



# Alexander Way

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## Phase I Drainage Report

### Prepared for:

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Denver, CO 80209

### Prepared by:

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Rev #2 8/12/22

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## Alexander Way Phase I Drainage Report

This report is provided to present a Phase I Drainage Plan for the improvement associated with the Alexander Way subdivision.

### A. General Location and Description

#### 1. Location:

The proposed Alexander Way subdivision is in the north half of Section 26, Township 7 South, Range 67 west of the 6<sup>th</sup> Principal Meridian in Douglas County, Colorado. The property is centrally located and includes portions of the NE ¼ and the NW ¼ of Section 26. The overall project boundary encompasses approximately 77.96 acres. Brewer Court is located at the southwest corner of the site, Alexander Place is located south of the project in the Cooper Hook subdivision, Collins Street is west of the site in the Silver Heights subdivision, Diamond Ridge Circle is located east of the subdivision in the Diamond Ridge Estates subdivision. In addition, there is 382 Alexander Place south of the site being a senior living community. Large lot residential lands are in the canyon to the north of the property.

#### 2. Property Description

The property encompasses approximately 84.59 acres that is generally sloped from east to west at grades ranging from 2% to 20% in the buildable areas, and some areas of significant slope along Diamond Ridge. The proposed development plan calls for a low density, low impact neighborhood with approximate ½ acre single family residential lots proposed.

Ground cover for the property includes scrub oaks, native grasses, and rock outcroppings. Site development is proposed to minimize over lot grading activities and maintain the native ground conditions in as much as possible.

Soils on site are a combination of Kutch Sandy Loams (49.1%) and Stony steep land (50.9%). These soils are generally consistent with hydrologic soil group D.

The project area is historically tributary to East Plum Creek through two tributaries located at the north and south sides of the site. The north tributary drains through an open channel system through a combination of open channels and storm sewer to the confluence with East Plum Creek located approximately 1.5 miles west of the development area. The south outfall drains through the Cooper Hook development through a 72" storm sewer that is part of the Tributary C to Plum Creek as modeled in the Flood Hazard Area Delineation and Master plan prepared for the Town of Castle Rock.

The site is in zone X as noted on FIRM Panel 08035C0186G Revised March 16, 2016. There are no irrigation ditches or canals adjacent to or impacted by this project. There is designated FEMA floodplain that begins approximately 2500 feet west of the project boundary. The FHAD for Tributary C identifies flood limits along the southern boundary of the Cooper Hook property.

Development of the project includes 55 single-family detached lots ranging from half-acre to one acre in size. Additionally, there are 22 duplex units proposed to be built in the southwest corner of the site with access to Brewer Court. These sites may be modified depending on market conditions and become single family residential lots at the time of final design. For this analysis, we have assumed impervious coverage with the development based on relative use.

Secondary emergency access will be provided from an extension of Alexander Place that will serve this development together with Lot 4 of the Cooper Hook development being planned in coordination with this project. This emergency access will serve also be secondary water service serving the development. The final configuration of this access may be coordinated with the adjacent development to optimize the benefit for both projects.



**B. Drainage Basins and Sub-Basins**

**1. Major Basin Description**

The watershed considered with this report includes approximately 107 acres that extends from the Silver Heights neighborhood on the west to a ridgeline with Diamond Ridge Estates to the east. The southern boundary is generally located along Alexander Place, off East Allen Street. The north boundary is the approximate project property line. The watershed generally discharges along two flow paths going either north or south.

Basins A generally drains along its historic flow path to the north draining through the existing channel system that is part of the Silver Heights subdivision. This basin includes historically tributary areas to the east and proposed rear lot drainage along the western project boundary. Tributary runoff from this basin will be attenuated and treated for water quality and discharged directly into the existing drainage channel directly north of the project in its historic flow path.

Basins B, C, D, E and F generally drain south through the storm sewer constructed with the Cooper Hook development also identified as Tributary C. Historically a portion of the flow from Basin B would cross the western boundary as a sheet flow or surface concentrated flow over the adjacent lots in Silver Heights. This condition represented a drainage challenge for the downstream area as documented in the Silver Heights Drainage Study alternative solutions to Local Drainage Problems (Reference 4). The improvements associated with this development will concentrate the tributary flow areas identified with Reference 4 and direct them through a controlled flow path to a proposed pond and ultimately back into Plum Creek. This approach will significantly alleviate impacts of stormwater to the downstream community.



There are no surface irrigation features that are impacted by the local drainage patterns described in this analysis. Stormwater runoff from this area drains west to Tributary "C" to Plum Creek located approximately 1 mile west of the project area.

The design of the major drainage features is based on assumptions related to specific detention requirements for the tributary areas. Volume requirements for basin A is established in Pond 1, Volume requirements for Basins B, C, D and E are identified in the proposed Pond 2. These basins are located within Sub Basin 106 as described in the Town FHAD and Master Plan Studies for Tributary C. Basin F is a historic hill side that will not be modified with this development and is part of sub-Basin 107 in the Tributary C FHAD and Masterplan. In additions, offsite flows from the Diamond Ridge subdivision are treated as pass through flows.

The final design of the watershed impervious coverage will be refined with the Phase 2 and 3 reports prepared through the Town of Castle Rock entitlement process. For the Phase 1 report, we have assumed a composite impervious coverage that includes the following

- Open Space 2%
- Front Lot Drainage 30%
- Rear Lot Drainage 30%
- Duplex Areas 50%

#### *Silver Heights Mitigation*

The existing outfall path for this area includes a combination of retention and overflow through the Silver Heights subdivision. The historic Basin A includes a total of 11.1 acres of tributary area including rear lot drainage from Diamond Ridge, and undeveloped areas. Additional flows tributary to the Silver Heights



subdivision includes direct flow from the historic Basin B area including a total of 12.4 acres that is tributary to the rear lots along the eastern boundary of the Silver Heights development.

The proposed improvements are designed to minimize existing drainage impacts to the Silver Heights subdivision in as much as possible. This is accomplished by re-directing the historic Basin B area to the south intercepting flows that are historically tributary to Silver Heights in the Brewer court extension and directing those flows to the south through a defined storm sewer system. This takes existing drainage pressure off of the central area of the Silver Heights subdivision. In addition, the historic area tributary from Basin A is reduced from 11.1 acres to 8.2 acres. The percent impervious is increased from 2% native to 15.2% representing the rear lot drainage from the lots fronting Brewer Court that could not be re-directed. These flows are further mitigated in a proposed extended dry basin addressing water quality, EURV and 100 year detention before releasing into the historic flow path being an existing channel section adjacent to the site.

#### Basin A Total Runoff Volume Comparison

Event	Historic	Developed
WQCV	0	0.065
EURV	0	0.108
2 Year	0.079	0.134
5 Year	0.315	0.328
100 Year	1.485	1.196

The table above indicates that there is an increase in the 2-year event runoff volume. The frequent event increase is mitigated by providing water quality treatment and EURV release that stages stormwater release to the retention



facility over a 72 hour period giving time for evaporation and infiltration to occur in the existing facility. It is also noteworthy that major event runoff total volume is significantly reduced. The combination of these improvements represents a net improvement to the overall impact to the Silver heights neighborhood.

The outfall path for historic waters from Basin A through Silver Heights includes a combination of retention, overflow direct flow and local conveyance. The pond discharge from the Alexander way development will discharge into the existing retention area on the Douglas County Park property as described above. The historic drainage pattern includes an emergency overflow and local drainage path that drains along the rear lot lines of the residential lots between Evalena Road and Bulkey Street. The combined basin drains to the existing detention facility located near Harvey Street and Interstate 25. The combination of the detention facility in Basin A and the diversion of Basin B dramatically improve the existing drainage condition of historic flows entering the Silver Heights subdivision.

## 2. Sub Basin Description

### Basin A

The Basin A watershed represents the north region of the study area. Basin A is divided into three sub basins with Basin A1 representing the offsite tributary area and Basin A2 representing the onsite undeveloped area and Basin A3 representing rear lot drainage along the Brewer Court extension. The basin historically drains directly to the existing channel in the Silver Heights subdivision. Developed areas will be directed to Pond 1. Basin A includes a total of approximately 8.25 acres with 0.97 acres being tributary from offsite areas.



### Basin B

The Basin B watershed represents the north central area of the study limits. This Basin includes 22.74 acres that is bounded by Basin A on the north and Basin C on the south. The eastern boundary of the basin is Diamond Ridge Estates. Basin B includes approximately 0.97 acres being tributary from offsite areas. Sub Basins B1, B2 and B3 are directed south as additional areas tributary as an extension of Sub Basin 106 and represent approximately 11.47 acres of additional area tributary to proposed Pond 2. As previously mentioned, these areas are directed away from the silver Heights surface flow path to a more clearly defined outfall where flow rates can more easily be attenuated before releasing downstream. Runoff from Basin B is attenuated in proposed Pond 2.

### Basin C

The Basin C watershed is in the central region of the study area and includes approximately 43.66 acres. The watershed is bounded by the ridgeline with Diamond Ridge Estates to the northeast. Basin B forms the northern boundary of Basin C. The southern boundary roughly follows Basin D to the South and the extension of Brewer Court to the west. Basin C includes approximately 13.03 acres being tributary from offsite areas. Runoff from Basin C is attenuated in proposed Pond 2.

### Basin D

The Basin D watershed is in the south-central region of the study area and includes approximately 21.56 acres. The watershed is bounded by the ridgeline with Diamond Ridge Estates to the northeast. Basin C forms the northern boundary of Basin D. The southern boundary roughly follows property line with 382 Alexander Place. The southeastern boundary is Basin E. Basin D includes approximately 2.14 acres being tributary from offsite areas both upstream and



downs stream of the project development limit. Runoff from Basin D is attenuated in proposed Pond 2.

#### Basin E

The Basin E watershed is in the southeastern region of the study area and includes approximately 8.27 acres. The watershed is bounded by the ridgeline with Diamond Ridge Estates to the northeast. Basin D forms the northern boundary of Basin E. The southern boundary roughly follows property line with 382 Alexander Place. Basin E includes approximately 4.07 acres being tributary from offsite areas. Runoff from Basin E is attenuated in proposed Pond 2.

It is noteworthy that there is no development activity proposed in Basin E

#### Basin F

The Basin F watershed is in the southwestern region of the study area and includes approximately 1.29 acres. The watershed includes the approximate limits of lot 9.

### **C. Existing Stormwater Conveyance and Storage Facilities**

The existing storm outfalls for the site include two paths. The existing flow path from areas in the north and central part of the property generally sheet flow through the Silver Heights subdivision and concentrate in the surface channel along the northern part of the development. Issues with his flow path have been documented in reports as referenced in the appendix of this report. This channel drains to an existing detention facility located at the intersection of East Harvey Street and Evalena Road that serves the Silver Heights subdivision. The sheet flow condition across the Silver Heights subdivision will be diverted to a local detention facility in order to mitigate developed runoff and improve downstream conditions.

The southern outfall is the Tributary C to Plum Creek. This outfall is documented in the FHAD prepared for the Town of Castle Rock. The outfall receives



stormwater in a surface channel along the Cooper Hook southern property line and is conveyed in a pipe to the west to Plum Creek.

**D. Proposed Stormwater Conveyance or Storage Facilities**

**1. General Concept**

The proposed improvements associated with the drainage design of the Alexander Way Phase I study include preliminary design of pond facilities to address water quality and peak flow attenuation for increases to the impervious coverage.

This analysis presents a plan where stormwater attenuation is handled in on site ponds. Future analysis may include an aggregation of this site and adjacent developments to support a combined pond facility.

**2. Runoff Method.**

This analysis considers watershed areas that vary between 1 acre and 15 acres as individual areas. As such, we have used the rational method for peak flow basin analysis. Stormwater runoff is evaluated for the 5-year and 100-year design events.

**3. Sediment Control.**

This evaluation includes recommendations for point source control of waterborne sediment expected to occur on site. A part of this approach is to manage sediment transport from offsite areas to minimize the impact of offsite tributary sediment loads to the downstream facilities.

**4. Water Quality and Detention:**

This analysis includes six primary watersheds as part of the analysis identified as Basins A, B, C, D, E and F.



Basin A drains through Pond 1 and is attenuated for Peak Flow and water quality. The historic flow path for Basin A is to the north through the Silver Heights subdivision.

Basins B, C, D, E and F drain through proposed Pond 2 and are attenuated for Peak Flow and water quality. The historic flow path for Basins B through F are a combination of the southerly outfall path as formalized with the development and an easterly sheet flow through the Silver Heights subdivision that is being corrected with the development of this project.

To mitigate flow through these systems, we are proposing that these flows be directed south to combine with release flow from proposed Pond 2. This approach is intended to minimize impact to the existing open channel system. Ultimate design release may be adjusted to minimize the peak condition tributary to the Cooper Hook storm sewer system.

The water quality facilities for the development are sized in accordance with Town of Castle Rock Criteria.

There are no wetlands associated with the Alexander Way Development.

## 5. **Specific Details**

Stormwater runoff for basin A is generally collected at a low point at the north end of Brewer Court. The outfall path includes collection of surface runoff from the proposed open space area and directing it in a pipe to Pond 1.

Stormwater runoff for Basins B and C are concentrated in the developments proposed curb and gutter and generally directed to the west. A proposed storm sewer system in Brewers Court will collect surface runoff in a pipe where the flows will combine and be directed to the south where flows are diverted in a pipe to the proposed Pond 2 location.

Stormwater runoff for Basin D is concentrated in the developments proposed curb and gutter and generally directed to the west. A proposed storm sewer



system in the eastern most road will collect surface runoff in a pipe where the flows will combine and be directed to the south and east where flows are diverted in a pipe to the proposed Pond 2 location.

Basin E will be concentrated at a diversion Ditch located at the south property line and directed to proposed Pond 2 through Basin D5.

Basin F will remain in its historic condition and will continue to drain along its historic flow path.

Pond 1 is estimated for a combined area of 8.25 acres at 15.2% impervious. The pond volume requirements are based on Water Quality Capture Volume, Equivalent Urban Runoff Volume and 100-year plus  $\frac{1}{2}$  the water quality volume for minimum detention requirements.

Proposed Pond 2 represents the upper limits of the existing 72" RCP that is identified as Reach 2 in the FHAD for Tributary C (Design point 1060). The design point receives flow from sub basins 106 and 107 for a combined area of 151.2 acres at 4.8%. This plan proposes including an additional 11.5 acres in the outfall and providing in line peak flow attenuation for planned development with this subdivision and the Cooperhook development.

The pond volume requirements are based on Water Quality Capture Volume, Equivalent Urban Runoff Volume and 100 year plus  $\frac{1}{2}$  the water quality volume for minimum detention requirements.

Proposed Pond 2 is tributary to the existing 72" outfall through Tributary C as identified in the Flood Hazard Area Delineation Tributary C and D Watersheds (Reference 8)

The proposed Pond 2 outfall includes tributary flows from sub basins 106 and 107 with most of the development being tributary from Basin 106.

The hydrology condition for Basin 106 includes a total of 109.0 acres at a combined impervious coverage of 18.6%. This includes 96.2 acres at 20.3%



and 12.8 acres at 6.0%. Future conditions for Basin 107 include 53.7 acres with 2.9% impervious coverage. The combined flows for Basins 106 and 107 are identified at design point 1060 in the SWMM model. The hydrology model demonstrates that the 100-year peak flow increases from 278 cfs to 299 cfs at this location.

The proposed improvements include installation of the pond designed such that the design flows for the regional area are attenuated to the design condition anticipated with the master hydrology report.

Composite Impervious Coverage Table

Basin	Open Space ac.	Lot Front ac.	Lot Rear ac.	Duplex ac.	Total Area ac.	Composite I
A1	0.87	0.00	0.10	0.00	0.97	4.9%
A2	2.25	0.00	0.05	0.00	2.29	2.6%
A3	1.24	0.00	3.75	0.00	4.99	23.0%
B1	0.91	0.00	0.06	0.00	0.97	3.8%
B2	3.42	1.77	2.98	0.00	8.16	18.3%
B3	0.00	2.34	0.00	0.00	2.34	30.0%
B4	0.00	1.36	2.95	0.00	4.31	30.0%
B5	0.00	1.07	0.00	0.00	1.07	30.0%
B6	0.00	1.14	0.00	0.00	1.14	30.0%
B7	0.00	0.00	1.54	2.18	3.72	41.8%
B8	0.00	0.00	0.00	1.03	1.03	49.9%
C1.1	1.71	0.00	1.96	0.00	3.67	16.9%
C1.2	4.14	1.20	0.86	0.00	6.20	11.3%
C1.3	1.40	0.00	2.28	0.00	3.68	19.4%
C1.4	4.04	0.48	0.00	0.00	4.52	5.0%



C2	0.00	0.72	0.00	0.00	0.72	30.0%
C3.1	2.22	0.00	3.46	0.00	5.68	19.1%
C3.2	4.89	1.84	1.00	0.00	7.73	12.3%
C4	0.00	1.86	0.00	0.00	1.86	30.0%
C5	0.00	0.00	1.42	0.00	1.42	30.0%
C6	0.00	4.76	0.00	0.00	4.76	30.0%
C7	0.00	0.60	0.00	0.17	0.77	34.3%
C8	0.56	0.40	1.69	0.00	2.65	24.1%
D1	2.82	0.00	1.34	0.00	4.16	11.0%
D2	4.67	0.60	1.37	0.00	6.64	10.3%
D3	0.15	0.44	0.54	0.00	1.13	26.2%
D4	0.00	0.00	0.00	3.78	3.78	50.0%
D5	0.85	0.00	0.00	1.17	2.02	29.8%
D6	2.11	0.00	0.00	1.72	3.83	23.5%
E1	2.49	0.00	1.71	0.00	4.20	13.4%
E2	4.07	0.00	0.00	0.00	4.07	2.0%
F1	0.00	1.29	0.00	0.00	1.29	29.9%

Detention Volume Summary Table

Pond	WQCV	EURV	V-100	Total
Pond 1	0.065	0.108	0.309	0.416
Pond 2 MP	0.438	0.131	3.794	4.363
Pond 2	1.157	0.699	5.836	7.692

Volumes are in acre feet



The table above demonstrates that the proposed Pond 2 volume between the Master plan assumptions and the proposed condition includes an increase in Water Quality Capture Volume of 0.719 ac ft, an increase of EURV of 0.568 ac ft and an increase in Total Volume of 3.329 ac ft. Based on the Masterplan parameters, the predevelopment peak flow was 236.1 cfs. The proposed pond outfall will restrict the 100-year developed release to 236.1 cfs or less.

The design of the pond shall be prepared and refined in conformance with the MHFD-Detention v4.04 worksheet for water quality, EURV and 100 Year + ½ WQCV.

**E. Water Quality Enhancement Control Measured**

Water quality mitigation for volume is managed through recommendations for impervious coverage that minimize directly connected impervious areas, suggest alternatives for impervious paving, and support drought tolerant green spaces that optimize water usage for the site.

In addition to source control, water quality enhancements can occur as part of the area detention proposed for the site and adjoining developments. This approach has the benefit of mitigating various particulate as sedimentation at fore bay structures and at the micro pool for the pond outlet.

The slope areas receiving stormwater runoff from the Diamond Ridge development may include isolated improvements for channelized areas where runoff is currently conveyed. This may include grass buffers, rock check structures, or formal channelization in localized areas for runoff management that control offsite tributary runoff prior to conveyance across the site using surface and piped conveyance solutions.

Water quality mitigation can be addressed through a series of techniques that may include minimizing directly connected impervious areas, identifying areas where grass buffers and infiltration can be encouraged, and source controls



including community education for strategies as presented in the Water Efficiency Plan. This plan does not propose structural elements for source control.

**F. Floodplain Modifications**

Development along the Cooper Hook improvements is beyond the scope of this analysis, however a proposal is in development with this report to aggregate the stormwater improvements from the Master Planned basins 106 and 107 for a combined detention at the upper end of the existing 72" outfall pipe. This solution will include a detention and stormwater quality facility. This plan does not propose modifications to Tributary C to Plum Creek.

**G. Masterplan Recommendations**

The Master Plan for Tributary C to Plum Creek includes channel stabilization improvements that are associated with the Cooper Hook property. Drainage from this project is directed to the proposed Pond 2 outfall and therefore will not impact the design concepts presented with the Master plan report.

**H. Operation and Maintenance**

Pond maintenance operations will be initially managed with the Homeowners association for Alexander Way. The pond as proposed supports additional development from the Cooper Hook property bordering the site. At such time as that property develops, a contribution shall be provided in support of pond operation costs to the Alexander Way HOA. The terms of the agreement for the pond maintenance will be established as part of the drainage easement that will be provided for the pond area with the Final design of the system.

Maintenance activity will include semiannual inspections initially to evaluate debris sources to the pond and patterns for sediment transport and deposition. Depending on performance, pond observation and maintenance activity may be reduced to annual operations. Repairs to pond infrastructure will occur on an as



required basis and may be prioritized depending on the severity of the failure. Slope and vegetation repairs may be managed on an interim basis where vegetation repairs may be dependent on seasonal schedules for success.

**I. Variances from Criteria**

This report includes a recommendation that we redirect 11.5 acres from Basin B to the south through the Cooper Hook storm sewer system. This recommendation alleviates some pressure from the existing Silver Heights Drainage system. A degree of over detention may be necessary to mitigate this proposed diversion. It is noteworthy that these follows are still tributary to Tributary "C" to Plum Creek and does not represent an inter-basin transfer for the larger watershed.

In addition, as part of the subsequent analysis for this site and the proposals for development on the adjacent areas, we may negotiate a combined drainage facility serving the local developments along Alexander Place. This determination will be complete with the presentation of the Phase 2 drainage study subsequent to this report. Pond Criteria and design flows in this report reflect the shared uses approach.

**J. Potential Permitting Requirements**

The project is not located on or adjacent to a FEMA designated Floodplain. The project does not impact designated wetlands or waters of the US. Therefore there are no State or Federal permitting requirements related to storm water that are required for this project. The site will be subject to Stormwater discharge permits for construction activities together with compliance with the Town of Castle Rock requirements for sediment control and stormwater discharge. The project will also be subject to review through Douglas County for the unincorporated properties to the north and west of the development.



K. **Summaries and Conclusions**

This document is developed to serve as a guideline for the development of the Drainage impacts associate with the Alexander Way drainage plan. The drainage design includes strategies for conveyance of local offsite tributary areas along with water quality and peak flow attenuation for the planned improvements. Stormwater runoff and conveyance is proposed in accordance with the Town of Castle Rock Criteria with supplemental information taken from the Mile High Flood District.

This plan is developed to document drainage improvements necessary to serve planned improvements based on an assumed impervious coverage presented by development type, planned impervious coverage, and design conveyance to the existing downstream drainage facilities.

The design concept presented with this stormwater management program will not adversely impact downstream properties and enhances the water quality for tributary runoff to the Plum Creek receiving waters.

This report for the Phase 1 drainage design of the Alexander Way was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Storm Drainage Design and Technical Criteria and was designed to comply with the provisions thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.

-----  
Rick Rome  
Registered Professional Engineer  
State of Colorado No. 35103



L. **References**

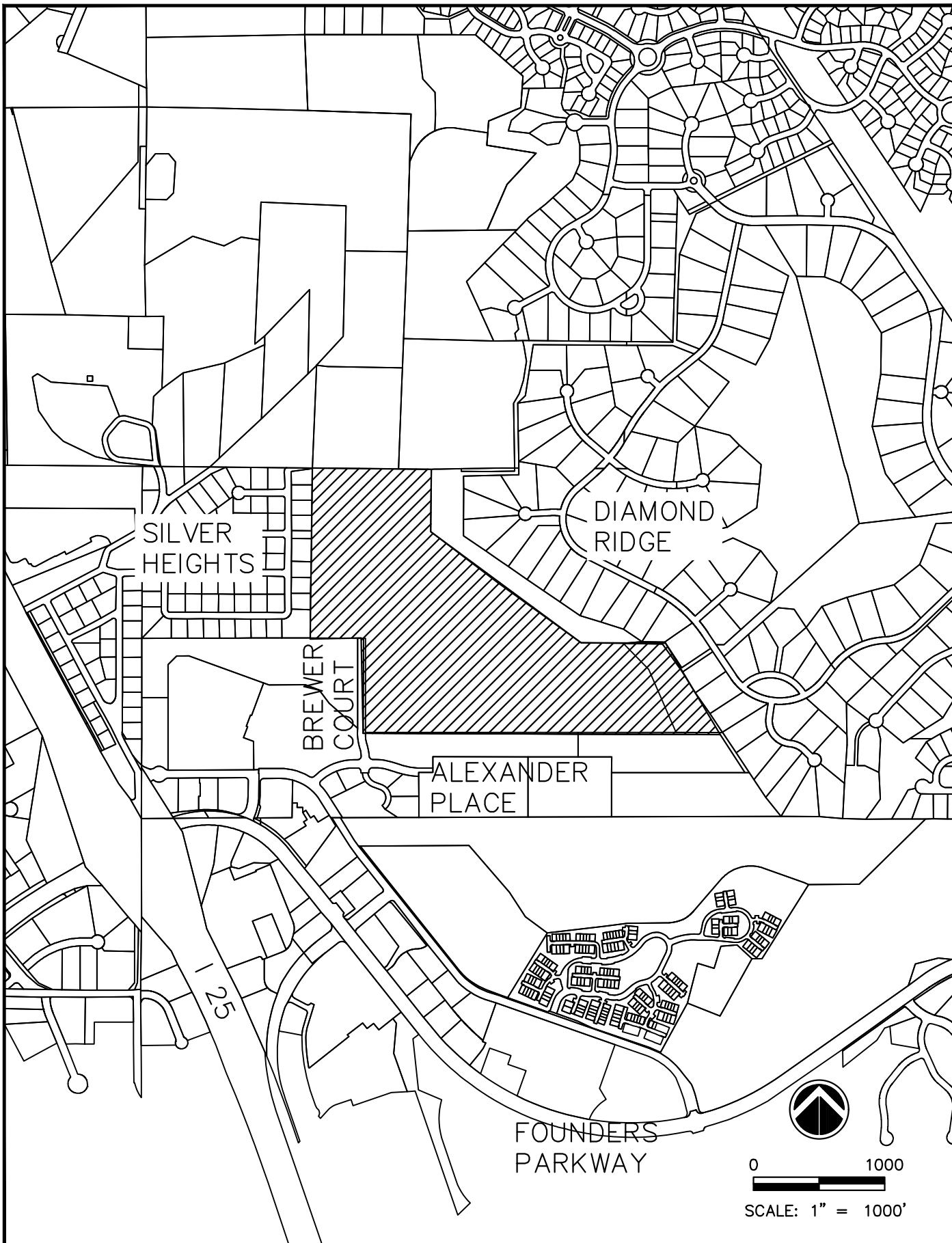
1. Storm Drainage Design and Technical Criteria Manual, Town of Castle Rock, June 2019
2. Mile High Flood District Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3
3. Phase III Drainage Report for Cooper Hook/Main Place Filing No. 1, Galloway Romero & Associates, August 2001
4. Silver Heights Drainage Study Alternative Solutions to Local Drainage Problems. Kirkham Michael and Associates, January 1994
5. Phase III Drainage Report for Silver Heights – Collins Street, Harvey Street and Evalena Road Drainage Improvements, Harris Kocher Smith September 8, 2011
6. Design Report for Home Street/Evalena Road Interim Drainage Improvements, Muller Engineering Company, July 2015
7. FIRM Panel number 08035C0186G Douglas County Colorado Dated March 16, 2016.
8. Flood Hazard Area Delineation Tributary C and D Watersheds – Respec, October 2014



# Appendix A



11/9/21 G:\2020\20002764.00\DESIGN\CIVIL\C3D\EXHIBITCONCEPT\20002764 VIC MAP.DWG



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ALEXANDER WAY

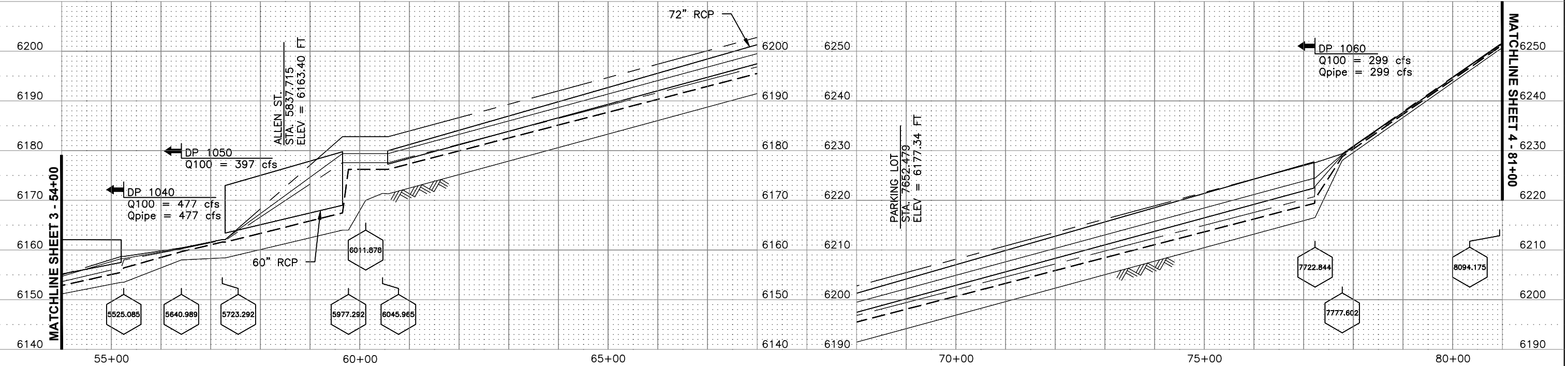
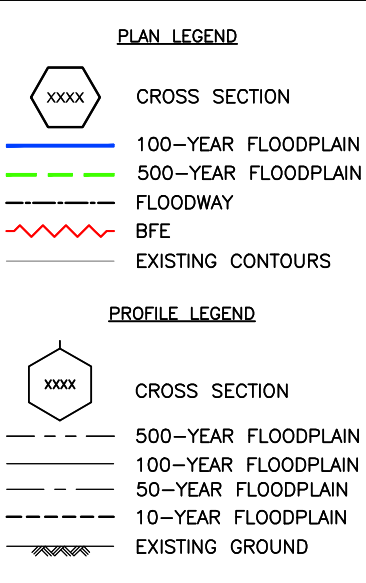
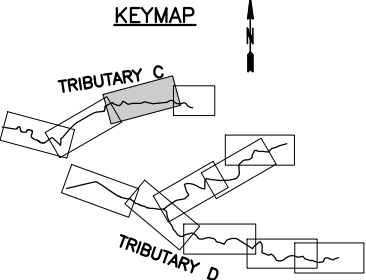
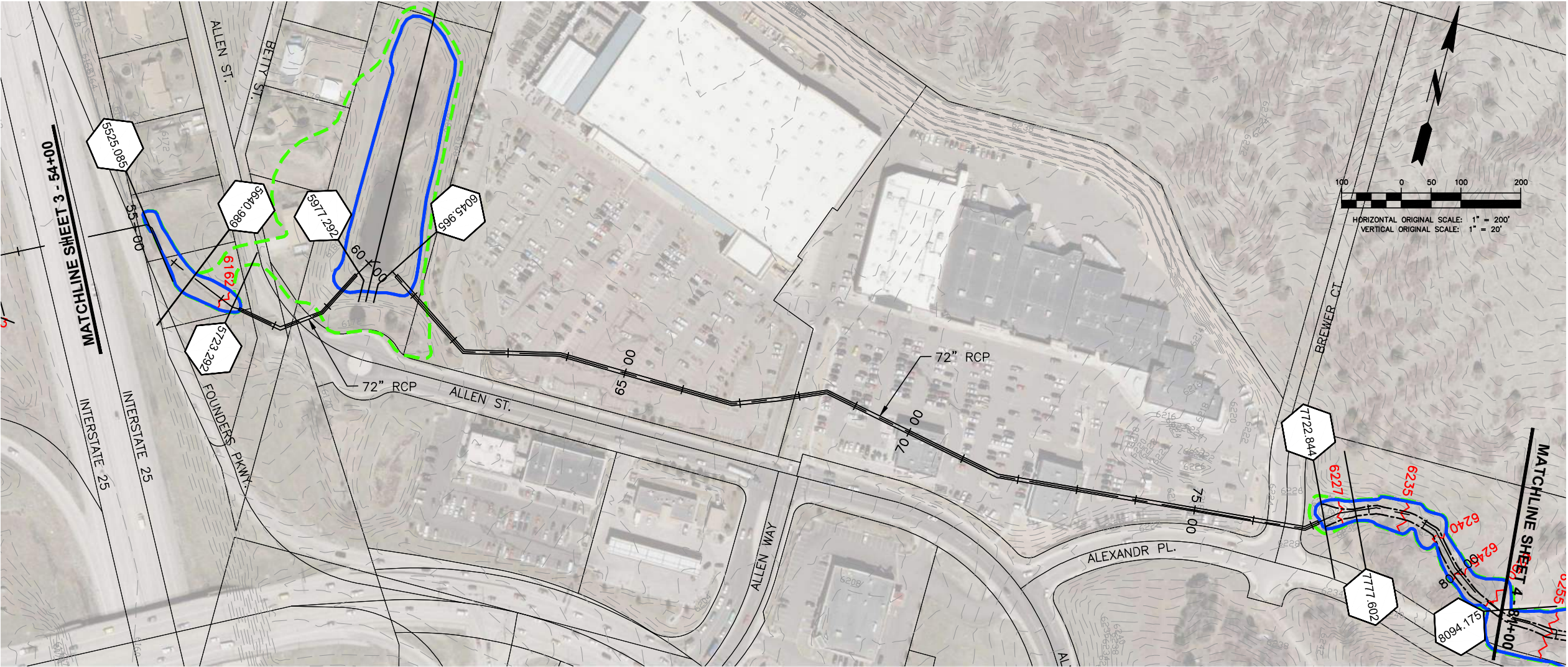
CASTLE ROCK, CO

VICINITY MAP

EXHIBIT



NAME: Z:\Castle Rock\TCR Planning Studies\CAD\Draw-Flood\Tributary C FHAD P & P.dwg  
PLOT DATE: Jul 25, 2014 9:26am



NO.	DATE	DESCRIPTION	BY

DESIGNED WPF DATE 7/8/13  
DRAWN ACT DATE 7/8/13  
CHECKED RCO DATE 7/8/13



720 S. COLORADO BLVD. SUITE 4105  
DENVER, CO 80246  
PH: (303) 757-3655

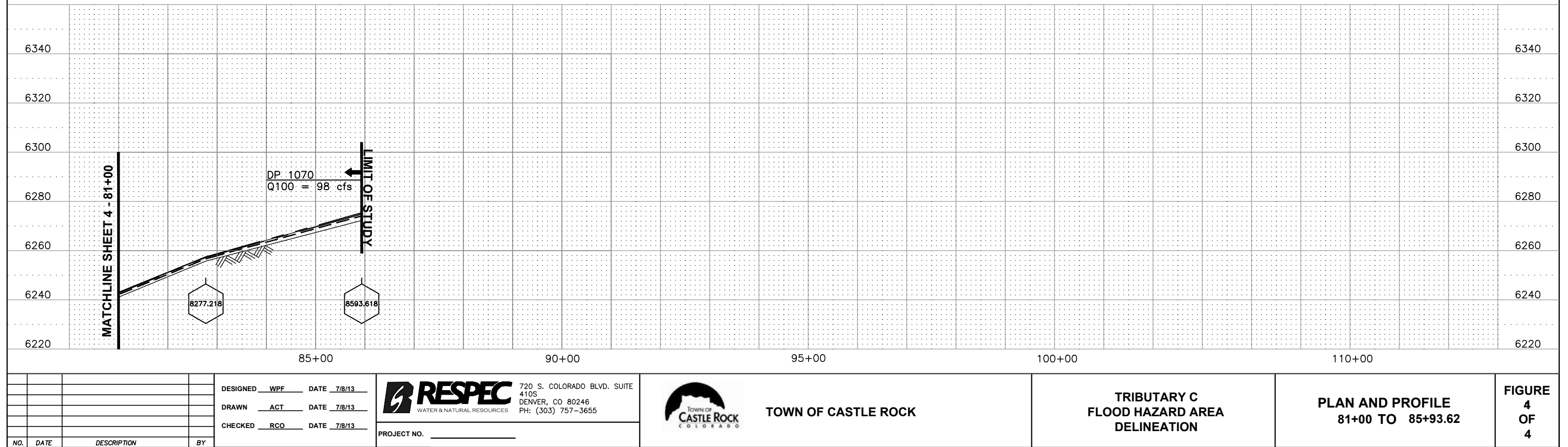
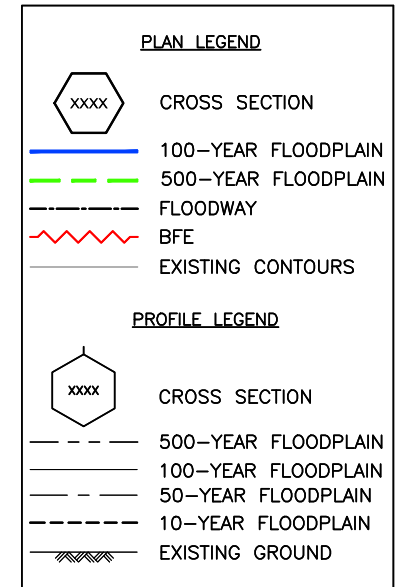
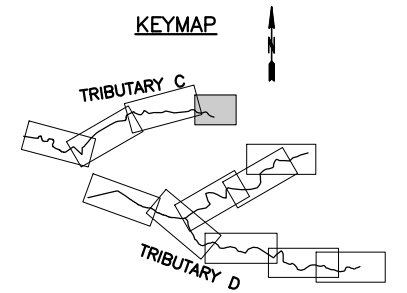
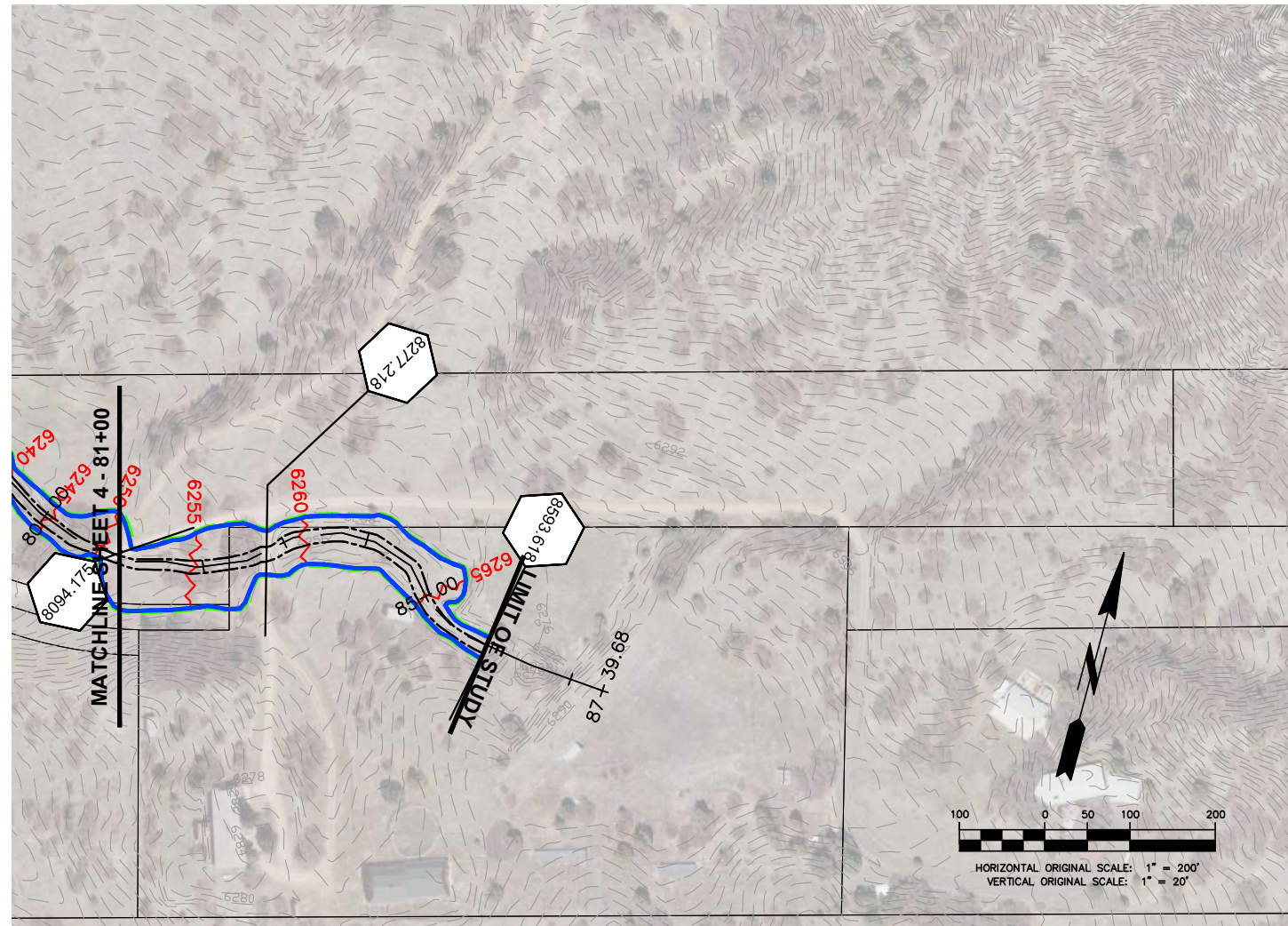


TOWN OF CASTLE ROCK

TRIBUTARY C  
FLOOD HAZARD AREA  
DELINEATION

PLAN AND PROFILE  
54+00 TO 81+00

FIGURE  
3  
OF  
4



# Soil Map—Castle Rock Area, Colorado






## MAP LEGEND




















### Area of Interest (AOI)





Area of Interest (AOI)

### Soils


-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points

### Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

### Water Features

-  Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

### Background

-  Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado  
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

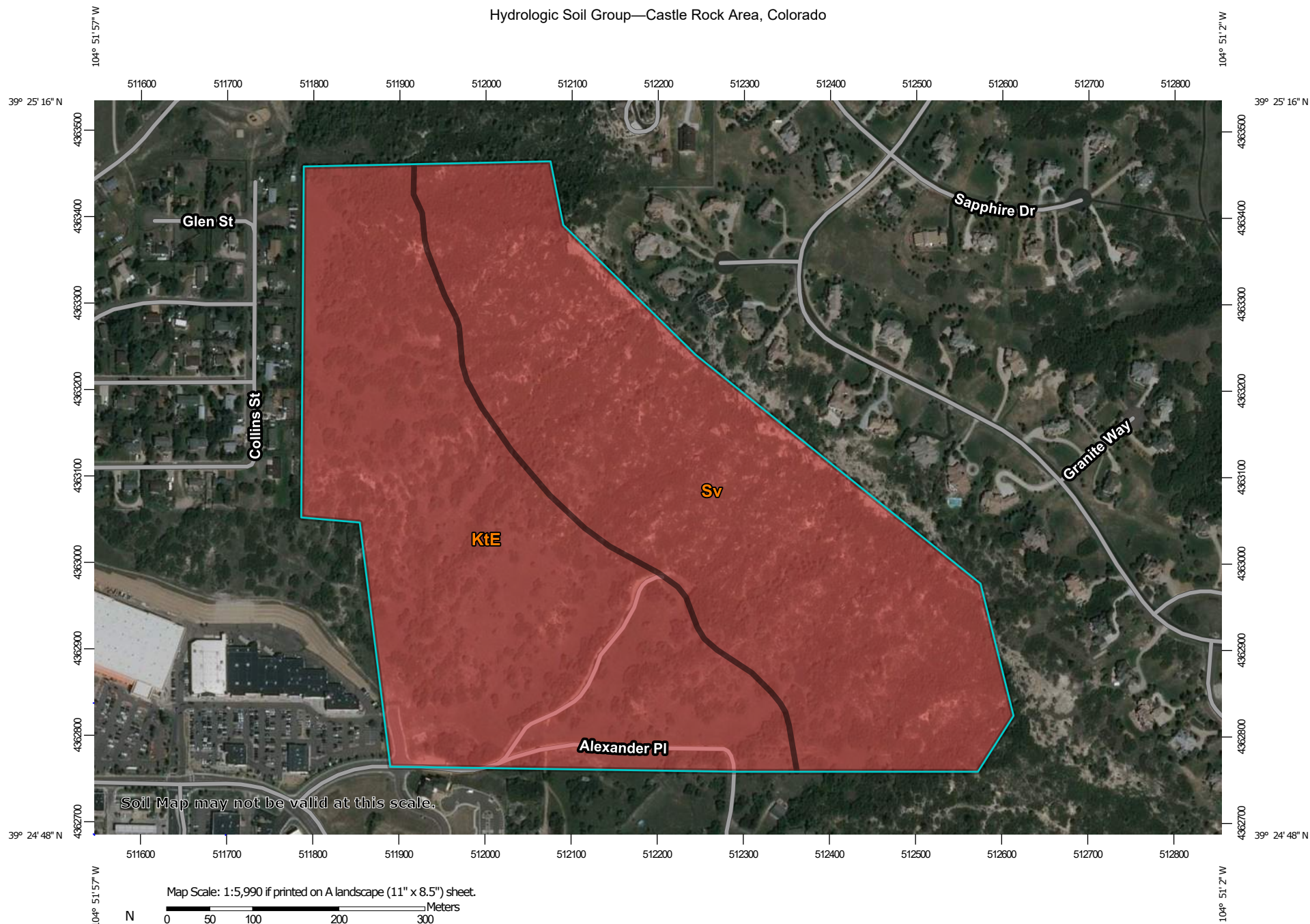
Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KtE	Kutch sandy loam, 5 to 20 percent slopes	47.8	49.1%
Sv	Stony steep land	49.5	50.9%
<b>Totals for Area of Interest</b>		<b>97.3</b>	<b>100.0%</b>

# Hydrologic Soil Group—Castle Rock Area, Colorado



Map Scale: 1:5,990 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

12/15/2020  
Page 1 of 4

## MAP LEGEND

### Area of Interest (AOI)









Area of Interest (AOI)

### Soils

#### Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

#### Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

#### Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


### Water Features

-  Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

### Background

-  Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado  
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	47.8	49.1%
Sv	Stony steep land	D	49.5	50.9%
<b>Totals for Area of Interest</b>			<b>97.3</b>	<b>100.0%</b>

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

# Appendix B



*Alexander Way*  
**Phase 1 Drainage Report**  
**Historic Basins A and B**

**STANDARD FORM SF-2**REFERENCE MHFD TABLE 6-2

Watercourse Coefficient

**Runoff Calculations**

Heavy Meadow 2.5

Short Grass Pasture &amp; Lawns 7.0

Grassed Waterway 15.0

**Time of Concentration**

Tillage/field 5.0

Nearly Bare Ground 10.0

Paved Area &amp; Shallow Gutter 20.0

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA ac.	% I	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	EQ 6-5	min.
1	HA	11.06	2.0%	0.05	70	2.0	12.8	240	10.0	2.5	0.8	5.1	17.9	310	25.8	17.9
2	HB	12.42	2.0%	0.05	200	10.0	12.6	400	10.0	2.5	0.8	8.4	21.0	600	26.0	21.0
3	DA	8.15	15.2%	0.16	70	2.0	11.4	240	10.0	2.5	0.8	5.1	16.5	310	23.6	16.5

*Alexander Way*  
**Phase 1 Drainage Report**  
**Historic Basins A and B**

**STANDARD FORM SF-3**REFERENCE: MHFD Volume 1**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 1.43

(Rational Method Procedure)

**Design Storm 5 Year**

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
1	HA	11.06	0.05	17.9	0.57	2.98	1.7					HA HB
2	HB	12.42	0.05	21.0	0.64	2.74	1.7	21.0	1.21	2.74	3.3	
3	DA	8.15	0.16	16.5	1.30	3.10	4.0					

*Alexander Way*  
**Phase 1 Drainage Report**  
**Historic Basins A and B**

**STANDARD FORM SF-3**REFERENCE: MHFD Volume 1**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 2.60

(Rational Method Procedure)

**Design Storm 100 Year**

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
1	HA	11.06	0.49	17.9	5.44	5.42	29.5					HA HB
2	HB	12.42	0.49	21.0	6.11	4.98	30.4	21.0	11.56	4.98	57.6	
3	DA	8.15	0.55	16.5	4.45	5.65	25.1					

**Alexander Way**  
**Phase 1 Drainage Report**

**STANDARD FORM SF-2**

REFERENCE MHFD TABLE 6-2

Watercourse Coefficient

**Runoff Calculations**

Heavy Meadow 2.5

Short Grass Pasture &amp; Lawns 7.0

Grassed Waterway 15.0

**Time of Concentration**

Tillage/field 5.0

Nearly Bare Ground 10.0

Paved Area &amp; Shallow Gutter 20.0

DESIGN POINT	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)				T(t) min.	T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
	DRAIN BASIN	AREA ac.	% I	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps		COMP. T(c)	TOTAL LENGTH	EQ 6-5	min.
1	A1	0.97	4.9%	0.07	70	2.0	12.5	240	10.0	2.5	0.8	5.1	17.6	310	25.3	17.6
2	A2	2.29	2.6%	0.06	200	10.0	12.6	400	10.0	2.5	0.8	8.4	21.0	600	25.9	21.0
3	A3	4.99	23.0%	0.22	70	2.0	10.7	250	10.0	7.0	2.2	1.9	12.6	320	22.2	12.6
4	B1	0.97	3.8%	0.07	200	10.0	12.4	400	10.0	10.0	3.2	2.1	14.5	600	25.7	14.5
5	B2	8.16	18.3%	0.18	300	10.0	13.5	800	1.0	20.0	2.0	6.7	20.2	1100	24.5	20.2
6	B3	2.34	30.0%	0.28	100	2.0	11.9	800	1.0	20.0	2.0	6.7	18.6	900	22.0	18.6
7	B4	4.31	30.0%	0.28	100	2.0	11.9	100	5.0	20.0	4.5	0.4	12.3	200	21.0	12.3
8	B5	1.07	30.0%	0.28	100	2.0	11.9	550	5.0	20.0	4.5	2.0	13.9	650	21.3	13.9
9	B6	1.14	30.0%	0.28	200	10.0	9.9	800	8.0	20.0	5.7	2.4	12.3	1000	21.4	12.3
10	B7	3.72	41.8%	0.38	50	2.0	7.4	600	5.0	20.0	4.5	2.2	9.6	650	19.2	9.6
11	B8	1.03	49.9%	0.44	50	2.0	6.7	650	8.0	20.0	5.7	1.9	8.6	700	17.8	8.6
12	C1.1	3.67	16.9%	0.17	200	5.0	14.0	700	6.0	20.0	4.9	2.4	16.4	900	23.7	16.4
13	C1.2	6.20	11.3%	0.13	50	2.0	10.0	900	6.0	20.0	4.9	3.1	13.1	950	24.7	13.1
14	C1.3	3.68	19.4%	0.19	30	2.0	7.2	250	8.0	20.0	5.7	0.7	7.9	280	22.8	7.9
15	C1.4	4.52	5.0%	0.08	150	5.0	13.4	400	5.0	20.0	4.5	1.5	14.9	550	25.6	14.9

**Alexander Way  
Phase 1 Drainage Report**



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Paved Area &amp; Shallow Gutter 20.0

DESIGN POINT	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)				T(t) min.	T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
	DRAIN BASIN	AREA ac.	% I	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps		COMP. T(c)	TOTAL LENGTH	EQ 6-5	min.
16	C2	0.72	30.0%	0.28	30	2.0	6.5	400	5.0	20.0	4.5	1.5	8.0	430	21.1	8.0
17	C3.1	5.68	19.1%	0.19	30	2.0	7.2	150	8.0	20.0	5.7	0.4	7.6	180	22.8	7.6
18	C3.2	7.73	12.3%	0.14	70	10.0	6.9	550	5.0	20.0	4.5	2.0	8.9	620	24.3	8.9
19	C4	1.86	30.0%	0.28	200	10.0	9.9	550	5.0	20.0	4.5	2.0	11.9	750	21.3	11.9
20	C5	1.42	30.0%	0.28	200	10.0	9.9	550	5.0	20.0	4.5	2.0	11.9	750	21.3	11.9
21	C6	4.76	30.0%	0.28	30	2.0	6.5	150	8.0	20.0	5.7	0.4	6.9	180	21.0	6.9
22	C7	0.77	34.3%	0.32	30	2.0	6.2	150	8.0	20.0	5.7	0.4	6.6	180	20.2	6.6
23	C8	2.65	24.1%	0.23	30	2.0	6.9	150	8.0	20.0	5.7	0.4	7.3	180	22.0	7.3
24	D1	4.16	11.0%	0.13	200	2.0	20.0	200	10.0	10.0	3.2	1.1	21.1	400	24.3	21.1
25	D2	6.64	10.3%	0.12	200	10.0	11.8	700	2.0	20.0	2.8	4.1	15.9	900	25.3	15.9
26	D3	1.13	26.2%	0.25	50	2.0	8.7	700	2.0	20.0	2.8	4.1	12.8	750	22.2	12.8
27	D4	3.78	50.0%	0.45	30	2.0	5.2	500	4.0	20.0	4.0	2.1	7.3	530	17.8	7.3
28	D5	2.02	29.8%	0.28	150	10.0	8.5	350	10.0	10.0	3.2	1.8	10.3	500	21.1	10.3
29	D6	3.83	23.5%	0.23	150	10.0	9.1	350	10.0	10.0	3.2	1.8	10.9	500	22.2	10.9
30	E1	4.20	13.4%	0.14	150	10.0	9.9	650	10.0	10.0	3.2	3.4	13.3	800	24.1	13.3
31	E2	4.07	2.0%	0.05	150	10.0	10.9	450	10.0	10.0	3.2	2.4	13.3	600	26.0	13.3
32	F1	1.29	29.9%	0.28	150	10.0	8.5	450	10.0	10.0	3.2	2.4	10.9	600	21.2	10.9

**Alexander Way**  
**Phase 1 Drainage Report**

**STANDARD FORM SF-3**REFERENCE: MHFD Volume 1**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 1.43

(Rational Method Procedure)

**Design Storm 5 Year**

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
1	A1	0.97	0.07	17.6	0.07	3.01	0.2					
2	A2	2.29	0.06	21.0	0.13	2.74	0.4	21.0	0.20	2.74	0.6	A1, A2
3	A3	4.99	0.22	12.6	1.12	3.52	3.9	21.0	1.32	2.74	3.6	A1 thru A3
4	B1	0.97	0.07	14.5	0.06	3.30	0.2					
5	B2	8.16	0.18	20.2	1.51	2.80	4.2	20.2	1.57	2.80	4.4	B1, B2
6	B3	2.34	0.28	18.6	0.66	2.92	1.9	20.2	2.23	2.80	6.2	B1 thru B3
7	B4	4.31	0.28	12.3	1.21	3.55	4.3					
8	B5	1.07	0.28	13.9	0.30	3.36	1.0	13.9	1.51	3.36	5.1	B4, B5
9	B6	1.14	0.28	12.3	0.32	3.56	1.1					
10	B7	3.72	0.38	9.6	1.40	3.93	5.5					
11	B8	1.03	0.44	8.6	0.46	4.09	1.9	20.2	5.92	2.80	16.6	B1 thru B8
12	C1.1	3.67	0.17	16.4	0.64	3.11	2.0					
13	C1.2	6.20	0.13	13.1	0.79	3.46	2.7	16.4	1.43	3.11	4.4	C1.1, C1.2
14	C1.3	3.68	0.19	7.9	0.71	4.21	3.0					
15	C1.4	4.52	0.08	14.9	0.34	3.26	1.1	16.4	2.49	3.11	7.7	C1.3, C1.4

**Alexander Way  
Phase 1 Drainage Report**



REFERENCE: MHFD Volume 1

**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 1.43

(Rational Method Procedure)

**Design Storm 5 Year**

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
16	C2	0.72	0.28	8.0	0.20	4.20	0.9					
17	C3.1	5.68	0.19	7.6	1.09	4.27	4.6					
18	C3.2	7.73	0.14	8.9	1.05	4.04	4.2	8.9	2.14	4.04	8.6	C3.1,C3.2
19	C4	1.86	0.28	11.9	0.52	3.60	1.9	11.9	2.66	3.60	9.6	C3,C4
20	C5	1.42	0.28	11.9	0.40	3.60	1.4	11.9	3.06	3.60	11.0	C3 thru C5
21	C6	4.76	0.28	6.9	1.34	4.41	5.9					
22	C7	0.77	0.32	6.6	0.24	4.47	1.1					
23	C8	2.65	0.23	7.3	0.62	4.33	2.7	16.4	7.94	3.11	24.7	C1 thru C8
24	D1	4.16	0.13	21.1	0.52	2.74	1.4					
25	D2	6.64	0.12	15.9	0.79	3.16	2.5	21.1	1.32	2.74	3.6	D1,D2
26	D3	1.13	0.25	12.8	0.28	3.49	1.0	21.1	1.60	2.74	4.4	D1 thru D3
27	D4	3.78	0.45	7.3	1.68	4.34	7.3	21.1	3.28	2.74	9.0	D1 thru D4
28	D5	2.02	0.28	10.3	0.56	3.82	2.2					
29	D6	3.83	0.23	10.9	0.87	3.73	3.3	21.1	4.72	2.74	12.9	D1 thru D6
30	E1	4.20	0.14	13.3	0.61	3.43	2.1					
31	E2	4.07	0.05	13.3	0.21	3.43	0.7	13.3	0.82	3.43	2.8	E1,E2
32	F1	1.29	0.28	10.9	0.36	3.74	1.4					

**Alexander Way**  
**Phase 1 Drainage Report**

**STANDARD FORM SF-3**REFERENCE: MHFD Volume 1**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 2.60

(Rational Method Procedure)

**Design Storm 100 Year**

BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
1	A1	0.97	0.50	17.6	0.49	5.47	2.7					
2	A2	2.29	0.49	21.0	1.13	4.98	5.6	21.0	1.62	4.98	8.1	A1, A2
3	A3	4.99	0.58	12.6	2.89	6.39	18.5	21.0	4.51	4.98	22.4	A1 thru A3
4	B1	0.97	0.50	14.5	0.48	6.00	2.9					
5	B2	8.16	0.56	20.2	4.56	5.09	23.2	20.2	5.05	5.09	25.7	B1, B2
6	B3	2.34	0.61	15.6	1.42	5.79	8.2	20.2	6.47	5.09	32.9	B1 thru B3
7	B4	4.31	0.61	12.3	2.62	6.46	16.9					
8	B5	1.07	0.61	13.9	0.65	6.11	4.0	13.9	3.27	6.11	19.9	B4, B5
9	B6	1.14	0.61	12.3	0.69	6.47	4.5					
10	B7	3.72	0.66	9.6	2.44	7.14	17.4					
11	B8	1.03	0.69	8.6	0.71	7.44	5.3	20.2	13.57	5.09	69.1	B1 thru B8
12	C1.1	3.67	0.55	16.4	2.03	5.66	11.5					
13	C1.2	6.20	0.53	13.1	3.29	6.29	20.7	16.4	5.32	5.66	30.1	C1.1, C1.2
14	C1.3	3.68	0.56	7.9	2.07	7.66	15.9					
15	C1.4	4.52	0.50	14.9	2.28	5.92	13.5	16.4	9.67	5.66	54.7	Inlet C1

**Alexander Way  
Phase 1 Drainage Report**



REFERENCE: MHFD Volume 1

**Runoff Calculations**

Rainfall Depth-Duration-Frequency (1-hr) = 2.60

(Rational Method Procedure)

**Design Storm 100 Year**

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
16	C2	0.72	0.61	8.0	0.44	7.64	3.3					
17	C3.1	5.68	0.56	7.6	3.19	7.76	24.8					
18	C3.2	7.73	0.53	8.9	4.13	7.34	30.3	8.9	7.32	7.34	53.8	C3.1,C3.2
19	C4	1.86	0.61	11.9	1.13	6.54	7.4	11.9	8.45	6.54	55.3	C3,C4
20	C5	1.42	0.61	11.9	0.86	6.54	5.6	11.9	9.32	6.54	60.9	C3 thru C5
21	C6	4.76	0.61	6.9	2.89	8.01	23.2					
22	C7	0.77	0.62	6.6	0.48	8.13	3.9					
23	C8	2.65	0.58	7.3	1.54	7.87	12.1	16.4	24.34	5.66	137.7	C1 thru C8
24	D1	4.16	0.53	21.1	2.20	4.98	11.0					
25	D2	6.64	0.53	15.9	3.49	5.74	20.0	21.1	5.70	4.98	28.4	D1,D2
26	D3	1.13	0.59	12.8	0.67	6.34	4.2	21.1	6.36	4.98	31.7	D1 thru D3
27	D4	3.78	0.69	7.3	2.61	7.89	20.6	21.1	8.97	4.98	44.6	D1 thru D4
28	D5	2.02	0.61	10.3	1.22	6.94	8.5					
29	D6	3.83	0.58	10.9	2.22	6.78	15.1	21.1	12.42	4.98	61.8	D1 thru D6
30	E1	4.20	0.54	13.3	2.26	6.23	14.1					
31	E2	4.07	0.49	13.3	2.00	6.24	12.5	13.3	4.27	6.23	26.6	E1,E2
32	F1	1.29	0.61	10.9	0.78	6.80	5.3					

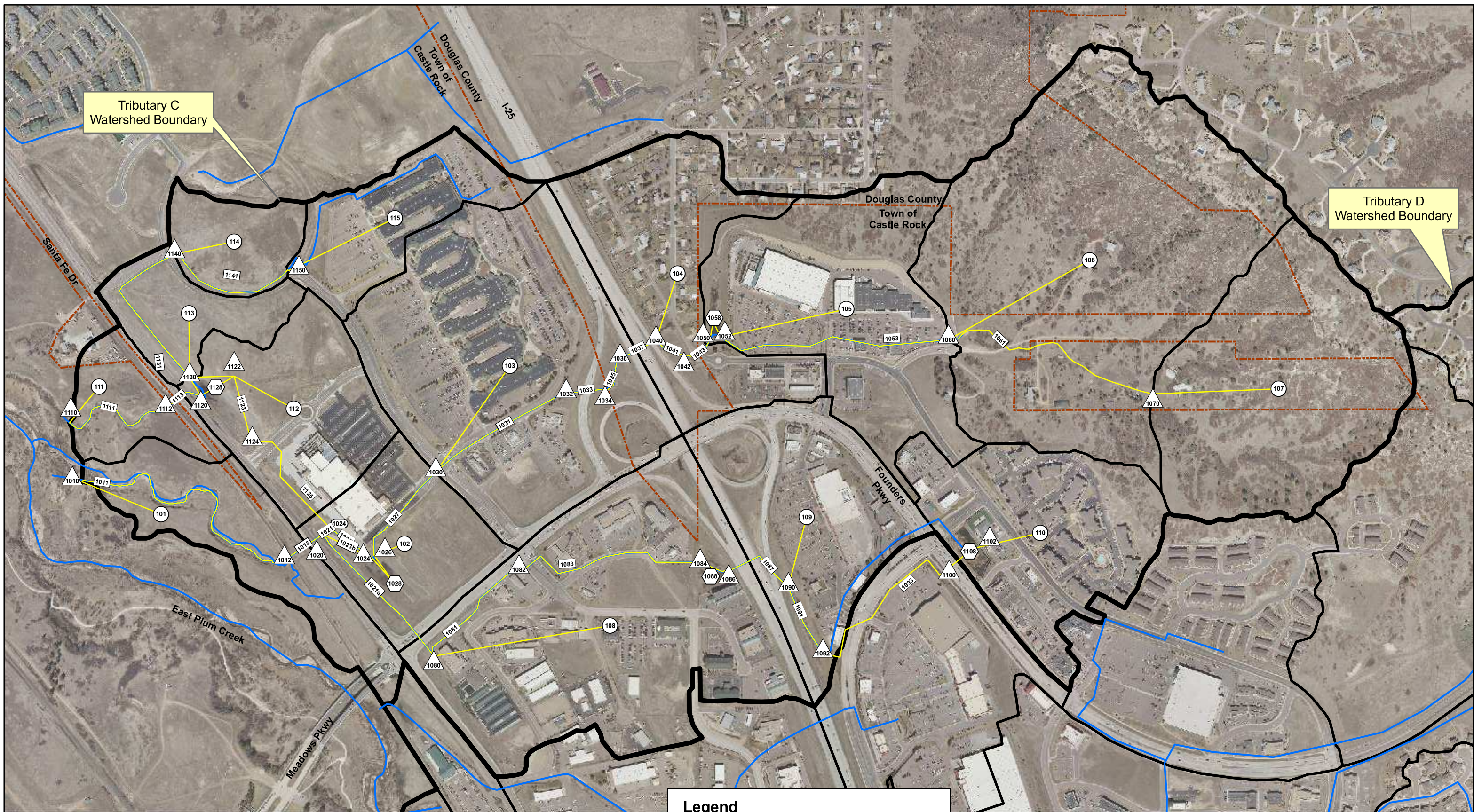
Table B-4 - Land Use by Subwatershed - Tributary C

Future

Subwatershed ID	Subwatershed Area (Acres)	Subwatershed Imperviousness (%)	Subwatershed Land Use Breakdown (Acres)						
			Open Space / Agricultural / Vacant (2%)	Single Family Large Lot (20%)	Multi-Family Residential (60%)	General Commercial (70%)	General / Restricted Commercial (85%)	General Commercial (95%)	Roads (100%)
101	25.5	39.8	15.5	0.0	0.0	0.0	1.2	0.0	8.8
102	24.0	63.3	7.9	0.0	0.0	0.0	5.0	5.7	5.4
103	72.0	89.3	4.5	0.0	0.0	0.0	9.5	37.4	20.6
104	37.7	51.7	3.2	18.1	0.0	0.0	3.9	0.0	12.5
105	48.1	61.3	13.1	1.3	0.4	0.0	30.5	0.0	2.9
106	97.5	14.9	73.5	11.5	0.5	0.0	10.4	0.0	1.6
107	53.7	2.9	51.5	2.1	0.0	0.0	0.1	0.0	0.0
108	76.3	88.7	0.9	0.0	0.0	0.0	51.8	0.0	23.6
109	37.0	84.0	3.1	0.0	0.0	0.0	19.0	0.0	14.9
110	37.2	64.3	4.4	0.0	17.9	0.0	11.9	0.0	3.0
111	12.4	74.2	2.1	0.0	0.0	0.0	7.7	0.0	2.7
112	28.4	78.7	1.2	0.0	0.0	14.8	0.0	9.3	3.1
113	13.7	70.0	0.0	0.0	0.0	11.5	0.0	0.0	0.0
114	11.5	70.0	0.0	0.0	0.0	13.7	0.0	0.0	0.0
115	19.5	95.5	0.0	0.0	0.0	0.0	0.2	16.9	2.3
Total	594.6	58.1	181.0	33.0	18.7	40.0	151.3	69.3	101.2

Existing

Subwatershed ID	Subwatershed Area (Acres)	Subwatershed Imperviousness (%)	Subwatershed Land Use Breakdown (Acres)					
			Open Space / Agricultural / Vacant (2%)	Single Family Large Lot (20%)	Multi-Family Residential (60%)	General / Restricted Commercial (85%)	General Commercial (95%)	Roads (100%)
101	25.5	35.7	16.7	0.0	0.0	0.0	0.0	8.8
102	24.0	46.0	13.0	0.0	0.0	0.0	5.7	5.4
103	72.0	84.8	8.4	0.0	0.0	5.6	37.4	20.6
104	37.7	51.7	3.2	18.1	0.0	3.9	0.0	12.5
105	48.1	57.4	15.4	1.3	0.4	28.2	0.0	2.9
106	97.5	6.0	83.9	11.5	0.5	0.0	0.0	1.6
107	53.7	2.7	51.6	2.1	0.0	0.0	0.0	0.0
108	76.3	82.6	6.5	0.0	0.0	46.2	0.0	23.6
109	37.0	84.0	3.1	0.0	0.0	19.0	0.0	14.9
110	37.2	64.3	4.4	0.0	17.9	11.9	0.0	3.0
111	12.4	29.6	8.8	0.0	0.0	1.0	0.0	2.7
112	28.4	43.3	16.0	0.0	0.0	0.0	9.3	3.1
113	13.7	20.9	11.0	0.0	0.0	0.0	0.0	2.6
114	11.5	7.8	10.9	0.0	0.0	0.0	0.0	0.7
115	19.5	94.6	0.2	0.0	0.0	0.0	16.9	2.3
Total	594.6	49.1	253.2	33.0	18.7	115.8	69.3	104.5



0 187.5 375 750 1,125 1,500 Feet

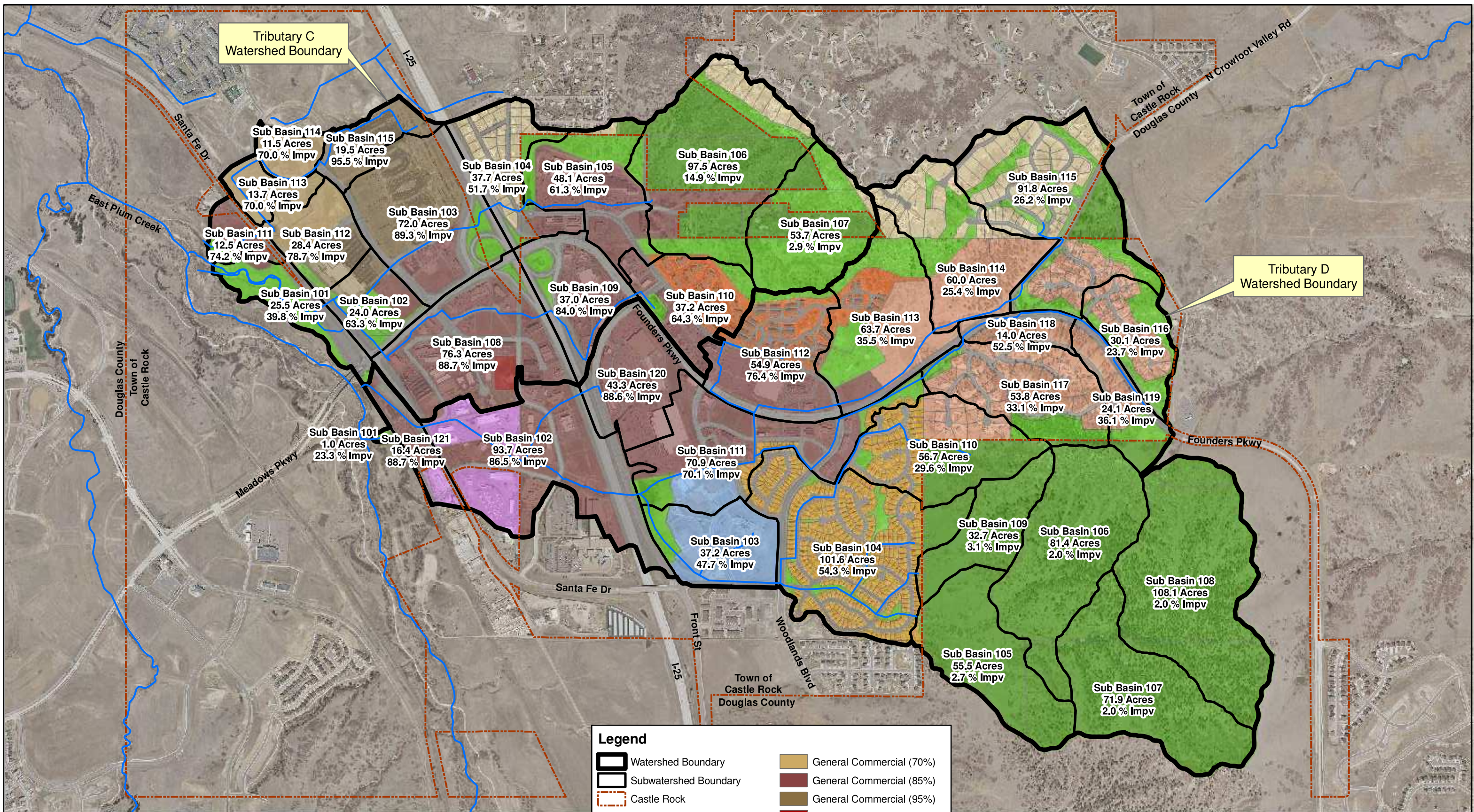


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#### Legend

- |                       |              |
|-----------------------|--------------|
| Watershed Boundary    | Basin ID     |
| Subwatershed Boundary | Design Point |
| Castle Rock           | Detention    |
| Streams               | Conveyance   |
| Conveyance Link       | Diversion    |

Tributary C - EPA SWMM Connectivity  
Figure A-7  
Tributary C and Tributary D  
Tributary Watersheds Master Plan



0 380 760 1,520 2,280 3,040 Feet

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Future Land Use  
Figure A-5  
Tributary C and Tributary D  
Tributary Watersheds Master Plan

Table B-9 CUHP Subwatershed Peak Flows - Tributary C

Catchment Name/ID	2-Yr				5-Yr				10-Yr				25-Yr				50-Yr				100-Yr				500-Yr			
	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)	Exist. (cfs)	Vol (cf)	Fut. (cfs)	Vol (cf)
101	9	36,095	11	40,225	16	64,901	19	69,475	20	85,091	24	89,784	124,095	32	128,599	37	38	145,900	43	150,502	47	182,948	53	187,414	60	235,271	67	240,145
102	14	40,382	23	56,422	24	67,123	35	85,686	30	85,066	42	104,793	122,609	46	141,299	59	53	142,938	68	161,874	65	177,192	82	195,280	83	226,575	101	245,057
103	124	219,476	131	231,416	172	309,631	180	324,592	202	367,912	210	383,921	469,416	261	484,663	267	295	530,288	300	545,730	348	624,651	353	639,052	425	768,957	429	783,824
104	36	71,360	36	71,350	60	114,488	60	114,476	75	143,315	75	143,302	200,682	107	200,670	107	124	232,413	124	232,402	151	285,150	151	285,140	190	362,454	190	362,445
105	56	105,639	60	111,341	91	164,355	95	170,706	110	203,165	114	209,704	272,757	151	278,923	155	173	313,576	177	319,832	209	379,139	213	384,989	259	475,910	264	481,952
106	16	41,532	25	68,541	49	136,050	62	169,804	68	207,733	82	244,047	359,687	118	394,958	137	142	439,992	163	476,405	181	587,036	206	621,642	237	781,352	267	818,072
107	7	17,892	7	18,140	25	68,372	25	68,704	35	107,288	35	107,652	191,324	63	191,675	63	76	235,292	76	235,658	98	316,798	98	317,141	128	423,429	128	423,796
108	127	238,972	139	257,089	181	342,905	194	363,725	214	409,079	227	431,006	521,305	278	542,547	290	314	589,090	326	610,700	366	693,031	378	713,844	447	853,655	460	874,770
109	48	121,389	48	121,389	68	173,763	68	173,763	79	207,003	79	207,003	262,250	104	262,250	104	117	295,983	117	295,983	138	347,356	138	347,356	169	426,840	169	426,840
110	49	90,132	49	90,132	75	136,540	75	136,540	89	166,857	89	166,857	220,170	121	220,170	121	137	251,812	137	251,812	165	301,893	165	301,893	203	376,801	203	376,801
111	5	15,129	18	34,937	10	29,197	27	51,265	12	39,108	31	61,770	58,219	19	79,712	41	23	68,841	46	90,517	28	87,067	55	107,284	36	112,535	68	132,799
112	16	42,813	42	82,520	26	67,751	59	117,686	34	86,324	71	140,715	129,840	53	182,394	94	63	152,775	106	206,912	78	193,609	126	245,643	100	249,428	155	303,918
113	2	9,061	14	35,637	4	21,687	21	52,781	6	30,409	25	63,794	52,747	11	84,481	34	13	63,792	39	96,298	17	83,807	47	115,184	22	110,896	58	143,630
114	1	2,139	16	30,263	3	8,548	24	44,019	4	14,059	28	53,184	32,757	10	70,737	38	12	41,424	43	80,773	16	58,719	53	97,059	22	80,534	66	121,036
115	35	69,947	35	70,718	47	97,377	48	98,301	55	114,599	55	115,588	142,979	69	143,934	70	78	160,452	78	161,427	90	186,672	91	187,609	110	227,863	110	228,818

Table B-11 Peak Flow Summary Table - Tributary C

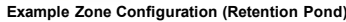
Station	Design Point	Location	Drainage Area		100-Year	2-Year		5-Year		10-Year		25-Year		50-Year		100-Year		500-Year	
			Runoff Volume		Existing FuLU (ac-ft)	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
			(acres)	(sq.mi.)		(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
	113		14	0.021	2.6	2	14	4	21	6	25	11	34	13	39	17	47	22	58
	114		12	0.018	2.2	1	16	3	24	4	28	10	38	12	43	16	53	22	66
	115		19	0.030	4.3	35	35	47	48	55	55	69	70	78	78	90	91	110	110
	104		38	0.059	6.5	36	36	60	60	75	75	107	107	124	124	151	151	190	190
	105		48	0.075	8.8	56	60	91	95	110	114	151	155	173	177	209	213	259	264
	112		28	0.044	5.6	16	42	26	59	34	71	53	94	63	106	78	126	100	155
	102		24	0.038	4.5	14	23	24	35	30	42	46	59	53	68	65	82	83	101
	111		12	0.019	2.5	5	18	10	27	12	31	19	41	23	46	28	55	36	68
	101		26	0.040	4.3	9	11	16	19	20	24	32	37	38	43	47	53	60	67
	110		37	0.058	6.9	49	49	75	75	89	89	121	121	137	137	165	165	203	203
	103		72	0.113	14.7	124	131	172	180	202	210	261	267	295	300	348	353	425	429
	107		54	0.084	7.3	7	7	25	25	35	35	63	63	76	76	98	98	128	128
	106		97	0.152	14.3	16	25	49	62	68	82	118	137	142	163	181	206	237	267
	109		37	0.058	8.0	48	48	68	68	79	79	104	104	117	117	138	138	169	169
	108		76	0.119	16.4	127	139	181	194	214	227	278	290	314	326	366	378	447	460
	1130		45	0.070	9.2	34	61	51	87	60	102	84	136	96	154	116	183	144	225
	1140		31	0.048	6.5	34	49	48	68	57	80	76	104	86	117	102	139	126	170
	1150		19	0.030	4.3	35	35	47	48	55	55	69	70	78	78	90	91	110	110
	1110	North Outfall to East Plum Creek D/S Study Limits	86	0.134	15.5	9	22	14	31	17	36	29	59	40	78	72	115	113	239
	1010	South Outfall to East Plum Creek D/S Study Limits	509	0.795	82.0	173	189	250	269	293	310	426	467	563	614	793	860	1,135	1,209
	1100		37	0.058	5.5	4	4	7	7	9	9	20	20	27	27	32	32	35	35
	1060	Brewer Court and Alexander Place	151	0.236	21.5	22	30	73	84	101	114	180	196	216	235	278	299	364	390
	1086		74	0.116	13.3	48	48	68	68	79	79	104	104	117	117	139	139	182	182
	1030	Factory Shops Blvd	309	0.483	49.1	156	164	227	235	272	279	390	410	469	505	628	662	866	934
	1070		54	0.084	7.3	7	7	25	25	35	35	63	63	76	76	98	98	128	128
	1020		333	0.520	51.3	68	74	96	100	139	157	311	343	410	453	577	641	835	892
	1012		484	0.756	77.7	171	185	240	256	281	298	402	439	534	582	753	817	1,084	1,154
	1026		333	0.520	53.6	168	185	248	268	298	319	434	467	515	562	689	738	938	1,019
	1084		74	0.116	10.2	2	2	15	15	22	22	26	26	28	28	30	30	32	32
	1082	Castleton Road	74	0.116	10.2	2	2	15	15	22	22	26	26	28	28	30	30	32	32
	1092		37	0.058	5.4	4	4	7	7	9	9	20	20	27	27	32	32	35	35
	1052		199	0.311	30.3	63	76	141	156	183	201	296	317	351	374	442	470	570	603
	1036		237	0.370	34.7	35	36	106	123	141	147	270	292	337	361	435	498	654	701
	1102		37	0.058	6.9	49	49	75	75	89	89	121	121	137	137	165	165	203	203
	1042		199	0.311	28.0	13	22	86	99	104	116	222	240	276	289	359	395	528	567
	1124		-	0.000	2.3	8	9	12	12	12	12	12	12	12	12	12	12	12	12
	1112		73	0.114	13.1	7	9	9	22	12	30	27	53	35	70	62	102	95	216
	1122		73	0.114	17.1	50	99	78	141	96	167	143	225	165	256	202	306	253	377
	1014	U/S of US 85 (South)	484	0.756	77.7	171	185	240	256	281	298	402	439	534	582	753	817	1,084	1,154
	1022	Lot 3 Detention	333	0.520	22.0	76	83	108	112	112	112	112	112	112	112	112	112	112	143
	1024		333	0.520	53.6	76	83	108	112	151	169	323	355	422	463	582	644	843	904
	1120	U/S of US 85 (North)	73	0.114	13.1	7	9	9	22	12	30	27	53	35	70	62	102	95	207
	1080	Meadows Pkwy and US 85	151	0.235	26.5	128	140	182	195	215	228	280	292	315	327	367	380	449	462
	1040	I-25	237	0.370	34.5	36	36	106	123	141	147	270	292	337	361	435	477	655	701
	1090		74	0.116	13.4	48	48	68	68	79	79	104	104	117	117	139	139	174	174
	1050	U/S of US 85	199	0.311	28.0	13	22	86	99	104	116	222	240	276	289	360	397	529	567
	1034		237	0.370	34.4	35	36	106	123	141	147	270	292	337	361	435	498	654	701
	1032		237	0.370	34.4	35	36	106	123	141	147	270	292	337	361	435	496	654	701
	1028	South Lowe's Pond	333	0.520	53.6	168	185	248	268	298	319	434	467	515	562	689	738	938	1,019
	1108	Pond H	37	0.058	6.9	49	49	75	75	89	89	121	121	137	137	165	165	203	203
	1058	Home Depot Pond	199	0.311	30.3	63	76	141	156	183	201	296	317	351	374	442	470	570	603
	1088	Douglas County Justice Center Filing No. 3 Pond	74	0.116	13.3	48	48	68	68	79	79	104	104	117	117	139	139	182	182
	1128	North Lowe's Pond	73	0.114	17.1	50	99	78	141	96	167	143	225	165	256	202	306	253	377

# Appendix C



*MHFD-Detention, Version 4.04 (February 2021)*

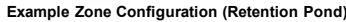
**Basin ID: Pond 1 Basins A**



8/15/2022, 9:56 AM

*MHFD-Detention, Version 4.04 (February 2021)*

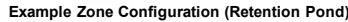
**Basin ID: Pond 2 Sub Basins 106 and 107 Masterplan**



8/15/2022, 10:09 AM

*MHFD-Detention, Version 4.04 (February 2021)*

**Basin ID: Pond 2 Sub Basins 106 Modified and 107**



8/15/2022, 10:07 AM

# Appendix D



**Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)**

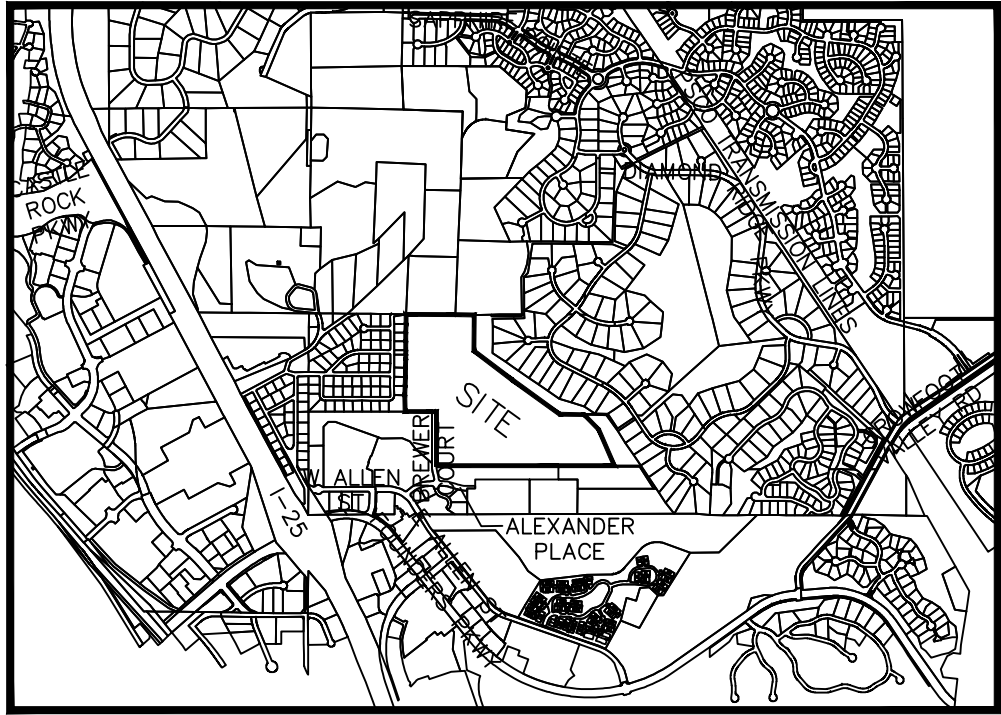
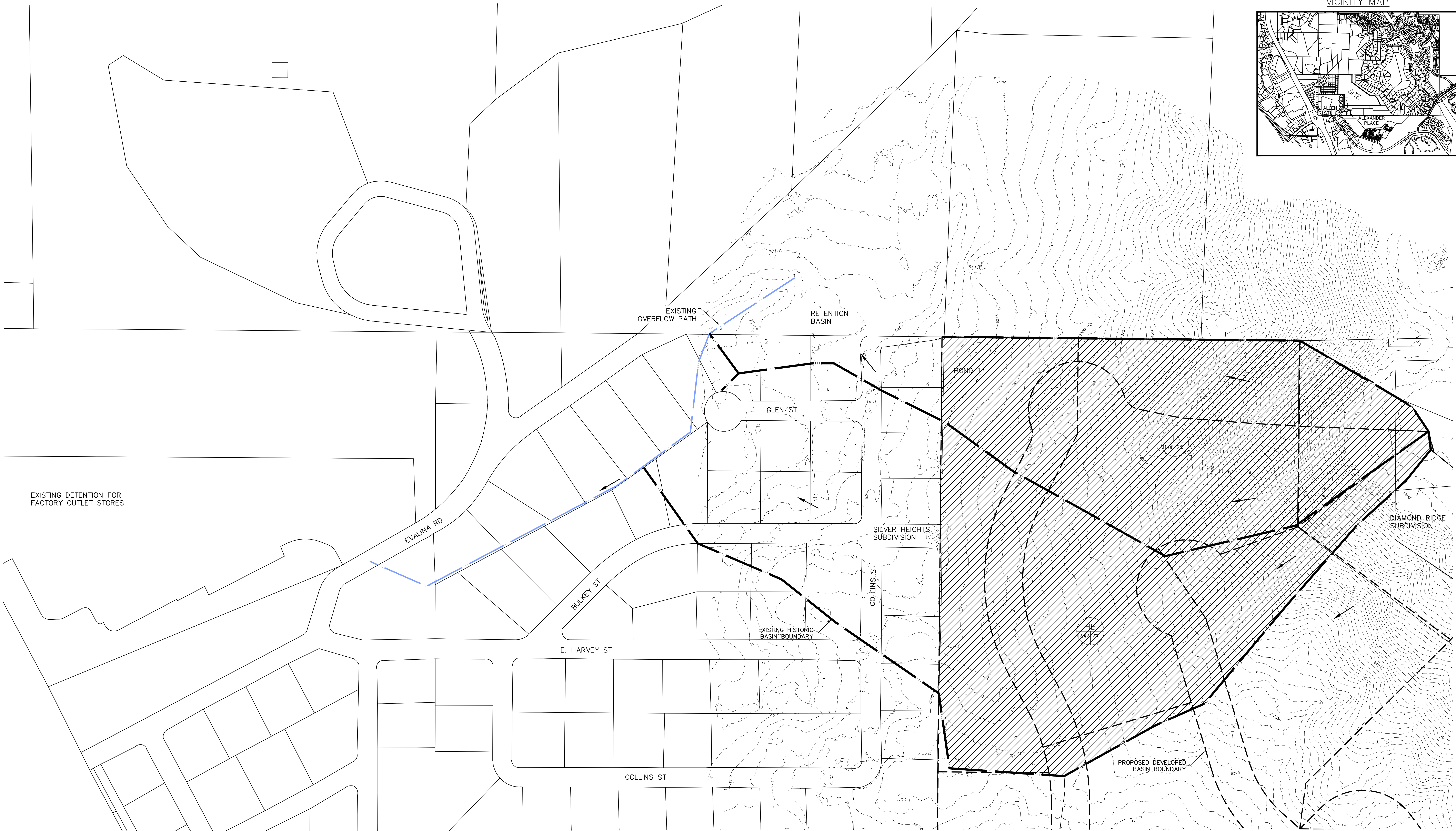
Project:		Project#		Applicant:
Section	Questions	Response	Check those that apply	Instructions
<b>1</b>	<b>Non-applicable Sites</b>			
1.1	Will the project result in a temporary disturbance of greater than one acre?	No Yes	<input type="checkbox"/> <input checked="" type="checkbox"/>	Proceed to section 1.2. Proceed to section 2.
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No  Yes	<input type="checkbox"/>  <input type="checkbox"/>	Proceed to section 1.3.  Proceed to section 2.
1.3	Is the project within the Cherry Creek Watershed?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Permanent water quality control measures may be required. Refer to Water Quality Control Regulation 72.7 for details and allowable exclusions. Permanent water quality control measures are not required.
<b>2</b>	<b>Applicable Site Types and Exclusions by Variance</b>			
2.1	Does the project have more than 35% impervious area on the existing site?	No Yes	<input checked="" type="checkbox"/> <input type="checkbox"/>	Project is an applicable Development Site. Proceed to section 3. Proceed to 2.2.
2.2	Does the project have greater than 75% impervious area on the existing site?	No Yes	<input type="checkbox"/> <input type="checkbox"/>	Project is an applicable Redevelopment Site. Proceed to section 3. Project is an applicable Constrained Redevelopment Site. Proceed to 2.3.
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes  No	<input type="checkbox"/>  <input type="checkbox"/>	No further action required.  Proceed to 2.4.
2.4	Do any other water quality exclusions apply to the site?	No  Yes	<input type="checkbox"/>  <input type="checkbox"/>	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for <b>variance</b> for <u>Constrained Redevelopment Sites</u> . Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for <b>variance</b> for <u>Constrained Redevelopment Sites</u> .
<b>3</b>	<b>Applicable Sites with Other Exclusions by Variance</b>			
<b>3.1</b>	<b>Category 1: Roadways, bridges and trails only</b>			
3.1.1	Is the project a bike or pedestrian trail?	Yes No	<input type="checkbox"/> <input checked="" type="checkbox"/>	Proceed to next line. Proceed to 3.1.2.
	Is the trail for a roadway?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Proceed to 3.1.2. Project is excluded. Submit <b>variance</b> for <u>Trails Excluded from Permanent Water Quality Requirements</u> .
3.1.2	Is the project primarily used for parking or access to parking?	Yes No	<input type="checkbox"/> <input checked="" type="checkbox"/>	This exclusion does not apply. Permanent water quality is required. Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No Yes	<input type="checkbox"/> <input checked="" type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.1.4.

Section	Questions	Response	Check those that apply	Instructions
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No Yes	<input type="checkbox"/> <input checked="" type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No Yes	<input type="checkbox"/> <input checked="" type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No Yes	<input type="checkbox"/> <input checked="" type="checkbox"/>	Existing areas of site are excluded only. Submit <b>variance</b> for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
<b>3.2</b>	<b>Category 2: Non-residential and non-commercial projects only</b>			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>study</b> along with <b>variance</b> for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
<b>3.3</b>	<b>Category 3: Residential, Agricultural and Commercial projects</b>			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes No	<input type="checkbox"/> <input checked="" type="checkbox"/>	Proceed to next line. Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No Yes	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>variance</b> for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Is the project site greater than 20% impervious?	Yes No	<input type="checkbox"/> <input type="checkbox"/>	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No Yes	<input type="checkbox"/> <input type="checkbox"/>	Project is excluded. Submit <b>study</b> along with <b>variance</b> for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.

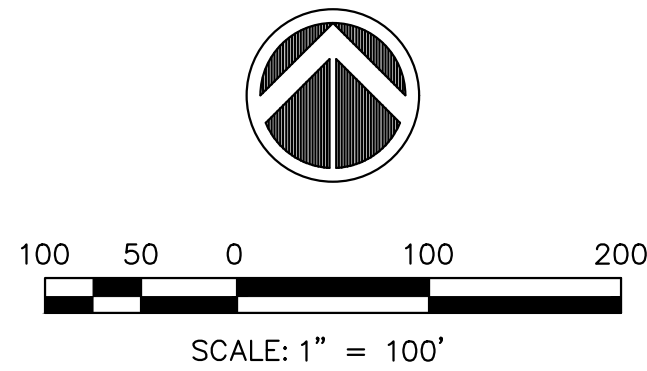
Section	Questions	Response	Check those that apply	Instructions
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes No	<input type="checkbox"/> <input checked="" type="checkbox"/>	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes No	<input checked="" type="checkbox"/> <input type="checkbox"/>	This portion of the project is excluded. Submit <b>variance</b> for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line. Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes No	<input checked="" type="checkbox"/> <input type="checkbox"/>	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes No	<input checked="" type="checkbox"/> <input type="checkbox"/>	This exclusion does not apply. Permanent water quality is required. Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No Yes	<input checked="" type="checkbox"/> <input type="checkbox"/>	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the <b>drainage report</b> . No further action is needed. This exclusion does not apply. Permanent water quality is required.



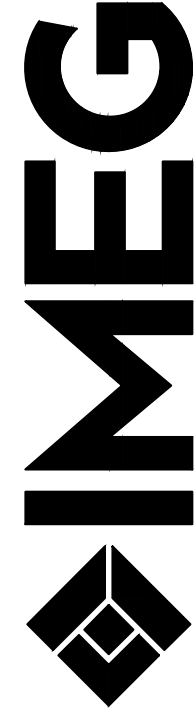
Monday, August 15, 2022 1:38:57 PM  
C:\2020\2002764-00\DESIGN\DWG\1500\EXHIBIT\CONCEPT\2002764-00 PHASE 1 HISTORIC DRAINAGE EXHIBIT.DWG



- A = BASIN DESIGNATION  
B = AREA IN ACRES  
I = % IMPERVIOUSNESS  
D = DESIGN POINT DESIGNATION
- EXISTING CONTOURS (5' INTERVAL)  
--- PROPOSED CONTOURS (2' INTERVAL)  
--- STORM SEWER  
--- BASIN BOUNDARY



REVISIONS		DATE
No.	DESCRIPTION	



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ALEXANDER WAY  
CASTLE ROCK, CO

PHASE 1 HISTORIC DRAINAGE MAP

IMEG Project No:  
2002764.00

File Name:  
2002764.00 Phase 1 Historic  
Drainage Exhibit.dwg  
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Field Book No:

Drawn By: RAR  
Checked By: TCG  
Date: 8/12/2022

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Sheet 1 of 1