

PHASE 1 DRAINAGE REPORT

FOR

The Brickyard

401 PRAIRIE HAWK DRIVE
CASTLE ROCK, CO 80109
PDP22-0002

LOT 1 OF CITADEL STATION FILING NO. 2
LOT 1, BLOCK 10, CITADEL STATION FILING NO. 6
LOT 1, BLOCK 7, CITADEL STATION FILING NO. 6
AND TRACT OF LAND, COUNTY OF DOUGLAS, STATE OF COLORADO

Prepared: 8/25/2022
Revised: 05/10/2024

for:

Confluence Companies, LLC
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by:



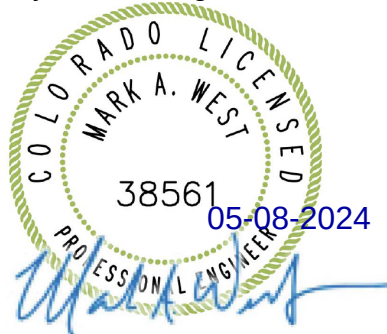
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HKS Project No. 200726
Mark West

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CERTIFICATION

I hereby affirm that this PHASE 1 DRAINAGE REPORT for The Brickyard was prepared under my direct supervision in accordance with the provisions of the municipality's *storm drainage criteria* for the owners thereof. I understand that the municipality does not and will not assume liability for drainage facilities designed by others.



Mark A. West, P.E., C.F.M.
State of Colorado License No. 38561
On Behalf of Harris Kocher Smith

I. GENERAL LOCATION AND DESCRIPTION

A. SITE LOCATION

The entire property, including The Brickyard development is located north of Plum Creek Parkway and west of Interstate 25 (I-25) in Castle Rock, Colorado in 4 parcels. Lot 1, Citadel Station Filing No. 2, County of Douglas, State of Colorado. Lot 1 of Block 10 and Lot 1 of Block 7, Citadel Station Filing No. 6, County of Douglas, State of Colorado. A tract of land situated in sections 10 and 11, Township 8 South, Range 67 West of the 6th Principal Meridian, County of Douglas, State of Colorado. The entire property is situated in the Northwest ¼ of Section 11, Township 8 South, Range 66 West of the 6th Principal Meridian, Town of Castle Rock, County of Douglas, State of Colorado. A Vicinity Map is included in Appendix A of this report, for reference.

The property is bounded by Prairie Hawk Drive along the east with East Plum Creek across the street. To the north is an adjacent existing drainageway known as the Industrial Channel. On the west side of the property is a planned development project known as Millers Landing and can be found in Appendix G.

B. DESCRIPTION OF PROPERTY

The entire property is comprised of approximately 31.1 acres. The total area to be developed and total disturbed area, including offsite area, is approximately 35.3 acres. The Brickyard site, hereby referring to the proposed development is referred to as "Site" for this report.

There are no known irrigation facilities on, adjacent to, or otherwise impacting the Site.

The Site slopes generally to the east towards Prairie Hawk Drive.

According to the Natural Resources Conservation Service (NRCS) – Web Soil Survey, the underlying soils are mostly Newlin gravelly sandy loam (NeE) and Fondis clay loam (FoD) which are classified as Hydrologic Groups B and C (see Appendix B. Since the majority of the underlying soil is primarily and largely NeE, Hydrologic Soil Group B was used as a preliminary step in this report. Pages from the NRCS WSS report are included in Appendix B: a summary table follows.

Map Unit Symbol	Map Unit Name	Area of Interest (AOI)	Hydrologic Soil Group	Percent of AOI
		Acres	Percent	Percent
FoD	Fondis Clay loam, 3 to 9 percent slopes	2.6	C	4.6
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	53.1	B	95.

The Site does not lie within a FEMA designated floodplain as shown on the attached Flood Insurance Rate Map (FIRM) in Appendix A.

C. PROPOSED LAND USE

The Site will be developed as mixed use. The proposed development will include a hotel, condos, for-rent apartments, townhomes, a recreation center, retail/commercial buildings, office buildings, public and private roads, landscaped areas, and a water quality/detention pond.

II. DRAINAGE BASINS AND SUB-BASINS

A. CRITERIA

The basis for design and analysis of the drainage system and drainage impacts for the Site were the municipality's *storm drainage criteria*, dated June 2019 (Town of Castle Rock Criteria), and the *Urban Storm Drainage Criteria Manuals* (Mile High Flood District, formerly known as Urban Drainage and Flood Control District), Volumes 1, 2 and 3.

The total area of the Site to be developed is 31.1 acres. The Rational Method is appropriate and was used to calculate peak rates of stormwater runoff. The design storms analyzed for this Site are the 5-year and 100-year for the initial and major storms, respectively. Rainfall intensities were determined by the Town of Castle Rock Drainage Criteria.

Preliminary results of hydrologic and hydraulic analysis, in addition to pertinent charts, nomographs, figures and tables, are included within the appendix of this report.

B. MAJOR DRAINAGE BASINS

Nearly the entire Site is located within a portion of the Industrial Watershed which outfalls to East Plum Creek. The Industrial Watershed was studied as part of the Omni, Industrial and Westfield Watershed Master Plan report by CH2MHill in January 2011, referred to as the Master Plan hereafter. The Master Plan provided a comprehensive drainage plan and flood plain analysis for the Omni, Industrial and Westfield Watersheds, including providing recommendations for channel improvements. The Master Plan is referenced throughout this report, reference material can be found in Appendix G. The provided reference information has been reviewed and accepted for use in this report. In conjunction with the Master Plan a Flood Hazard Area Delineation study was also completed in April 2013 that mapped the AE flood zone for the Industrial Channel.

C. MINOR DRAINAGE BASINS

The project is impacted by offsite flows from the southernly direction of Prairie Hawk Drive. The contributing area is approximately 4.1 acres adjacent to the Site and is known as OS1 as referenced in Appendix F.

The Site has been generally subdivided into two individual sub-basins that are described in more detail below and can be found in Appendix F. One off-site basin is analyzed in this report since it contributes to the on-site detention pond.

Sub-basin A1 (31.18 acre) is located north of W. Plum Creek Parkway and west of Interstate I25. It is the same as the entire Site area. This sub-basin consists of buildings, drives, walks, and parking. Runoff for this subbasin will be captured and conveyed through proposed storm sewers to the Detention Pond.

Sub-basin OS1 (4.15 acre) is located off-site on Prairie Hawk R.O.W. and adjacent to the Site. This sub-basin consists of an asphalt road and grass. Runoff for this subbasin will be captured and conveyed through proposed storm sewers to the Pond.

D. WATER QUALITY & DETENTION

The Pond has been sized to fit within an area of 1.0 acre and designed for an imperviousness of 85% percent as a preliminary base for this report. As the project continues to push forward, this value will be updated accordingly.

E. STREETS

The site will include public roads, private drives, surface parking lots, below grade parking structures, pedestrian plazas and landscape areas. Public improvements adjacent to the Site include Prairie Hawk Drive. Inlets will be added along the street to capture flow necessary to maintain drainage conditions. Inlets are proposed to intercept runoff and connect to pipes to convey the flow to the proposed on-site drainage facilities. Interception rates at all inlets will be calculated based on Urban Drainage UD-Inlet (v4.05) spreadsheets; copies of these spreadsheet computations will be included in the final drainage report appendix. The UD-Inlet spreadsheet calculation for local depression at a curb inlet assumes a 6-inch curb head. Curb inlets are in primarily located where the curb head is only 4 inches; the 2-inch difference is, by default, put into the local depression.

F. OPEN CHANNEL FLOW

No open channels are proposed with this project at this time.

G. STORM SEWERS AND CULVERTS

The on-site and off-site storm sewer systems will be designed in accordance with municipality's criteria. The hydraulic grade lines for the minor and major storms will be generated utilizing Bentley's StormCAD software. As the project continues to move forward, calculations will be provided.

III. EXISTING STORMWATER CONVEYANCE OR STORAGE FACILITIES

A. EXISTING STORMWATER CONVEYANCE FACILITIES

The Master Plan identifies several channel improvements to the Industrial Channel. The Site is located at approximately between station 20+00 to 8+00 of the Industrial Channel as seen on the Master Plan and Profile drawings, refer to Appendix G. Along the Site, 5 Drop Structures are identified within the Industrial Channel.

Per project correspondence, The Town has completed grade control drop structures along this reach. The project will investigate the use of bank protection measures such as buried riprap to protect adjacent infrastructure.

B. EXISTING STORMWATER AND DETENTION FACILITIES

There are currently no stormwater quality and storage facilities. Future drainage studies will determine if modifications need to be made along Industrial Channel per Town of Castle Rock drainage requirements.

IV. PROPOSED STORMWATER CONVEYANCE OR STORAGE FACILITIES

A. PROPOSED STORMWATER CONVEYANCE FACILITIES

Runoff from the Site will be captured in proposed inlets, conveyed in proposed pipes, detained in the proposed extended basin (Pond), and released at or below historic rates. Drainage patterns will remain relatively unchanged from current conditions. See appendix for pertinent calculations.

B. PROPOSED STORMWATER STORAGE FACILITIES

A pond will be located on the northeast section of the Site and adjacent to Industrial Channel. Calculations and details will be found in Appendix E in the final design. The pond will include water quality capture volume (WQCV), excess urban runoff volume (EURV), 100-year detention. A spillway will be included with the final design detailing 1' of freeboard. From the outlet structure, the treated and detained runoff will discharge into Industrial Channel.

V. WATER QUALITY ENHANCEMENT CONTROL MEASURES

STORMWATER QUALITY MANAGEMENT PROCESS

Both UDFCD/MHFD (Urban Drainage & Flood Control District / Mile High Flood District) recommend implementation of the Four Step Process, summarized below, which helps to minimize adverse impacts of urbanization. Benefits of this process include reduced runoff, improved water quality, a decrease of the required storage volume, reduced burdens to downstream facilities, and improved site aesthetics. The Four Step Process is outlined below:

Step 1: Reduce runoff by disconnecting impervious areas, eliminating “unnecessary” impervious areas, and encouraging infiltration into soils that are suitable. This is accomplished by a combination of landscape islands and landscape areas adjacent to buildings and amenity areas on the site.

Step 2: Treat and slowly release the WQCV. This is being accomplished through the Full Spectrum Detention Pond where runoff will slowly flow from the forebay of the pond to the outlet structure while sediment settles to the bottom of the pond. Then the runoff is slowly released out the outlet structure.

Step 3: Stabilize drainageways. A combination of seeding and mulching and riprap around the outfall will be used on site to stabilize the land and prevent erosion. All new and re-development projects are required to construct or participate in the funding of channel stabilization measures.

Drainage basin fees paid, at the time of platting, go towards channel stabilization within the drainage basin. The proposed outlet has sufficient stabilization.

Step 4: Implement source controls. A combination of source control BMP's will be utilized including landscape maintenance, snow and ice management, and street sweeping and cleaning utilized, one can apply for reimbursement of the parts of these fees that are unused.

VI. FLOODPLAIN MODIFICATIONS

A. MAJOR DRAINAGEWAY – UNDESIGNATED FLOODPLAIN

The Industrial Channel is the only major drainageway impacted by the project and for the purpose of this report will be addressed in Section VI – B.

B. MAJOR DRAINAGEWAY – DESIGNATED FLOODPLAIN

The Industrial Channel was mostly recently studied by the Omni, Industrial and Westfield Watersheds Flood Hazard Area Delineation report by CH2MHill in April 2013 in conjunction with the referenced Master Plan. No modifications are planned to be made within the floodplain in this report, as of now.

VII. POTENTIAL PERMITTING REQUIREMENTS

A Colorado Discharge System Permit (CDPS) will be required for the project.

VIII. CONCLUSIONS

A. IMPACT OF IMPROVEMENTS

Currently, the Site is mostly pervious, and flows are otherwise untreated and undetained. The proposed development includes a storm drainage system conveying runoff from the majority of the Site to an on-site water quality pond and detention facilities. The Brickyard project will result in a significant improvement to the area storm drainage system.

B. COMPLIANCE WITH APPLICABLE CRITERIA

The design of the water quality, detention facility, and depth and velocity of street flow are in accordance with the criteria of municipality and Urban Drainage.

IX. REFERENCES

1. *Storm Drainage Design and Technical Criteria Manual, Town of Castle Rock, Colorado, updated June 2019*
2. *Urban Storm Drainage Criteria Manual (USDCM), Mile High Flood District (MHFD, formerly known as Urban Drainage and Flood Control District, UDFCD):*
Volume 1, Management, Hydrology and Hydraulics, Revised August 2018.
Volume 2, Structures, Storage and Recreation, Revised September 2017.

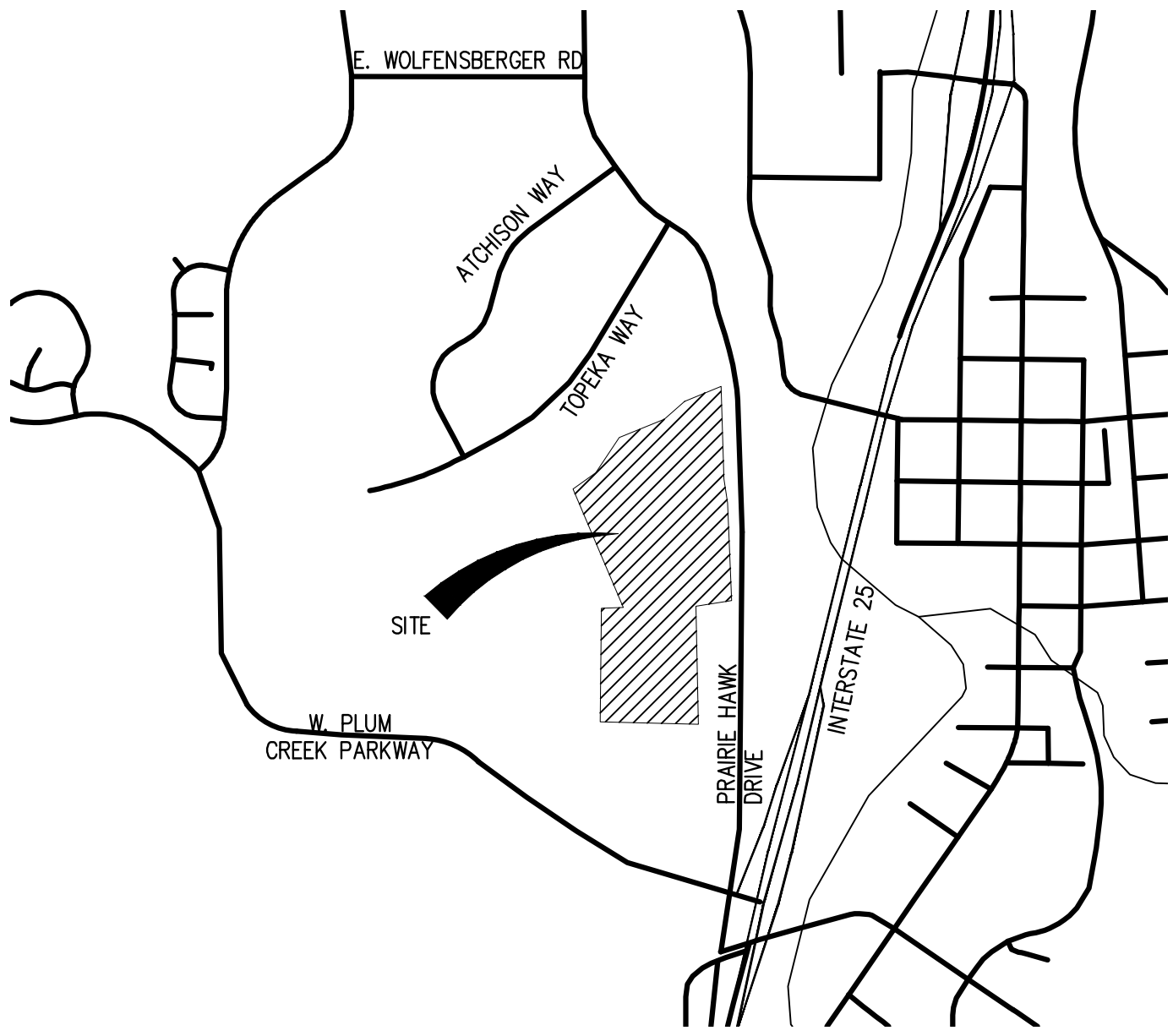
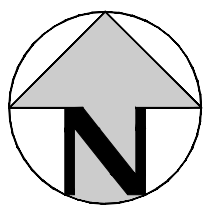
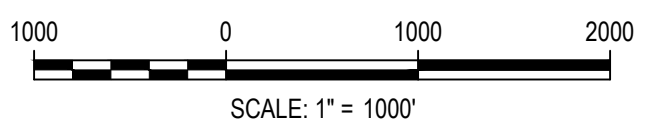
Volume 3, Stormwater Quality, Updated January 2021

3. *Omni, Industrial and Westfield Watershed Master Plan report by CH2MHill in January 201*

X. APPENDICES

APPENDIX A - Vicinity Map and FIRMette Map

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CONFLUENCE COMPANIES, L.L.C.

THE BRICKYARD VICINITY MAP

PROJECT #: 200726
SHEET NUMBER

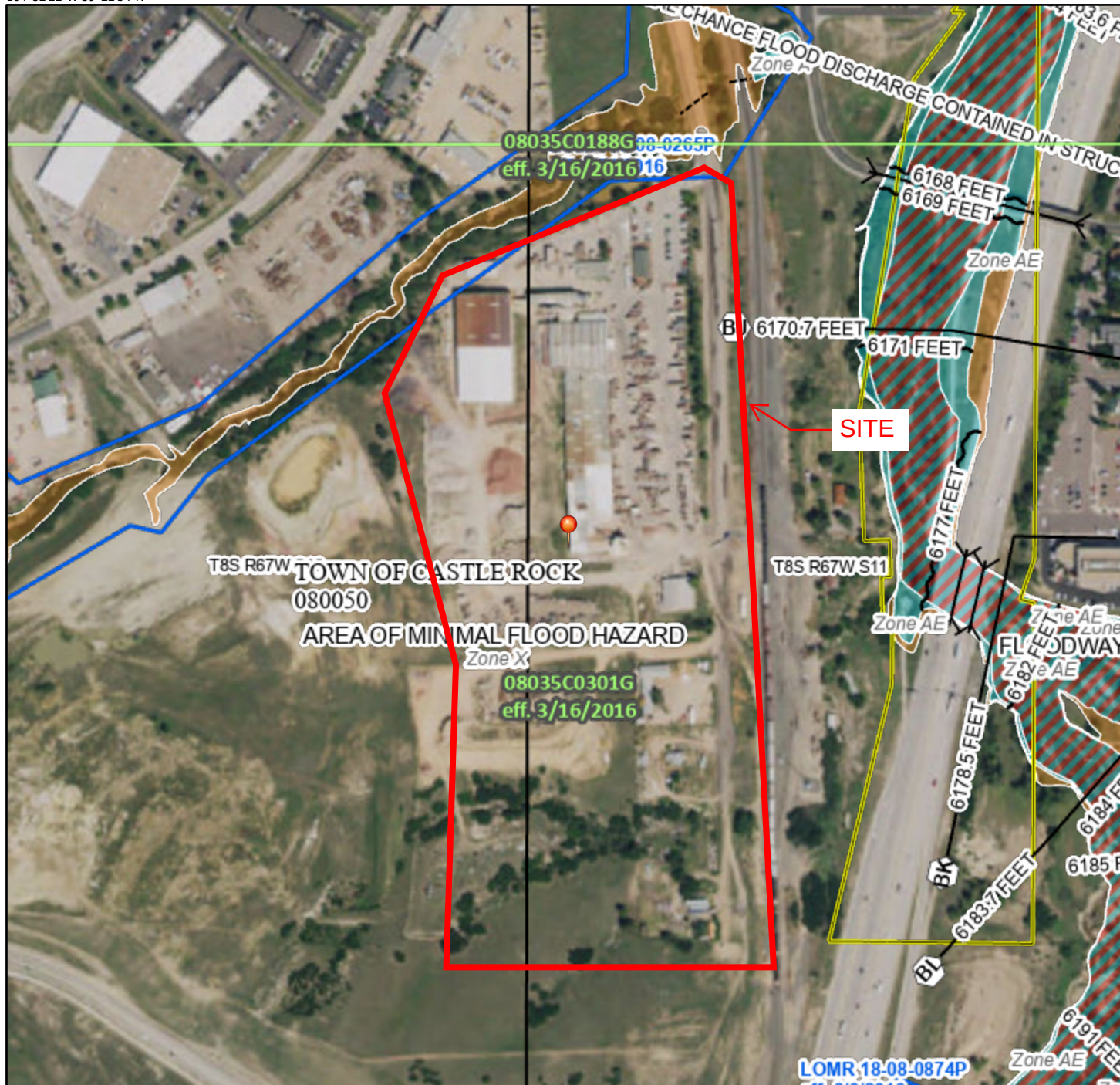
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1 OF 1

National Flood Hazard Layer FIRMette



104°52'22"W 39°22'34"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped

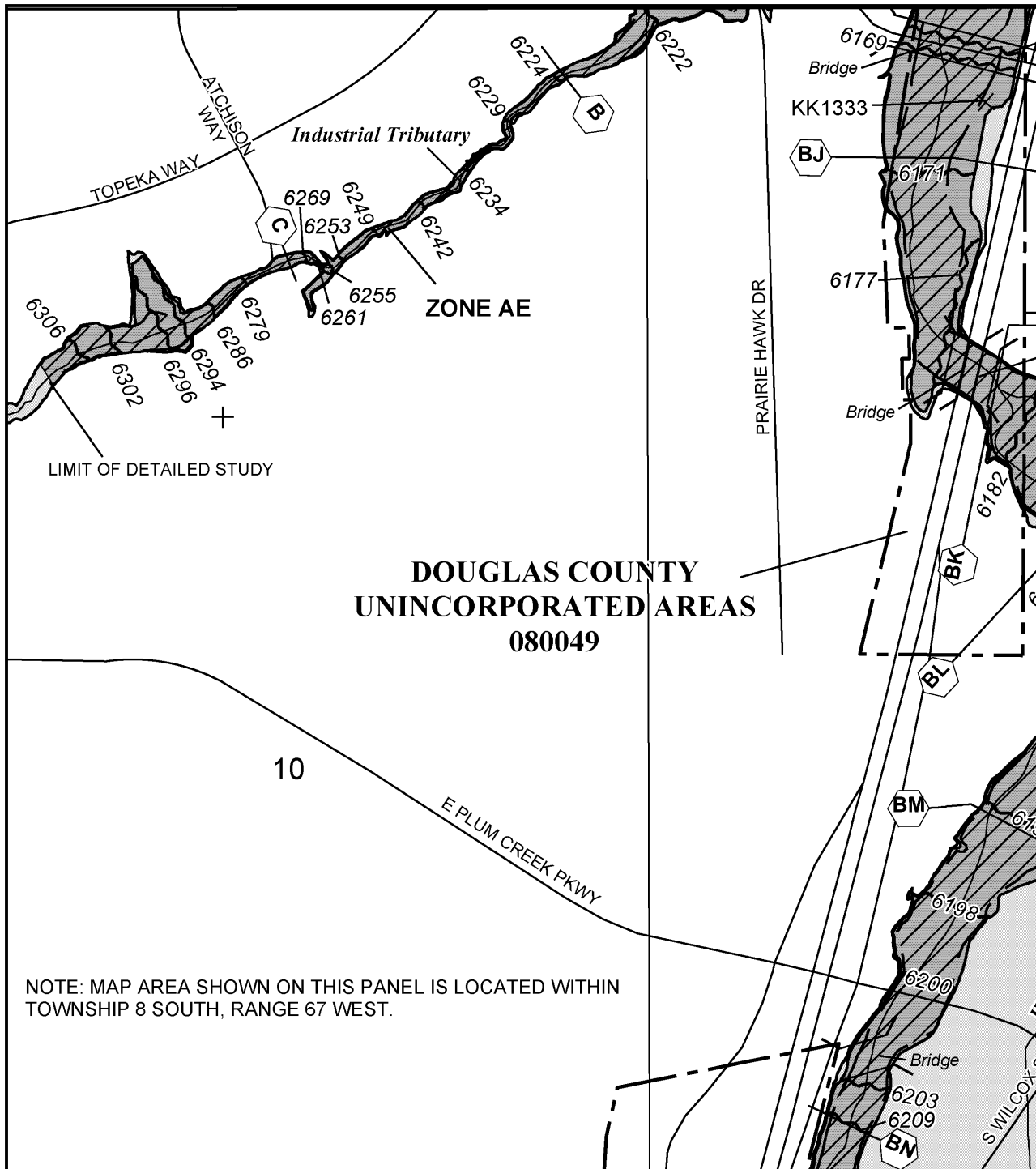


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

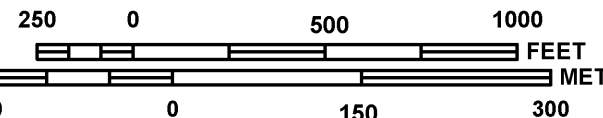
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/23/2023 at 8:55 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0301G

FIRM

FLOOD INSURANCE RATE MAP
DOUGLAS COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 301 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0301	G
DOUGLAS COUNTY	080049	0301	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
08035C0301G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

APPENDIX B - NRCS Soils Report



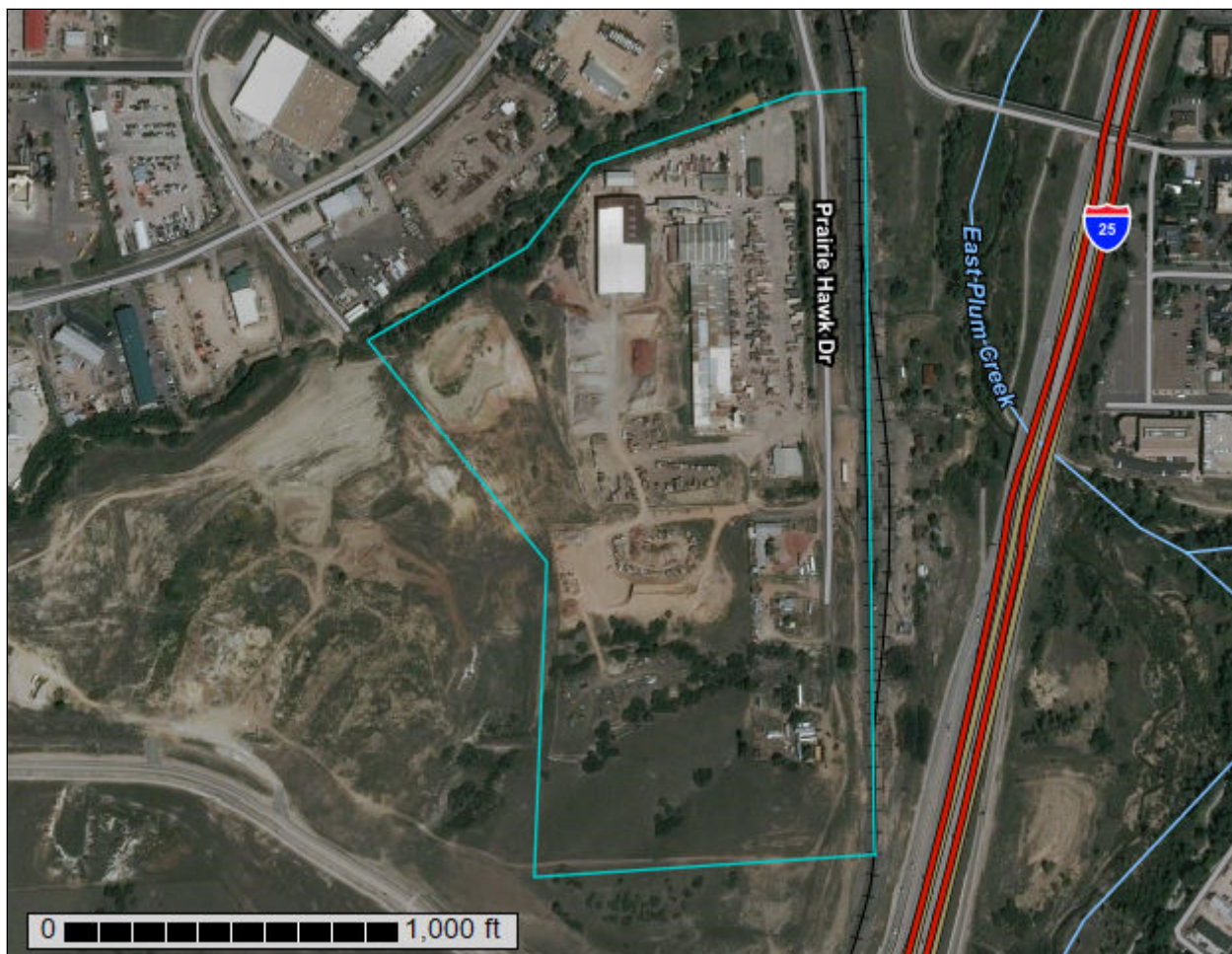
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Castle Rock Area, Colorado**



October 21, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

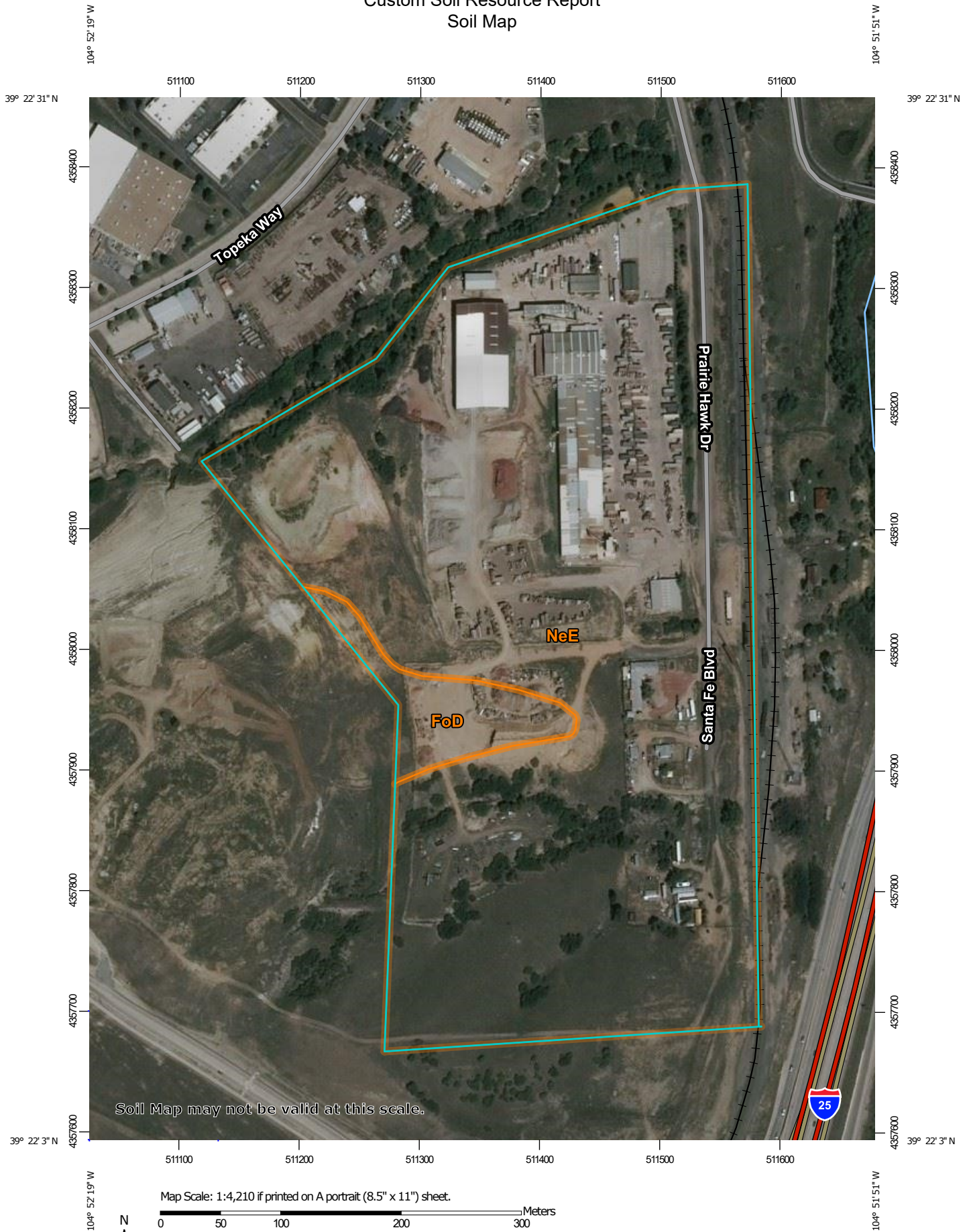
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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
FoD	Fondis clay loam, 3 to 9 percent slopes	2.6	4.6%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	53.1	95.4%
Totals for Area of Interest		55.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Castle Rock Area, Colorado

FoD—Fondis clay loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jqyp
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Fondis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landform: Buttes, ridges, mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
***Hydrologic Soil Group:* C**
Ecological site: R049XY208CO - Clayey Foothill DRAFT (1-2018) MLRA 49
Hydric soil rating: No

Minor Components

Kutch

Percent of map unit: 5 percent
Hydric soil rating: No

Englewood

Percent of map unit: 5 percent

Hydric soil rating: No

Denver

Percent of map unit: 4 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent

Landform: Swales

Hydric soil rating: Yes

NeE—Newlin gravelly sandy loam, 8 to 30 percent slopes

Map Unit Setting

National map unit symbol: jqzg

Elevation: 5,500 to 6,600 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 49 to 51 degrees F

Frost-free period: 120 to 135 days

Farmland classification: Not prime farmland

Map Unit Composition

Newlin and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting

Landform: Terraces, mesas, plateaus

Landform position (three-dimensional): Riser

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile

H1 - 0 to 8 inches: gravelly sandy loam

H2 - 8 to 17 inches: gravelly sandy clay loam

H3 - 17 to 22 inches: gravelly sandy loam

H4 - 22 to 60 inches: very gravelly sand

Properties and qualities

Slope: 8 to 30 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 in/hr)*

Depth to water table: More than 80 inches

Custom Soil Resource Report

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB215CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent
Hydric soil rating: No

Satanta

Percent of map unit: 4 percent
Hydric soil rating: No

Stapleton

Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent
Landform: Swales
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (ACME Hydrologic Soil Group)

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.

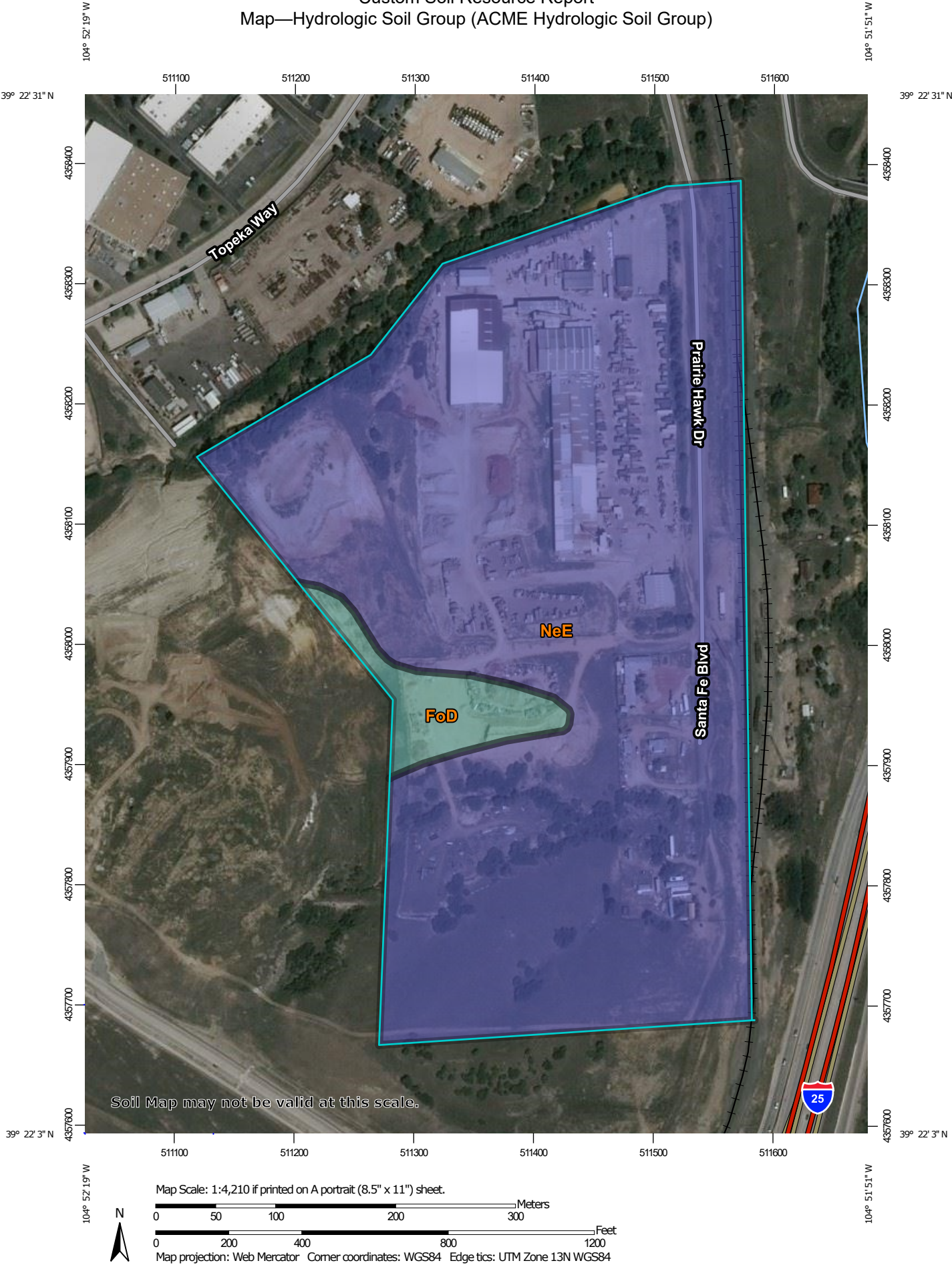
Custom Soil Resource Report

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group (ACME Hydrologic Soil Group)



Custom Soil Resource Report

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.

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.

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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.

Table—Hydrologic Soil Group (ACME Hydrologic Soil Group)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FoD	Fondis clay loam, 3 to 9 percent slopes	C	2.6	4.6%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	B	53.1	95.4%
Totals for Area of Interest			55.7	100.0%

Rating Options—Hydrologic Soil Group (ACME Hydrologic Soil Group)*Aggregation Method: Dominant Condition**Component Percent Cutoff: None Specified**Tie-break Rule: Higher*

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APPENDIX C – Hydrologic Calculations

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.

JOB NO: 200726
PROJECT: ACME Brickyard - Existing
REVISED: 6/28/2023

[illegible]

1-HR Rainfall

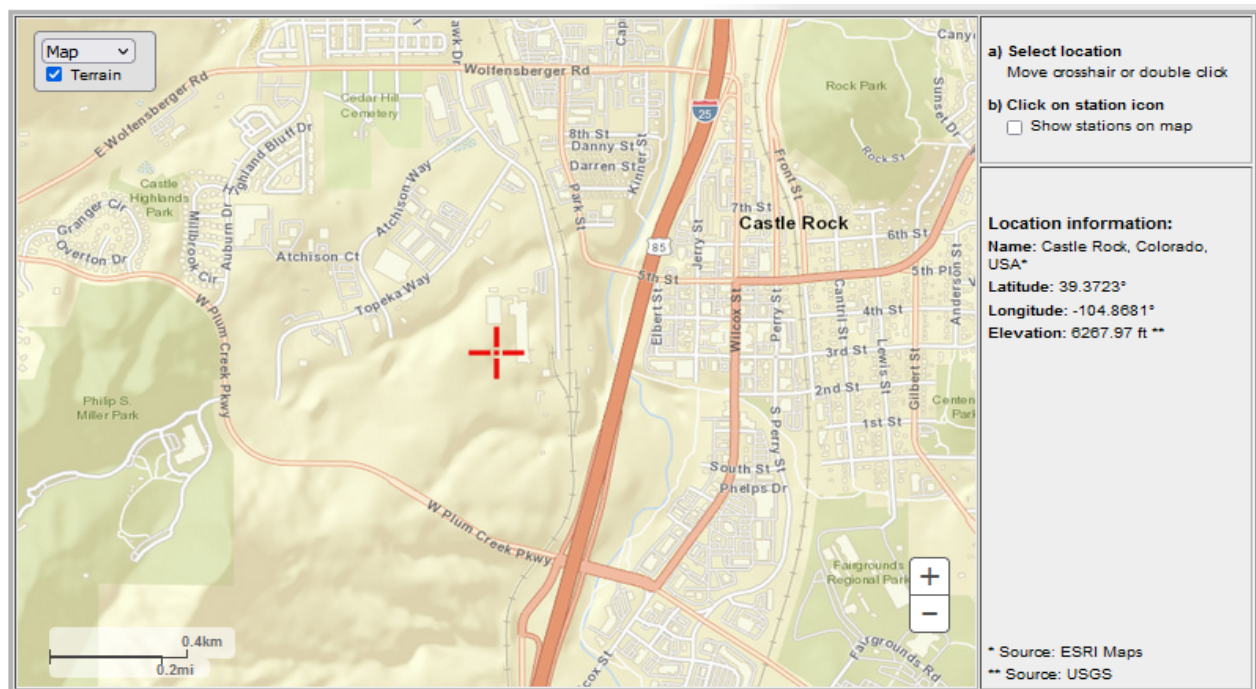
Site Specific (NOAA Atlas 14 online interactive map)

Return Interval (YR)	1-hour Rainfall
WQ	0.60 (WQ per MHFD USDCM Vol 3, p 1-9 [29 of 577])
1	0.684
2	0.850
5	1.13
10	1.38
25	1.74
50	2.02
100	2.32
500	2.64

Rainfall Values for the Town of Castle Rock (Drainage Area)

Return Interval (YR)	1-hour Rainfall
WQ	0.60
1	unknown
2	1.060
5	1.43
10	1.66
25	unknown
50	2.25
100	2.60
500	unknown

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co



POINT PRECIPITATION FREQUENCY (PF) ESTIMATES WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION NOAA Atlas 14, Volume 8, Version 2

PF tabular

PF graphical

Supplementary information

Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	2.75 (2.30-3.31)	3.49 (2.93-4.22)	4.74 (3.97-5.75)	5.80 (4.82-7.08)	7.28 (5.82-9.20)	8.46 (6.58-10.8)	9.66 (7.21-12.7)	10.9 (7.75-14.7)	12.6 (8.56-17.4)	13.9 (9.18-19.5)
10-min	2.01 (1.69-2.42)	2.56 (2.15-3.09)	3.47 (2.90-4.21)	4.25 (3.53-5.17)	5.33 (4.26-6.74)	6.20 (4.81-7.93)	7.07 (5.28-9.28)	7.98 (5.68-10.8)	9.20 (6.26-12.8)	10.2 (6.70-14.3)
15-min	1.63 (1.37-1.97)	2.08 (1.74-2.51)	2.82 (2.36-3.42)	3.45 (2.87-4.20)	4.34 (3.46-5.48)	5.04 (3.92-6.45)	5.75 (4.29-7.54)	6.49 (4.82-8.75)	7.48 (5.09-10.4)	8.25 (5.45-11.6)
30-min	1.07 (0.902-1.30)	1.37 (1.15-1.66)	1.86 (1.56-2.26)	2.28 (1.89-2.77)	2.86 (2.28-3.61)	3.32 (2.58-4.24)	3.78 (2.82-4.98)	4.26 (3.03-5.75)	4.91 (3.34-6.80)	5.41 (3.57-7.61)
60-min	0.684 (0.575-0.825)	0.850 (0.714-1.03)	1.13 (0.948-1.37)	1.38 (1.15-1.66)	1.74 (1.39-2.20)	2.02 (1.58-2.60)	2.32 (1.74-3.09)	2.64 (1.89-3.57)	3.07 (2.09-4.27)	3.42 (2.29-4.81)
24-hr	0.416	0.508	0.668	0.810	1.02	1.19	1.38	1.57	1.85	2.06

CALCULATED BY:	AML
DATE:	6/28/2023
CHECKED BY:	MAW
PROJECT MANAGER:	EM

Standard Form SF-2 (modified)
Storm Drainage System Design
(Rational Method Procedure)
Proposed Development

JOB NO: 200726
PROJECT: ACME Brickyard - Existing
DESIGN STORM: 5 YR

[illegible]

CALCULATED BY:	AML
DATE:	6/28/2023
CHECKED BY:	MAW
PROJECT MANAGER:	EM

Standard Form SF-2 (modified)
Storm Drainage System Design
(Rational Method Procedure)
Proposed Development

JOB NO: 200726
PROJECT: ACME Brickyard - Existing
DESIGN STORM: 100 YR

[illegible]

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.

DATE: 4/6/2022

Time of Concentration

REVISÉD: 6/28/2023

[illegible]

CALCULATED BY:	<u>AML</u>
DATE:	<u>6/28/2023</u>
CHECKED BY:	<u>MAW</u>
PROJECT MANAGER:	<u>EM</u>

Standard Form SF-2 (modified)
Storm Drainage System Design
(Rational Method Procedure)
Proposed Development

JOB NO: 200726
PROJECT: ACME Brickyard - Proposed
DESIGN STORM: 5 YR

[illegible]

CALCULATED BY:	AML
DATE:	6/28/2023
CHECKED BY:	MAW
PROJECT MANAGER:	EM

Standard Form SF-2 (modified)
Storm Drainage System Design
(Rational Method Procedure)
Proposed Development

JOB NO: 200726
PROJECT: ACME Brickyard - Proposed
DESIGN STORM: 100 YR

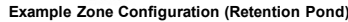
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APPENDIX D – Hydraulic Calculations

APPENDIX E – Water Quality and Detention Calculations

MHFD-Detention, Version 4.06 (July 2022)

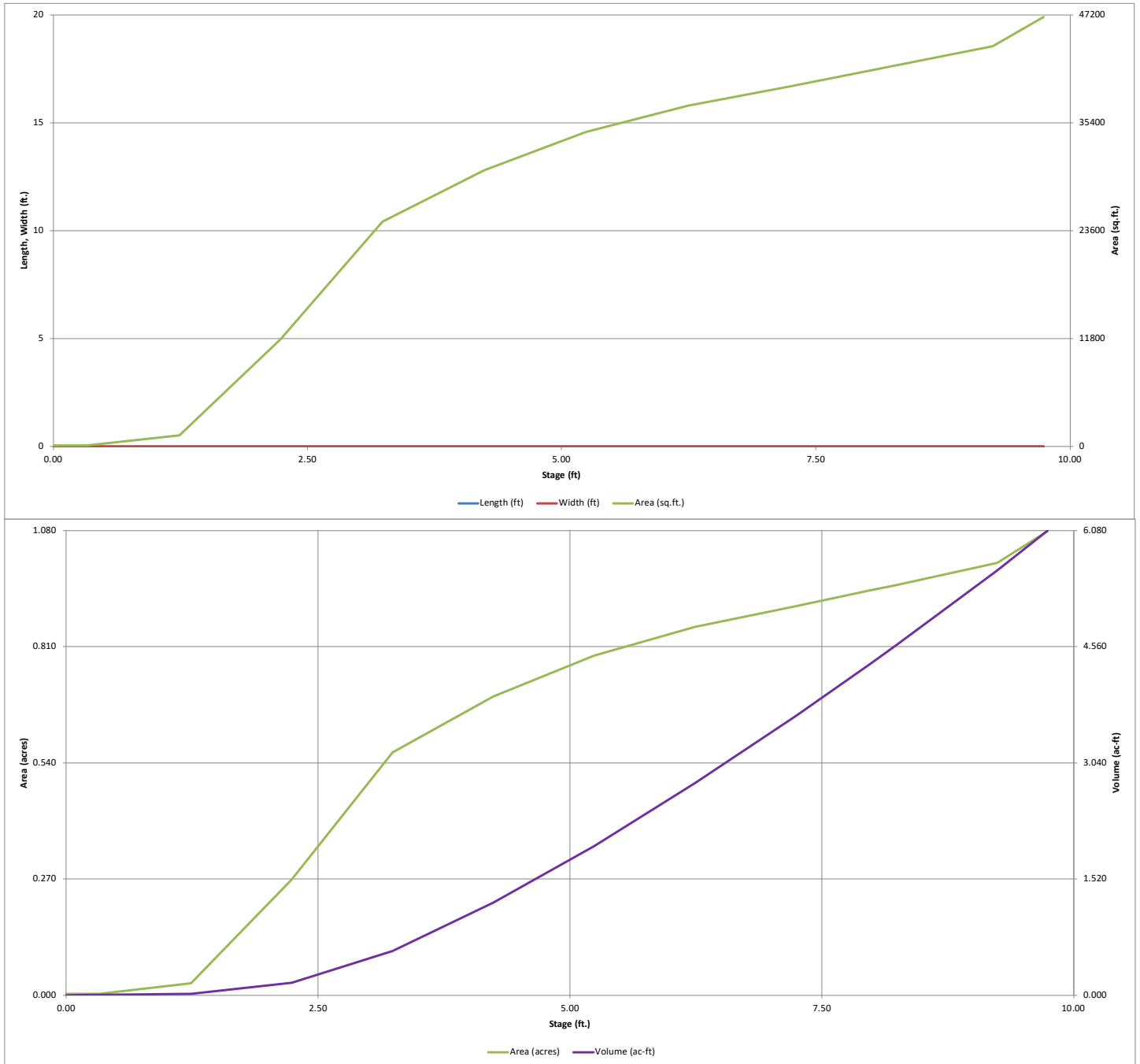
Basin ID: A1



6/26/2023, 3:44 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

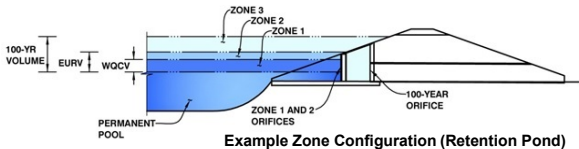


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: ACME Brickyard

Basin ID: A1



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.62	0.802	Orifice Plate
Zone 2 (EURV)	6.13	1.874	Orifice Plate
3 (100+1/2WQCV)	8.43	2.079	Weir&Pipe (Restrict)
Total (all zones)		4.756	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth = N/A ft (distance below the filtration media surface)
Underdrain Orifice Diameter = N/A inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = N/A ft²
Underdrain Orifice Centroid = N/A feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Calculated Parameters for Plate

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 6.13 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = 24.00 inches
Orifice Plate: Orifice Area per Row = 3.13 sq. inches (diameter = 2 inches)

WQ Orifice Area per Row = 2.174E-02 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	2.04	4.09					
Orifice Area (sq. inches)	3.13	3.13	3.13					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Calculated Parameters for Vertical Orifice

Invert of Vertical Orifice = Not Selected ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = Not Selected ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter = Not Selected inches

Vertical Orifice Area = Not Selected ft²
Vertical Orifice Centroid = Not Selected feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H_o = 6.13 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 9.00 feet
Overflow Weir Gate Slope = 4.00 H:V
Horiz. Length of Weir Sides = 6.00 feet
Overflow Gate Type = Close Mesh Gate
Debris Clogging % = 50%

Height of Gate Upper Edge, H_g = 7.63 feet
Overflow Weir Slope Length = 6.18 feet
Gate Open Area / 100-yr Orifice Area = 12.66
Overflow Gate Open Area w/o Debris = 44.03 ft²
Overflow Gate Open Area w/ Debris = 22.01 ft²

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe = 0.33 ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = 30.00 inches
Restrictor Plate Height Above Pipe Invert = 20.00 inches

Outlet Orifice Area = 3.48 ft²
Outlet Orifice Centroid = 0.94 feet
Half-Central Angle of Restrictor Plate on Pipe = 1.91 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage = 8.00 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 87.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Spillway Design Flow Depth = 0.58 feet
Stage at Top of Freeboard = 9.58 feet
Basin Area at Top of Freeboard = 1.05 acres
Basin Volume at Top of Freeboard = 5.91 acre-ft

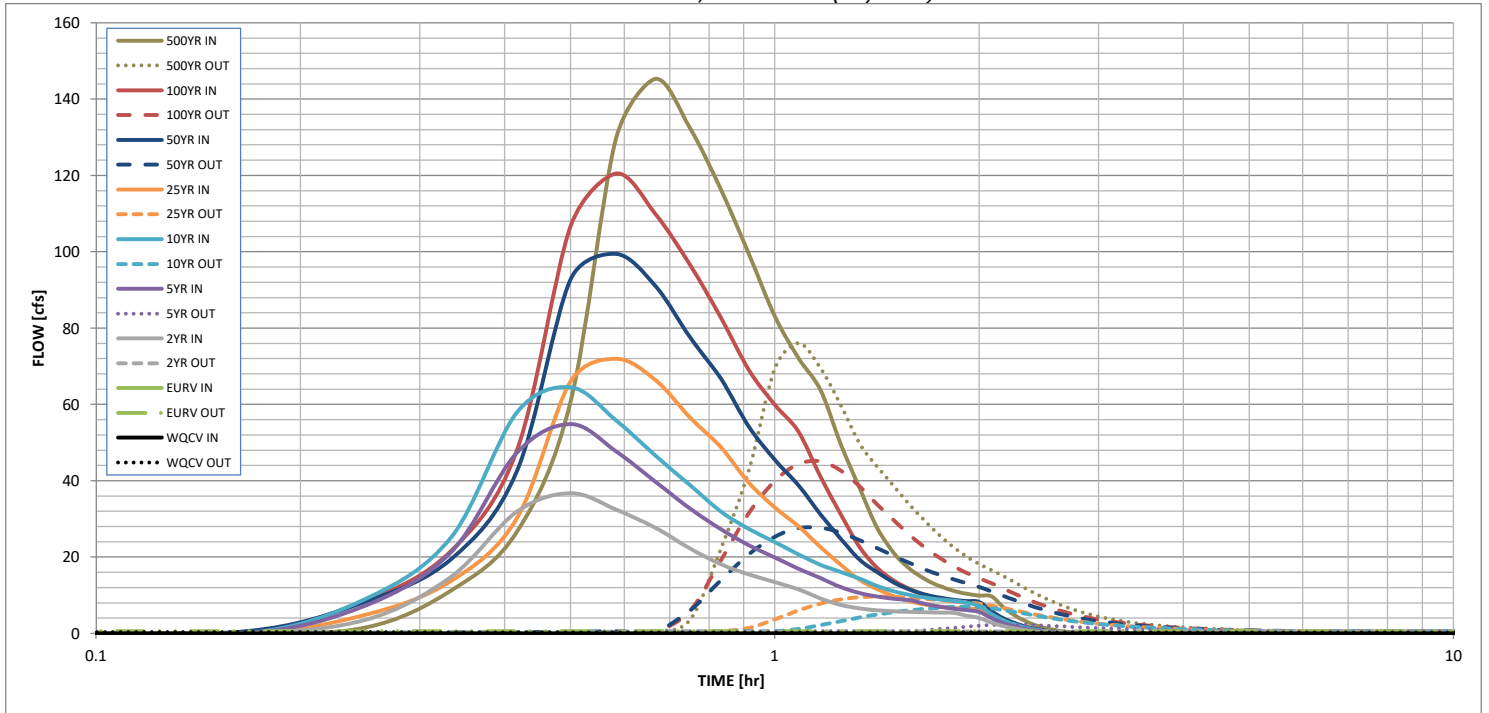
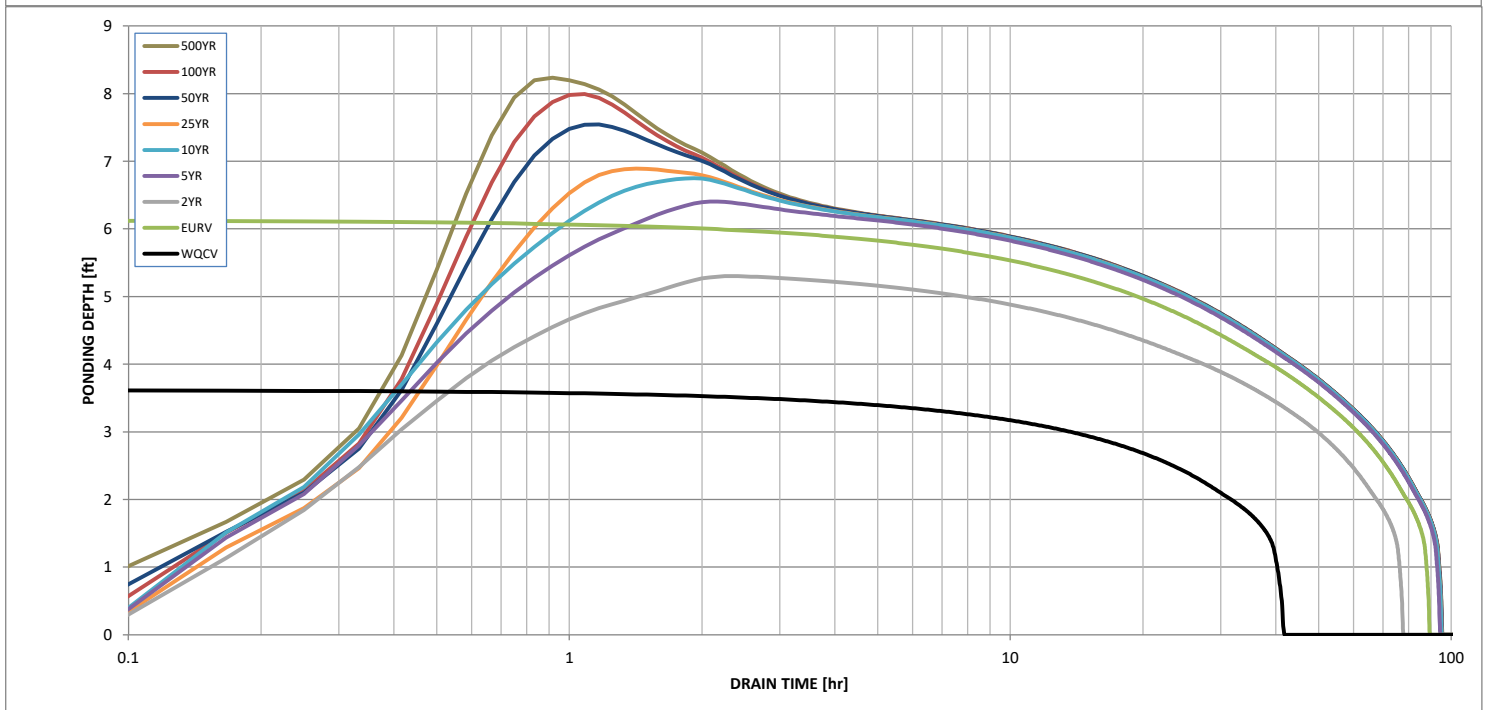
Routed Hydrograph Results

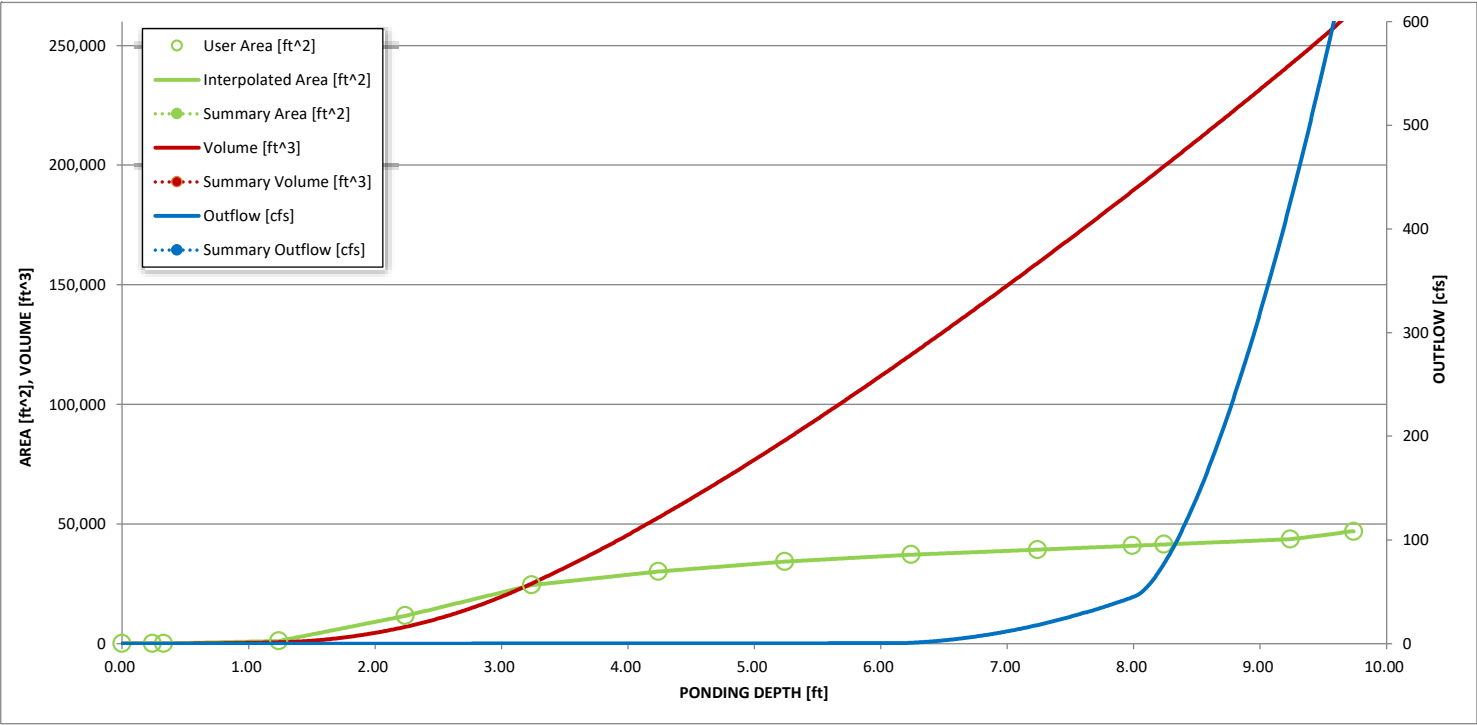
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.06	1.43	1.66	1.74	2.26	2.60	3.07
One-Hour Rainfall Depth (in) =	0.802	2.676	2.085	3.087	3.730	4.072	5.619	6.716	8.155
CUHP Runoff Volume (acre-ft) =	N/A	N/A	2.085	3.087	3.730	4.072	5.619	6.716	8.155
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.5	8.9	13.6	21.2	36.3	48.2	61.9
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.02	0.25	0.39	0.61	1.04	1.38	1.78
Peak Inflow Q (cfs) =	N/A	N/A	36.8	54.9	64.5	72.0	99.5	120.5	145.3
Peak Outflow Q (cfs) =	0.3	0.6	0.5	2.3	7.1	9.7	27.7	45.1	76.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.5	0.5	0.8	0.9	1.2
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	0.0	0.1	0.2	0.6	1.0	1.0
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	81	71	85	85	84	81	79	77
Time to Drain 99% of Inflow Volume (hours) =	41	86	75	91	91	91	89	89	87
Maximum Ponding Depth (ft) =	3.62	6.13	5.30	6.41	6.75	6.89	7.54	7.99	8.23
Area at Maximum Ponding Depth (acres) =	0.61	0.85	0.79	0.86	0.88	0.89	0.92	0.94	0.95
Maximum Volume Stored (acre-ft) =	0.803	2.677	1.997	2.909	3.214	3.337	3.924	4.342	4.570

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)





APPENDIX F – Drainage Maps

THE BRICKYARD

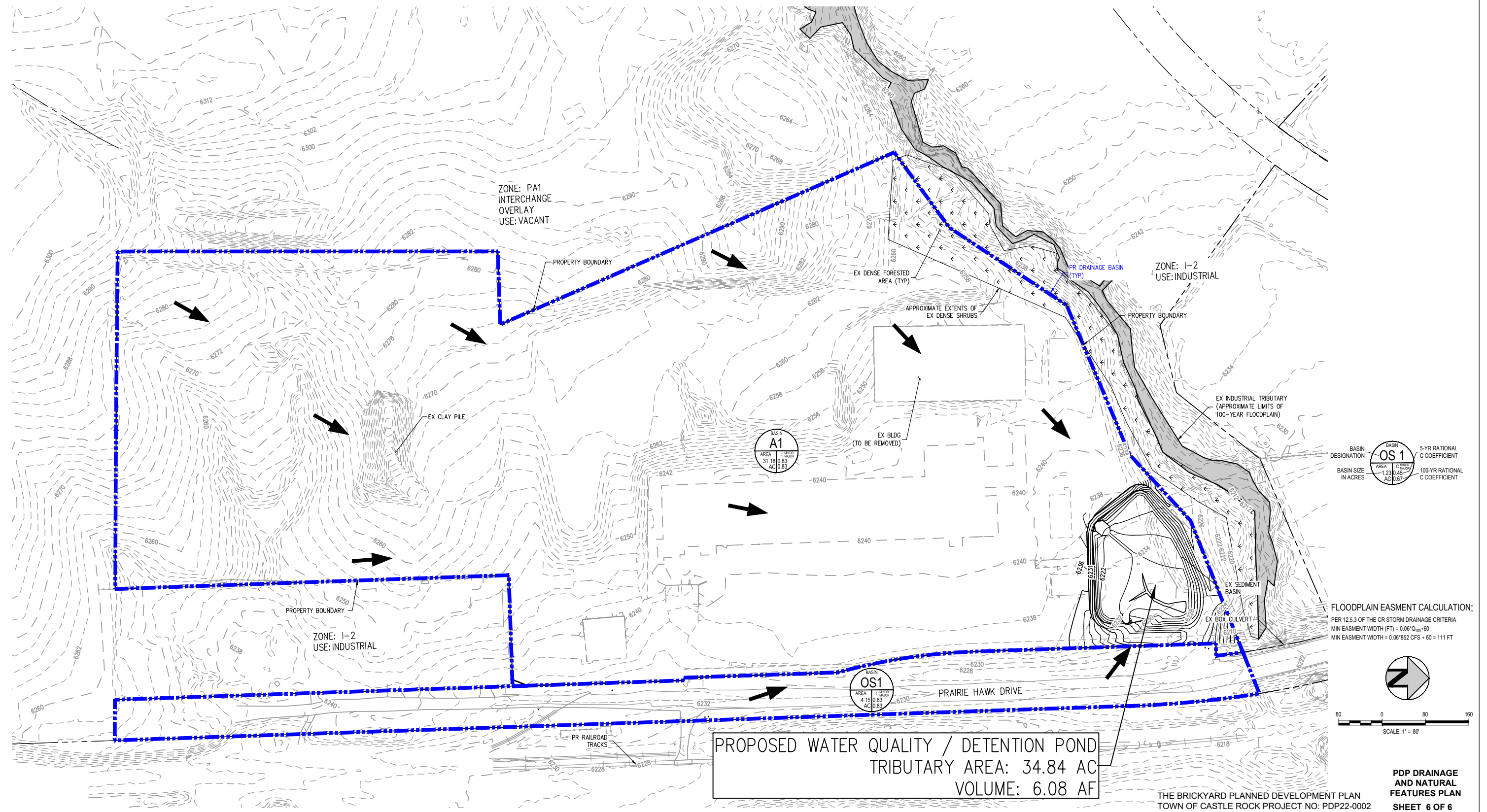
PLANNED DEVELOPMENT PLAN AND ZONING REGULATIONS

CASTLE ROCK, COLORADO

SITUATED IN THE NORTHEAST 1/4 OF SECTION 10 AND THE NORTHWEST 1/4 OF SECTION 11 TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE 6TH P.M. TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.

LEGEND:

EXISTING CONTOUR LINES
PROPOSED BASIN BOUNDARY
FLOW ARROW
EXISTING STORM



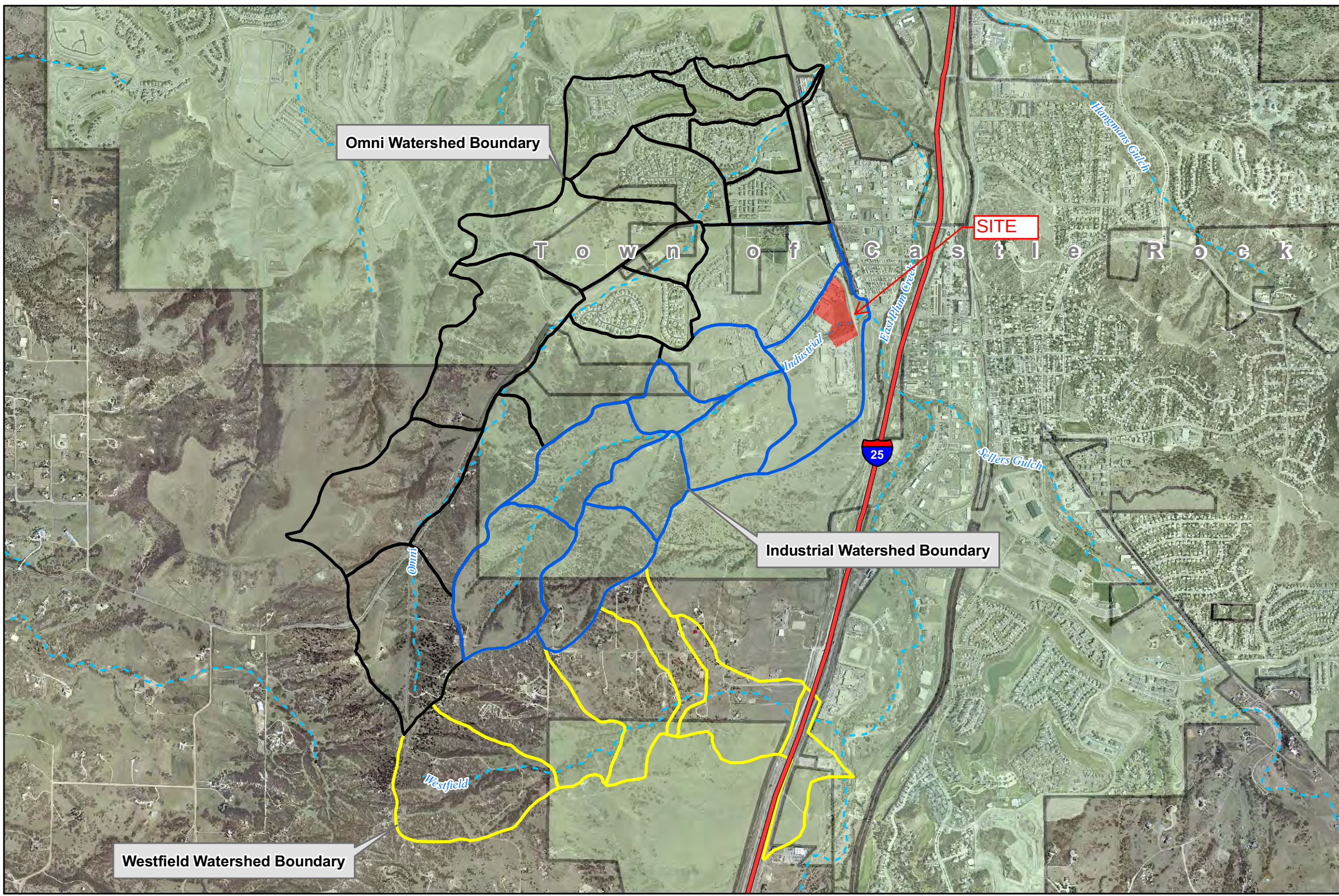
APPENDIX G – Studies

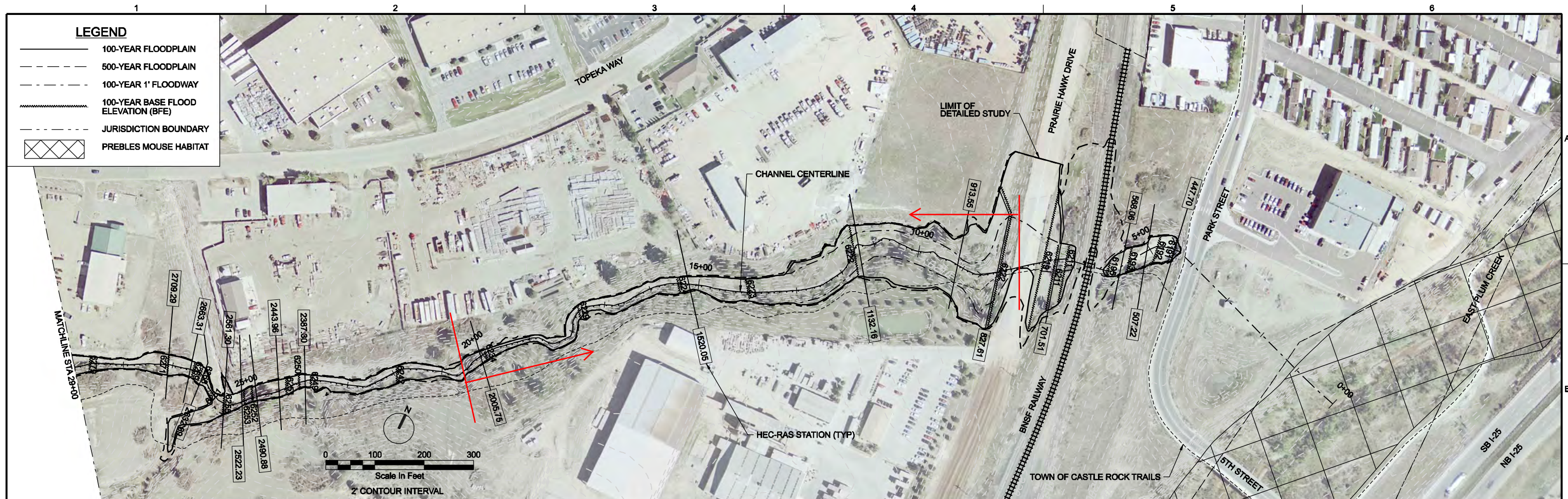
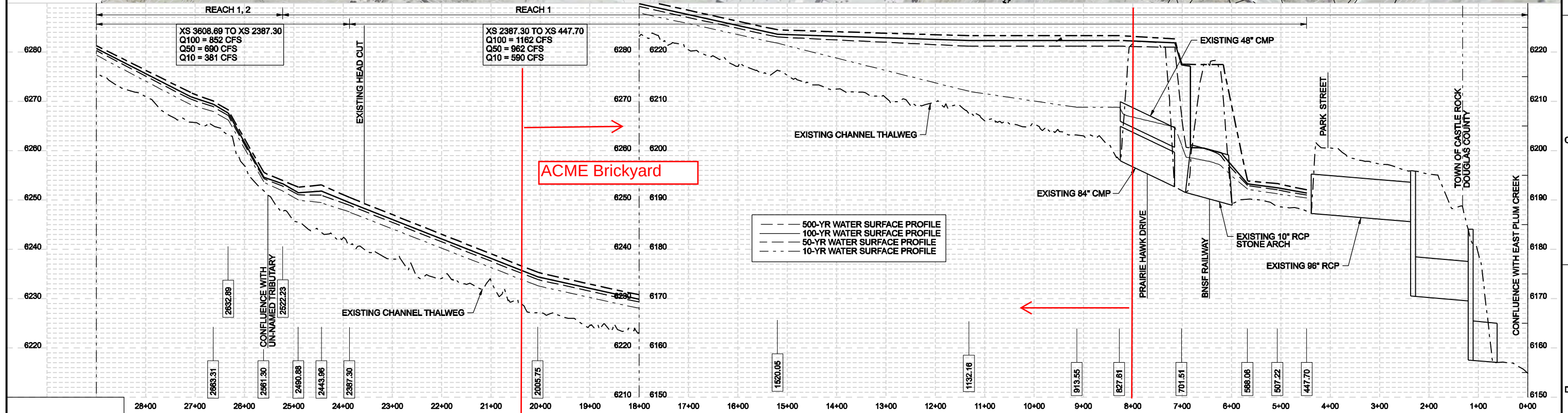
OMNI, INDUSTRIAL AND WESTFIELD WATERSHEDS FLOOD HAZARD AREA DELINEATION APRIL 2013

PREPARED FOR:



PREPARED BY:
 CH2MHILL





PRELIMINARY		NOTE: TOPOGRAPHY FROM TOWN OF CASTLE ROCK (2006), NAVD 88 VERTICAL DATUM, NAD 83 STATE PLANE COLORADO CONTROL HORIZONTAL DATUM AERIAL MAPPING FROM TOWN OF CASTLE ROCK (2006)		VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY		CH2MHILL				INDUSTRIAL PLAN AND PROFILE STA 29+00 TO STA 0+00		SHEET 11
NOT FOR CONSTRUCTION		DSGN A COOK		APVR N								DWG PP-4
		DR C SCHNEE		BY APVD								DATE DECEMBER 2011
		CHK A TURNER										PROJ 381198
		APVD M GLIDDEN										PLOT TIME: 11:33:27 AM
		NO	DATE	DESCRIPTION								FILENAME: Industrial_PP04.dgn PLOT DATE: 2/6/2012
		NO.	DATE	REVISION								



**PHASE I DRAINAGE REPORT
FOR
MILLERS LANDING
Castle Rock, Colorado
PROJECT NO. PDPI6-0003**

PREPARED FOR:

Norris Design
1101 Bannock Street
Denver, CO 80204
Phone: 303-892-1166
Contact: Mitch Black

Developer:

Citadel Development, LLC (developer and future owner)
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PREPARED BY:

CORE Consultants, Inc.
1950 W. Littleton Boulevard, Suite 109
Littleton, CO 80120
Phone: 303-703-4444
Contact: Rob Hansen
CORE Project Number: 16-033

August 15, 2016
REV September 8, 2016



APPROVAL BLOCKS

I. ENGINEER'S STATEMENT:

I affirm that this report and plan for the Phase I Drainage design of Millers Landing was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.



Robert D. Hansen, PE, CFM
Colorado Professional Engineer
License #50417

II. TOWN OF CASTLE ROCK APPROVALS:

UTILITIES DEPARTMENT

DATE

DEVELOPMENT SERVICES

DATE



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I. GENERAL LOCATION AND DESCRIPTION

I.1. Site Location

The Millers Landing project is located north of Plum Creek Parkway approximately 1,300ft west of Interstate 25 (I-25) in Castle Rock, Colorado. The site is primarily within the Northeast Quarter (NE $\frac{1}{4}$) of Section 10 with a small portion in the Southeast Quarter (SE $\frac{1}{4}$) of Section 10 in Township 8 South, Range 67 West of the 6th P.M. in Douglas County, Colorado. The project is bounded to the north by an existing drainageway known as the Industrial Channel. The Phillip S. Miller Park is located southwest of the project site. Existing industrial development is located to the north and northeast. Undeveloped land is located to the south of Plum Creek Parkway known as the Castle Meadow Planned Development. An 18ac undeveloped parcel is located southeast of the project site and is also part of the Castle Meadows Planned Development, known as the Castle Meadows Northeast Corner Parcel. Refer to the Vicinity Map located in Appendix A.

I.2. Description of Property and Land Use

The Millers Landing project includes approximately 48.2 acres of undeveloped land. Portions of the site were previously disturbed but have generally been revegetated. The site generally drains to the north and northeast toward the Industrial Channel. A local storm sewer system collects runoff from Plum Creek Parkway and outlets to the project site via a 36" RCP. A portion of the Industrial Channel is identified as a Zone AE flood zone on FEMA FIRM Panels 08035C0282G and 08035C0301G dated March 16, 2016, refer to Appendix B.

The soils vary throughout the site and include Newlin gravelly sandy loam (NeE), Fondis clay loam (FoD) and Pits, clay (CP). The Newlin gravelly sandy loam is a part of the Type B hydrologic soil group, Fondis clay loam is part of the Type C hydrologic soil group and the Pits, clay soil type is assumed to be part of the Type D hydrologic soil group. A soils map has been provided in Appendix B.

The property is currently zone as I-2, General Industrial. The property is to be rezoned to IO, Interchange Overlay District, to support a Mixed Use Development. The specific future uses and site configuration have not been determined at this time. It is likely the development will include: retail stores, food and beverage establishments, entertainment establishments, office space and a hotel.

The project will complete the east half of Plum Creek Parkway along the project frontage and complete the roadway improvements north to Auburn Drive. Additionally it is assumed the project will extend Atchison Way from Topeka Way to Plum Creek Parkway.



2. DRAINAGE BASIN AND SUB-BASINS

2.1. Major Drainage Basins

The Millers Landing site is located in a portion of the Industrial Watershed which outfalls to East Plum Creek. The Industrial Watershed was studied as part of the Omni, Industrial and Westfield Watershed Master Plan report by CH2MHill in January 2011, referred to as the Master Plan hereafter. The Master Plan provided a comprehensive drainage plan and flood plain analysis for the Omni, Industrial and Westfield Watersheds, including providing recommendations for channel improvements. The Master Plan is referenced throughout this report, reference material can be found in Appendix D. The provided reference information has been reviewed and accepted for use in this report. In conjunction with the Master Plan a Flood Hazard Area Delineation study was also completed in April 2013 that mapped the AE floodzone for the Industrial Channel.

2.2. Minor Drainage Basins

The project is impacted by offsite storm flows from a portion of Plum Creek Parkway. The Phase III Drainage Report for Coachline Road and Plum Creek Boulevard at I-15, by Felsburg Holt & Ullevig revised March 18, 2009 was reviewed and used to quantify offsite flows impacting the project site. This study will be referred to as the Plum Creek Study hereafter. Additionally at the time of the Plum Creek Study the roadway west of I-25 was called Coachline Road; today it's known as Plum Creek Parkway. The Plum Creek Study is referenced throughout this report, reference material can be found in Appendix D. The provided reference information has been reviewed and accepted for use in this report. The Plum Creek Study master planned the improvements for the full build out of Plum Creek Parkway and identified sub-basin groups using letter designations; the Millers Landing project is adjacent to the A, B and C sub-basin groups. The A basins include portions of Plum Creek Parkway north of the Industrial Channel to Auburn Drive. The B basins include Plum Creek Parkway from the Industrial Channel south to the 36" RCP that discharges to the Millers Landing site. Additionally a 10.4ac offsite basin, OS2, contributes runoff to the B basins storm sewer system and ultimately the project site. The C basins include Plum Creek Parkway from the 36" RCP south to I-25. The referenced sub-basins are shown on the Drainage Plan in Appendix E.

The project site will follow the historic drainage patterns with some minor rerouting due to the proposed roadways and development. Runoff will generally drain north towards the Industrial Channel. An onsite storm sewer system will collect and convey runoff to a proposed detention pond located at the northeast corner of the project site.



3. EXISTING STORMWATER CONVEYANCE OR STORAGE FACILITIES

3.1. Existing Stormwater Conveyance Facilities

An existing 18ftx10ft box culvert conveys flow in the Industrial Channel under Plum Creek Parkway at the west edge of the project site. The Master Plan indicates the existing 100-year flow just upstream of Plum Creek Parkway is 400cfs, refer to referenced design point J7. The Industrial Channel continues northeast along the northern edge of the project site. At the downstream end of the project site the Master Plan indicates an existing 100-year flow rate of 610cfs in the Industrial Channel, refer to referenced design point J6. Significant erosion is present along the Industrial Channel; stabilization will likely be required.

The Master Plan identifies a number of channel improvements to the Industrial Channel. The Millers Landing project site is located from approximately station 20+00 to 46+00 of the Industrial Channel as identified on the Master Plan and Profile drawings, refer to Appendix D. The Master Plan indicates approximately 14 check structures, a 12ft sloping grouted boulder run down, and 750LF of channelization are required along the project frontage. Refer to reference material in Appendix D. The Millers Landing development will likely be required to complete channel improvements along the Industrial Channel. Future drainage studies will determine whether to follow the Master Plan recommendations or some other alternative.

A small storm drain system collects flow from the A basins and discharges on the south (upstream) side of Plum Creek Parkway and the Industrial Channel to a water quality basin. The Millers Landing project will be responsible for completing the east half of Plum Creek Parkway to Auburn Drive. Existing storm sewer stubs will need to be extended to future inlets to collect runoff at referenced design points A2, A4 and A6. The existing storm sewer system that collects runoff from the B basins will need to be extended as well to collect flows at design points B2 and B4 to support the buildout of Plum Creek Parkway. The outlet for the B basin storm sewer discharges to the project site; this runoff will need be routed through the project site, most likely in a storm sewer system, to Pond A, the detention pond at the northeast corner of the project. Within the C sub-basins existing storm drain stubs have also been provided to serve the future roadway expansion. Storm drain inlets will be required to collect runoff from basins C2, C4 and C6. This C sub-basin storm sewer system discharges to a water quality pond, Pond 2, adjacent to I-25.

An existing earthen channel conveys runoff from an existing culvert crossing Topeka Way at Atchison Way to the Industrial Channel; the channel will need to be modified with the extension of Atchison Way from Topeka Way to Plum Creek Parkway. Additionally there appears to be significant erosion in the existing channel.

3.2. Existing Stormwater Storage Facilities

Within the project site there are no existing stormwater storage or water quality treatment facilities. There are two existing water quality basins used to treat runoff from Plum Creek Parkway. Pond 1 water quality basin is located on the south side of Plum Creek Parkway and the Industrial Channel crossing and treats flow from the A basins. This water quality basin will need to be modified to account for additional impervious area for the expansion of the Plum Creek Parkway. Pond 2 is located at the southwest corner of the I-25 and Plum Creek Parkway. According to the Plum Creek study Pond 2 provides water quality and detains the minor storm for runoff from the C basins. Refer to the Plum Creek study reference material for the location of Pond 2.



4. PROPOSED STORMWATER CONVEYANCE OR STORAGE FACILITIES

4.1. Proposed Stormwater Conveyance Facilities

A large culvert crossing will be required to convey flow in the Industrial Channel under the Atchison Way roadway extension. The Master Plan identifies the future 100-year flow at this crossing is 850cfs, refer to referenced design point J6. Additionally a multi-use trail is planned to follow the Industrial Channel, therefore the culvert should be designed for pedestrian access to provide grade separation between Atchison Way and the multi-use trail.

As previously discussed the existing storm sewer systems in Plum Creek Parkway will need to be modified in conjunction with the roadway expansion. The B basin storm drain system will be extended through the project site to a detention basin, Pond A.

Onsite runoff will be routed through the site via surface flow and onsite storm sewer systems. Runoff will generally be conveyed northeast to the proposed detention pond. The size and location of this storm drain system will be designed during the detailed design phase of the project.

4.2. Proposed Stormwater Storage Facilities

The proposed detention pond, Pond A, at the northeast corner of the project will be designed as a full-spectrum detention pond (WQCV, EURV, 100-year), and will release at the required flow rates. The area treated includes the B basins, offsite basin OS2 and the project site, basin I. The detention pond volume has been calculated using the Urban Drainage spreadsheet for detention ponds. The location and configuration of Pond A is conceptual and subject to change. Refer to Appendix C for calculations. Pond A will release runoff at historic rates into the Industrial Channel.

5. WATER QUALITY ENCHANCEMENT BEST MANAGEMENT PRACTICES

5.1. Non-Structural Best Management Practices

The project will utilize non-structural best management practices as defined in the future grading, erosion, & sediment control plans for the site during construction. They will include but are not limited to silt fence, inlet protection, diversion ditches, check dams, and sediment basins. Post construction best management practices may include swales and permanent seeding.

5.2. Structural Best Management Practices

Water quality measures will be included in the design of the proposed detention pond for the site. The pond will be designed as an extended detention basin which will incorporate structures which will release flows for the excess urban runoff volume (EURV), and the 100-year storm event. Stream stabilization improvements within Industrial Channel will also be incorporated as previously discussed.



6. FLOODPLAIN MODIFICATIONS

6.1. Major Drainageway – Undesignated Floodplain

The Industrial Channel is the only major drainageway impacted by the project and for the purpose of this report will be addressed in Section 6.2.

6.2. Major Drainageway – Designated Floodplain

A portion of the Industrial Channel is located in a 100-yr floodplain, the remaining portion of the channel is mapped as a 500-yr floodplain. The Industrial Channel was mostly recently studied by the Omni, Industrial and Westfield Watersheds Flood Hazard Area Delineation report by CH2MHill in April 2013 in conjunction with the referenced Master Plan.

As previously discussed in section 3.1 the Master Plan indicates multiple improvements to the channel for stabilization, additionally a roadway crossing is proposed at Atchison Way. Due to the proposed modifications within the floodzone a Floodplain Development Permit and subsequently a Conditional Letter of Map Revision (CLOMR) will be required prior to construction of the modifications to the Industrial Channel. After the Industrial Channel improvements are constructed a Letter of Map Revision (LOMR) will need to be processed through FEMA. The Floodplain Development Permit will need to be permitted through the Town of Castle Rock.

7. POTENTIAL PERMITTING REQUIREMENTS

According to the Master Plan, the United States Fish and Wildlife Service (USFWS) have not identified any areas of the Industrial tributary as “riverine wetlands” or as “emergent wetlands. Therefore a Section 404 permit is not anticipated, however small pockets of ephemeral wetlands were found along the stream and a detailed inventory should be completed prior to the construction of any improvements.

As previously mentioned in Section 6.2 a Floodplain Development Permit, CLOMR and LOMR will be required for the project. A Colorado Discharge System Permit (CDPS) will also be required for the project.

Aracdis completed a Wildlife and Habitat Survey in June 2016 and determined that threatened, endangered, proposed and candidate species were not likely to occur on the project site; this includes the Preble’s Meadows Jumping Mouse. Excerpts from the report can be found in Appendix D.



8. REFERENCES

Drainage Criteria Manual, Volumes 1, 2, & 3, Urban Drainage and Flood Control District, Volumes 1 & 2 – Originally Published September 1969, Updated January 2016; Volume 3 Originally Published September 1992, Updated November 2010.

Omni, Industrial and Westfield Watersheds Flood Hazard Area Delineation, CH2MHill, April 2013

Omni, Industrial and Westfield Watershed Master Plan, CH2MHill, January 2011

Phase III Drainage Report for Coachline Road and Plum Creek Boulevard at I-15, Felsburg Holt & Ullevig, revised March 18, 2009

Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, September 2007, Revised October 2012.

Wildlife and Habitat Survey Citadel Station, Castle Rock, CO 80109, Arcadis, Inc, June 2016.



APPENDICIES

APPENDIX A

Drainage Report Checklist

APPENDIX B

Figures

APPENDIX C

Calculations

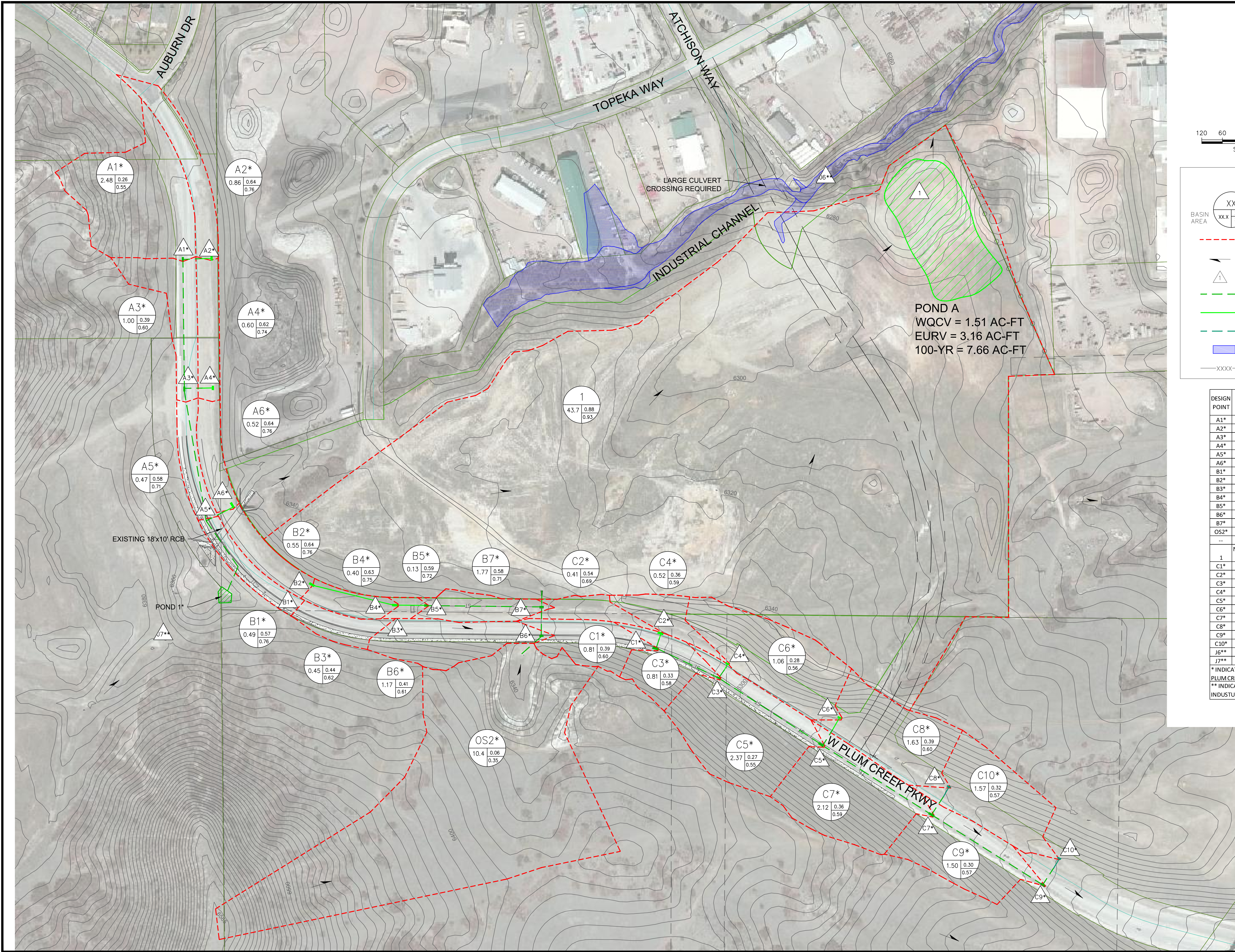
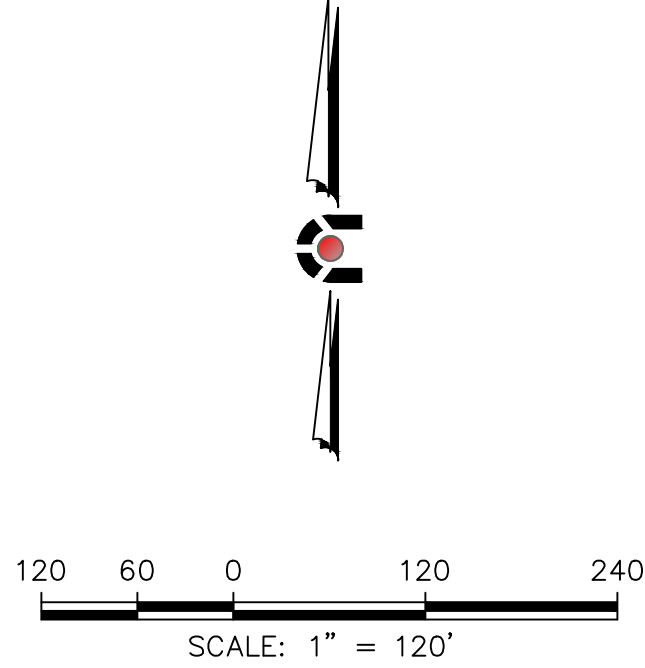
APPENDIX D

Reference Material

APPENDIX E

Drainage Plan

December 21, 2015 X:\16-033 MILLERS LANDING\GADD\CIVIL STORMWATER DRAINAGE PLANNING\RHANSEN



LEGEND

BASIN DESIGNATION
5 YEAR COEFFICIENTS
100 YEAR COEFFICIENTS

BASIN BOUNDARY

DIRECTIONAL FLOW ARROW

DESIGN POINT

EXISTING STORM SEWER

PROPOSED STORM SEWER

FUTURE STORM SEWER

100YR FLOOD ZONE

5FT CONTOUR

DESIGN POINT	BASIN	5-YR Q (CFS)	100-YR Q (CFS)
A1*	A1*	2.9	11.5
A2*	A2*	2.3	4.9
A3*	A3*	1.4	4.0
A4*	A4*	1.5	3.3
A5*	A5*	1.1	2.5
A6*	A6*	1.4	3.1
B1*	B1*	1.1	2.5
B2*	B2*	1.5	3.2
B3*	B3*	0.8	2.1
B4*	B4*	1.1	2.5
B5*	B5*	0.4	0.8
B6*	B6*	1.7	4.6
B7*	B7*	1.5	3.5
OS2*	OS2*	2.1	22.6
--	1	126.5	242.8
1	N/A POND 1 INFLOW	136.7	284.6
C1*	C1*	1.3	3.6
C2*	C2*	0.9	2.1
C3*	C3*	1.1	3.8
C4*	C4*	0.7	2.2
C5*	C5*	2.5	9.8
C6*	C6*	1.9	7.0
C7*	C7*	3.1	9.5
C8*	C8*	2.8	7.9
C9*	C9*	1.8	6.5
C10*	C10*	2.1	7.0
J6**	--	310	850
J7**	--	130	490

* INDICATES FLOW REFERENCED FROM PLUM CREEK STUDY
** INDICATES FLOW REFERENCED FROM INDUSTRIAL TRIBUTARY MASTER PLAN

CIVIL ENGINEERING
DEVELOPMENT CONSULTING
LAND SURVEYING
303.703.4444
1950 W. Littleton Blvd., Ste. 109
Littleton, CO 80120

CORE
CONSULTANTS



CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.
CORE ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS, HORIZONTAL AND VERTICAL ALIGNMENT, OR DEPTH FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE USER'S RESPONSIBILITY TO VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

REVISIONS		DATE	BY
#	DESCRIPTION		

MILLERS LANDING
DRAINAGE PLAN
CASTLE ROCK, COLORADO

INITIAL PLAN
RELEASE: 8/15/16
DESIGNED BY: RDH
DRAWN BY: RDH
CHECKED BY: BC

JOB NO.
16-033
SHEET
1 OF 1

APPENDIX H – MS4 and Permanent Water Quality Compliance Summary



Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name ACME Brickyard

Project Owner Confluence Companies

Project Location Castle Rock

ToCR Project Number PDP22-0002

Total Site Area 31.18 acres

Total Size of Common Plan of Development 4.15 acres

Check all that apply:

☒ **Project within Plum Creek Basin**

☐ **Project within Cherry Creek Basin**

Estimated construction completion date Summer 2025

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

- ☒ WQCV standard
- ☐ Pollutant removal standard
- ☐ Runoff reduction standard
- ☒ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
- ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
- ☐ Constrained redevelopment sites standard
 - Imperviousness of existing site _____/_____ (Imp. Ac/Site Ac) = ____%
 - Variance required TCV No. _____
- ☐ Existing control measure with WQCV per previous criteria standards
 - Reference Construction Permit No. _____
- ☐ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3
- ☐ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☒ No

i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

- ☐ Pavement management site
Excluded impervious area: _____ acres
- ☐ Excluded roadway redevelopment
Excluded impervious area: _____ acres
- ☐ Excluded existing roadway areas
Excluded impervious area: _____ acres
- ☐ Above ground and below ground utilities
- ☐ Large lot single family home
- ☐ Non-residential and non-commercial infiltration
Excluded impervious area: _____ acres
- ☐ Land disturbance for land to remain undeveloped
Excluded impervious area: _____ acres
- ☐ Stream Stabilization Sites
Excluded impervious area: _____ acres
- ☐ Trails
Excluded impervious area: _____ acres
- ☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres
Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☐ No

If yes, complete the following:

Excluded area: _____ acres
Excluded impervious area: _____ acres
Total Site area: _____ acres, _____ % site excluded
Total Impervious area: _____ acres, _____ % impervious excluded

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

Project:	The Brickyard	Project#	PDP22-0002	Applicant:	Confluence Companies
Section	Questions	Response	Check those that apply	Instructions	
1	Non-applicable Sites				
1.1	Will the project result in a temporary disturbance of greater than one acre?	No Yes	☐ ☒	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	☐ ☐	Proceed to section 1.3. Proceed to section 2.	
1.3	Is the project within the Cherry Creek Watershed?	Yes No	☐ ☐	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.	
2	Applicable Site Types and Exclusions by Variance				
2.1	Does the project have more than 35% impervious area on the existing site?	No Yes	☒ ☐	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	☐ ☐	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	☐ ☐	No further action required. Proceed to 2.4.	
2.4	Do any other water quality exclusions apply to the site?	No Yes	☐ ☐	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for variance 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 variance for <u>Constrained Redevelopment Sites</u> .	
3	Applicable Sites with Other Exclusions by Variance				
3.1	Category 1: Roadways, bridges and trails only				
3.1.1	Is the project a bike or pedestrian trail?	Yes No	☐ ☐	Proceed to next line. Proceed to 3.1.2.	
	Is the trail for a roadway?	Yes No	☐ ☐	Proceed to 3.1.2. Project is excluded. Submit variance 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	☐ ☐	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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.
3.2	Category 2: Non-residential and non-commercial projects only			
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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	Project is excluded. Submit study along with variance 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.
3.3	Category 3: Residential, Agricultural and Commercial projects			
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	☐ ☒	Proceed to next line. Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No Yes	☐ ☐	Project is excluded. Submit variance 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	☐ ☐	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	☐ ☐	Project is excluded. Submit study along with variance 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	☐	This exclusion does not apply. Permanent water quality is required.
		No	☒	Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes	☐	This portion of the project is excluded. Submit variance for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
		No	☒	Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☒	Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☒	Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No	☒	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the drainage report . No further action is needed.
		Yes	☐	This exclusion does not apply. Permanent water quality is required.