

Final Utility Report

Bella Mesa Filing No. 1

Prepared for:

Cardel Homes

9110 East Nichols Ave, Suite 120

Denver, CO 80112

Contact: Mike Newman

(303) 662-8942 voice

Prepared by:



Redland

WHERE GREAT PLACES BEGIN

720.283.6783 Office
1500 West Canal Court
Littleton, Colorado 80120

REDLAND.COM

June 10, 2026

Project No. 17026.007



Engineer's Statement:

The enclosed utility report, and exhibits, were prepared by me or under my direct supervision and is correct to the best of my knowledge and belief. Said utility report has been prepared in accordance with applicable Town of Castle Rock criteria and is in conformance with the master utility plans for the affected area. I accept responsibility for any liability caused by negligent acts, errors, or omissions on my part in preparing this report.

Signature: _____

Travis Frazier, P.E.

Registered Professional Engineer

State Of Colorado No. 45342

Owner/Developer's Statement:

As Owner/Developer of Land(s) identified within this report; I agree to proceed, implement and comply with all recommendations and requirements outlined herein.

Name of Developer

Authorized Signature

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General Location and Description

Introduction

This report presents an analysis of the water and wastewater requirements for the Bella Mesa South subdivision, hereafter referred to as the Site.

Site Location

The Site is a part of the East half of Section 8, Township 8 South, Range 66 West of the 6th P.M., in the Town of Castle Rock, County of Douglas, State of Colorado. See Appendix F for project Vicinity Map.

Description of Property and Land Use

The Site is roughly 8.9 acres undeveloped and located north of Mikelson Boulevard and is bounded by the Founders Village Filing 24 development to the east, and Founders Village Filing 24 Tract S to the west. Proposed development will include approximately 93 multi-family dwellings along with landscaping, associated roadways, and site infrastructure. In the current condition, native grasses and weeds cover the Site. The southern portion of the Site generally slopes to the southwest towards Mitchell Gulch. The northern portion of the Site generally slopes to the northwest towards Mitchell Gulch and Tract B of Founders Village Filing No. 24. See Appendix F for a conceptual Site utility plan.

Calculated Water Demands

This report analyzes the water system that services the Site's 93 SFE's (Single Family Equivalent). The proposed water flows for the Site have been calculated using the Town of Castle Rock Water System Design 2018 Criteria Manual. See relevant design criteria below:

Demand per SFE	260 gal/day/SFE (Multi-Family Residential)
Maximum Day Factor	MDF = 2.5
Peak Hour Factor	PHF = 5.5
Maximum Day Demand	MDD = (Domestic ADD*MDF) + Irrigation ADD
Peak Hour Demand	PHD = (Domestic ADD*PHF) + Irrigation ADD

Average Day Demands (ADD)

Average Daily Demands were calculated using 260 gpd/SFE and 60.45 SFE for the design demand, resulting in an Average Daily Demand of 16.79 gpm. For complete calculations see Appendix A.

Residential

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Average Daily Demand	16.79	24,180	27.08

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Average Daily Demand	22.99	33,105	37.08

Maximum Day Demands (MDD)

Using the Maximum Day Factor of 2.5, the Maximum Day Demand was calculated to be 41.98 gpm. For complete calculations see Appendix A.

Residential

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	41.98	60,451	67.71

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Maximum Daily Demand	48.18	69,379	77.71

Peak Hour Demands (PHD)

Using the Peak Hour Factor of 5.5, the Peak Hour Demand was calculated to be 92.35. For complete calculations see Appendix A.

Residential

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Peak Hour Demand	92.35	132,984	148.96

Residential & Irrigation

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Acre-ft Per Year (af/yr)
Peak Hour Demand	98.55	141,912	158.96

Existing Water System

The Site has two existing 8" water main stubs, located at the southern and northeastern connections of private road Zola Sage Circle to Mitchell Street within the development. An existing 12" water main is located within Mitchell Street. A map of this can be found within Appendix F. Water services for the development are within the Green Zone, which is supplied by tanks 6A and 6C near Ridge Road, as designated by the Town of Castle Rock. These tanks have a capacity of 4.22 MG.

Most of the development falls within the Green Zone, except for the southwest section of the site within the drainage easement, and a small portion of the northern boundary. Both sections fall within the Red Zone. However, these areas do not require water services since housing is not planned in these areas.

The elevation range of the proposed lots is 6568' - 6583'.

Proposed Water System

Proposed Distribution System

The proposed water system for the Site will connect to existing infrastructure at two points along Mitchell Street and one point along Mikelson Boulevard. Both points on Mitchell Street are existing 8" mains, one at the southeast corner of the Site and the other located at the northeast corner. The proposed water system will also connect to the existing 16" main along Mikelson Boulevard. The proposed water system will be composed of 8" diameter PVC and will be routed throughout the Site, being looped to the three existing connection points. Any future development of the existing water infrastructure needed to serve this site is the responsibility of the developer.

The proposed water system will be constructed in one phase (Phase 1), which will serve the proposed 93 SFD lots. Three points of connection will be made with the existing water system and will serve the Site and create effective looping. Fire hydrants will be placed throughout the Site in accordance with the Castle Rock Fire Department spacing standards of 500 feet maximum. Per City of Castle Rock Standards, residential developments are required to meet a minimum of 1,500 GPM in a fire flow condition. Refer to the tables provided in Appendix C for more details on water demand calculations. The design of the proposed water system complies with the Town's Water Master Plan.

Proposed Supply Facilities

The Site is served by the Green Zone Water Tanks 6A and 6C, with the combined capacity of 4.22 MG.

Required storage needed for the Site is based on proposed demands and is calculated below.

Storage Volume = Maximum Day Demand + Fire Flow
= (41.98gpm * 60min/hr * 24hrs) + (1000gpm * 60 min/hr * 2hrs)
= 60,450 gallons + 120,000 gallons
Storage Volume = approximately 180,450 gallons (0.155 MG)

Dedication Requirements

To support the municipal water supply for the property, the owner must convey water rights to the Town. The Town will not grant land use approvals for any additional development until this requirement is met. Please see the Bella Mesa South Water Budget Letter by Redland dated October 10th, 2024 in Appendix G. The Budget Letter accounts for 82 townhome lots, with a dedication of 0.65 SFE per townhome lot. With the updated SDP Site Plan, 93 townhome lots are assumed. Based on the updated irrigation plans by Hines, approximately 2.6 acre-feet of water will be required for irrigation. Only permanently irrigated areas were used to calculate the anticipated SFE's, which excludes areas such as native grasses. One 1" irrigation tap shall be assumed, which equates to approximately 1.67 SFE's per the Town's system development fee table. The Site will require 62.1 SFE's total, with the calculation shown below.

$$(93 \text{ lots} * 0.65 \text{ SFE}) + (1 \text{ irrigation tap} * 1.67 \text{ SFE}) = 62.1 \text{ SFE}$$

Proposed water infrastructure not located within public right-of-way will be within a dedicated utility easement for access and maintenance. Individually owned townhomes shall have a dedicated service line and meter to each dwelling unit. The minimum width of the easement is 20' for one utility, 30' for two utilities, and 40' for three utilities per the Town of Castle Rock Water System Design 2018 Criteria Manual. These will be dedicated on the final plat. Any future development of the existing water infrastructure needed to serve the Site is the responsibility of the developer.

Proposed Water System Analysis and Modeling

The proposed water analysis and modeling has been done in accordance with The Town of Castle Rock criteria. It requires the water distribution pipe system to deliver Maximum Day plus Fire Flows demand with a minimum dynamic pressure of 20 psi and a maximum velocity of 15 fps. The Town also requires the system to deliver Peak Hour demands with a minimum pressure of 35 psi and a maximum velocity of 10 fps under the same conditions. In addition, the minimum static pressure with zero demand criteria (20% tank stage) is 43 psi and the maximum static pressure with zero demand criteria (100% tank stage) is 125 psi.

Different flow models were completed and compared to the corresponding Town criteria. The models consisted of Average Day, Maximum Day, Maximum Day plus Fire Flow, Peak Hour. The minimum static pressure (20% tank stage) HGL elevation used in the model was 6805', and the maximum static pressure (100% tank stage) HGL used in the model was 6824'.

Each model contains two outputs. The first being the Junction Report, which is used to check water pressure in the model against the Town’s criteria. The second is the Pipe Report, which is used to check velocities and head loss against the Town’s criteria. Full results for each scenario can be found in Appendix C.

The proposed water distribution system within the Site has met all the Town of Castle Rocks criteria. The Maximum Day plus Fire Flow minimum network pressure was modeled to be 95 psi at Junction J-3, and the maximum velocity was modeled to be 11.72 fps. This meets the Towns criteria of a minimum dynamic pressure of 20 psi and maximum velocity of 15 fps.

The Peak Hour minimum network pressure was modeled to be 96 psi at Junction J-11, and the maximum velocity was modelled to be 0.22 fps. This meets the Towns criteria of a minimum dynamic pressure of 35 psi and maximum velocity of 10 fps.

The minimum static pressure (20% tank stage) network was modeled to be 96 psi at Junction J-11. This meets the Towns criteria of a minimum static pressure of 43 psi.

The maximum static pressure (100% tank stage) network was modeled to be 110 psi at Junction J-1. This meets the Towns criteria of a maximum static pressure of 125 psi.

Calculated Wastewater Flows

This report analyzes the sanitary sewer system that services the future Site’s 93 SFE’s. The proposed wastewater flows for the Site have been calculated using the Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual. See relevant design criteria below:

Demand per SFE	130 gal/day/SFE (Multi-Family Residential)
Peak Factor	PF = 5.0
Infiltration/Inflow	I/I = 0.10*ADF
Peak Design Flow	PDF = (ADF*PF) + (I/I)

Average Day Wastewater Flows (ADF)

Average Daily Flows were calculated using 130 gpd/SFE and 60.45 SFE for the design basin, resulting in an Average Daily Flow of 8.40 gpm. For complete calculations see Appendix D.

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Cubic Feet Per Second (cfs)
Average Daily Flow	8.40	12,090	0.02

Peaking Factor

A maximum peaking factor of 5.0 was used to determine a Peak Design Flow for the Site. This demand includes infiltration/inflow demands, for complete calculations see Appendix D.

Peak Design Flows (PDF)

Using the Peaking Factor of 5.0, the Peak Design Flow was calculated to be 41.98 gpm. Including Infiltration/Inflow the Peak Design Flow was calculated to be 42.82 gpm, for complete calculations see Appendix D.

	Gallons Per Minute (gpm)	Gallons Per Day (gpd)	Cubic Feet Per Second (cfs)
Peak Design Flow	41.98	60,450	0.09
Peak Design Flow w/ Infiltration	42.82	61,659	0.1

Existing Wastewater System

Existing Collection System

An existing 10" gravity sanitary sewer main lies within Mikelson Boulevard. The Site is located in the Mitchell Creek Lift Station Basin. The Site will connect and flow to an existing sanitary manhole, located near the southeast connection with Private Alley D. See Appendix F for a conceptual Site utility plan and Wastewater Master Plan Zone map.

Proposed Wastewater System

Proposed Collection System

It is anticipated that the Site will be serviced by 8" in diameter sanitary sewer mains throughout the Site. Within the Site, gravity mains will convey wastewater to the southwest.

Land Dedication Requirements

Sanitary sewer infrastructure not located within public right-of-way will be within a dedicated utility easement for access and maintenance. The minimum width of the easement is 20' per the Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual. Any future development of the existing wastewater infrastructure needed to serve the Site is the responsibility of the developer.

Proposed Wastewater System Analysis and Modeling

The proposed wastewater analysis and modeling has been done in accordance with The Town of Castle Rock criteria. Hydraflow Express was used to analyze the sanitary pipe capacity and velocities for the development.

See Appendix E for results of the modeling. Design constraints considered in the model are as follows:

Manning's Coefficient (PVC)	0.011
Maximum Velocity at Peak Design Flow	10 fps
Minimum Velocity at Peak Design Flow	2 fps
Minimum Pipe Slope (8in)	0.4%
Maximum Pipe Slope (8in)	7.5%
Full Flow Capacity	75%

Average Day and Peak Design Flow scenarios were modeled to analyze the proposed pipe capacities and velocities.

Peak Design Flow was calculated to be 0.1 cfs, and the resulting pipe velocity was modeled to be 1.68 fps at a minimum pipe slope of 0.4%, which does not meet the Town's minimum velocity criteria. Minimum pipe slopes for the Site will need to be 0.7%, resulting in a pipe velocity of 2.06 fps. A portion of the sanitary main will be approximately 0.4% due to design constraints regarding sanitary services and clearance from the storm sewer. This segment of pipes on Zola Sage Circle is at the beginning of the sanitary line, meaning they will not experience peak flows and will have capacity to operate properly. The pipe velocity was also modeled to be 4.13 fps at a maximum pipe slope of 7.5%, this meets the Town's maximum velocity criteria.

Potential Permitting Requirements

Permits for the proposed development will be applied for through the Town of Castle Rock and the State of Colorado, where applicable. Permits will be in place prior to the start of construction.

References

1. *Town of Castle Rock Water System Design 2018 Criteria Manual*, dated December 4, 2018.
2. *Town of Castle Rock Wastewater Collection Design 2018 Criteria Manual*, dated December 4, 2018.

3. *Town of Castle Rock, 2023 Water Master Plan*, dated 2023.
4. *Town of Castle Rock, 2022 Wastewater Master Plan*, dated 2022.
5. *Founders Village Filing 24 Final Utility Report*, dated 2005.

Appendix A – Water Demands

Bella Mesa South
Preliminary Utility Report

Redland
5/11/2026

Water Demands

Maximum Day Demand (MDD) 2.5
Peak Hour Demand (PHD) 5.5

Residential Only

Phase (SF -Residential)	Use	Dwelling Units	Area (AC)	Equivalent (SFE/DU)	SFE	Avg Day Demand (GPD/DU)	Avg Day (GPM/SFE)	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Peak Hour Demand (GPM)
1	SF	93	8.9	0.65	60.45	260	0.28	24,180.00	16.79	41.98	92.35
Totals:	-	93	8.9	-	60.45	-	0.28	24,180.00	16.79	41.98	92.35

*Per Town Of Castle Rock Water System Design 2018 Criteria Manual, Section 4.4.1

Irrigation

Phase	Use	Irrigated Area (AC)	Land Use Rate (GPD/AC)	Avg Day Demand (GPD)	Avg Day Demand (GPM)
1	IRR	2.38	3,750.00	8,925.00	6.20

*Per Town Of Castle Rock Water System Design 2018 Criteria Manual, Section 4.4.1

Residential & Irrigation

Phase	Use	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Peak Hour Demand (GPM)
1	SF & IRR	33,105.00	22.99	48.18	98.55

*Per Town Of Castle Rock Water System Design 2018 Criteria Manual, Section 4.4.1

Appendix B – Water Storage

MEMORANDUM

To: Castle Rock Fire and Rescue Department

Prepared By: Brooke Smetanka

Date: 10/3/2025

RE: Bella Mesa South – Required Fire Flow

Development Description

This memorandum has been prepared to confirm the required fire flow and duration for the proposed residential development, Bella Mesa South. The site is roughly 8.9 acres and undeveloped in the current condition. It is located north of Mikelson Boulevard and is bounded by the Founders Village Filing 24 development to the east, and Founders Village Filing 24 Tract S to the west. The development will include approximately 93 multi-family dwellings, along with landscaping, associated roadways, and site infrastructure.

- Building square footage:
 - This development includes townhome units in 4, 5, and 6 pack configurations. Units are separated by a fire wall.
 - The largest building within this development is 14,608 SQFT (6 pack)
 - The largest unit within that building is 2,560 SQFT
- Building construction type: V-B
- Sprinklered: Yes, 13D



Fire Flow and Required Duration (CRFD)

Fire Flow: 1000 gpm
Duration: 2 hours

Plan Review # 18684

Kevin Sullivan

Digitally signed by Kevin Sullivan
DN: C=US, E=ksullivan@crgov.com,
O="Castle Rock Fire and Rescue
Department ", CN=Kevin Sullivan
Reason: Reviewed for Compliance
Date: 2025.10.21 18:39:07-06'00'

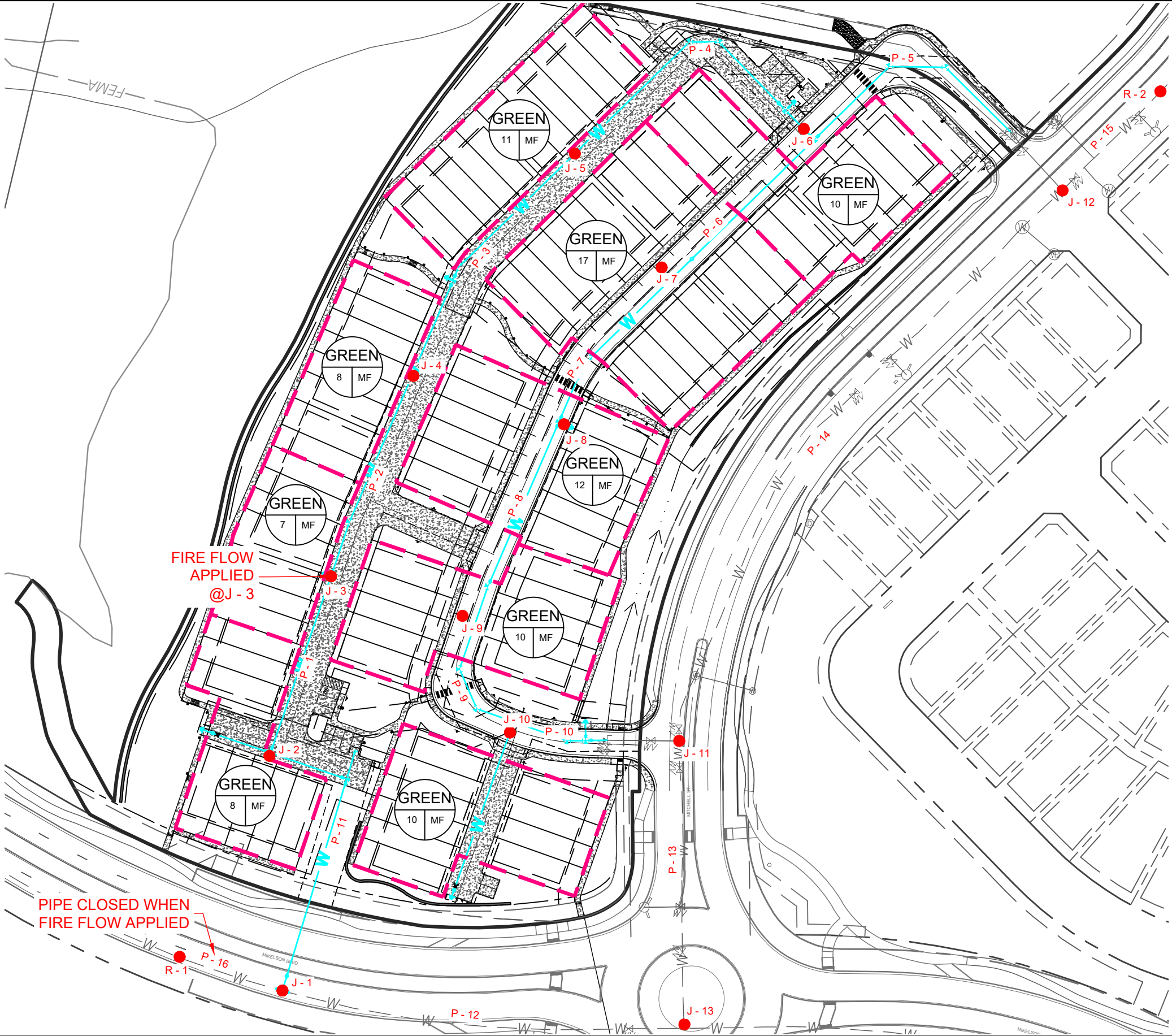
CRFD Signature

Water Storage
Maximum Day Demand (MDD) 2.5

Type	Use	Dwelling Units	Area (AC)	Equivalent (SFE/DU)	SFE	Avg Day Demand (GPD/DU)	Avg Day (GPM/SFE)	Avg Day Demand (GPD)	Avg Day Demand (GPM)	Maximum Day Demand (GPM)	Total (gallons)
Bella Mesa South Fire Flow (1500 gpm @ 2 hrs)	SF	93	8.9	0.65	60.45	260	0.28	24,180.00	16.79	41.98	60,450.00 120,000.00
Totals:											180,450.00

*Per Town Of Castle Rock Water System Design 2018 Criteria Manual, Section 4.4.2

Appendix C – Water Hydraulic Analysis and Modeling

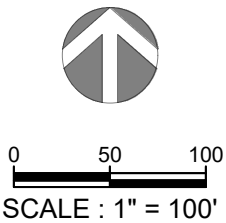


LEGEND:

UNIT COUNT — GREEN — WATER ZONE

XX MF — MULTI-FAMILY

PROPOSED WATER BASIN



BELLA MESA SOUTH
OVERALL WATER MAP
EXHIBIT

Redland
WHERE GREAT PLACES BEGIN

Land Planning Landscape Architecture
Civil Engineering Construction Management

720.283.6783
REDLAND.COM

DATE: 06/04/2026

PROJECT NO: 17026.007

DRAWING NO:
1 OF 1

Bella Mesa South - WaterCAD Output Tables
Static Conditions - 20%
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,805.00	102
J-2	6,576.36	0	6,805.00	99
J-3	6,579.10	0	6,805.00	98
J-4	6,576.08	0	6,805.00	99
J-5	6,576.18	0	6,805.00	99
J-6	6,575.59	0	6,805.00	99
J-7	6,577.06	0	6,805.00	99
J-8	6,578.81	0	6,805.00	98
J-9	6,579.52	0	6,805.00	98
J-10	6,578.80	0	6,805.00	98
J-11	6,582.43	0	6,805.00	96
J-12	6,578.92	0	6,805.00	98
J-13	6,580.68	0	6,805.00	97

Bella Mesa South - WaterCAD Output Tables

Static Conditions - 20%

FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3	187	8.0	PVC	120.0	0	0.00	0.000
P-2	J-3	J-4	184	8.0	PVC	120.0	0	0.00	0.000
P-3	J-4	J-5	260	8.0	PVC	120.0	0	0.00	0.000
P-4	J-5	J-6	287	8.0	PVC	120.0	0	0.00	0.000
P-5	J-6	J-12	312	8.0	PVC	120.0	0	0.00	0.000
P-6	J-6	J-7	182	8.0	PVC	120.0	0	0.00	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	0	0.00	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	0	0.00	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	0	0.00	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	0	0.00	0.000
P-11	J-2	J-1	275	8.0	PVC	120.0	0	0.00	0.000
P-12	J-1	J-13	374	16.0	PVC	120.0	0	0.00	0.000
P-13	J-13	J-11	264	12.0	PVC	120.0	0	0.00	0.000
P-14	J-11	J-12	633	12.0	PVC	120.0	0	0.00	0.000
P-15	J-12	R-2	131	12.0	PVC	120.0	0	0.00	0.000
P-16	R-1	J-1	97	16.0	PVC	120.0	(N/A)	(N/A)	(N/A)

Bella Mesa South - WaterCAD Output Tables
Static Conditions - 20%

FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
60	R-1	6,805.00	<None>	0	6,805.00
61	R-2	6,805.00	<None>	0	6,805.00

Bella Mesa South - WaterCAD Output Tables
Static Conditions - 100%
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,824.00	110
J-2	6,576.36	0	6,824.00	107
J-3	6,579.10	0	6,824.00	106
J-4	6,576.08	0	6,824.00	107
J-5	6,576.18	0	6,824.00	107
J-6	6,575.59	0	6,824.00	107
J-7	6,577.06	0	6,824.00	107
J-8	6,578.81	0	6,824.00	106
J-9	6,579.52	0	6,824.00	106
J-10	6,578.80	0	6,824.00	106
J-11	6,582.43	0	6,824.00	105
J-12	6,578.92	0	6,824.00	106
J-13	6,580.68	0	6,824.00	105

Bella Mesa South - WaterCAD Output Tables
Static Conditions - 100%
FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3	187	8.0	PVC	120.0	0	0.00	0.000
P-2	J-3	J-4	184	8.0	PVC	120.0	0	0.00	0.000
P-3	J-4	J-5	260	8.0	PVC	120.0	0	0.00	0.000
P-4	J-5	J-6	287	8.0	PVC	120.0	0	0.00	0.000
P-5	J-6	J-12	312	8.0	PVC	120.0	0	0.00	0.000
P-6	J-6	J-7	182	8.0	PVC	120.0	0	0.00	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	0	0.00	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	0	0.00	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	0	0.00	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	0	0.00	0.000
P-11	J-2	J-1	275	8.0	PVC	120.0	0	0.00	0.000
P-12	J-1	J-13	374	16.0	PVC	120.0	0	0.00	0.000
P-13	J-13	J-11	264	12.0	PVC	120.0	0	0.00	0.000
P-14	J-11	J-12	633	12.0	PVC	120.0	0	0.00	0.000
P-15	J-12	R-2	131	12.0	PVC	120.0	0	0.00	0.000
P-16	R-1	J-1	97	16.0	PVC	120.0	(N/A)	(N/A)	(N/A)

Bella Mesa South - WaterCAD Output Tables
Static Conditions - 100%
FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
60	R-1	6,824.00	0	6,824.00
61	R-2	6,824.00	0	6,824.00

Bella Mesa South - WaterCAD Output Tables
Average Day Conditions
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,805.00	102
J-2	6,576.36	1	6,805.00	99
J-3	6,579.10	1	6,805.00	98
J-4	6,576.08	1	6,805.00	99
J-5	6,576.18	2	6,805.00	99
J-6	6,575.59	2	6,805.00	99
J-7	6,577.06	3	6,805.00	99
J-8	6,578.81	2	6,805.00	98
J-9	6,579.52	2	6,805.00	98
J-10	6,578.80	2	6,805.00	98
J-11	6,582.43	0	6,805.00	96
J-12	6,578.92	0	6,805.00	98
J-13	6,580.68	0	6,805.00	97

Bella Mesa South - WaterCAD Output Tables
Average Day Conditions
FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3	187	8.0	PVC	120.0	4	0.02	0.000
P-2	J-3	J-4	184	8.0	PVC	120.0	2	0.01	0.000
P-3	J-4	J-5	260	8.0	PVC	120.0	1	0.01	0.000
P-4	J-5	J-6	287	8.0	PVC	120.0	-1	0.01	0.000
P-5	J-6	J-12	312	8.0	PVC	120.0	-5	0.03	0.000
P-6	J-6	J-7	182	8.0	PVC	120.0	3	0.02	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	-1	0.00	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	-3	0.02	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	-5	0.03	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	-6	0.04	0.000
P-11	J-2	J-1	275	8.0	PVC	120.0	-5	0.03	0.000
P-12	J-1	J-13	374	16.0	PVC	120.0	5	0.01	0.000
P-13	J-13	J-11	264	12.0	PVC	120.0	5	0.01	0.000
P-14	J-11	J-12	633	12.0	PVC	120.0	-1	0.00	0.000
P-15	J-12	R-2	500	12.0	PVC	120.0	-7	0.02	0.000
P-16	R-1	J-1	500	16.0	PVC	120.0	10	0.02	0.000

Bella Mesa South - WaterCAD Output Tables
Peak Hour Conditions
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,805.00	102
J-2	6,576.36	8	6,804.99	99
J-3	6,579.10	7	6,804.99	98
J-4	6,576.08	8	6,804.99	99
J-5	6,576.18	11	6,804.99	99
J-6	6,575.59	10	6,804.99	99
J-7	6,577.06	17	6,804.99	99
J-8	6,578.81	12	6,804.99	98
J-9	6,579.52	10	6,804.99	98
J-10	6,578.80	10	6,804.99	98
J-11	6,582.43	0	6,805.00	96
J-12	6,578.92	0	6,805.00	98
J-13	6,580.68	0	6,805.00	97

Bella Mesa South - WaterCAD Output Tables
Peak Hour Conditions
FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3	187	8.0	PVC	120.0	20	0.13	0.000
P-2	J-3	J-4	184	8.0	PVC	120.0	13	0.08	0.000
P-3	J-4	J-5	260	8.0	PVC	120.0	5	0.03	0.000
P-4	J-5	J-6	287	8.0	PVC	120.0	-6	0.04	0.000
P-5	J-6	J-12	312	8.0	PVC	120.0	-30	0.19	0.000
P-6	J-6	J-7	182	8.0	PVC	120.0	14	0.09	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	-3	0.02	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	-15	0.09	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	-25	0.16	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	-35	0.22	0.000
P-11	J-2	J-1	275	8.0	PVC	120.0	-28	0.18	0.000
P-12	J-1	J-13	374	16.0	PVC	120.0	29	0.05	0.000
P-13	J-13	J-11	264	12.0	PVC	120.0	29	0.08	0.000
P-14	J-11	J-12	633	12.0	PVC	120.0	-6	0.02	0.000
P-15	J-12	R-2	500	12.0	PVC	120.0	-36	0.10	0.000
P-16	R-1	J-1	500	16.0	PVC	120.0	56	0.09	0.000

Bella Mesa South - WaterCAD Output Tables
Max Day Conditions
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,805.00	102
J-2	6,576.36	4	6,805.00	99
J-3	6,579.10	3	6,805.00	98
J-4	6,576.08	4	6,805.00	99
J-5	6,576.18	5	6,805.00	99
J-6	6,575.59	5	6,805.00	99
J-7	6,577.06	8	6,805.00	99
J-8	6,578.81	5	6,805.00	98
J-9	6,579.52	5	6,805.00	98
J-10	6,578.80	5	6,805.00	98
J-11	6,582.43	0	6,805.00	96
J-12	6,578.92	0	6,805.00	98
J-13	6,580.68	0	6,805.00	97

Bella Mesa South - WaterCAD Output Tables
Max Day Conditions
FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3	187	8.0	PVC	120.0	9	0.06	0.000
P-2	J-3	J-4	184	8.0	PVC	120.0	6	0.04	0.000
P-3	J-4	J-5	260	8.0	PVC	120.0	2	0.01	0.000
P-4	J-5	J-6	287	8.0	PVC	120.0	-3	0.02	0.000
P-5	J-6	J-12	312	8.0	PVC	120.0	-14	0.09	0.000
P-6	J-6	J-7	182	8.0	PVC	120.0	6	0.04	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	-1	0.01	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	-7	0.04	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	-11	0.07	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	-16	0.10	0.000
P-11	J-2	J-1	275	8.0	PVC	120.0	-13	0.08	0.000
P-12	J-1	J-13	374	16.0	PVC	120.0	13	0.02	0.000
P-13	J-13	J-11	264	12.0	PVC	120.0	13	0.04	0.000
P-14	J-11	J-12	633	12.0	PVC	120.0	-3	0.01	0.000
P-15	J-12	R-2	500	12.0	PVC	120.0	-16	0.05	0.000
P-16	R-1	J-1	500	16.0	PVC	120.0	26	0.04	0.000

Bella Mesa South - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P-16 Closed & FF Applied @ J-3
FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	6,570.21	0	6,799.32	99
J-2	6,576.36	1	6,795.15	95
J-3 (FF APPLIED)	6,579.10	1,500	6,792.32	92
J-4	6,576.08	1	6,794.16	94
J-5	6,576.18	2	6,796.77	95
J-6	6,575.59	2	6,799.66	97
J-7	6,577.06	3	6,799.74	96
J-8	6,578.81	2	6,799.85	96
J-9	6,579.52	2	6,799.92	95
J-10	6,578.80	2	6,799.99	96
J-11	6,582.43	0	6,800.07	94
J-12	6,578.92	0	6,801.83	96
J-13	6,580.68	0	6,799.52	95

Bella Mesa South - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P-16 Closed & FF Applied @ J-3
FlexTable: Pipe Table

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	J-2	J-3 (FF APPLIED)	187	8.0	PVC	120.0	834	5.32	0.015
P-2	J-3 (FF APPLIED)	J-4	184	8.0	PVC	120.0	-666	4.25	0.010
P-3	J-4	J-5	260	8.0	PVC	120.0	-668	4.26	0.010
P-4	J-5	J-6	287	8.0	PVC	120.0	-670	4.28	0.010
P-5	J-6	J-12	312	8.0	PVC	120.0	-547	3.49	0.007
P-6	J-6	J-7	182	8.0	PVC	120.0	-124	0.79	0.000
P-7	J-7	J-8	223	8.0	PVC	120.0	-127	0.81	0.000
P-8	J-8	J-9	153	8.0	PVC	120.0	-130	0.83	0.000
P-9	J-9	J-10	146	8.0	PVC	120.0	-131	0.84	0.000
P-10	J-10	J-11	157	8.0	PVC	120.0	-133	0.85	0.001
P-11	J-2	J-1	275	8.0	PVC	120.0	-835	5.33	0.015
P-12	J-1	J-13	374	16.0	PVC	120.0	-835	1.33	0.001
P-13	J-13	J-11	264	12.0	PVC	120.0	-835	2.37	0.002
P-14	J-11	J-12	633	12.0	PVC	120.0	-968	2.75	0.003
P-15	J-12	R-2	500	12.0	PVC	120.0	-1,516	4.30	0.006
P-16	R-1	J-1	500	16.0	PVC	120.0	(N/A)	(N/A)	(N/A)

Bella Mesa South - WaterCAD Output Tables
Max Day + Fire Flow Conditions
P-16 Closed & FF Applied @ J-3
FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
60	R-1	6,805.00	0	6,805.00
61	R-2	6,805.00	1,516	6,805.00

Appendix D – Wastewater Flows

Wastewater Flow

Peaking Factor:
Peak Hour (PHD) 5.0

Phase (SF -Residential)	Use	Dwelling Units	Acres (AC)	Equivalent (SFE/DU)	SFE	Avg Day (GPD/DU)	Avg Day (GPD)	Avg Day (GPM)	Peak Design (GPM)	Peak Design (GPD)	Peak Design Including I/I (GPM)	Peak Design Including I/I (GPD)
1	SF	93	8.9	0.65	60.45	130	12,090.00	8.40	41.98	60,450.00	42.82	61,659.00
Totals:	-	93	8.9	-	60.45	-	12,090.00	8.40	41.98	60,450.00	42.82	61,659.00

*Per Town Of Castle Rock Wastewater Collection Design 2018 Criteria Manual, Section 4.4.1

Appendix E – Wastewater Hydraulic Modeling

Channel Report

Bella Mesa South - Average Day - 8 in Sanitary Main @ 7.5%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 7.50

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.02

Highlighted

Depth (ft) = 0.04

Q (cfs) = 0.020

Area (sqft) = 0.01

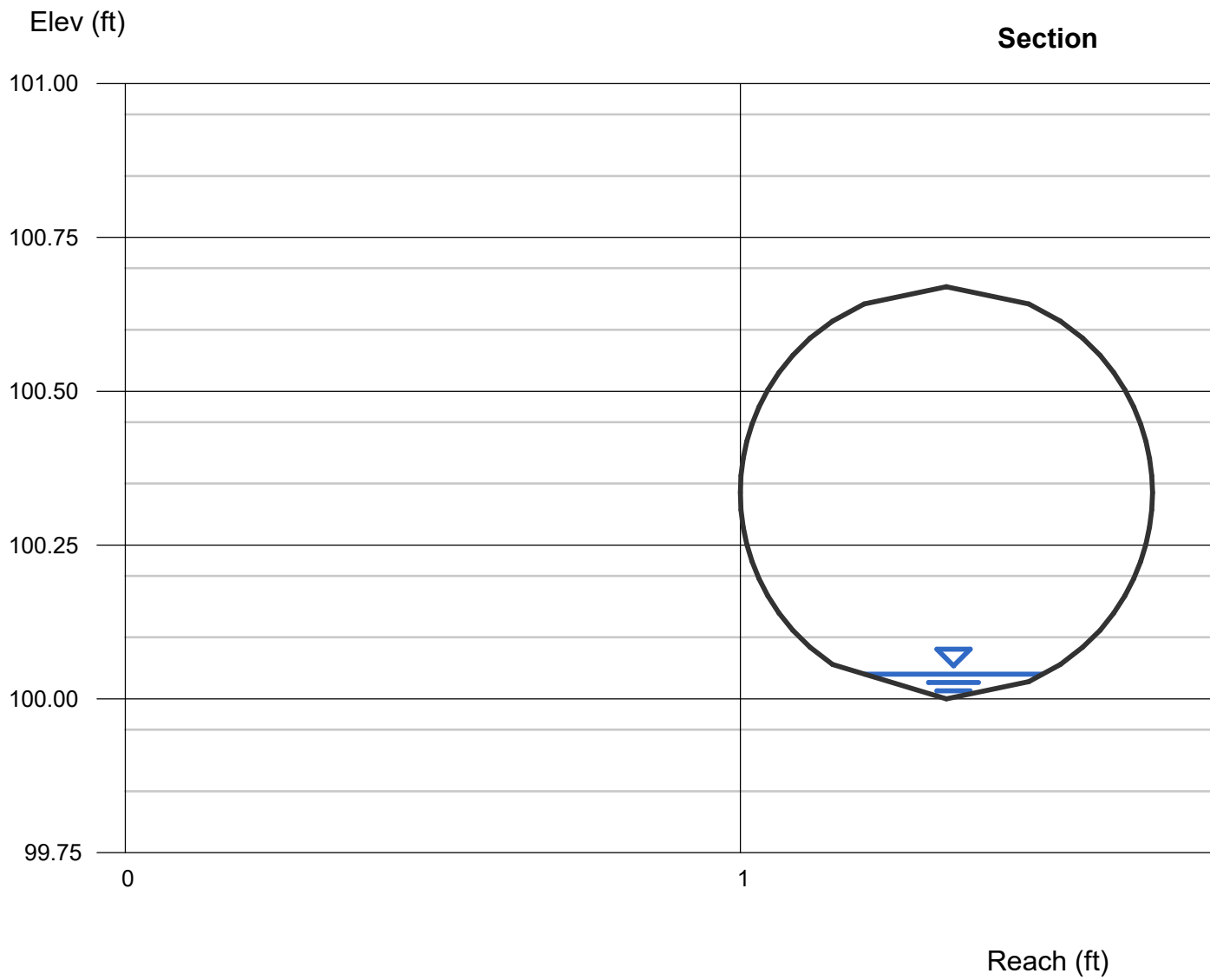
Velocity (ft/s) = 2.31

Wetted Perim (ft) = 0.33

Crit Depth, Yc (ft) = 0.07

Top Width (ft) = 0.32

EGL (ft) = 0.12



Channel Report

Bella Mesa South - Average Day - 8 in Sanitary Main @ 0.4%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.40

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.02

Highlighted

Depth (ft) = 0.07

Q (cfs) = 0.020

Area (sqft) = 0.02

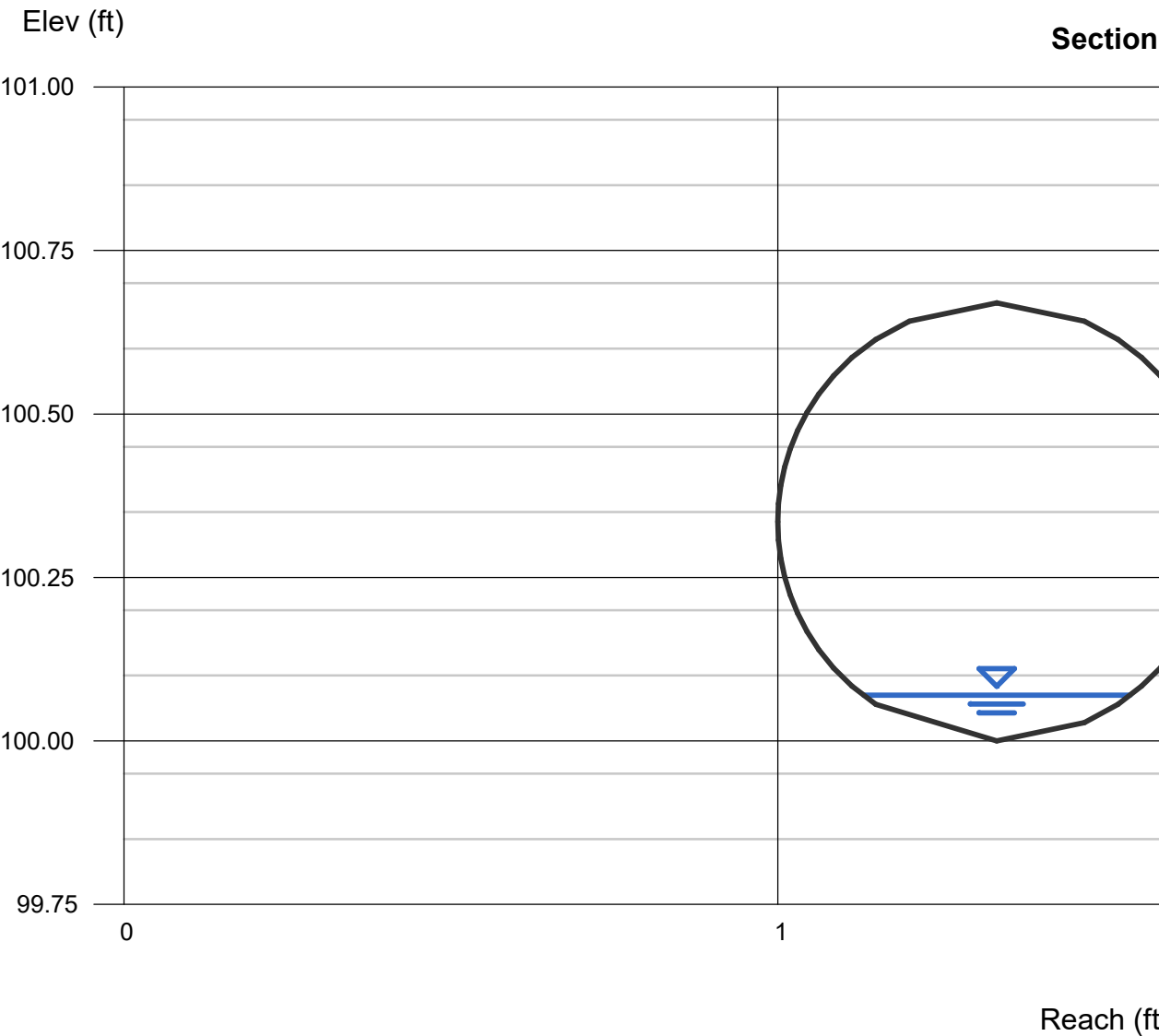
Velocity (ft/s) = 1.01

Wetted Perim (ft) = 0.44

Crit Depth, Yc (ft) = 0.07

Top Width (ft) = 0.41

EGL (ft) = 0.09



Channel Report

Bella Mesa South - Peak Design - 8 in Sanitary Main @ 0.4%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.40

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.10

Highlighted

Depth (ft) = 0.15

Q (cfs) = 0.100

Area (sqft) = 0.06

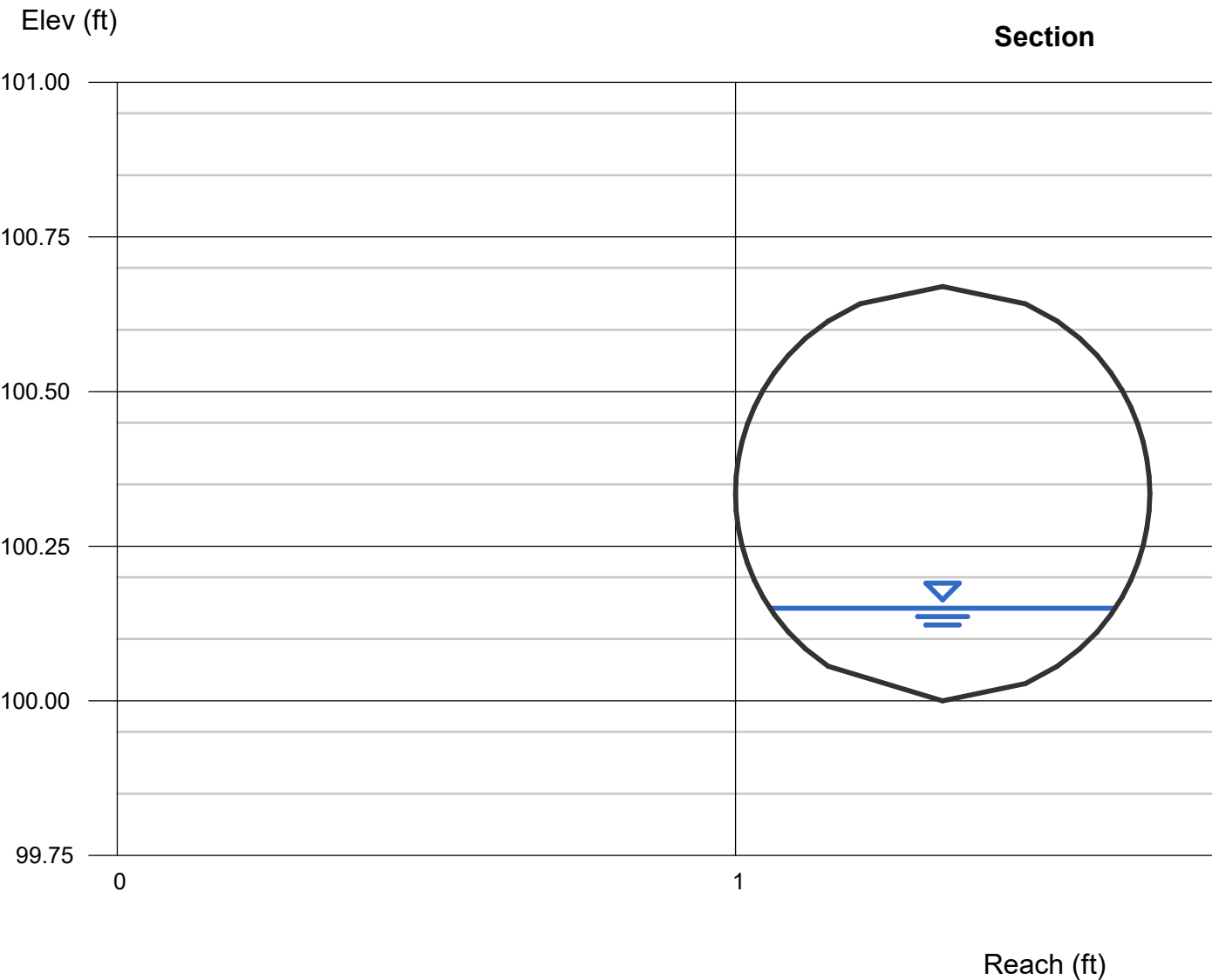
Velocity (ft/s) = 1.68

Wetted Perim (ft) = 0.66

Crit Depth, Yc (ft) = 0.15

Top Width (ft) = 0.56

EGL (ft) = 0.19



Channel Report

Bella Mesa South - Peak Design - 8 in Sanitary Main @ 0.7%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.70

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.10

Highlighted

Depth (ft) = 0.13

Q (cfs) = 0.100

Area (sqft) = 0.05

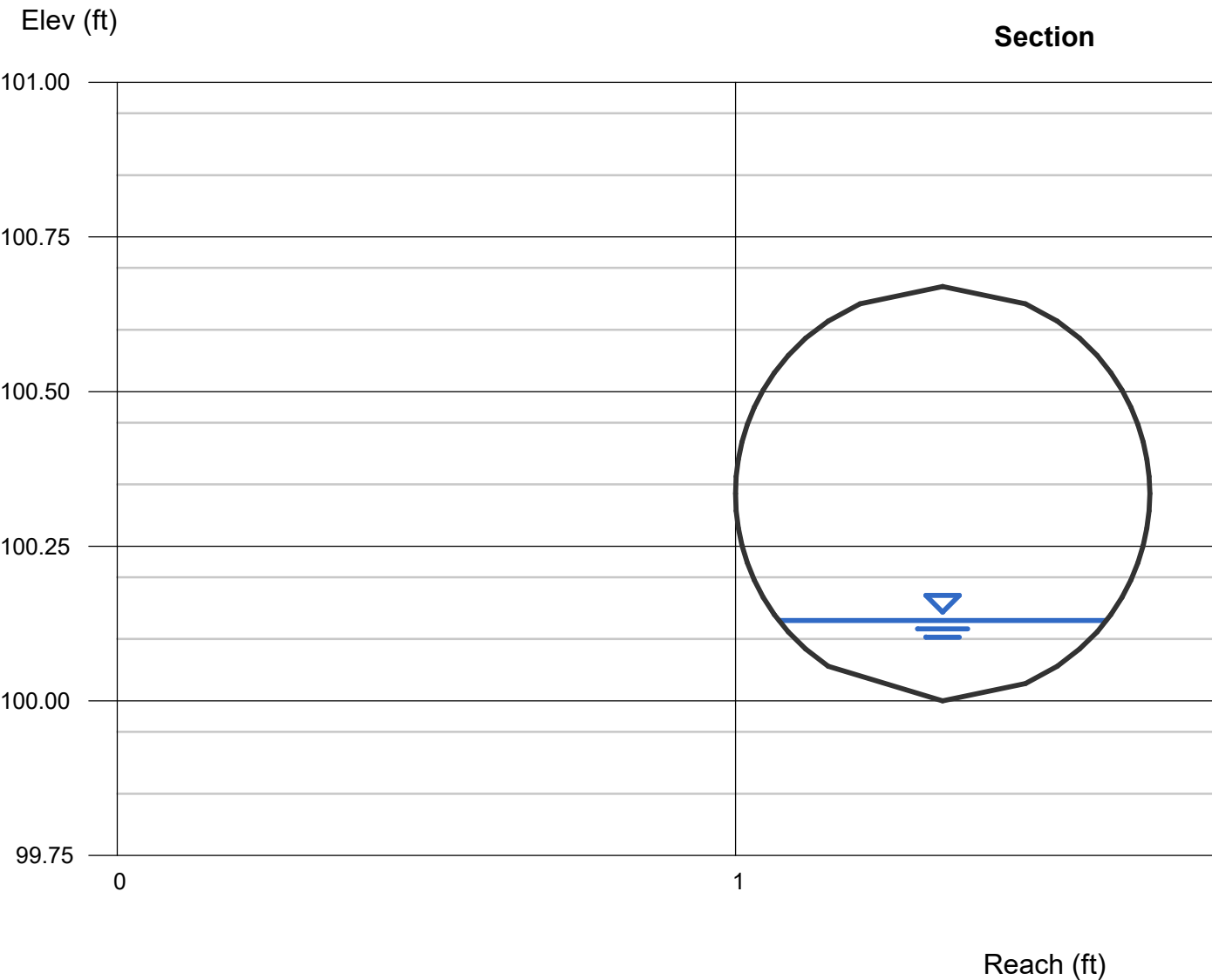
Velocity (ft/s) = 2.06

Wetted Perim (ft) = 0.61

Crit Depth, Yc (ft) = 0.15

Top Width (ft) = 0.53

EGL (ft) = 0.20



Channel Report

Bella Mesa South - Peak Design - 8 in Sanitary Main @ 7.5%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 7.50

N-Value = 0.011

Calculations

Compute by: Known Q

Known Q (cfs) = 0.10

Highlighted

Depth (ft) = 0.08

Q (cfs) = 0.100

Area (sqft) = 0.02

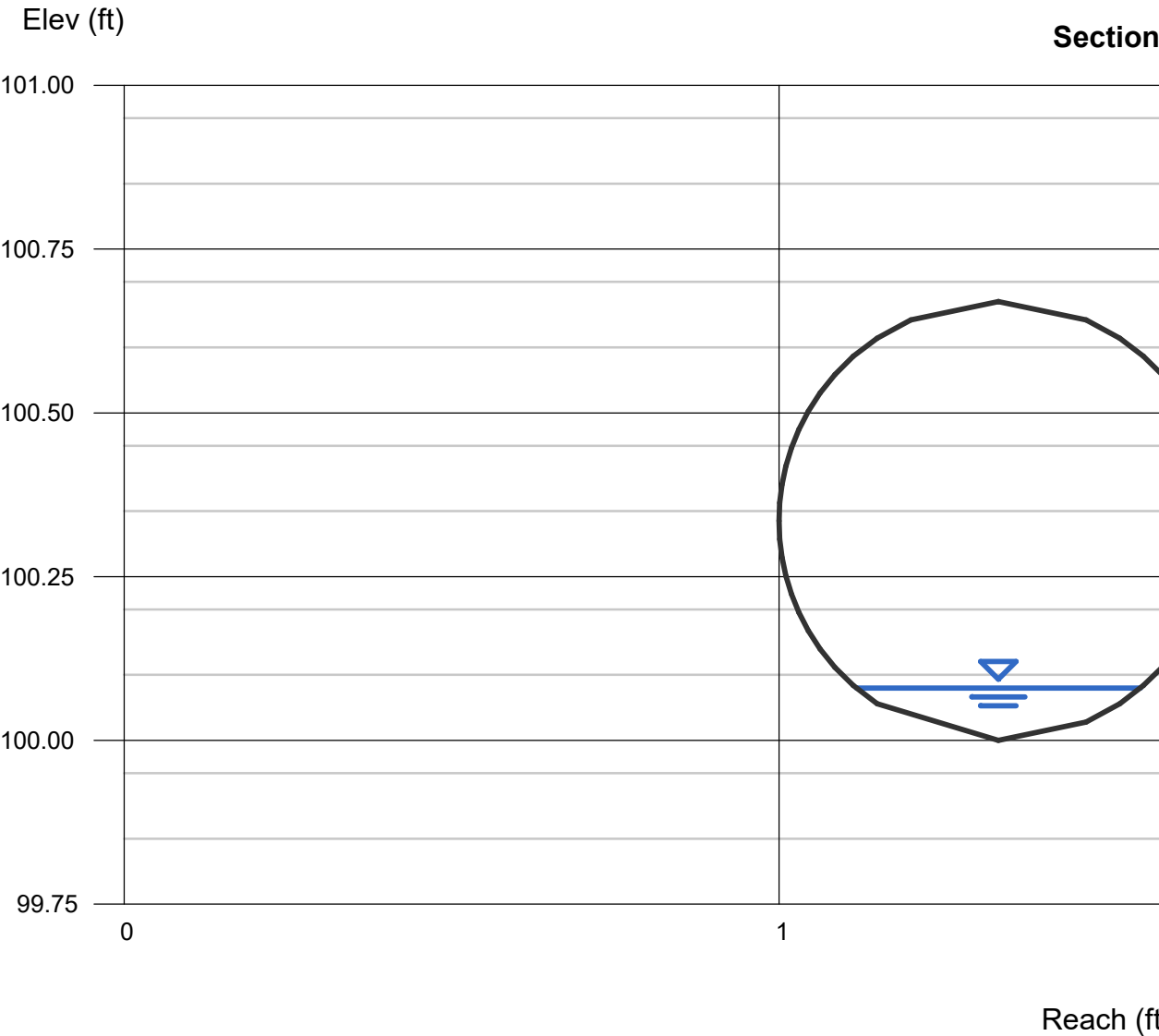
Velocity (ft/s) = 4.13

Wetted Perim (ft) = 0.48

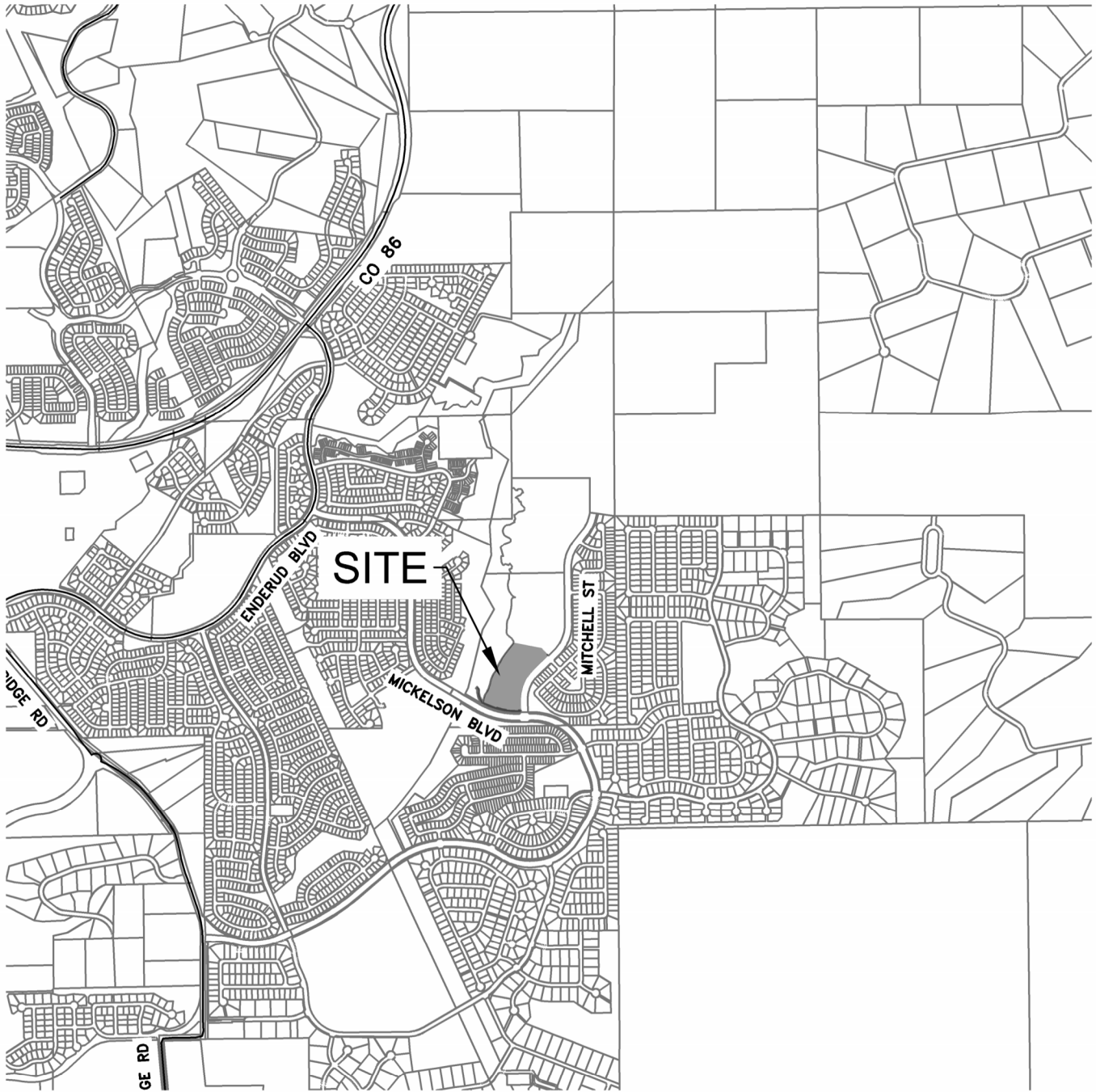
Crit Depth, Yc (ft) = 0.15

Top Width (ft) = 0.44

EGL (ft) = 0.35



Appendix F – Maps and Plans



0 1000 2000
SCALE : 1" = 2000'

BELLA MESA SOUTH

VICINITY MAP



Redland
WHERE GREAT PLACES BEGIN

720.283.6783
REDLAND.COM

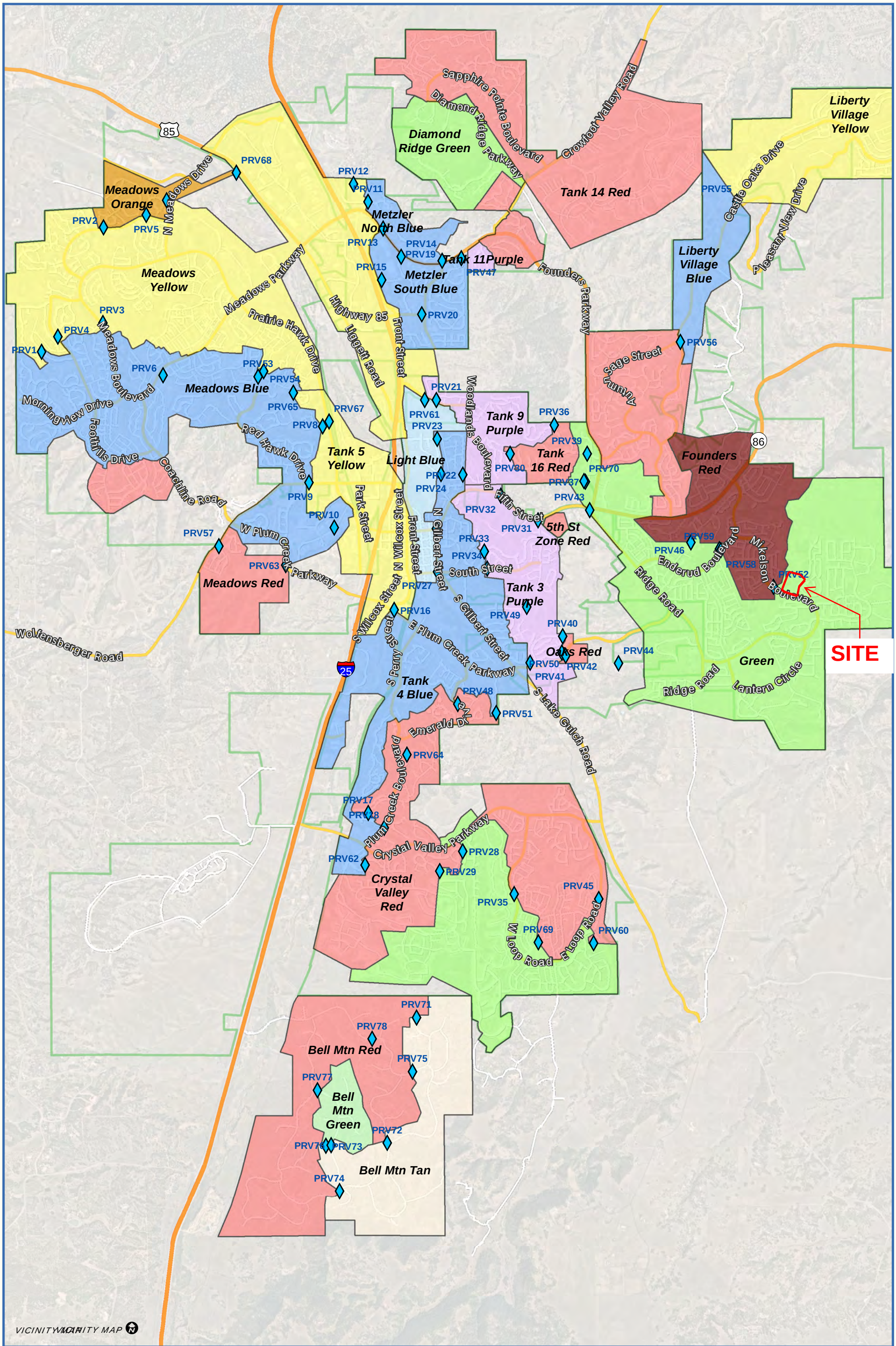
• Land Planning • Landscape Architecture
• Civil Engineering • Construction Management

PROJECT NO: 17026.007

DATE: 06/04/2026

DRAWING NO:

VIC



VICINITY MAP



0 1,950 3,900 7,800 11,700 Feet

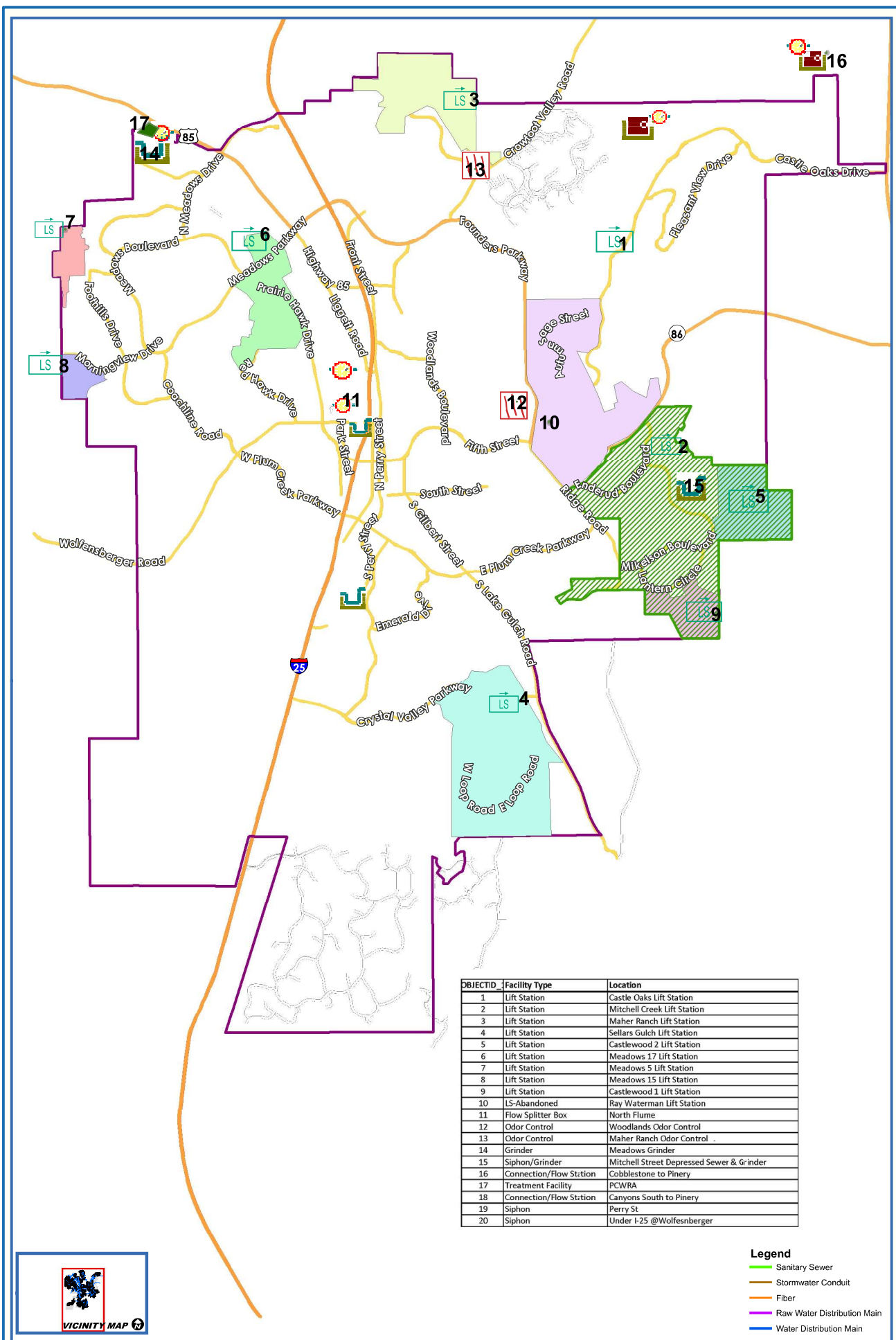
1 inch = 3,833 feet



Date: 3/9/2023 Document Path: J:\GIS\Standard Maps\10.6\11x17 Portrait.mxd

Disclaimer: The data presented has been compiled from various sources, each of which introduces varying degrees of inaccuracies or inconsistencies. Such discrepancies in data are inherent and in supplying this product the Town of Castle Rock assumes no liability for its use or accuracy. Questions or comments regarding the cartographic composition of this map including, but not limited to, errors, omissions, corrections, and/or updates, should be directed to the Utilities Department, Town of Castle Rock, (720) 733-6056. Copyright 2022, Town of Castle Rock Utilities Mapping.

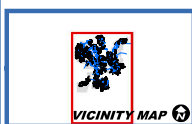
CASTLE ROCK WATER
FIGURE 2.7
PRESSURE ZONES AND PRVs



OBJECTID	Facility Type	Location
1	Lift Station	Castle Oaks Lift Station
2	Lift Station	Mitchell Creek Lift Station
3	Lift Station	Maher Ranch Lift Station
4	Lift Station	Sellers Gulch Lift Station
5	Lift Station	Castlewood 2 Lift Station
6	Lift Station	Meadows 17 Lift Station
7	Lift Station	Meadows 5 Lift Station
8	Lift Station	Meadows 15 Lift Station
9	Lift Station	Castlewood 1 Lift Station
10	LS-Abandoned	Ray Waterman Lift Station
11	Flow Splitter Box	North Flume
12	Odor Control	Woodlands Odor Control
13	Odor Control	Maher Ranch Odor Control
14	Grinder	Meadows Grinder
15	Siphon/Grinder	Mitchell Street Depressed Sewer & Grinder
16	Connection/Flow Station	Cobblestone to Pinery
17	Treatment Facility	PCWRA
18	Connection/Flow Station	Canyons South to Pinery
19	Siphon	Perry St
20	Siphon	Under I-25 @ Wolfensberger

Legend

- Sanitary Sewer
- Stormwater Conduit
- Fiber
- Raw Water Distribution Main
- Water Distribution Main



0 2,350 4,700 9,400 14,100 Feet
1 inch = 4,667 feet



Disclaimer: The data presented has been compiled from various sources, each of which introduces varying degrees of inaccuracies or inconsistencies. Castle Rock assumes no liability for its use or accuracy. Questions or comments regarding the cartographic composition of this map, including but not limited to, errors, omissions, corrections, and/or updates, should be directed to the Utility Department, Town of Castle Rock, (720) 734-6066. Copyright 2022.

**Castle Rock Water
WWMP
Figure 2.1**

I:\2017\17026 - Bella Mesa\CAAD\Exhibits\17026.007 - Bella Mesa South\17026.007 Bella Mesa South - Overall Utility Plan.dwg tab: 7 OF 83 OVERALL SITE AND UTILITY PLAN Jun 05, 2026 - 12:24pm rhopp

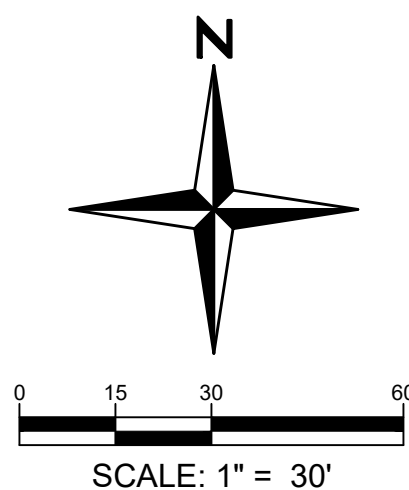


EXISTING LEGEND

- EXISTING PROPERTY LINE
- EXISTING R.O.W.
- EXISTING LOT LINE
- EXISTING EASEMENT
- SECTION LINE
- ROAD CENTERLINE
- EDGE OF PAVEMENT
- CURB AND GUTTER
- CONCRETE
- FENCE

PROPOSED LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED R.O.W.
- PROPOSED LOT LINE
- PROPOSED LOT SETBACK
- PROPOSED ROADWAY SETBACK
- PROPOSED EASEMENT
- PROPOSED UTILITY EASEMENT
- PROPOSED ROAD CENTERLINE
- PROPOSED CURB AND GUTTER (CATCH)
- PROPOSED CONCRETE SIDEWALK / TRAIL
- SIGHT TRIANGLE
- LIGHT POLE
- TRACT BOUNDARY
- PROPOSED SWALE LINE
- PROPOSED RETAINING WALL
- PROPOSED SAW CUT
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATER LINE
- PROPOSED MANHOLE w/ DIA. (FT.)
- PROPOSED INLET
- PROPOSED FLARED END SECTION
- PROPOSED WATER BEND
- PROPOSED WATER CROSS
- PROPOSED WATER TEE
- PROPOSED WATER REDUCER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED PLUG/CAP
- PROPOSED RETAINING WALL
- TRACT BOUNDARY
- PROPOSED SWALE LINE



NOT FOR
CONSTRUCTION

NOTES		DATE		NOTES	
PROJECT NO.	17026.007	DATE		PROJECT NO.	
DATE		DATE		DATE	

BELLA MESA SOUTH
EXHIBIT
OVERALL UTILITY PLAN

SHEET

EX.

Appendix G – Water Budget Letter

MEMORANDUM

To: Sara Dieringer, Mike Newman

Prepared By: Travis Frazier, P.E.

Date: June 10, 2026

RE: Bella Mesa South – Water Budget

Below is a breakdown of the approximate water demand/dedication requirements that may be needed for the Bella Mesa South project. The SFE amounts below are subject to change based on the final landscape/irrigation design that is selected for the project as it progresses during the design phase.

SFE Summary Table

Project Name or Description	SFE
Bella Mesa South	62.1

Bella Mesa South – Assumptions

- The PD allows for a maximum of 196 multi-family units for the Bella Mesa South parcel. The most current site plan for the parcel yields approximately 93 units, which is what we assumed for the below calculations.
- A dedication of 0.65 SFE per townhome lot is required per Section 4.4.1 of the Town of Castle Rock's Water System Design Criteria Manual.
- The Landscape Summary Table on Sheet 14 of 31 of the SDP prepared by Redland, dated 02/20/2026 for the site, was used for determining the irrigated landscape area for all common area open space tracts on the project.
- Denver Water's published spreadsheet was used for determining the approximate water dedication requirement (acre-feet) based on the 3 types of plantings (turf, native, shrubs & tree beds) shown.
- One - 1" irrigation tap is assumed for the project. This was used to determine the approximate number of SFEs needed per Castle Rock Water's system development fees (effective Jan 1, 2026 – Dec 31, 2026).

Bella Mesa South – Water Dedication Requirements

- A total of 93 townhome lots was assumed based on the current conceptual site plan. This would equate to the need for an additional 60.5 SFEs.
- Based on the landscape plans prepared by Redland and Denver Water's spreadsheet, a total of approximately 3.1 acre-feet of water will be required for irrigation. This may increase or decrease as Redland coordinates and prepares the landscape plans for Cardel Homes.

- Using the assumption of one 1" tap as stated above, this would equate to approximately 1.67 SFEs for the irrigation tap per the Town's system development fee table.
- Therefore, the total amount of SFEs need to serve both on lot and irrigated common area open space for the Bella Mesa South project is approximately 62.1 SFEs.

Overall Summary

Based on the above assumptions and information, we estimate the minimum number of Single-Family Equivalent's (SFEs) necessary to develop the Bella Mesa South parcel are 62.1 SFEs. This includes 60.5 SFEs for the water taps to each lot, and approximately an additional 1.67 SFEs for the irrigation taps serving the common area open space tracts.

This equates to a minimum of 62.1 SFEs suggested to be available for the project based on the level of design completed to date.

MONTH	POC 1				
	Native Shrubs Drip	Turf (General) Rotor	Native Grasses Spray	Native Grasses Rotor	Subtotal
January	-	-	-	-	-
February	-	-	-	-	-
March	-	-	-	-	-
April	10,620	1,134	10,545	2,820	25,119
May	46,019	4,915	45,696	12,218	108,849
June	77,879	8,318	77,332	20,677	184,206
July	83,779	8,948	83,190	22,243	198,161
August	73,159	7,814	72,645	19,424	173,042
September	53,099	5,672	52,726	14,098	125,595
October	10,620	1,134	10,545	2,820	25,119
November	-	-	-	-	-
December	-	-	-	-	-
TOTAL (gallons)	355,175	37,936	352,681	94,298	840,090
TOTAL (acre-feet)	1.1	0.1	1.1	0.3	2.6
Flow Requirement (gpm)	13.4	1.4	13.3	3.6	31.8