TRUE	TRUE	1500	2399.51	20.01	181701
J-7403	B	21	TRUE	TRUE	1500	2462.44	20.99	181701
J-7535	B	21	TRUE	TRUE	1500	2428.40	21.59	181701
J-7992	B	22	TRUE	TRUE	1500	2400.74	21.22	181701
J-8001	B	21	TRUE	TRUE	1500	2489.62	22.35	181701
J-8645	B	21	TRUE	TRUE	1500	2465.81	22.05	181701
J-8768	B	10	TRUE	TRUE	1500	3032.15	20.66	181701
J-8769	B	23	TRUE	TRUE	1500	3009.86	21.02	181701
J-9341	B	3	TRUE	TRUE	1500	3500.00	111.31	181701
J-9387	B	5	TRUE	TRUE	1500	3009.37	20.00	181701
J-9492	B	3	TRUE	TRUE	1500	3500.00	101.15	181701
J-9552	B	4	TRUE	TRUE	1500	2359.01	20.01	181701
J-11599	B	21	TRUE	TRUE	1500	2421.80	21.83	181701
J-11676	B	8	TRUE	TRUE	1500	2521.00	23.59	181701
J-12315	B	23	TRUE	TRUE	1500	2941.70	22.36	181701
J-13593	B	3	TRUE	TRUE	1500	2365.56	20.01	181701
J-14080	B	3	TRUE	TRUE	1500	3500.00	59.13	181701
J-14199	B	3	TRUE	TRUE	1500	3500.00	95.70	181701
J-14201	B	3	TRUE	TRUE	1500	3500.00	31.33	181701
J-14204	B	3	TRUE	TRUE	1500	3500.00	56.79	181701