

**PUD SKETCH PLAN
UTILITY IMPACT REPORT**

FOR

**RESERVE AT
HOCKETT GULCH**

January 2019

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I. Introduction.

The Reserve at Hockett Gulch project is proposed to be on a 29.65-acre parcel of land at the western edge of Eagle Ranch. The parcel is bordered by Highway 6 along the west and Green Acres Mobile Home Park to the north, Sylvan Lake Road and Town of Eagle Open Space to the east, and private property to the south and west.

The Reserve at Hockett Gulch property is proposed to be annexed into the Town of Eagle which would in turn provide water service and sanitary collection service to the project.

The conceptual plan for the Reserve at Hockett Gulch property includes both commercial and residential development. The Concept Plan for Reserve at Hockett Gulch includes three development parcels and two open space parcels. The PUD allows up to 500 residential units and 30,000 square feet of commercial uses.

II. Sanitary Sewer

The Reserve at Hockett Gulch sanitary sewer will connect to the Town of Eagle's existing 21" trunkline located at the northern edge of the property. The collected sewage from Reserve at Hockett Gulch will flow through the existing trunkline and will then be treated at the Town's sewer treatment plant located at the confluence of Brush Creek and the Eagle River, just downstream of the proposed project.

The existing 21" sanitary sewer trunkline was designed and installed as a part of the first filing of Eagle Ranch in 1999. The trunkline was sized to accommodate sewage volumes from Eagle Ranch, Reserve at Hockett Gulch, Adams Rib Ranch and additional development of Adams Rib parcels upstream of the Lower and Upper Ranch parcels. See the attached Adams Rib Ranch exhibit showing the proposed project site plan in relation to Eagle Ranch. The Haymeadow project was carved out of the Upper Ranch parcel as the westerly most 660 acres and is proposed to have 867 residential units.

The sewer main through Eagle Ranch was sized based on the Adams Rib Ranch proposal which was approximately 1540 acres and the last iteration contained a minimum of the following:

- Two 18 hole golf courses
- Church
- Recreation center
- Two clubhouses
- Hotel
- Approximately 1600 residential units

When the trunkline was installed as part of the Eagle Ranch construction, there was a cost recovery agreement between Eagle Ranch and the Town of Eagle based on the number of proposed units within Adams Rib as a pro rata share of the cost of the installation.

Based on the high number of proposed units for the now defunct Adams Rib Ranch project, the trunkline sizing was based on a conservative amount of future density which exceeds the number of units proposed for Haymeadow and Reserve at Hockett Gulch combined. Therefore, there should be more than adequate capacity in the existing 21” diameter trunk line to accommodate the proposed project sewer volume.

Typically, municipalities will have a Sewer System Master Plan prepared to identify WWTP and sewer trunkline capacities so that proposed land use decisions can be based on the ability to serve future areas identified for growth based on a future land use map.

The existing 21” sewer trunkline is parallel and just north of an existing 24” diameter irrigation pipe. An access path for both the sanitary sewer and irrigation piping will be constructed in the area between the two pipes and will then connect to the proposed roadway system within RHG.

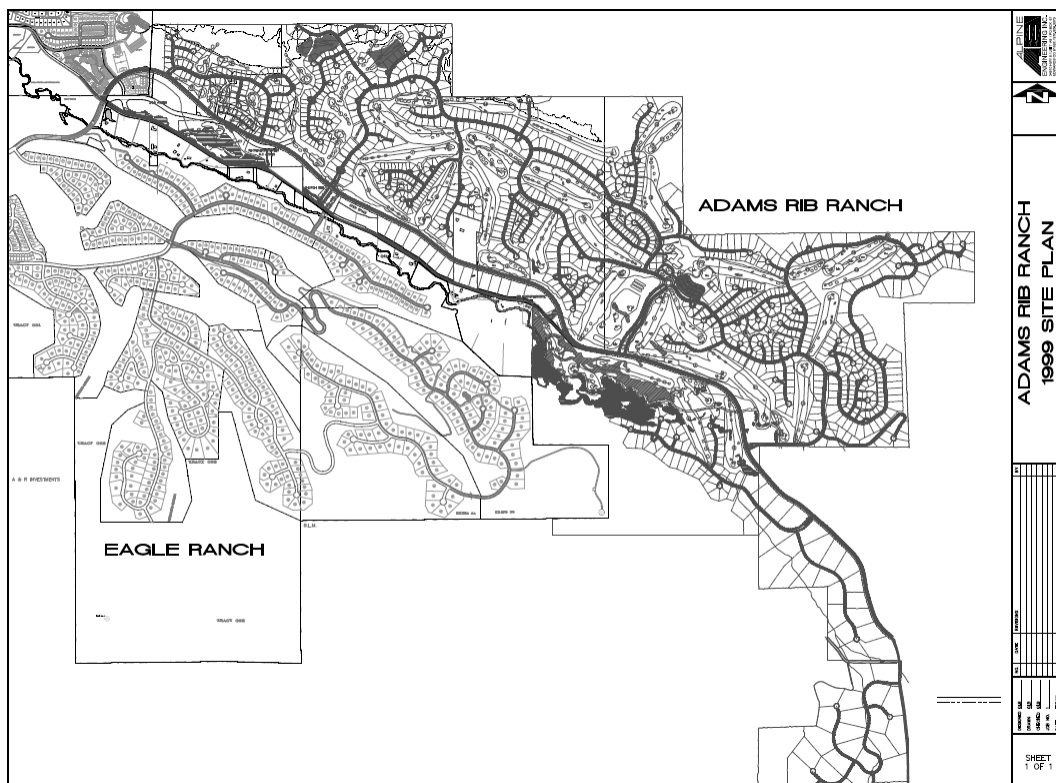


Figure 1 Adams Rib Ranch Development Plan circa 1999

Within the Reserve at Hockett Gulch site 8” diameter sewer main lines are proposed to serve the proposed development. The sewer mains would typically fall within road rights of way or where outside of the right of way, a public sewer easement would be dedicated to the Town of Eagle. It is understood that the Town does not allow trees or other large landscaping items within their public sewer easements.

Projected sewer effluent volumes for the Reserve at Hockett Gulch at buildout are shown in Table 1 below, and illustrate that a proposed pipe diameter of 8” will be sufficient to accommodate the peak sewer volumes at buildout of the entire project.

TABLE 1: RESERVE AT HOCKETT GULCH SEWAGE VOLUME

Peak Day Volume at Buildout

Commercial Use

Density Type	Square Footage	Sewage GPD/1000 SF Gross Building	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
Commercial	30,000	400 *	12,000	1.5	18,000
TOTALS	30,000		12,000		18,000

* Flowrates taken from City of Denver Public Works and averaged for restaurants, office building and stores

Residential Use

Density Type	Unit Count	Persons Per Unit	Sewage Volume Per Capita Daily (Gallons)	Average Daily Volume (Gallons)	Peaking Factor	Peak Day Volume (Gallons)
Residential (1 bdrm)	200	2.0	36	14,400	1.5	21,600
Residential (2 bdrm)	200	2.6	48	24,960	1.5	37,440
Residential (2+ bdrm)	100	3.2	60	19,200	1.5	28,800
TOTALS	500			58,560		87,840

TABLE 2: TYPICAL PIPE CAPACITY

Pipe Size (inch)	Pipe Material	Pipe Diameter (ft)	Manning's (n)	Slope 0.50%	Area A (ft ²)	Wet Area ½ full (ft ²)	Wet Perim. ½ full (ft ²)	Hydraulic Radius (ft)	Velocity V (ft/sec)	Flow Q (ft ³ /sec)	Flow Q (gal/sec)	Flow Q (gal/day)
8	PVC	0.667	0.013	0.005	0.349	0.175	1.047	0.167	2.45	0.43	3.19	275,967.21
10	PVC	0.833	0.013	0.005	0.545	0.273	1.309	0.208	2.84	0.77	5.79	500,399.07
12	PVC	1.000	0.013	0.005	0.785	0.393	1.571	0.250	3.21	1.26	9.42	813,753.51
15	PVC	1.250	0.013	0.005	1.227	0.614	1.964	0.313	3.72	2.28	17.08	1,475,543.04
18	PVC	1.500	0.013	0.005	1.767	0.884	2.356	0.375	4.20	3.71	27.77	2,399,541.50
21	PVC	1.750	0.013	0.005	2.405	1.203	2.749	0.438	4.67	5.62	42.06	3,633,984.00

Projected Peak Sewage Volume at buildout of Reserve at Hockett Gulch = 87,840 gpd (2.4172% of capacity)

III. Treated Water System

The proposed treated water distribution system for Reserve at Hockett Gulch is anticipated to connect to the town's existing water main line infrastructure within Sylvan Lake Road along the eastern boundary of the project.

The proposed treated water distribution system for Reserve at Hockett Gulch is anticipated to connect to the town's water main line infrastructure within Sylvan Lake Road at the eastern side of the project and eventually being looped to the town's new Lower Basin Water Treatment Facility (LBWTP)

The water demand for the project is summarized in a report prepared by Aquacraft Water Engineering dated December 14, 2018 which was submitted to the town for review. The Aquacraft study contains the proposed number and type of units with estimates of in house water usage by unit type. Reserve at Hockett Gulch is proposing to utilize a non-potable irrigation system which is summarized in section IV of this report.

The town's engineering consultant, Mott MacDonald has prepared two technical memos summarizing the hydraulic regime for this project. The first memo was issued on July 19, 2018. The report states that the RHG water system as proposed meets the criteria for water service and fire protection. The second technical memo was issued on October 23, 2018 as an evaluation of the water distribution system related to upsizing of the proposed water main through the RHG site in conjunction with the construction of the LBWTP. The report recommends that the town participate in a cost sharing agreement to upsize one of the project water mains from 12" to 16" diameter. RHG is amenable to working with the town to upsize the water main through the project to the connection point to the existing 8" water main in Sylvan Lake Road. A 16" stub is proposed at the northern end of the RHG site where the town would connect and extend the 16" main north to the LBWTP. The timing of the first phase of RHG construction and the town's 16" water line extension are still to be determined.

The proposed water system for the RHG project at buildout would have the 16" main line installed by the town at the LBWTP and extended to the RHG project with the 16" main proposed for the northern roadway and connecting to an upsized water main in Sylvan Lake Road and further on to Capitol Street in Eagle Ranch where it would connect to an existing 16" water line. Internal to the project would be a series of looped 12" and 8" water mains connected to the 16" looped line.

RHG is proposing to connect at two locations to the existing 8" water main in Sylvan Lake Road (upsized to 16" in the future by the town). The northerly connection point is proposed at the intersection of the access drive to the medical center and to RHG. The southerly connection is shown approximately 330' to the south of the entry drive. The southerly connection point has been selected to minimize the impact to the existing paved path and associated storm piping.

The goal of the proposed RHG water system is to minimize or eliminate dead end runs and to have multiple loops within loops to provide adequate fire flows and to provide redundancy in the system.

Water services to commercial units or multi-family units will be designed in compliance with Town Design Standards. Water line easements will be created and dedicated to the Town by Final Plat for all water mains outside of the public right-of-way.

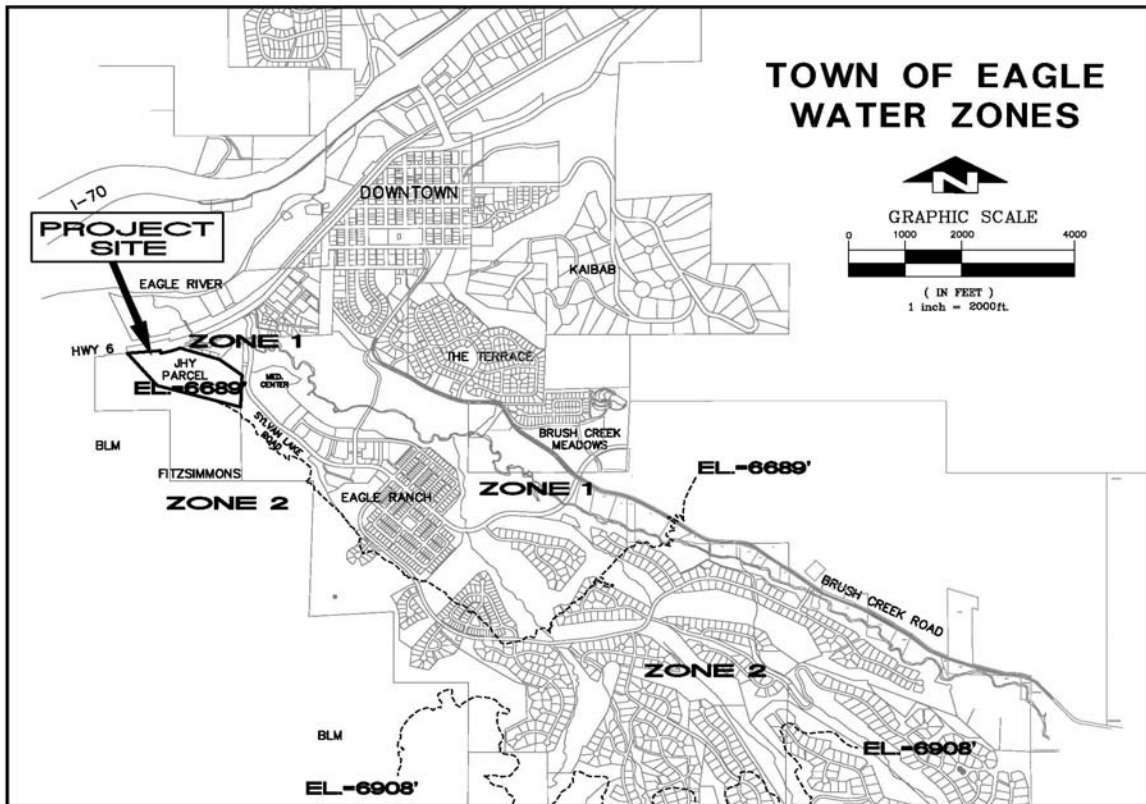


Figure 2 Town of Eagle Water System Pressure Zones

IV. Non-potable Irrigation System

The Reserve at Hockett Gulch is proposing to utilize a raw water irrigation system to serve the project for outdoor irrigation uses. The concept and location for the proposed system is based on the memo prepared by Resource Engineering dated September 17, 2018. The concept for water supply is summarized in the Resource memo to use a portion of the Ditch No. 3 water rights and to file for an alternate point of diversion downstream on Brush Creek.

The raw water system would likely include some form of surface diversion from Brush Creek to a wet well and pump station that would have a raw water force main that would run to the RHG site and terminate in a meter vault. The standard irrigation system would connect at the meter vault and serve as the source of water for landscape irrigation. RHG intends to be in compliance with the town's 5 year water efficiency plan for landscaping and irrigation and other outdoor uses supplied by this proposed raw water system.

AEI has shown two potential location options for the intake and pump station along Brush Creek (Sheet C3.03 Civil Sketch Plans). Option 1 was suggested by the Resource

Memorandum and is located immediately downstream of the Sylvan Lake Road bridge over Brush Creek. The location is on a parcel of town open space that lies between the Sylvan Lake Road ROW and the Green Acres Mobile Home Park parcel. Per the wetland delineation report for Eagle Ranch, this area is predominantly wetlands and riparian vegetation. The construction of the intake and pump station would require trenching of the force main and the installation of an access drive to the pump station for access by public works staff. This option would have significant wetland impacts.

The alternate location shown as Option 2 would be located on Brush Creek east of Sylvan Lake Road also on a town open space parcel. This location could be accessed from the existing 10' wide asphalt path system and would be much less impactful to wetland areas.

V. Shallow Utilities

Shallow utility service (electric, communication, gas) to the Reserve at Hockett Gulch project is available at the eastern end of the project along Sylvan Lake Road. There is also opportunity along Highway 6 for connection to low pressure gas and communication facilities, which could potentially allow for looping of these services.

There are two gas lines that bisect the parcel from west to east. One is a 6" steel high pressure line that runs from Highway 6 at the northwest corner of the site, crosses the parcel and extends through Eagle Ranch. The other one is an 8" steel low pressure gas line that runs generally parallel to the high pressure line. This low pressure line provides gas to Eagle Ranch, Haymeadow and to parcels further south along Brush Creek.

It is likely that both lines will need to be relocated away from the proposed development areas within the site. We are currently showing a rerouting of both lines along the southern edge of the site on the Utility Plan however, an evaluation by Black Hills Energy will be needed to determine the final location for both the high pressure and low pressure lines. These gas lines are to be relocated by Black Hills under the terms of the easement granted to the property owner.

Proposed electric service from Holy Cross Energy will likely connect to the existing underground primary electric lines located in the Sylvan Lake Road R.O.W. There is also a section of existing overhead electric located along the western end of the property running adjacent to Highway 6. This line will probably need to be buried or raised in place for some portion of the run to accommodate the proposed access point into the project site from Highway 6. As the site plan is refined, plans will be sent to Holy Cross Energy for review and for them to provide input on the best design layout for the extension of primary electric in to the site. Electric mains and services interior to the property will be installed as single phase underground runs, primarily located within project roadways.

Gas service (low pressure) is anticipated to be a polyethylene main running within the project roadways with services stubbed out for development parcels.

Communication lines, including fiber optic phone and video, will be installed underground along with the alignment of the electric system.