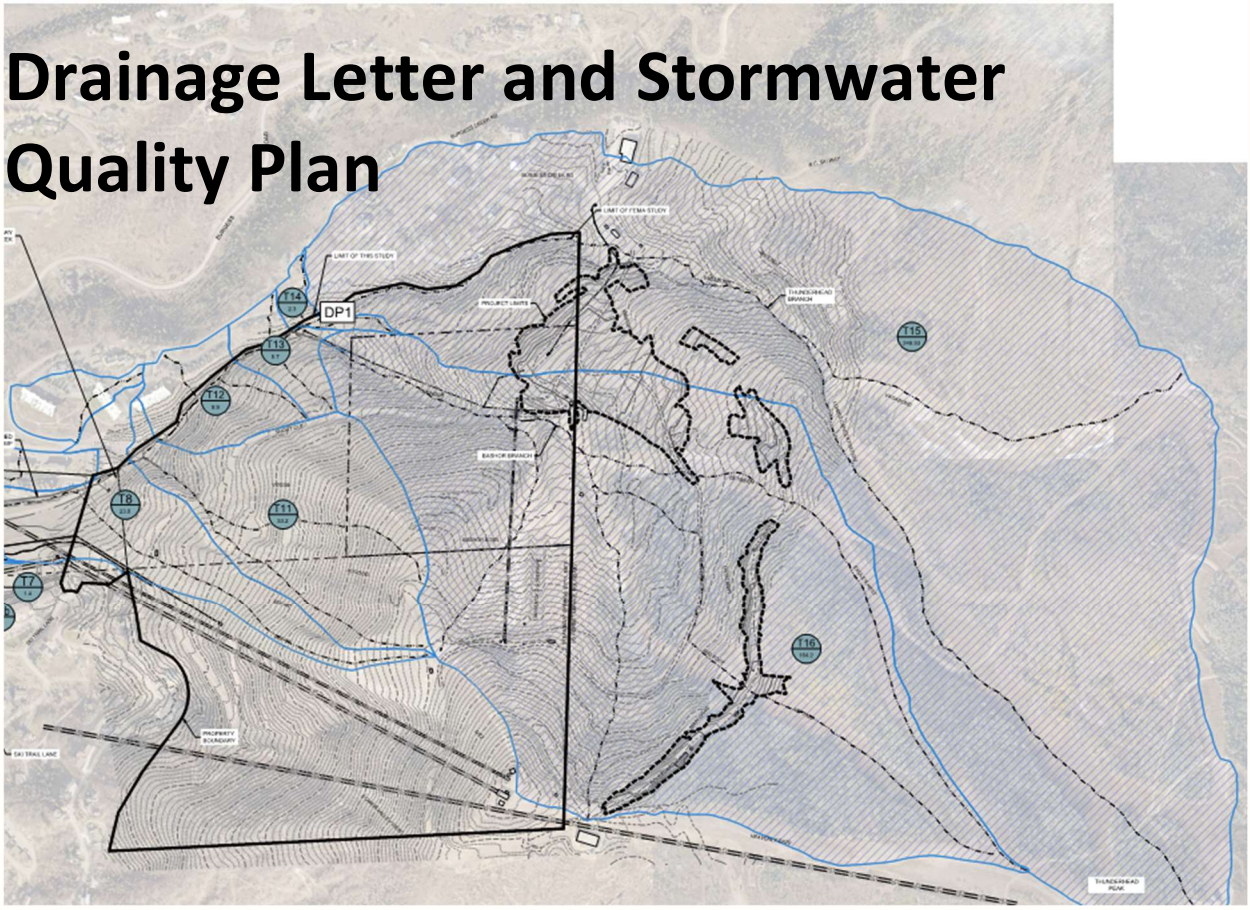
DRAFT

Drainage Letter and Stormwater Quality Plan



Green Horn Ranch

Preliminary Plat

Located in the SE ¼ and in the SE1/4 Section 22 and in the NE ¼ NW1/4 and in the NE1/4 Section 27, T6N, R84W, 6th P.M.

Original Date: February 26, 2021
Revised: June 18, 2021

Prepared by: Deborah Spaustat, P.E.

NOTE
City of Steamboat Springs plan review and approval is only for general conformance with City design criteria and the City code. The City is not responsible for the accuracy and adequacy of the design, dimensions, and elevations that shall be confirmed and correlated at the job site. The City of Steamboat Springs assumes no responsibility for the completeness or accuracy of this document.

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CERTIFICATION

I hereby affirm that this Drainage Letter and Stormwater Quality Plan for the Preliminary Plat for Green Horn Ranch 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 provisions of the City of Steamboat Springs Storm Drainage Criteria and approved variances. I understand that the City of Steamboat Springs does not and will not assume liability for drainage facilities designed by others.

Deborah Spaustat, P.E.
State of Colorado No. 0041286

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CO 80477 • (970) 871-9494
www.landmark-co.com

INTRODUCTION AND LOCATION

The purpose of this report is to estimate peak stormwater runoff, evaluate existing infrastructure and design required infrastructure to manage the existing stormwater experienced onsite and the incremental stormwater generated by the proposed Green Horn Ranch Preliminary Plat (the Project). This report includes all the base data, methods, assumptions, and calculations used by Landmark Consultants, Inc. (Landmark) to design the stormwater management system for the project. It was prepared in conjunction with the Preliminary Plat application and for Forest Service review and input.

The subject property is an unplatted lot located in the SE ¼ and in the SE ¼ Section 22 and in the NE ¼ NW ¼ and in the NE ¼ Section 27, T6N, R84W, 6th P.M. as described by Parcel Number 936271001. It is 173.88-acres in total area and encompasses a portion of the ski and bike trails of the Steamboat Ski Resort, roughly from the Christie Peak Express mid-station to the Christie Peak Express Upper Terminal and the Thunderhead Express lower terminal.

This project proposes to regrade approximately 4.4 acres within the limits of the City of Steamboat Springs and an additional 14.5 acres on US Forest Service Property in the vicinity of the Lower Bashor Bull-Wheel. The drainage basin containing the proposed activity is 250-acres in total. The 4.4-acre disturbed area is considered the "site" for purposes of the City's review of this drainage study; however, this study also addresses drainage infrastructure design on Forest Service Property.

The property is zoned open space and recreation and is currently used as a ski area and a summer recreation area. There is no proposed change in zoning or use.

Landmark prepared this report in accordance with City of Steamboat Springs Drainage Criteria for the purpose of designing the storm water infrastructure required by the project at the time of this report. This report may not be used by other parties without the express written consent of Landmark.

The facts and opinions expressed in this report are based on Landmark's understanding of the project and data gathered from:

- Site visits
- Steamboat Springs GIS data
- FEMA FIRM Map Number 08107C0883D and FIS Study
- LOMR 15-08-0994P
- NRCS soil maps
- Field survey by Landmark Consultants, Inc.
- Final Drainage Report for Steamboat Base Area Redevelopment by Drexel, Barrell & Co.
- Citywide Stormwater Masterplan by SHE
- The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development
- References listed at the end of this report

The location of the project is shown on Figure 1: Vicinity Map.

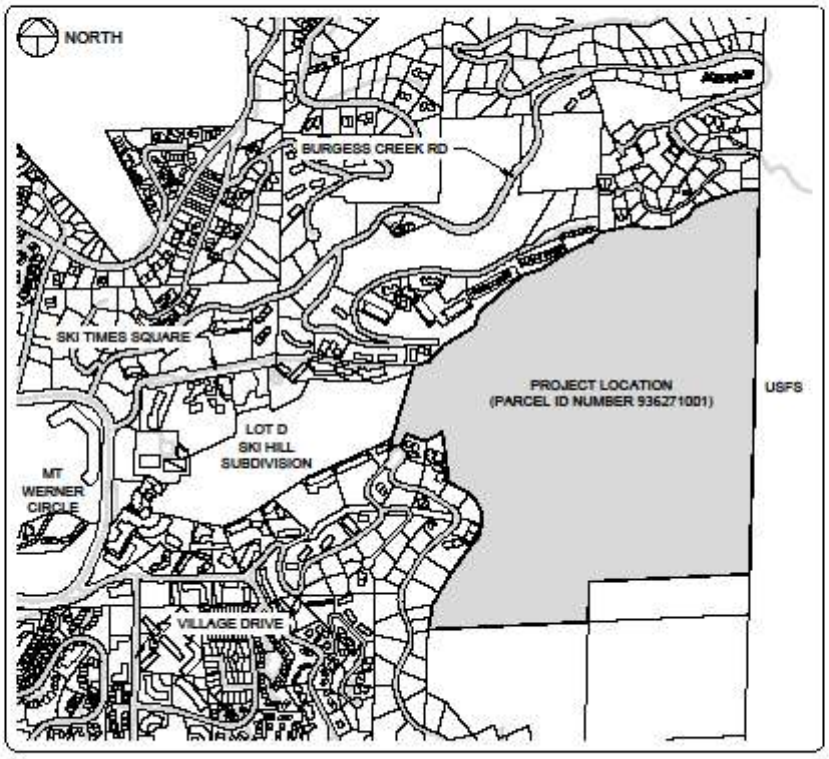


Figure 1- Vicinity Map

DRAINAGE CRITERIA AND METHODOLOGY

Landmark prepared this report in accordance with City of Steamboat Springs, Colorado Drainage Criteria, effective July 2019 and BLM and USFS's "The Gold Book" standards for oil and gas exploration and develoment. The methods used by Landmark are described below and the actual calculations are presented in the Appendices. The scope of this report is limited to flow determinations related to the described hydrological storm event. This report does not attempt to model subsurface flows nor is it intended to be used in the design of structure features including foundation drains and roof drains.

Design Rainfall and Runoff Frequency

For this project, determining the imperviousness of the basins was sufficient to conclude that the project will not increase the peak flows from the site and thus no peak flows were calculated. Site imperviousness was determined using Table 6-3 in the MHFCD's Urban Sotrm Drainage Criteria Manual Volume 1.

Additional hydrologic information was referenced from FEMA LOMR 18-08-0922P, effective June 29, 2019. This LOMR provided the 100-year estimated peak flow in the contributing basins to the Unnamed Tributary to Burgess Creek using the EPA SWMM method. It is discussed further below.

Stormwater Quality

The approximately 4.4-acres of disturbed area is excluded from the MS4 permit requirement to implement permanent stormwater treatment facilities as defined in the City's Drainage Design Standards by:

> *"Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped*: Land disturbance to undeveloped land that will remain undeveloped with no human-made structures such as buildings or pavement."

Form 6: Permanent Stormwater Treatment Facilities Exclusion Tracking Form has been included in Appendix B for this area.

EXISTING SITE CONDITIONS

In this report the term "historic condition" refers to the conditions of the site at the time of this report and may also be referred to as "pre-development condition" or "existing condition". The affected 4.4-acres (the site) are partially "developed" in the sense that they have been previously disturbed and revegetated from their native state, albeit with native vegetation. It slopes steeply to the west at grades up to 40%, however the grades in the area proposed disturbed area range from 10%-35% with an average slope of 20%.

The soils in project area are a Dorpat-Reddles complex (hydrologic soil group C). The soils in offsite contributing basins are a mix of Dorpat-Reddles complex, (HSG C), mine loam (HSG B) and Boatsteam Storm family (HSG A).

The site contains a small ski operation building, hiking and biking trails, gravel forest service access roads and ski lift terminals. Existing utilities onsite include potable water, sanitary sewer service, electric, telephone and snowmaking lines. Three propane tanks are also located in the project area. There are numerous small diameter culverts put in place by Ski Area operations on both Ski Corps and USFS land to manage runoff along the access roads. Most runoff flows overland to one of the tributary drainages with water bars and swales providing direction where needed.

Unnamed Tributary to Burgess Creek & FEMA Floodplain

Several natural drainage channels descend from the mountain and join to form the "Unnamed Tributary to Burgess Creek", which runs from northeast to southwest along the Right-O-Way ski trail. It is confined to a large diameter storm sewer as it enters the base of the ski area and then discharges to the Burgess Creek Culvert at the creek diversion structure adjacent to Slopeside Grill. The eventual outfall is the Yampa River.

LOMR 18-08-0922P, effective July 29, 2019, revised FEMA FIRM Number 08107C0883D dated February 4, 2005 to remove a portion of the Tributary from the SFHA leaving approximately 1,670-lineal feet of the tributary in the SFHA zone A. The effective floodplain limits are shown in Figure 2: FEMA FIRM and in Figure 3: Drainage Plan.

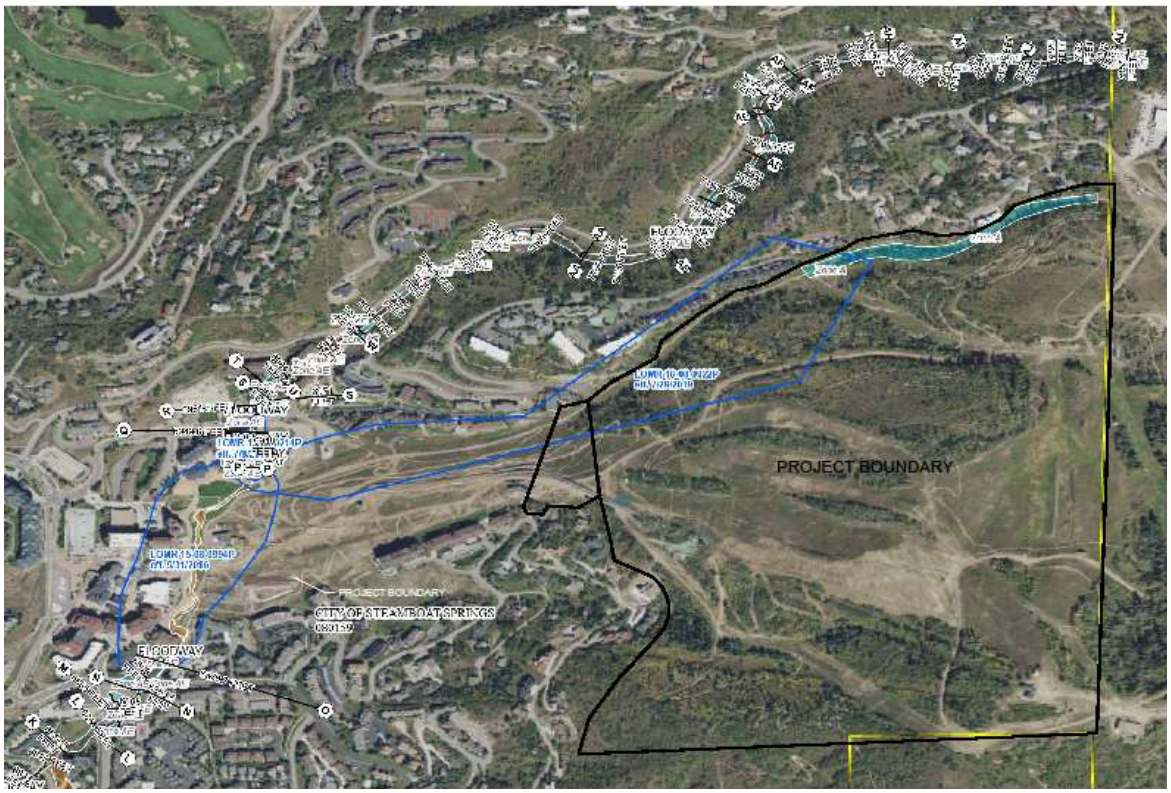


Figure 2-FEMA FIRM

The LOMR analyzed 10 subbasins and this project site is located in basins T15 and T16 between the Bashor Branch and the Thunderhead branch of the Unnamed Tributary.

The Citywide Master Stormwater Plan identifies several areas downstream on Burgess Creek in need of maintenance or replacement. This project does not propose to increase peak flows in Burgess Creek and will not affect downstream properties.

Easements

Several sanitary sewer easements exist onsite as shown in Figure 3: Drainage Plan.

Drainage Basins

The project is located in two subbasins of the Unnamed Tributary, basins T15 and T16 (see Figure 3: Drainage Plan). Runoff from basin T15 is collected in the "Thunderhead Branch" and runoff from T16 is collected in the "Bashor Branch".

Total runoff from both basins is quantified at design point 1 (DP1), which is representative of the total flow from basins T15 and T16 to the Unnamed Tributary.

The imperviousness of the drainage basins was calculated based on site features (i.e. gravel road, roof, ski slope) for areas within the ski area and Forest service boundaries. Imperviousness for portions of the basins outside of these areas were based on City of Steamboat Springs zoning.

Table 1 summarizes the imperviousness of the existing basins and design point:

Table 1: Existing Conditions Imperviousness

Basin	Total Area (acres)	%Imp	C_5	C_{100}
T15	249.88	5.15%	0.08	0.51
T16	164.19	2.35%	0.06	0.50
DP1	414.07	4.04%	0.08	0.50

The overall imperviousness of the combined drainage basins is 4.04%.

The LOMR application calculated the peak 100-year flows in each basin as Q_{T15}=73.8-cfs and Q_{T16}=34.9-cfs

PROPOSED SITE CONDITIONS

The project proposes to re-grade and re-vegetate with native seed approximately 4.4 acres of existing ski area terrain within the limits of the City of Steamboat Springs. A water line will be replaced and a sanitary sewer service will be installed. Additional work is proposed in Routt County on US Forest Service Land.

The proposed access roads will be constructed with roadside swales. Surface water on the roads will be diverted by "water dips" to the swales. 18-inch "ditch relief culverts" will be installed at intervals of 140-feet to 200-feet to convey water from the uphill to downhill side of the roads. "Rundown" culverts, half 18-inch culverts anchored to the top of fill slopes, will convey runoff from ditches on the downhill side of the roads safely down steep slopes to prevent erosion. Final locations of culverts will be determined in the field during a "plan-in-hand" meeting with the USFS.

Additionally, the existing 30-inch culvert that crosses under the Bashor Lift will be replaced with a culvert that can convey the 100-year flow in the Bashor Branch of the Unnamed tributary per the calculations included in the LOMR for that area.

Drainage patterns will be largely maintained with the intent to avoid diverting runoff from its historical basin to another.

Temporary stormwater quality management such as slope stabilization will be implemented until vegetation is established.

The proposed work will not change the imperviousness or any other hydrological feature of the drain basins and therefore will not increase or decrease the peak flows. Flows were not calculated since no stormwater systems exist onsite and none are proposed.

Stormwater Quality

Because the site will remain undeveloped, the project is eligible to be excluded from the MS4 permit requirement to implement permanent stormwater treatment facilities as defined in the City's Drainage Design Standards by:

"Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped: Land disturbance to undeveloped land that will remain undeveloped with no human-made structures such as buildings or pavement.".

Water quality in the Yampa River is degraded by the washing off of accumulated deposits on the urban landscape of Steamboat Springs. Metals, salts, sand, gravel, trash, debris, and organics (including oil and gasoline) all accumulate on the streets and in parking lots of Steamboat Springs over the course of time. During a rainstorm event, these pollutants are washed by the runoff into the Yampa River and its tributaries. Water quality problems caused by these pollutants include turbid water, nutrient enrichment, bacterial contamination, reduction in dissolved oxygen, and increased stress on aquatic life. The most prevalent pollutant in Steamboat Springs is sediment. BMP's included in this project are designed to minimize the amount of sediment leaving the site and entering the waterways.

Potential Pollutant Sources: The following are anticipated pollutant sources for this project:

1. Ski Area operations vehicles
2. Landscaping maintenance
3. Snow removal and related transport of sand, dirt and oils;
4. Trash.

TEMPORARY EROSION AND SEDIMENT CONTROL

The primary source of storm water contaminants in the City of Steamboat Springs are suspended sediments and are most susceptible during construction activities. Temporary erosion and sediment control during construction is the responsibility of the permit holder (including NPDES permitting). Appropriate best management practices (BMP's) for construction activities are detailed in Erosion and Sediment Control During Construction by Routt County, Colorado. It is the responsibility of the permit holder to identify and properly handle all materials that are potential pollution sources prior to mobilization. The following are some common examples of potential pollution sources:

- Stockpiling of materials that can be transported to receiving waterways
- Uncovered trash bins
- Exposed and stored soils, management of contaminated soils
- Off-site tracking of soils and sediment
- Loading and unloading operations
- Outdoor storage of building materials, chemicals, fertilizers, etc.
- Vehicle and equipment maintenance and fueling
- Significant dust or particulate generating processes
- Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.
- On-site waste disposal practices (waste piles, dumpsters, etc.)
- Concrete truck/equipment washing.
- Non-industrial waste sources that may be significant, such as worker trash and portable toilets.

It is not possible to identify all materials that will be used or stored on the construction site. It is the sole responsibility of the permit holder to identify and properly handle all materials that are potential pollutant sources prior to mobilization.

Some temporary BMP's include, but are not limited to, straw bales, silt fences, ditch checks, berms, slope drains, seeding and mulching, pipes, and sediment basins. In order to prevent mud

from being transported into public right of ways, vehicle tracking pads and wheel wash areas should be utilized. Temporary BMP's should be coordinated with the site's permanent erosion control measures to assure continuous and economical erosion control. Because different BMP's are required at different stages of construction, the site should be periodically reviewed by the permit holder to verify the proper BMP's are in place.

Temporary BMP's should be inspected at a minimum once every two weeks, after each significant storm event, and at 24 hour intervals during extended storm events. Repairs or reconstruction of temporary BMP's shall occur within two working days in order to ensure continued performance. It is the responsibility of the Construction Site Operator to conduct bi-weekly inspections, maintain BMP's, and keep records of site conditions and inspections.

Areas used for material storage which are exposed to precipitation, disturbed areas, the construction site perimeter, and all applicable/installed erosion and sediment control measures shall be inspected for evidence of, or the potential for, pollutants entering the drainage system.

Preventative maintenance of all temporary BMP's shall be provided in order to ensure continued performance. Maintenance activities and actions shall be noted and recorded during inspections. All temporary erosion control measures must be kept in place and maintained until the site has been sufficiently stabilized in accordance with permit requirements.

It is recommended that a Stormwater Management Plan (SWMP) be completed prior to commencement of any land disturbing activities. Additionally, all pertinent local, state, and federal permits should be obtained prior to construction.

CONCLUSIONS

The improvements proposed for Green Horn Ranch include regrading and re-vegetating 4.6-acres of the ski area. Stormwater runoff will be collected in the Thunderhead and Bashor Branches of the unnamed tributary to Burgess Creek, flow through the unnamed tributary, Burgess Creek Culvert, and Burgess Creek and ultimately discharge to the Yampa River maintaining historical drainage patterns. The project will not increase imperviousness of the drainage basins nor increase peak flows. It is exempt from MS4 permit requirements for water quality treatment because it will remain undeveloped. No detention or water quality treatment is proposed.

The design contained herein complies with the criteria set forth in the City's Drainage Design Manual.

LIMITATIONS

This study is intended to estimate and analyze peak stormwater runoff volumes generated by hydrologic events to evaluate existing drainage infrastructure and design new infrastructure needed to manage these flows. It does not account for groundwater, springs, or seeps and is not intended to be used for the evaluation or design of foundation drains or roof drains.

Basin delineations, areas, and soil characteristics are based on the best available information listed in the INTRODUCTION AND LOCATION section of the report. Actual conditions may vary. Landmark's assumptions, recommendations and opinions are based on this information and the proposed site plan. If any of the data is found to be inaccurate or the proposed site plan is changed, Landmark should be contacted to review this report and make any necessary revisions.

The 100-year event is defined as the rainfall, runoff, or flooding event which has a probability of 1-percent of occurring in any given year based on available data. The 100-year event could occur in successive years or even multiple times in a single year. Events greater than the 100-year event or lesser events combined with malfunctioning drainage works can occur on rare occasion and may cause flooding damage.

The data, opinions, and recommendations of this report are applicable to the specific design elements and location that is the subject of this report. The report is not applicable to any other design elements or to any other locations. Any and subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendation without the prior written consent of Landmark Consultants, Inc.

Landmark Consultants, Inc. has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the contractor, or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the Final Construction Drawings and Specifications.

The only warranty or guarantee made by Landmark Consultants, Inc. in connection with the services performed for this project is that such services are performed with the care and skill ordinarily exercised by members of the profession practicing under similar conditions, at the same time, and in the same or similar locality. No other warranty, expressed or implied, is made or intended by rendering such services or by furnishing written reports of the findings.

This study is intended to estimate and analyze peak stormwater runoff volumes generated by hydrologic events in order to evaluate existing drainage infrastructure and design new infrastructure needed to manage these flows. It does not account for groundwater, springs, or seeps and is not intended to be used for the evaluation or design of foundation drains or roof drains.

REFERENCES

1. Section 5.0 Drainage Criteria, City of Steamboat Springs Department of Public Works, September 2007.

2. Drainage Criteria Manual (Volumes 1 – 3), Urban Drainage and Flood Control District, June 2001

3. Hydraulic Design of Highway Culverts (HDS-5), Federal Highway Administration, September 2001

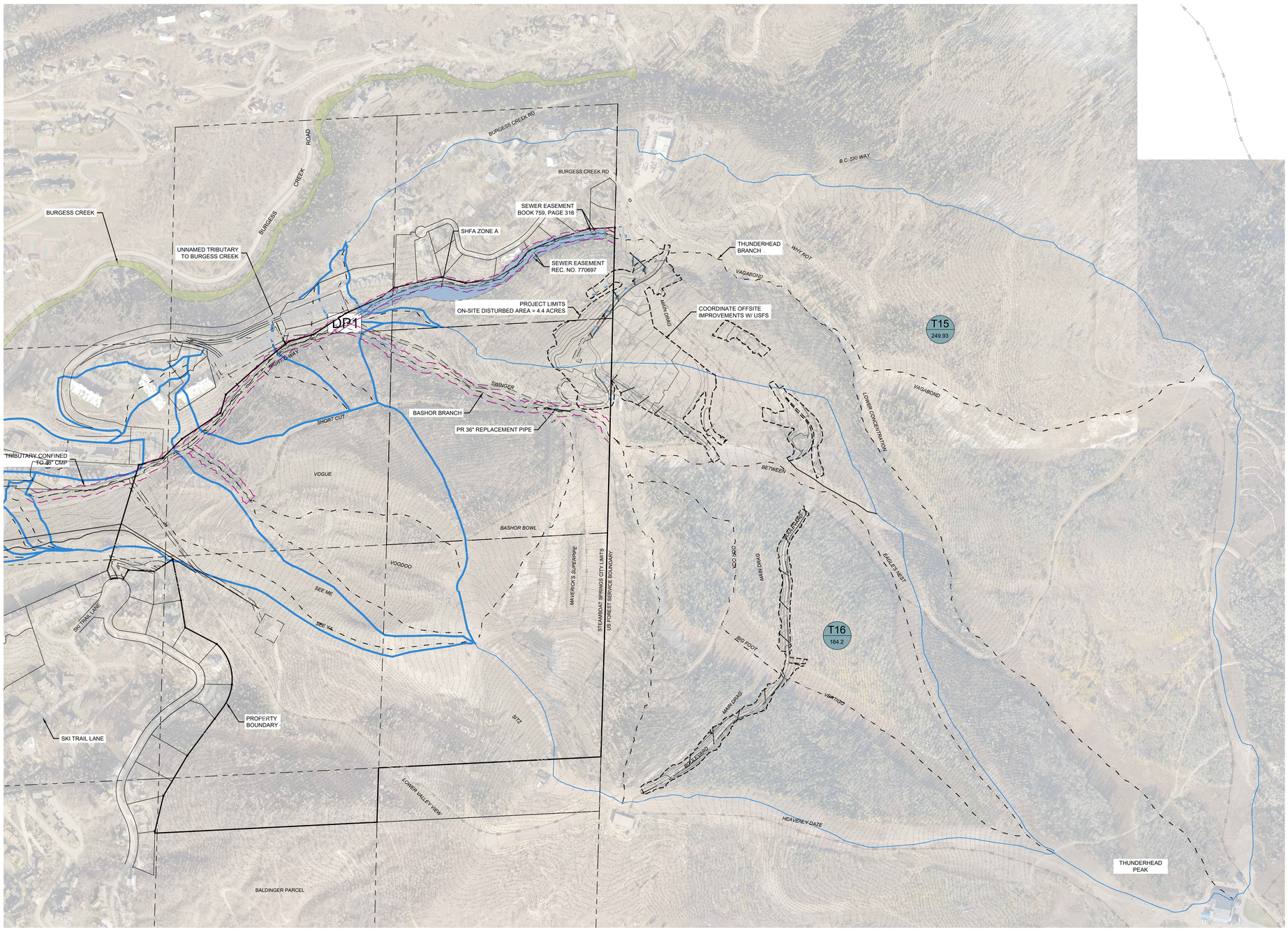
4. Procedures for Determining Peak Flows in Colorado, Natural Resource Conservation Service, 1984

5. Urban Hydrology for Small Watersheds (TR-55), Natural Resource Conservation Service, June 1986

6. Final Drainage Report for Steamboat Base Area Redevelopment, Drexel, Barrell & Co., December 1, 2006.

7. Citywide Stormwater Master Plan for the City of Steamboat Spring, Colorado, SEH, March 2013.

8. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, United States Department of the Interior Bureau of Land Management & United States Department of Agriculture Forest Service, 2007.



NORTH

300 0 300 600 900 Feet

(IN FEET)
1 inch = 300 ft.

LEGEND:

EXISTING STORM SEWER	
PROPOSED MAJOR CONTOUR	6805
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	6805
EXISTING MINOR CONTOUR	
PROPOSED SWALE	
PROPOSED CURB & GUTTER	
PROPERTY BOUNDARY	
FLOOD HAZARD LIMITS	
EXISTING OVERLAND FLOW DIRECTION	

NOTES:

1. THE SIZE, TYPE AND LOCATION OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THESE DRAWINGS. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO VERIFY THE EXISTENCE OF ALL UNDERGROUND UTILITIES IN THE AREA OF THE WORK. BEFORE COMMENCING NEW CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR FOR ALL UNKNOWN UNDERGROUND UTILITIES.
2. ALL PROJECT DATA IS ON VERTICAL DATUM; NAVD 88. SEE NOTES SHEET FOR BENCHMARK REFERENCES.
3. ELEVATIONS FOR IMPROVEMENTS THAT ARE CONTROLLED BY ADJACENT EXISTING FACILITIES (SUCH AS PROPOSED GUTTERS ALONG EXISTING ASPHALT) MAY REQUIRE ADJUSTMENT BASED ON ACTUAL CONDITIONS. COORDINATE WITH ENGINEER TO ENSURE A CONSISTENT SECTION WITH SMOOTH TRANSITIONS WHERE NECESSARY.
4. SEE SOILS REPORT FOR PAVEMENT, SUBGRADE AND MATERIAL PREPARATION, DESIGN AND RECOMMENDATIONS.
5. ALL CURB SPOTS SHOWN ARE FLOWLINE ELEVATIONS, UNLESS NOTED OTHERWISE. ALL OTHER SPOTS ARE FINISHED GRADE ELEVATIONS.

CIVIL ENGINEERS | SURVEYORS
141 9th Street ~ P.O. Box 774943
Steamboat Springs, Colorado 80477
(970) 871-9494
www.LANDMARK-CO.com

LANDMARK CONSULTANTS, INC.

NO.	DESCRIPTION:	BY:	DATE:
	REVIEW SET NOT FOR CONSTRUCTION		2/19/2021

PROJECT:	1012.447
DATE:	2/26/2021
DRAWN BY:	DCS
CHECKED BY:	LCI

SSRC Green Horn Ranch
Figure 3:
Drainage Plan

SHEET
1
Of 1 Sheets

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NORTH

60 0 60 120 180 Feet

(IN FEET)
1 inch = 60 ft.

LEGEND:

EXISTING STORM SEWER	
PROPOSED MAJOR CONTOUR	6805
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	6805
EXISTING MINOR CONTOUR	
PROPOSED SWALE	
PROPOSED CURB & GUTTER	
PROPERTY BOUNDARY	
FLOOD HAZARD LIMITS	
EXISTING OVERLAND FLOW DIRECTION	

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141 9th Street ~ P.O. Box 774943
Steamboat Springs, Colorado 80477
(970) 871-9494
www.LANDMARK-CO.com

LANDMARK CONSULTANTS, INC.

NO.	DATE:	BY:	DESCRIPTION:
1	6/18/2021	DCS	DRT COMMENTS

REVIEW SET
NOT FOR CONSTRUCTION
2/19/2021

PROJECT:	1012-047
DATE:	2/26/2021
DRAWN BY:	DCS
CHECKED BY:	LCI

SSRC Green Horn Ranch
Figure 4:
Drainage Plan Detail

SHEET
1
Of 1 Sheets

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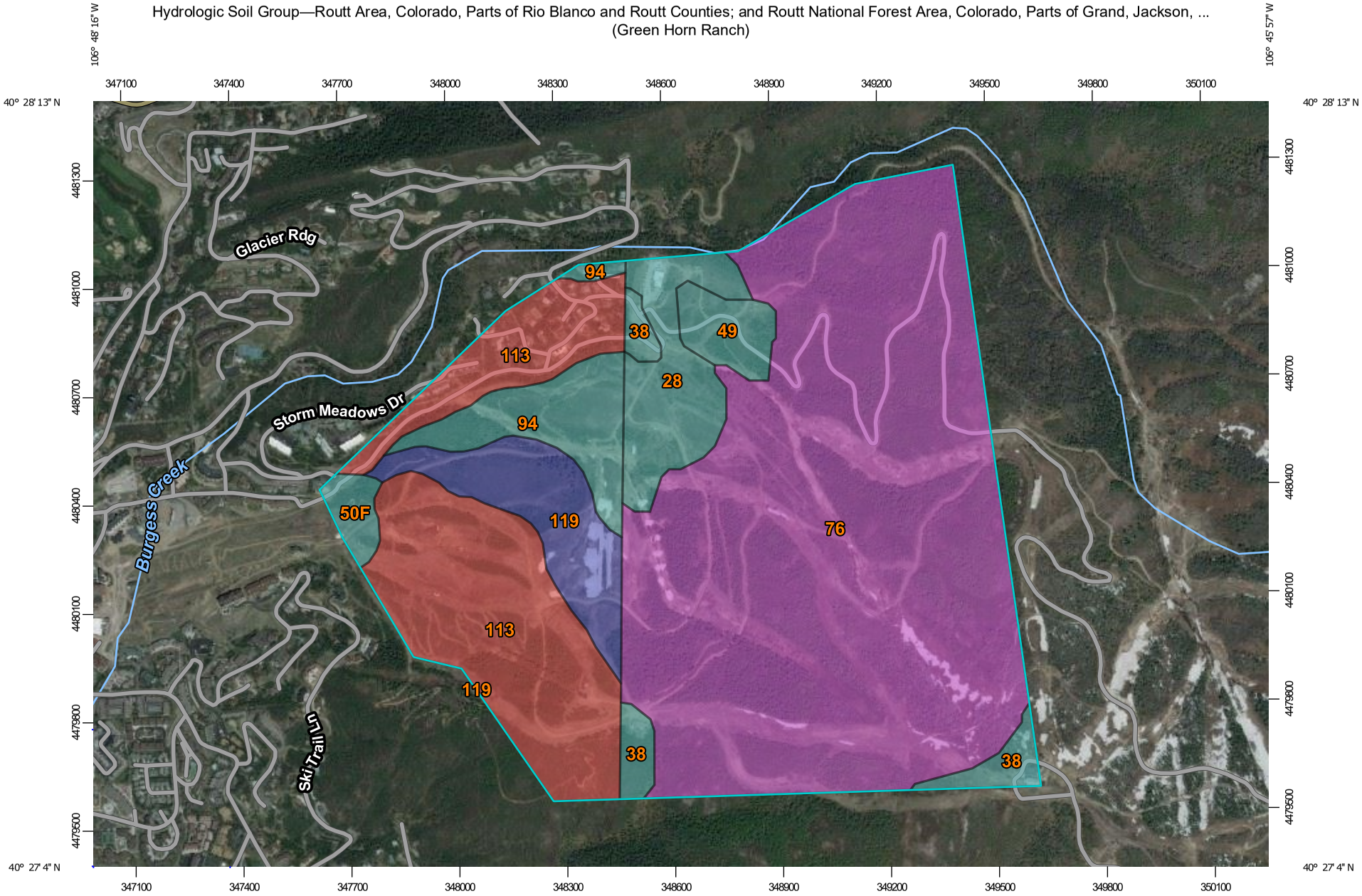
APPENDIX A

HYDROLOGIC CALCULATIONS

Hydrologic Soil Group—Routt Area, Colorado, Parts of Rio Blanco and Routt Counties; and Routt National Forest Area, Colorado, Parts of Grand, Jackson, ...
(Green Horn Ranch)



Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 200 400 800 1200

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
50F	Routt loam, 25 to 65 percent slopes, very stony	C	7.0	1.1%
94	Dorpat-Reddles complex, 30 to 65 percent slopes	C	31.2	5.1%
113	Bucklon, very stony-Skyway complex, 30 to 75 percent slopes	D	119.1	19.5%
119	Mine loam, 30 to 75 percent slopes	B	37.0	6.1%
Subtotals for Soil Survey Area			**194.3**	**31.9%**
Totals for Area of Interest			**609.9**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
28	Haviland-Hollandlake families, complex, 10 to 40 percent slopes, landslides	C	34.2	5.6%
38	Namela-Rogert, very flaggy-Rock outcrop complex, 35 to 75 percent slopes	C	16.0	2.6%
49	Uinta-Pineguest families, complex, 15 to 40 percent slopes, landslides, very bouldery	C	12.9	2.1%
76	Boatsteam-Storm family, very bouldery-Pineguest family complex, 30 to 55 percent slopes	A	352.5	57.8%
Subtotals for Soil Survey Area			**415.6**	**68.1%**
Totals for Area of Interest			**609.9**	**100.0%**

Table 6-3. Recommended percentage imperviousness values

Land Use or Surface Characteristics	Percentage Imperviousness (%)
Business:	
Downtown Areas	95
Suburban Areas	75
Residential lots (lot area only)**:**	
Single-family	
2.5 acres or larger	12
0.75 – 2.5 acres	20
0.25 – 0.75 acres	30
0.25 acres or less	45
Apartments	75
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	10
Playgrounds	25
Schools	55
Railroad yard areas	50
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

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PROJECT	Green Horn Ranch
DESIGNER	Deb Spaustat
DATE	2/19/2021
LOCATION	Steamboat Springs, CO

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

Character of Surface	Percent Impervious
Zone RE1	30%
Zone RE 2	45%
Zone RN 1	20%
Zone RR 1	75%
Zone OR	2%
Right-of-Way	90%
Ski Slope	2%
Gravel Surfaces	40%
Roof	90%

IDF	Soil Type
Steamboat Springs NOAA	C

Basin ID	Basin Area (sq. ft.)	Basin Area (acres)	Area of Gravel Surfaces (sq. ft.)	Area of Gravel Surfaces (acres)	Area of Roof (sq. ft.)	Area of Roof (acres)	Area of Ski Slope (sq. ft.)	Area of Ski Slope (acres)	Area of Ski Slope (USFS, Unzoned) (sq. ft.)	Area of Ski Slope (USFS, Unzoned) (acres)	Zone RN 1 (sq. ft.)	Zone RN 1 (acres)	Zone RE 1 (sq. ft.)	Zone RE 1 (acres)	Zone RE 2 (sq. ft.)	Zone RE 2 (acres)	Zone RR 1 (sq. ft.)	Zone RR 1 (acres)	Zone OR (sq. ft.)	Zone OR (acres)	R-O-W (sq.ft.)	R-O-W (acres)	Percent Impervious
T15	10884818.00	249.88	35589.54	0.82	0.00	0.00	663494.92	15.23	9141694.49	209.86	639174.27	14.67	47711.14	1.10	58539.70	1.34	86654.31	1.99	84142.71	1.93	127623.89	2.93	5.15%
T16	7152256.29	164.19	61864.08	1.42	1669.28	0.04	2107444.81	48.38	4981285.27	114.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.35%
Total		414.07																					4.04%

HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: REPLACEMENT PIPE

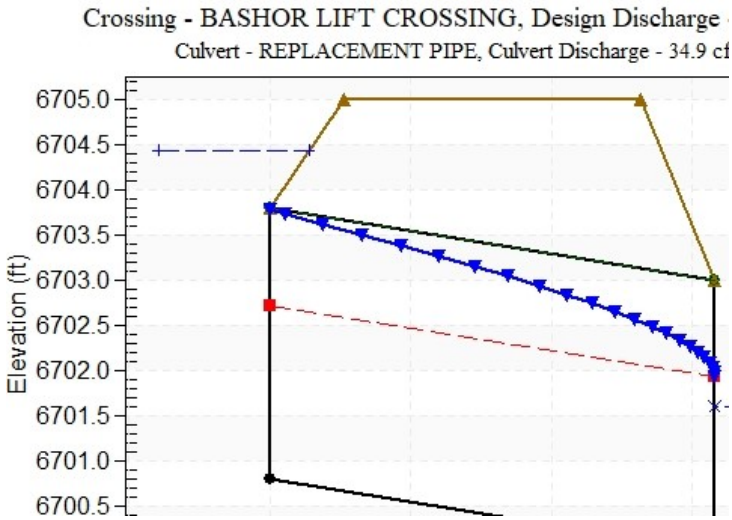


Table 1 - Culvert Summary Table: REPLACEMENT PIPE

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
1.00	1.00	6701.28	0.435	0.486	2-M2c	0.404	0.309	0.309	0.146	2.604	2.281
5.90	5.90	6702.00	1.087	1.208	2-M2c	0.979	0.762	0.762	0.454	4.175	4.329
10.80	10.80	6702.47	1.499	1.675	2-M2c	1.360	1.041	1.041	0.682	4.957	5.276
15.70	15.70	6702.86	1.853	2.070	2-M2c	1.698	1.264	1.264	0.885	5.547	5.915
20.60	20.60	6703.23	2.159	2.441	2-M2c	2.039	1.457	1.457	1.074	6.048	6.395
25.50	25.50	6703.60	2.451	2.805	2-M2c	2.449	1.630	1.630	1.254	6.501	6.779
30.40	30.40	6703.98	2.755	3.192	7-M2c	3.000	1.786	1.786	1.428	6.927	7.097
34.90	34.90	6704.43	3.059	3.637	7-M2c	3.000	1.919	1.919	1.584	7.307	7.345
40.20	38.73	6705.03	3.345	4.241	7-M2c	3.000	2.025	2.025	1.763	7.627	7.599
45.10	39.11	6705.08	3.375	4.291	7-M2c	3.000	2.035	2.035	1.927	7.660	7.803
50.00	39.36	6705.12	3.395	4.329	7-M2t	3.000	2.042	2.088	2.088	7.495	7.984

****
****
****

Straight Culvert

Inlet Elevation (invert): 6700.79 ft, Outlet Elevation (invert): 6700.00 ft

Culvert Length: 158.00 ft, Culvert Slope: 0.0050

****
****
****

Site Data - REPLACEMENT PIPE

Site Data Option:

Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6700.79 ft

Outlet Station: 158.00 ft

Outlet Elevation: 6700.00 ft

Number of Barrels: 1

Culvert Data Summary - REPLACEMENT PIPE

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 1 cfs

Design Flow: 34.9 cfs

Maximum Flow: 50 cfs

Table 2 - Summary of Culvert Flows at Crossing: BASHOR LIFT CROSSING

Headwater Elevation (ft)	Total Discharge (cfs)	REPLACEMENT PIPE Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6701.28	1.00	1.00	0.00	1
6702.00	5.90	5.90	0.00	1
6702.47	10.80	10.80	0.00	1
6702.86	15.70	15.70	0.00	1
6703.23	20.60	20.60	0.00	1
6703.60	25.50	25.50	0.00	1
6703.98	30.40	30.40	0.00	1
6704.43	34.90	34.90	0.00	1
6705.03	40.20	38.73	1.37	26
6705.08	45.10	39.11	5.86	5
6705.12	50.00	39.36	10.51	4
6705.00	38.68	38.68	0.00	Overtopping

Table 3 - Downstream Channel Rating Curve (Crossing: BASHOR LIFT CROSSING)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
1.00	6700.15	0.15	2.28	0.36	1.05
5.90	6700.45	0.45	4.33	1.13	1.13
10.80	6700.68	0.68	5.28	1.70	1.13
15.70	6700.88	0.88	5.91	2.21	1.11
20.60	6701.07	1.07	6.40	2.68	1.09
25.50	6701.25	1.25	6.78	3.13	1.07
30.40	6701.43	1.43	7.10	3.56	1.05
34.90	6701.58	1.58	7.35	3.95	1.03
40.20	6701.76	1.76	7.60	4.40	1.01
45.10	6701.93	1.93	7.80	4.81	0.99
50.00	6702.09	2.09	7.98	5.21	0.97

Tailwater Channel Data - BASHOR LIFT CROSSING

Tailwater Channel Option: Rectangular Channel

Bottom Width: 3.00 ft

Channel Slope: 0.0400

Channel Manning's n: 0.0340

Channel Invert Elevation: 6700.00 ft

Roadway Data for Crossing: BASHOR LIFT CROSSING

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 6705.00 ft

Roadway Surface: Gravel

Roadway Top Width: 105.00 ft

APPENDIX B

CITY CHECKLISTS

STANDARD FORM NO. 1 DRAINAGE LETTER CHECKLIST

Instructions:

1. The applicant shall identify with a "check mark" if information is provided with letter. If applicant believes information is not required, indicate with "N/A" and attach separate sheet with explanation.
2. The reviewer will determine if information labeled "N/A" is required and whether additional information must be submitted.

I. General

✓ A. Typed and legible in 8½ x 11" format.
✓ B. Drawings that are 8½" x 11" or 11 x 17 bound within letter, larger drawings (up to 24 x 36) included in a pocket attached to the letter. Drawings shall be at an appropriate size and scale to be legible and include project area.

II. Title Page

✓ A. Type of Letter.
✓ B. Project Name, Subdivision, Original Date, Revision Date.
✓ C. Preparer's name, firm, address, and phone number.
✓ D. Certifications, PE stamp, signature and date from licensed Colorado PE (for FINAL letter).
✓ E. "DRAFT" for 1st Submittal and revisions; "FINAL" once approved.
✓ F. Note: City of Steamboat Springs plan review and approval is only for general conformance with City design criteria and the City code. The City is not responsible for the accuracy and adequacy of the design, dimensions, and elevations that shall be confirmed and correlated at the job site. The City of Steamboat Springs assumes no responsibility for the completeness or accuracy of this document.

III. Introduction

✓ A. Description of site location, size in acres, existing and proposed land use, and any pertinent background info.
✓ B. Identify drainage reports for adjacent development.

IV. Drainage Criteria and Methodology Used

✓ A. Identify design rainfall and storm frequency.
✓ B. Identify runoff calculation method used.

V. Existing Conditions (Pre-Development/Historic)

✓ A. Indicate ground cover, imperviousness, topography, and size of site (acres).
✓ B. Describe existing stormwater system (sizes, materials, etc.).
✓ C. Describe other notable features (canals, major utilities, etc.).
✓ D. Note site outfall locations and ultimate outfall location (typically Yampa River).
NA E. Note capacity of existing system and identify any constraints. NO EXISITNG SYSTEM
✓ F. Identify NRCS soil type.
✓ G. Identify the FEMA Map reviewed, if site is in floodplain/way, and zone designation.

VI. Proposed Conditions

SINCE NO STORMWATER SYSTEMS EXIST ONSITE OR ARE PROPOSED FLOWS WERE NOT CALCULATED.

✓ A. Indicate ground cover, imperviousness, topography, and disturbed area (acres).
NA B. Describe proposed stormwater system (sizes, materials, etc.). NO PROPOSED SYSTEM
NA C. Describe proposed outlets and indicate historic and proposed flow for each.
NA D. Include calculations for all pipes, inlets, culverts, ditches, ponds, etc. in appendix.
NA E. Include a summary table for the 5- and 100-year events showing historic flow and proposed flow for total site and each basin.
NA F. Include a summary of proposed water quality measures to be constructed. EXEMPT FROM WQ

VII. Conclusions

✓ A. Provide general summary.
✓ B. Note if site does or does not comply with criteria and any variances to criteria.
✓ C. Indicate if peak proposed flow is less than, equal to, or greater than peak historic flow for each outfall, design point, and for the total site.
NA D. Indicate proposed stormwater quality system.

VIII. References

✓ A. Provide a reference list of all criteria, master plans, drainage reports and technical information used.

IX. Figures

SITE PLAN, EXISTING CONDITIONS PLAN AND PROPOSED CONDITIONS PLAN ARE COMBINED INTO A SINGLE PLAN FIGURE 3: DRAINAGE PLAN

✓ A. Vicinity Map.
✓ B. Site Plan (include the horizontal and vertical datum used and all benchmarks).
C. Existing conditions.
✓ 1. Delineate existing basin boundaries.
✓ 2. Show existing runoff flow arrows.
✓ 3. Show existing topography.
✓ 4. Show existing stormwater features (structures, sizes, materials, etc.).
✓ 5. Show floodplain limits and information.
✓ 6. For each basin, show bubble with basin number, acreage and percent impervious or provide information in summary table or figure.
✓ 7. For each outlet show bubble with acreage and historic flow and proposed flow or provide information in summary table on figure.

D. Proposed Conditions
✓ 1. Delineate proposed basin boundaries.
✓ 2. Show proposed runoff flow arrows.
✓ 3. Show existing and proposed topography at an interval of at least 5-ft.
✓ 4. For each basin show bubble with basin number, acreage and percent impervious or provide a summary table or figure.
✓ 5. For each outlet show bubble with acreage, historic flow, and proposed flow or provide a summary table or figure.
✓ 6. Show floodplain limits and information.
NA 7. Show proposed stormwater system (components, sizes, materials, & slopes).
✓ 8. Show property lines and easements.
NA 9. Show any new easements required.

X. Appendices

✓ A. Runoff Calculations
NA B. Culvert Calculations
NA C. Pond Calculations.
NA D. Other Calculations

Acknowledgements:

Standard Form No. 1 was prepared by: Deborah Spaustat Digitally signed by Deborah Spaustat DN: C=US, E=debs@landmark-co.com, O="Landmark Consultants, Inc.", CN=Deborah Spaustat Date: 2021.02.24 12:50:02-07'00' _____

Date

Include Attachment A – Scope Approval Form (see Standard Form No. 5)
Include Attachment B – Storm Water Quality Plan (see Standard Form No. 4)

Standard Form No. 5 Drainage and Stormwater Treatment Scope Approval Form

Prior to starting a development plan and before the first drainage submittal, a Drainage and Stormwater Treatment Scope Approval Form must be submitted for review and signed by the City Engineer. A signed form shall also be included in every drainage submittal as Attachment A. This Scope Approval Form is for City requirements only. Values may be approximate. The City encourages supporting calculations and figures to be attached.

Project Information	
Project name:	Green Horn Ranch
Project location:	2305 Mt Werner Circle (Parcel ID Number 936271001)
Developer name/contact info:	Steamboat Ski & Resort Corp. Jim Schneider, 970-871-5381, jschneider@steamboat.com
Drainage engineer name/contact info:	Deborah Spaustat, P.E., Landmark Consultants, Inc. debs@landmark-co.com, 970-871-9494
Application Type:	Preliminary Plat - Administrative
Proposed Land Use:	Open Space & Recreation (OR); Ski Area

Project Site Parameters	
Total parcel area (acres):	181 acres (Drainage Basin = 414 acres)
Disturbed area (acres):	4.6 acres
Existing impervious area (acres, if applicable):	4.04% overall imperviousness
Proposed new impervious area (acres):	0 acres
Proposed total impervious area (acres):	4.04% overall imperviousness
Proposed number of project outfalls:	1
Number of additional parking spaces:	0
Description and site percentage of existing cover/land use(s):	OR - Open Space & Recreation (100%)
Description and site percentage of proposed cover/land use(s):	OR - Open Space & Recreation (100%)
Expected maximum proposed conveyance gradient (%):	Sheet flow slopes up to 50% (2:1)
Description of size (acres) and cover/land use(s) of offsite areas draining to the site	OR - 16.4%, RE 1 - 0.3%, RE 2 - 0.3%, RN 1 - 3.5% RR 1 - 0.5%, Ski Area (outside city limits) - 78.2% R-O-W - 0.7%

Type of Study Required:

☑ Drainage Letter
☐ Final Drainage Study
☐ Conceptual Drainage Study
☐ Stormwater Quality Plan

Hydrologic Evaluation:

☑ Rational Method ☐ CUHP/SWMM ☐ HEC-HMS ☐ Other_____

Project Drainage	
Number of subbasins to be evaluated:	1
Presence of pass through flow (circle):	(YES) NO
Description of proposed stormwater conveyance on site:	n/a
Project includes roadway conveyance as part of design evaluation (circle):	YES (NO)
Description of conveyance of site runoff downstream of site, identify any infrastructure noted in Stormwater Master Plan noted as lacking capacity for minor or major storm event:	Site runoff patterns will remain unchanged, continuing to drain to the unnamed tributary to Burgess Creek (BC). The unnamed tributary will join BC at the 78" base area culvert. This project does not propose to increase peak flows.
Detention expected onsite (circle):	YES (NO)
Presence of Floodway or Floodplain on site (circle):	(YES) NO
Anticipated modification of Floodway or Floodplain proposed (circle):	YES (NO)
Describe culvert or storm sewer conveyance evaluative method:	n/a

Permanent Stormwater Treatment Facility Design Standard (check all that apply with only one standard per tributary basin):

☐ WQCV Standard ☐ TSS Standard ☐ Infiltration Standard
☐ Constrained Redevelopment WQCV Standard
☐ Constrained Redevelopment TSS Standard
☐ Constrained Redevelopment Infiltration Standard
☑ Does not Require Permanent Stormwater Treatment (attach Exclusion Tracking Form)

Project Permanent Stormwater Treatment	
Justification of choice of proposed design standard, including how the site meets the constrained redevelopment standard, infiltration test results, etc.:	The site is remaining unchanged except for grading including re-vegetation.
Concept-level permanent stormwater treatment facility design details (type, location of facilities, proprietary structure selection, treatment train concept, etc.):	n/a
Proposed LID measures to reduce runoff volume:	n/a
Will treatment evaluation include off-site, pass through flow (circle):	YES (NO)

Approvals

Deborah Spaustat	2/19/21	970-871-9494
Prepared By: (Insert drainage engineer name & firm)	Date	Phone number

Approved By:

Emrick Soltis

Digitally signed by Emrick Soltis
DN: C=US, E=esoltis@steamboatsprings.net, O=City of Steamboat Springs, OU=PW - Engineering Div., CN=Emrick Soltis
Date: 2021.02.23 06:42:12-07'00'

Printed Name: Date
City Engineer

Standard Form No. 6 Permanent Stormwater Treatment Facility Exclusions Tracking Form

If a site development is eligible for an exclusion from the requirement to implement permanent stormwater treatment facilities, this form must be filled out and submitted for approval. If an exclusion is sought, this form shall be attached to the development's Drainage and Stormwater Treatment Scope Approval Form when it is submitted for review. The City is required to track all sites excluded from the requirement to implement permanent stormwater treatment facilities. Initial values may be approximate, but final values must meet the requirements of Section 5.12.3 of the City's Engineering Standards. Supporting calculations, figures, and narrative must be included.

Project Information	
Project/site name:	Green Horn Ranch
Project/site location:	2305 Mt Werner Circle (Parcel ID Number 936271001)
Developer name/ contact info:	Steamboat Ski & Resort Corp. Jim Schneider, 970-871-5381, jschneider@steamboat.com
Drainage engineer name/contact info:	Deborah paustat, P.E., Landmark Consultants, Inc. debs@landmark-co.com, 970-871-9494
Owner name/ contact info:	Steamboat Ski & Resort Corp. Jim Schneider, 970-871-5381, jschneider@steamboat.com
Anticipated Construction Completion Date:	September 2021

Project Site Parameters	
Total parcel area (acres):	181 acres (Drainage Basin = 414 acres)
Disturbed area (acres):	4.6 acres
Existing impervious area (acres):	4.04% overall imperviousness
Proposed new impervious area (acres):	0 acres
Proposal total impervious area (acres):	4.04%
Excluded impervious area (acres):	0 acres

Exclusion Category:

☐ 1. Pavement Management Site ☐ 2. Excluded Roadway Redevelopment

☐ 3. Excluded Existing Roadway Area ☐ 4. Aboveground & Underground Utilities

☐ 5. Large Lot Single Family Site

☐ 6. Non-Residential & Non-Commercial Infiltration Conditions

☑ 7. Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped

☐ 8. Stream Stabilization Sites ☐ 9. Trails

1. Pavement Management Site		
Describe the nature of the activity having to do with roads and bridges used for vehicle traffic or those contiguous impervious areas used for pedestrian or bicycle traffic, roadway drainage, or roadside parking.		
Existing Impervious Area:		
Proposed Impervious Area:		Impervious area must not increase.

2. Excluded Roadway Redevelopment		
Length of roadway redevelopment:		
Total additional paved area:		
Additional paved area/mile:		Must be less than 1 acre.
Maximum increase in paved width:		Must be no more than 8.25'.

3. Excluded Existing Roadway Area		
Existing Roadway Ave. Width (feet):		
Proposed Roadway Ave. Width (feet):		
Average of Increase in Roadway Width:		Must be less than 2x.
Only the existing roadway portion of the project may be excluded from requiring permanent water quality treatment. If existing roadway drains to new roadway, existing roadway runoff must be accounted for in the design of the treatment facility for the new roadway.		

4. Aboveground & Underground Utilities
Describe the type of utility or utilities, the owner(s) of each utility, the nature, location, length, and width of the land disturbance, whether utilities are new or being maintained, and how vegetation, topography, and drainage patterns will be reestablished once the project is completed.

5. Large Lot Single Family Site		
Zoning:		Must be single family or agricultural
Parcel size (acres):		Must be at least 2.5 acres.
Proposed Site Imperviousness (%):		Must be less than 10%.
If proposed site imperviousness is 10% or more and less than or equal to 20%, a report is required to justify exclusion. See Engineering Standards.		

6. Non-Residential/Non-Commercial Infiltration Conditions

Submit a narrative study that describe the nature and extent of the non-residential and non-commercial development, and how vegetation will be reestablished once the disturbance is completed. Describe topography and drainage patterns on the existing and proposed sites.

Existing vegetation and percent coverage:		
Proposed vegetation and percent coverage:		Must be at least 70%
80% percentile runoff flow rate (cfs):		
Soil types on site and percent of each:		Must be A or B HSG.

The City may accept more detailed studies that do not meet these criteria if they show the required infiltration is achieved.

7. Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped

Describe the nature and extent of the land disturbance and how vegetation will be reestablished once the disturbance is completed.

Approximately 4.6 acres of the ski area will be regraded and re-vegetated using a native seed mix. Temporary construction storm-water quality management will include slope stabilization measures until vegetation is established.

8. Stream Stabilization Sites

Describe the name of the stream and the nature and location of the stabilization activities including which banks and the length of the stabilization.

9. Trails

Describe the trail geometry, trail location with respect to other roadways, trails, or sidewalks, and anticipated trail use. Confirm the trail is not an attached or detached sidewalk that is part of a roadway.

Approvals

Deborah Spaustat, P.E., Landmark Consultants, Inc.	2/19/2021	970-871-9494
Prepared By: (Insert drainage engineer name & firm)	Date	Phone

Approved By:

Emrick Soltis

Digitally signed by Emrick Soltis
DN: C=US, E=esoltis@steamboatsprings.net, O=City of Steamboat Springs, OU=PW - Engineering Div., CN=Emrick Soltis
Date: 2021.02.23 06:43:03-07'00'

Print Name: City Engineer	Date	Phone

LANDMARK CONSULTANTS, INC.

CIVIL ENGINEERS | SURVEYORS

141 9th Street ~ P.O. Box 774943
Steamboat Springs, Colorado 80477
(970) 871-9494
www.LANDMARK-CO.com

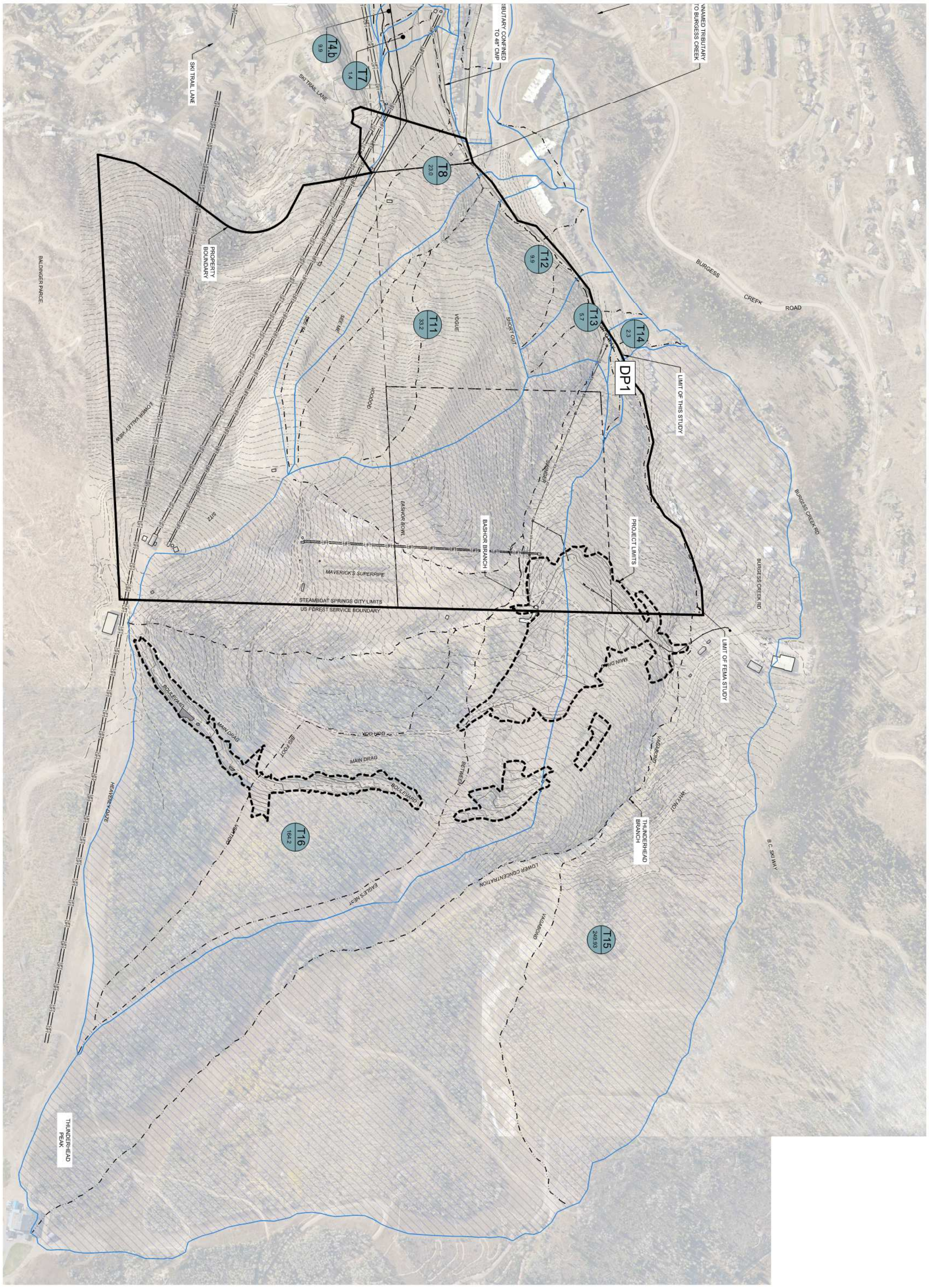
PROJECT	Green Horn Ranch
DESIGNER	Deb Spaustat
DATE	2/19/2021
LOCATION	Steamboat Springs, CO

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

Character of Surface	Percent Impervious
Zone RE1	30%
Zone RE 2	45%
Zone RN 1	20%
Zone RR 1	75%
Zone OR	2%
Right-of-Way	90%
Ski Slope	2%
Gravel Surfaces	40%
Roof	90%

IDF	Soil Type
Steamboat Springs NOAA	C

Basin ID	Basin Area (sq. ft.)	Basin Area (acres)	Area of Gravel Surfaces (sq. ft.)	Area of Gravel Surfaces (acres)	Area of Roof (sq. ft.)	Area of Roof (acres)	Area of Ski Slope (sq. ft.)	Area of Ski Slope (acres)	Area of Ski Slope (USFS, Unzoned) (sq. ft.)	Area of Ski Slope (USFS, Unzoned) (acres)	Zone RN 1 (sq. ft.)	Zone RN 1 (acres)	Zone RE 1 (sq. ft.)	Zone RE 1 (acres)	Zone RE 2 (sq. ft.)	Zone RE 2 (acres)	Zone RR 1 (sq. ft.)	Zone RR 1 (acres)	Zone OR (sq. ft.)	Zone OR (acres)	R-O-W (sq.ft.)	R-O-W (acres)	Percent Impervious
T15	10884818.00	249.88	35589.54	0.82	0.00	0.00	663494.92	15.23	9141694.49	209.86	639174.27	14.67	47711.14	1.10	58539.70	1.34	86654.31	1.99	84142.71	1.93	127623.89	2.93	5.15%
T16	7152256.29	164.19	61864.08	1.42	1669.28	0.04	2107444.81	48.38	4981285.27	114.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.35%
Total		414.07																					4.04%



SCALE 0 SCALE SCALE SCALEFeet

NORTH

(IN FEET)
1 inch = SCALE ft.

LEGEND:

EXISTING STORM SEWER	
PROPOSED STORM SEWER	
PROPOSED STORM INLET (CURB & AREA)	
PROPOSED MAJOR CONTOUR	6805
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	6805
EXISTING MINOR CONTOUR	
PROPOSED SWALE	
PROPOSED CURB & GUTTER	
PROPERTY BOUNDARY	
PROPOSED LOT LINE	
EXISTING RIGHT OF WAY	
FLOOD HAZARD LIMITS	
PROPOSED SPOT ELEVATION	00.10
EXISTING SPOT ELEVATION	00.10 X
PROPOSED OVERLAND FLOW DIRECTION W/SLOPE	2.0%
PROPOSED CHANNELIZED FLOW DIRECTION W/ SLOPE	2.0%
EXISTING CHANNELIZED FLOW DIRECTION	⇧

NOTES:

1. THE SIZE, TYPE AND LOCATION OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THESE DRAWINGS. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO VERIFY THE EXISTENCE OF ALL UNDERGROUND UTILITIES IN THE AREA OF THE WORK. BEFORE COMMENCING NEW CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR ALL UNKNOWN UNDERGROUND UTILITIES.
2. ALL PROJECT DATA IS ON VERTICAL DATUM; NAVD 88. SEE NOTES SHEET FOR BENCHMARK REFERENCES.
3. ELEVATIONS FOR IMPROVEMENTS THAT ARE CONTROLLED BY ADJACENT EXISTING FACILITIES (SUCH AS PROPOSED GUTTERS ALONG EXISTING ASPHALT) MAY REQUIRE ADJUSTMENT BASED ON ACTUAL CONDITIONS. COORDINATE WITH ENGINEER TO ENSURE A CONSISTENT SECTION WITH SMOOTH TRANSITIONS WHERE NECESSARY.
4. SEE SOILS REPORT FOR PAVEMENT, SUBGRADE AND MATERIAL PREPARATION, DESIGN AND RECOMMENDATIONS.
5. ALL CURB SPOTS SHOWN ARE FLOWLINE ELEVATIONS, UNLESS NOTED OTHERWISE. ALL OTHER SPOTS ARE FINISHED GRADE ELEVATIONS.

SHEET
1
Of 1 Sheets

SSRC Green Horn Ranch

Drainage Study
Figure 2: Overall Drainage Basins

PROJECT: 1012-047
DATE: 12/18/2020
DRAWN BY: DCS
CHECKED BY: LCI

NO.	DATE:	BY:	DESCRIPTION:

REVIEW SET
NOT FOR CONSTRUCTION
2/19/2021

These drawings are instruments of service provided by Landmark Consultants, Inc. and are not to be used for any type of construction or contracting unless signed and sealed by a Professional Engineer in the employ of Landmark Consultants, Inc.

LANDMARK CONSULTANTS, INC.

CIVIL ENGINEERS | SURVEYORS
141 9th Street ~ P.O. Box 774943
Steamboat Springs, Colorado 80477
(970) 871-9494
www.LANDMARK-CO.com