

Fire Flow Study

For

Parkland Farms Subdivision

120 Parkland Farms Boulevard

Healdsburg, CA

APN 091-040-111

JN 14032

September 14, 2018

Prepared for:

Urban Green Investments, LLC

1746 Union Street

San Francisco, CA 94123

Barrett.elmer@urbangreeninv.com

James L. Jensen, RCE 73042
My license expires 12/31/2018

Prepared by:

 **adobe associates, inc.**
civil engineering | land surveying | wastewater

1220 N. Dutton Ave., Santa Rosa, CA 95401

P. (707) 541-2300 F. (707) 541-2301

Website: www.adobeinc.com

Prepared By: KM

Checked By: ZR

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Fire Flow Study Narrative

1 Project Description

The proposed project is located at 120 Parkland Farms Boulevard in Healdsburg, California. The project proposes to subdivide an existing 11.4 acres into 11 custom lots. The subdivided lots propose single family homes.

2 Water Use Study

2.1 Existing Water System

Water supply is provided by the City of Healdsburg's existing distribution system. There is an existing 12-inch water main running along Parkland Farms which connects to hydrant "EX_FH-1", to the north west near the Subdivision and, a 12-inch water main along Canyon Run which connects to hydrant "EX_FH-2", located south east of the subdivision. **See, Appendix I: Hydrant Map.**

Static pressure for fire hydrants was determined using elevation difference between the Inversion North reservoir and the proposed lot elevations.

2.2 Proposed Water System

The water system improvements will consist of domestic, fire, and irrigation services for the proposed single-family subdivision. This project proposes to connect a new 8-inch water line between the existing 12-inch water main running along Parkland Farms Boulevard and the 8-inch water main in Long Acres Place.

2.3 Fire Protection Study

The onsite water system improvements can be designed to meet the City of Healdsburg's fire code. According to California Fire Code section BB105.1; the required fire flow may be reduced up to 75% from each building type requirement, no less than 1,500 gallons per minute (gpm), if the

building has an approved automatic sprinkler system. Residual pressure of 20-pounds per square inch (psi) must always be met or exceeded.

Modeling of the proposed fire water system was performed using public domain pipe distribution system modeling software (EPANET 2). The analysis model contains the existing 12-inch line, existing hydrants, and the proposed water line and fire hydrants. The proposed pipe network is shown in the **Fire Flow Exhibit** and detailed in **Table A** in **Appendix I**.

All proposed fire hydrants pass this requirement and shows sufficient pressure when in use.

Scenario 1 – 4: Modeled demand of 1,500-gpm

Model scenarios were computed for each hydrant at a flow rate of 1,500-gpm. Pipe and hydrant results are shown in **Table A**. The maximum system velocity for the 8” pipe is 6.82-feet per second (fps), and the minimum residual pressure at fire flow is 34-psi, occurring at FH-3.

3 Conclusion

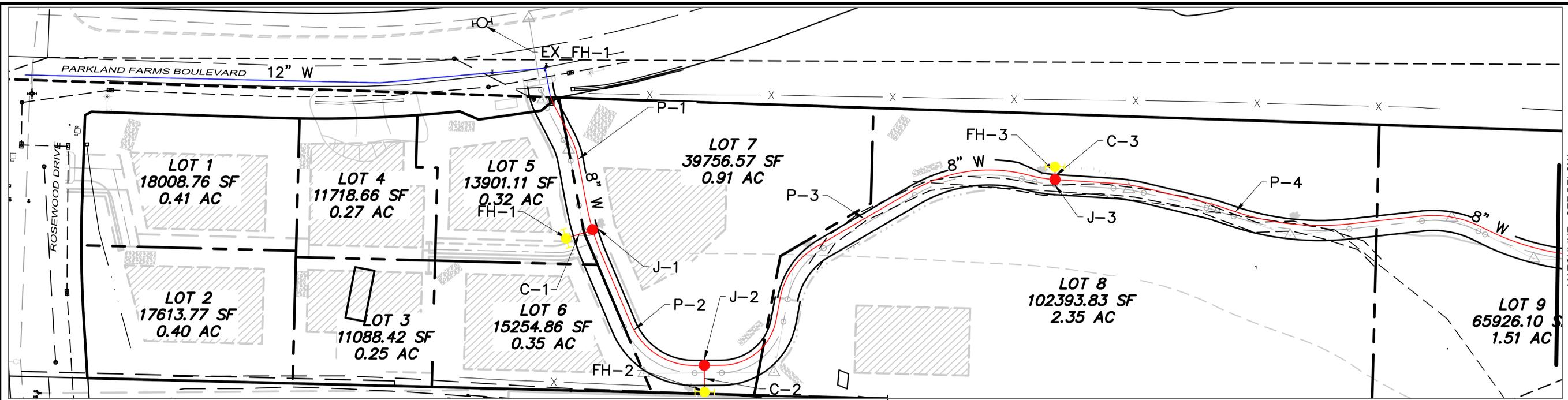
This analysis demonstrates that the proposed water system is sufficient and can deliver the required fire flow. Velocities of the proposed 8-inch line are under 10-fps with a flow rate of 1,500-gpm at any given fire hydrant. Residual pressures in the model were all above the minimum threshold of 20-psi at fire flow.

Appendix I

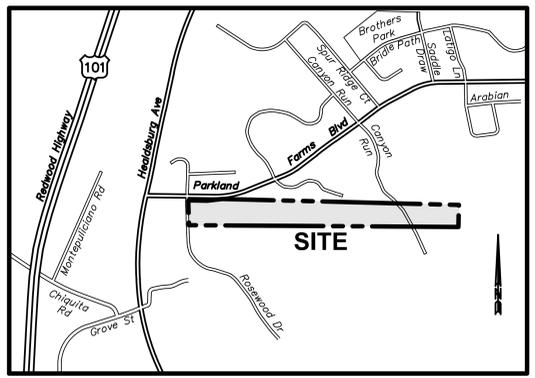
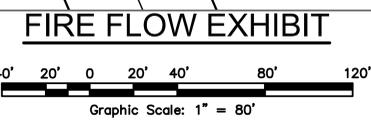
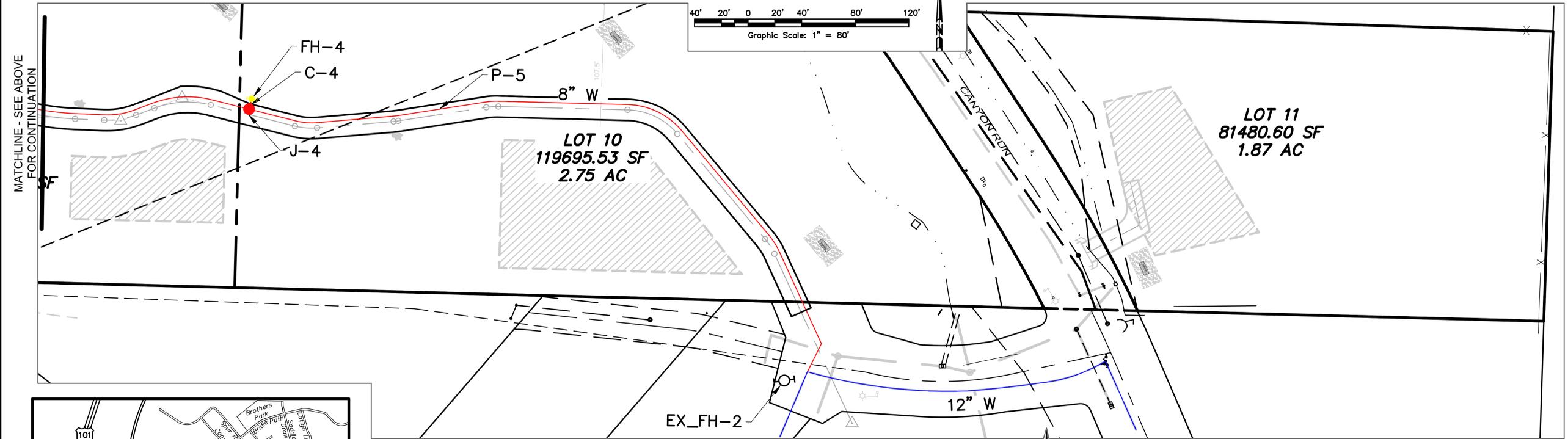
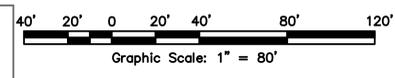
Water Use

Exhibits & Calculations

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FIRE FLOW EXHIBIT



VICINITY MAP
NTS

LEGEND:

- JUNCTION NODE
- FIRE HYDRANT NODE
- PUBLIC WATER PIPE
- PROPOSED WATER PIPE

ABBREVIATIONS

- C- CONNECTION
- EX EXISTING
- FH- FIRE HYDRANT
- J- JUNCTION
- NTS NOT TO SCALE
- P- PIPE
- W WATER MAIN

FIRE FLOW EXHIBIT

URBAN GREEN INVESTMENTS, LLC
120 Parkland Farms Boulevard, Healdsburg, CA

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MATCHLINE - SEE BELOW FOR CONTINUATION

MATCHLINE - SEE ABOVE FOR CONTINUATION

Fire Flow Summary Table

Date: 9/14/2018
By: KM

Project: Parkland Farms Subdivision
Job Number: 14032

Water Pipes

Label	Diameter (in)	Length (User Defined) (ft)	Minor Loss Equivalent Length (ft)	Total Length (ft)	Max Unit Headloss (ft/Kft)	Max Total Headloss in Pipe (ft)	Max Velocity (ft/s)	Hazen-Williams (C)	Material
P-1	8	136	37	173	15.86	2.75	6.82	150	PVC
P-2	8	152	77	229	2.95	0.68	6.21	150	PVC
P-3	8	348	47	395	2.95	1.16	5.31	150	PVC
P-4	8	564	47	611	2.95	1.80	4.26	150	PVC
P-5	8	548	35	583	2.95	1.72	5.55	150	PVC
C-1	6	21	65	86	120.57	10.40	17.02	150	PVC
C-2	6	20	65	85	120.57	10.27	17.02	150	PVC
C-3	6	6	65	71	120.57	8.59	17.02	150	PVC
C-4	6	6	65	71	120.57	8.59	17.02	150	PVC

Fire Hydrant Results

Label	Elevation (ft)	Hydraulic Grade (ft)	Max Demand (gpm)	Static System Pressure (psi)	Min Residual Pressure (psi)
FH-1	233	170	1,500	73	66
FH-2	250	153	1,500	66	58
FH-3	306	97	1,500	42	34
FH-4	289	114	1,500	49	42

Table A Fire Flow Analysis (Scenario 1)

Date: 9/14/2018
By: KM

Project: Parkland Farms Subdivision
Job Number: 14032

Water Pipes

Label	Diameter (in)	Length (User Defined) (ft)	Minor Loss Equivalent Length (ft)	Total Length (ft)	Unit Headloss (ft/Kft)	Total Headloss in Pipe (ft)	Max Velocity (ft/s)	Hazen-Williams (C)	Material
P-1	8	136	37	173	15.86	2.75	6.82	150	PVC
P-2	8	152	77	229	2.95	0.68	2.75	150	PVC
P-3	8	348	47	395	2.95	1.16	2.75	150	PVC
P-4	8	564	47	611	2.95	1.80	2.75	150	PVC
P-5	8	548	35	583	2.95	1.72	2.75	150	PVC
C-1	6	21	65	86	120.57	10.40	17.02	150	PVC
C-2	6	20	65	85	0	0	0	150	PVC
C-3	6	6	65	71	0	0	0	150	PVC
C-4	6	6	65	71	0	0	0	150	PVC

Fire Hydrant Results

Scenario 1: Fire Hydrant 1

Label	Elevation (ft)	Hydraulic Grade (ft)	Demand (gpm)	Static System Pressure (psi)	Residual Pressure (psi)
FH-1	233	170	1,500	73	66
FH-2	250	153	-	66	64
FH-3	306	97	-	42	40
FH-4	289	114	-	49	48

Table A Fire Flow Analysis (Scenario 2)

Date: 9/14/2018
By: KM

Project: Parkland Farms Subdivision
Job Number: 14032

Water Pipes

Label	Diameter (in)	Length (User Defined) (ft)	Minor Loss Equivalent Length (ft)	Total Length (ft)	Unit Headloss (ft/Kft)	Total Headloss in Pipe (ft)	Max Velocity (ft/s)	Hazen-Williams (C)	Material
P-1	8	136	37	173	13.32	2.31	6.21	150	PVC
P-2	8	152	77	229	13.32	3.05	6.21	150	PVC
P-3	8	348	47	395	4.28	1.69	3.36	150	PVC
P-4	8	564	47	611	4.28	2.61	3.36	150	PVC
P-5	8	548	35	583	4.28	2.49	3.36	150	PVC
C-1	6	21	65	86	0	0.00	0	150	PVC
C-2	6	20	65	85	120.57	10.27	17.02	150	PVC
C-3	6	6	65	71	0	0	0	150	PVC
C-4	6	6	65	71	0	0	0	150	PVC

Fire Hydrant Results

Scenario 2: Fire Hydrant 2

Label	Elevation (ft)	Hydraulic Grade (ft)	Demand (gpm)	Static System Pressure (psi)	Residual Pressure (psi)
FH-1	233	170	-	73	71
FH-2	250	153	1,500	66	58
FH-3	306	97	-	42	39
FH-4	289	114	-	49	48

Table A Fire Flow Analysis (Scenario 3)

Date: 9/14/2018
By: KM

Project: Parkland Farms Subdivision
Job Number: 14032

Water Pipes

Label	Diameter (in)	Length (User Defined) (ft)	Minor Loss Equivalent Length (ft)	Total Length (ft)	Unit Headloss (ft/Kft)	Total Headloss in Pipe (ft)	Max Velocity (ft/s)	Hazen-Williams (C)	Material
P-1	8	136	37	173	9.97	1.73	5.31	150	PVC
P-2	8	152	77	229	9.97	2.28	5.31	150	PVC
P-3	8	348	47	395	9.97	3.93	5.31	150	PVC
P-4	8	564	47	611	6.64	4.05	4.26	150	PVC
P-5	8	548	35	583	6.64	3.87	4.26	150	PVC
C-1	6	21	65	86	0	0.00	0	150	PVC
C-2	6	20	65	85	0	0.00	0	150	PVC
C-3	6	6	65	71	120.57	8.59	17.02	150	PVC
C-4	6	6	65	71	0	0	0	150	PVC

Fire Hydrant Results

Scenario 3: Fire Hydrant 3

Label	Elevation (ft)	Hydraulic Grade (ft)	Demand (gpm)	Static System Pressure (psi)	Residual Pressure (psi)
FH-1	233	170	-	73	72
FH-2	250	153	-	66	64
FH-3	306	97	1,500	42	34
FH-4	289	114	-	49	47

Table A Fire Flow Analysis (Scenario 4)

Date: 9/14/2018
By: KM

Project: Parkland Farms Subdivision
Job Number: 14032

Water Pipes

Label	Diameter (in)	Length (User Defined) (ft)	Minor Loss Equivalent Length (ft)	Total Length (ft)	Unit Headloss (ft/Kft)	Total Headloss in Pipe (ft)	Max Velocity (ft/s)	Hazen-Williams (C)	Material
P-1	8	136	37	173	5.96	1.03	4.02	150	PVC
P-2	8	152	77	229	5.96	1.37	4.02	150	PVC
P-3	8	348	47	395	5.96	2.35	4.02	150	PVC
P-4	8	564	47	611	5.96	3.64	4.02	150	PVC
P-5	8	548	35	583	10.82	6.30	5.55	150	PVC
C-1	6	21	65	86	0	0.00	0	150	PVC
C-2	6	20	65	85	0	0.00	0	150	PVC
C-3	6	6	65	71	0	0.00	0	150	PVC
C-4	6	6	65	71	120.57	8.59	17.02	150	PVC

Fire Hydrant Results

Scenario 4: Fire Hydrant 4

Label	Elevation (ft)	Hydraulic Grade (ft)	Demand (gpm)	Static System Pressure (psi)	Residual Pressure (psi)
FH-1	233	170	-	73	72
FH-2	250	153	-	66	65
FH-3	306	97	-	42	39
FH-4	289	114	1,500	49	42