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Draft Drainage Study for Lot 9, Alpine Acres

1900 County Road 32
Steamboat Springs, Colorado

Original Draft Drainage Report: 05/03/2021

Revised Drainage Report:

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CERTIFICATION

I hereby affirm that this Drainage Report for was prepared by me (or under my direct supervision) for the owners thereof and is, to the best of my knowledge, in accordance with the best engineering judgement and practices and using provisions of the City of Steamboat Springs Storm Drainage Criteria. I understand that Routt County does not and will not assume liability for drainage facilities designed by others.

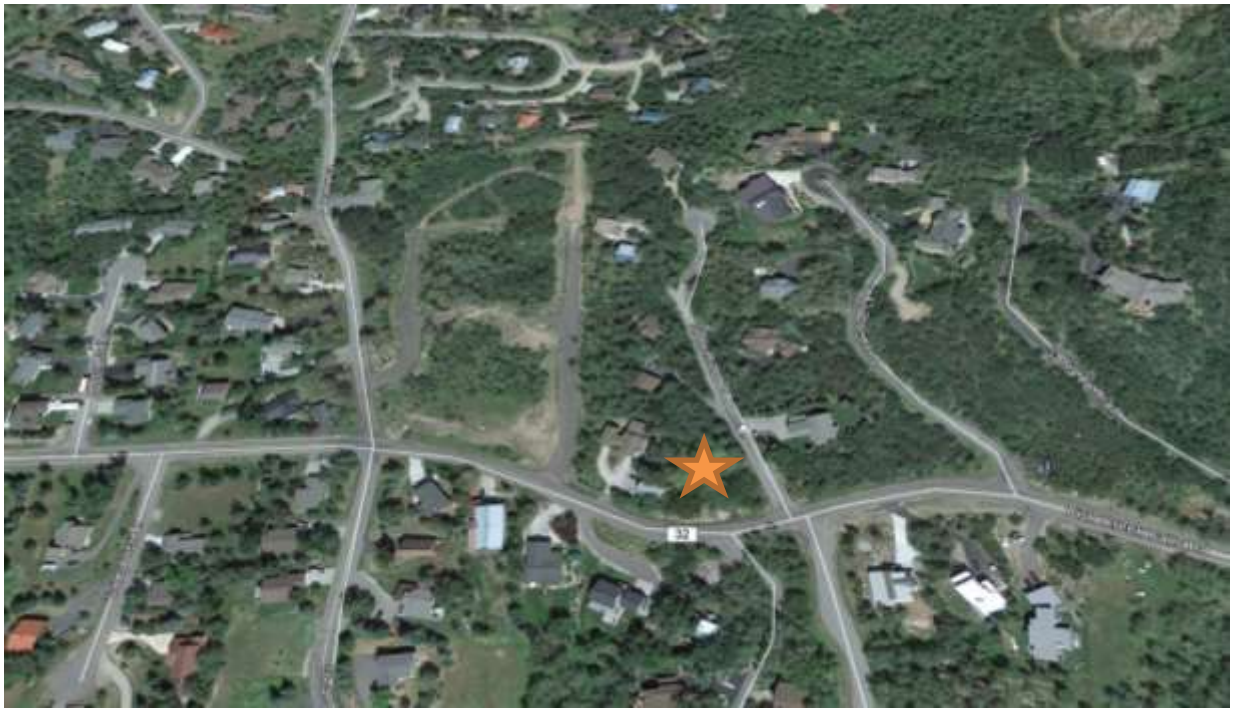
_____
Rebecca Lindeman, PE
State of Colorado No. 37279
Date:_____

1.0 General Location and Site Description

This report provides a detailed analysis of the existing pre-development and proposed post-development drainage conditions for subdividing a residential parcel located off Fish Creek Falls Road. This report includes data, engineering methods, assumptions, and calculations used by Four Points Surveying and Engineering (Four Points) to evaluate the pre- and post- development drainage from the subdivided site. While this site is in Routt County jurisdiction, Four Points prepared this report using guidance from the most recent version of the City of Steamboat Springs Drainage Criteria and Engineering Standards.

A. Location

Figure 1: Vicinity Map



The project site is located at 1900 Routt County Road 32, Steamboat Springs, Colorado and comprises a 0.87 acre lot off of Fish Creek Falls Road (RCR 32). Legal Description: XXX. The existing Lot 9 has one residence and is mostly covered with native grasses and vegetation. The replat of Lot 9 will result in the main residence on a 0.48 acre parcel, bordering a new lot on 0.39 acres. This evaluation was completed for the 0.39 acre vacant lot (eastern lot).

2.0 Drainage Criteria and Methodology Used

A. Design Rainfall and Storm Frequency

Design rainfall: NOAA Atlas 14, Volume 8, Version 2 for Steamboat Springs, CO.

- Minor Event (5-year) 24-hour rainfall depth: 1.59 inches

- Major Event (100-year) 24-hour rainfall depth: 2.91 inches

B. Runoff Calculation Methodology

Runoff calculation method: Small basin peak flow runoff was analyzed using the Rational Method, shown in Eq-1.

Rational Method: **Q = CiA** (Eq-1)

Where: Q = runoff, CFS
C = runoff coefficient, dimensionless
i = rainfall intensity, inches per hour
A = basin area, acres

3.0 Existing Conditions

A. Ground Cover, Imperviousness, Topography and Size

- Gently sloping lot is covered with native grasses and trees.
- 2% imperviousness
- Site gradients ranging from 0-6.5% draining mostly to the south-southwest
- Total lot size: 0.39 acres

B. Existing Stormwater Systems and Site Outfall

There is no existing drainage infrastructure located on the site.

C. NRCS Soil Type

Per the NWCC soil report dated November 8, 2019.

- 100% of the site is classified as Lintim loam.
- Loam is generally present from ground surface to 20-inches below grade, and clay or clay loam extending from there to approximately 60-inches below grade.
- Soils are described as well-drained with high water capacity .

Soils were classified as Hydraulic Group C.

4.0 Proposed Conditions

A. Ground Cover, Imperviousness, Topography and Size

Four Points evaluated the eastern lot post-development. Proposed final lot cover will consist of a single-family residence, garage, a driveway, and landscaping. The calculated proposed impervious area is 19%. The proposed grading scheme will not alter historic flow paths, with sheet flow generally from northeast to southwest, discharging to existing drainage features along Fish Creek Falls Road.

B. Proposed Stormwater System and Outfall

Sheet flows from the parcel will be conveyed to the existing drainage swale along Fish Creek Falls Road, with no change to overall discharge location.

5.0 Design Summary

The existing and proposed drainage was analyzed by subdividing the lot into the existing basin (EB), development basin (DB). Major and minor flows for the basins is summarized in the following table. Basin calculations are provided in **Appendix A**. Flow patterns will generally remain the same post-development. While there is a grade break on the site, this may be changed during grading therefore the entire eastern lot was evaluated as the proposed development basin.

Table 1: Major and Minor Flow Summary Table

Basin Condition	Area (acres)	Impervious Area (%)	Runoff	
			Q_5 (cfs)	Q_{100} (cfs)
EB1	0.39	2%	0.19	1.26
DB1	0.39	19%	0.30	1.44

Calculated post-development runoff is slightly higher than existing due to the addition of the residential structure and driveway. Routt County requests that peak flows post-development be equal to or less than pre-development.

6.0 Conclusions

Existing drainage patterns will generally be maintained under the proposed conditions. Calculated peak flows are increased following development due to the addition of the structure and driveway. To ensure that peak flows are maintained at pre-development rates, the new residence will implement low-impact development design to allow for infiltration of rainwater as well as slowing the flows. These design elements will include either a rain garden or a dry creek bed to route water from the roof drains through the selected infiltration element, and will be selected as part of planning with the project architect. The design element must account for a reduction of 0.11 cfs for the 5-year event and 0.18 cfs for the 100-year event via first-flush storage and/or infiltration. These are minor flow quantities easily managed through onsite infiltration and energy dissipation design elements.

7.0 References

Urban Drainage and Flood Control District Criteria Manual, 2018.

NOAA Precipitation Frequency Server. NOAA Atlas 14, Volume 8, Version 2. www.NOAA.com

City of Steamboat Springs Engineering Drainage Criteria, Latest Version.

8.0 Appendices

A. Basin Runoff Calculations
B. Basin Map

Appendix A: Basin Runoff Calculations

Appendix B: Basin Map