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September 14, 2022

City of Steamboat Springs Public Works Department
Attn: Amber Gregory
12410th Street, P.O. Box 775088
Steamboat Springs, CO 80477
Phone: (970)-871-8258

RE: West Acres Ranch Subdivision Filing No. 1
Water Demand Report
Steamboat Springs, CO
Four Points Surveying and Engineering Job No. 1670-001

Dear Amber,

Four Points Surveying and Engineering has prepared this water demand report for the proposed development of a portion of Lot 1, West Acres Ranch Exempt Subdivision by a Zoning Amendment as required by the City of Steamboat Community Code. The water demand report is based upon the Steamboat Springs Municipal Code Section 25-78, Adequate Water Supply for Development. This report is intended to provide an estimate of the water demands for MF-3 Zoning on a two new parcels with open space and public right of way to be created by a preliminary plat in the southeast corner of Lot 1.

Introduction and Location

Lot 1 of West Acres Ranch Subdivision is a 140-acre parcel with native grasses, scrub oak, brush and shale rock outcroppings. The property generally consists of vacant undisturbed land with highly variable topography from flat to steep hillside. The zoning amendment is a request to create Multi-Family 3 (MF-3) Zoning for a proposed 15-acre piece in the southeast corner of the Lot 1, north of Gloria Gossard Parkway. The 15-acres will be divided into two lots separated by a public right of way and has a variety of terrain. Four Points Surveying and Engineering has outlined the area of slopes exceeding 30% as areas which are not eligible for residential construction. At this time, development plans and a preliminary plat have been submitted for City review known as Copper Ridge Village and Steamboat Airpark respectively. The preliminary plat application includes water main and sewer access to the proposed property.

Proposed Project

Copper Ridge Village is proposed as a series of seven separate buildings containing one, two, and three-bedroom apartments from 800 square feet to 1,200 square feet on two stories with ground floor parking. The preliminary design estimates (104) one-bedroom apartments, (77) two-bedroom and (17) three-bedroom apartments across seven buildings.

The water service would be new 12-inch water main connection from the existing 12-inch water main in Gloria Gossard Parkway. The water alignment would follow the access roadway for the project and

terminate with a temporary plug near the proposed north property line, to connect to the next phase of the development of the remainder parcel of Lot 1, West Acres Ranch Subdivision in the future. In addition, the proposed water main will connect back to the existing Gloria Gossard water main to complete the loop through the proposed future Copper Ridge Village. The proposed apartments will include fire suppression systems as required by building code.

The proposed water infrastructure is included in the utility plan within the preliminary plat application. The property is located within the water services area of the City Main Zone, according to the 2009 Water Master Plan update. The specific locations of the constructed utilities will provide fire protection for the residences and be installed in right of ways or public easements dedicated to the City of Steamboat Springs prior to final acceptance.

Water Demand and Use for Proposed Apartment Zoning (MF-3)

Provided is a preliminary estimate of the projected water demands and consumptive use for the proposed residential types and numbers for a full build out scenario on the 15-acre MF-3 zoned property. The site plan as part of the preliminary plat application depicts the proposed locations of the apartment buildings. In estimating water demands for apartments, data was used from the U.S. Environmental Protection Agency Water Distribution System Analysis: Field Studies, Modeling and Management and Water Distribution Systems Handbook, Mays, W. Larry, 2000 edition.

See Table 1 attached for associated water demand and consumption parameters and calculations. Based on an estimated 2.5 people per two-bedroom and three-bedroom apartments and domestic unit flow rate of 75 gallons per day (gpd), water usage yields 188 gpd per two or three-bedroom apartment. A one bedroom apartment yields a unit flow rate of 75 gpd. For irrigation flows in gallons per square foot per day, landscaped areas around parking lots, buildings and a half-acre irrigated community park were calculated. Landscape areas for each building are estimated at 2,500 of irrigated square feet and 22,000 square feet proposed park area. Irrigation demand is as follows:

<u>Month</u>	<u>Rate (inches/week)</u>
May	1.0
June	1.5
July	1.5
August	2.0
September	1.0
October	1.0

This equates to an estimated total annual application of 32 inches per year or 788,000 gallons per year for irrigation demand.

Non-revenue water (NRW) is specifically defined to include the sum of specific types of water loss and any authorized, unbilled consumption that occurs within water distribution systems. Since all systems will incur leakage (real losses) and all water utilities fail to recover revenue from all of the water that is (or should be) billed to customers (apparent losses), a 5% rate was used for the demand report.

Consumptive use calculations are used to measure the amount of water use removed from available supply without a return to the natural watershed. For are accounted for as constant portion of both the domestic and irrigated uses for development. A standard 5% consumptive use for domestic/residential and 90% for irrigation purposes was used.

The total daily water demand and consumption estimated for the full buildout of the proposed West Acres Apartments is summarized in Table 1 attached. The table provides a separation of both domestic and irrigated uses in both summer and winter. Water demand was calculated for all one-bedroom, two-bedroom, and three-bedroom apartments scenarios

A flowrate summary in Table 2 attached is based on the higher water demand for the two-bedroom and three-bedroom apartments in all buildings. The flow rate summary includes calculating the Average Day Demand (ADD) for the irrigation season, the non-irrigation season and annually. The maximum day demand (MDD) represents the maximum consumption during any one day of the year. The maximum day peaking factor is expressed as a ratio of the MDD divided by the ADD. Four Points Surveying and Engineering utilized a maximum day flow of 2.5 times greater than the average annual demand.

The maximum flow rate delivered by the distribution system on any single hour during the year corresponds to the peak hour water demand. The peak hour demand (PHD) is the peak hour water demand divided by the ADD. Peak hour demands typically occur during the morning hours. In the absence of City of Steamboat Springs historical peak hour water flows, a PHD of 4.0 was used. For this study a PHD of 4.0 is used. $\text{Peak hour water demand} = 4.0 \times \text{ADD}$.

Table 2 breaks down monthly demand which fluctuates based on irrigation demand and provides the calculated total yearly demand of 25.6 acre-feet, a MDD of 35.8 gallons per minute (GPM) or 0.052 million gallons per day (MGD) and a PHD of 57.3 GPM or 0.083 MGD. The MDD and PHD are calculated using the annual ADD which is the average of the irrigation and non-irrigation season ADD.

Conclusions

Under the MF-3 zoning scenario, the MDD, PHD and total annual demand is 35.8 GPM, 57.3 GPM, and 25.6 acre-feet respectively. The calculated water usage MDD and PHD for the proposed MF-3 zoned 15-acre parcel is sufficient to meet zoning demand according to the City of Steamboat Springs 2009 Stantec Water Supply Master plan and current water supply. Any future development of the proposed 15-acre parcel will be subject to best management practices as outlined in the Steamboat Springs Water Conservation Plan II, May 2011 to develop a sustainable community.

TABLE 1 - ESTIMATED WATER DEMANDS AND CONSUMPTION FOR MF-3 ZONING

West Acres Ranch Subdivision Filing No. 1

Projected Water Demand and Consumptive Use - Multi-Family Parcel

Water Uses	Dwellings			Unit Areas and Flow Rates			Ultimate Buildout Demand and Consumption						Non-Revenue Water Demand, 5% Avg. Annual (GPD)
	Number of Apartment Units	No. of Buildings	Occupants Per Unit	Domestic Flows (GPD)	Landscaped Areas (SF)	Irrigation Flows (gal/ft2/d)	Domestic Demand (GPD)	Irrigation Demand (GPD)	Total Water Demand (GPD)	Domestic Consumption (5% GPD)	Irrigation Consumption (90%, GPD)	Total Water Consumption (GPD)	
	Residential Uses												
Two and Three Bdrm Apartments (1200 sf)	94	4	2.5	75	2,500	0.12	17,625	1,200	18,825	941	1,080	2,021	941
One Bedroom Apartments (800-1100 sf)	104	3	1	75	2,500	0.12	7,800	900	8,700	435	810	1,245	435
Non-Residential Uses													
Park	0	1			22,000	0.12	-	2,640	2,640	132	2,376	2,508	132
Demand and Consumption Totals													
Two & Three-Bedroom Ult Buildout (Res./Non-Res. TWD + Res./Non-Res. Non-Revenue TWD)									22,538			4,529	
One-Bedroom Ultimate Buildout (Res./Non-Res. TWD + Res./Non-Res. Non-Revenue TWD)									11,907			3,753	

TABLE 2 - FLOW RATE SUMMARY FOR MF-3 ZONING

West Acres Ranch Subdivision Filing No. 1

Projected Water Demand and Consumptive Use - Multi-Family Parcel

Final Buildout Demand

					Max Day/Ave Day Ratio	2.5
					Peak Hour: Avg Day Ratio	4.0
			Full Buildout Flowrates			
			GPM	MGD	Acre/Feet	
Average Day Demand						
Irrigation Season			15.7	0.0225		
Non-Irrigation Season			13.0	0.0187		
Annually (Avg. of Irrigation/Non-Irrigation Seasons)			14.3	0.0206		
Max Day Demand (2.5 x Annual Avg. Day Demand)			35.8	0.0515		
Peak Hour Demand (4.0 x Annual Avg. Day Demand)			57.3	0.0825		
Monthly Demands (Breakdown of Estimated Demand by Month)						
January				0.0187	1.78	
February				0.0187	1.78	
March				0.0187	1.78	
April				0.0187	1.78	
May				0.0252	2.40	
June				0.0267	2.54	
July				0.0267	2.54	
August				0.0282	2.68	
September				0.0252	2.40	
October				0.0252	2.40	
November				0.0187	1.78	
December				0.0187	1.78	
Total Annually (Sum of 12-month Period)					25.63	