PRELIMINARY DRAINAGE REPORT

GRANDVIEW RESERVE FILING NO. 1

El Paso County, Colorado

(Most pages without comments have been deleted)

PREPARED FOR:
D.R. Horton
9555 S. Kingston Court
Englewood, CO

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
September 09, 2022

PCD Filing No.: PUDSP2110

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Brady A. Shyrock, PE #38164
For and on behalf of Galloway & Company, Inc.

Date

Provide signatures

DEVELOPER'S CERTIFICATION

I, The developer, have read and will comply with all of the requirements specified in this drainage report and plan.

By:_____

Date

Address: D.R. Horton
9555 S. Kingston Court
Englewood, CO

EL PASO COUNTY CERTIFICATION

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua Palmer, P.E.
Interim County Engineer/ECM Administrator

Date

Conditions:

Delete "interim"

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I. Purpose

The purpose of this Preliminary Drainage Report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to identify which types of drainage facilities will be needed and where they will be located. This report will remain in general compliance with the approved MDDP prepared by HR Green, dated November 2020.

II. General Description

(under review)

The project is a single-family residential development located in the Falcon area of El Paso County, Colorado. The site is located in a portion of the South half of Section 21, the North half of Section 28, Township 12 South, Range 64 West of the 6th Principal Meridian, County of El Paso, State of Colorado. The subject property includes Eastonville Road to the west, which was studied separately in the "*Eastonville Road Final Drainage Report*", by HR Green, September 2022 (**E-FDR**). The project site is bounded by undeveloped land proposed as future development to the east, and undeveloped land within the Waterbury Development to the south. A Vicinity Map is included in **Appendix A**.

This preliminary drainage report is the basis for the drainage facility design in conformance with the previously approved MDDP for the site prepared by HR Green, "*Grandview Reserve Master Development Drainage Plan",* HR Green, November 2020 (**MDDP**). The site consists of approximately 189.479 acres and includes 565 dwelling units.

For upstream offsite runoff analysis, the basis for drainage concepts and calculations are derived form the approved "*Revision to: Master Development Drainage Plan, Meridian Ranch, El Paso County, Colorado*", Tech Contractors, July 2021 (**MR-MDDP**).

The existing soil types within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consist of Columbine gravelly sandy loam (hydrologic soil group A) and Stapleton sandy loam (hydrologic soil group B). See the soils map included in **Appendix A**.

III. Drainage Criteria

Hydrology calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

The drainage calculations were based on the criteria manual Figure 6-5 and IDF equations to determine the intensity and are listed in Table 1 below.

Table 1 - Precipitation Data

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

Q = CIA

Where:

Q = Peak Discharge (cfs)
C = Runoff Coefficient
I = Runoff intensity (inches/hour)
A = Drainage area (acres)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the drainage criteria manual (Table 6-6). Composite percent impervious and C values were calculated using the residential, streets, roofs, and lawns coefficients found in Table 6-6 of the manual.

The 100-year event was used as the major storm event. The 5-year event was used as the minor event. The UD-Inlets v5.01 spreadsheet was utilized for the sizing of the proposed sump inlets.

The UD-Detention v4.04 spreadsheet was utilized for the design of the proposed on-site water quality ponds, Ponds A, B, C, D, E, and Eastonville Pond.

IV. Existing Drainage Conditions

The site is contained fully within one major drainage basin; the Gieck Ranch Drainage Basin and is tributary to Black Squirrel Creek. The site generally drains from north to south with an average slope of 2% outside of the channel. The rational method was used to analyze the individual basins within the site because their size permits it.

There are two (2) major drainageways that currently convey existing on & off-site flows through the site to the southeast. These are the Main Stem (MS) and Main Stem Tributary Number 2 (MST) as referenced in the **MDDP**. These drainageways are referred to as Channel A and Channel B within the **E-FDR**. Both drainageways generally flow to the southeast towards Highway 24, before crossing via existing drainage structures. Currently, these channels receive flows from two off-site basins, one from the west (west of Basin B1 per the **MDDP;** 0.17 mi^2, Q_5 = ±67 cfs, Q_{100} = ±413 cfs) and the second from the northwest (northwest of Basin C1 per the **MDDP;** 0.44 mi^2, Q_5 = ±59 cfs, Q_{100} = ±280 cfs) and are routed under Eastonville Road via existing pipe culverts. There is an existing 24" CMP that conveys runoff under Eastonville Road at the MS, a location approximately 650 feet north of the proposed Rex Road extension that directs runoff via overtopping Eastonville Road at MST, and a 20" x 27" ECMP that directs runoff beneath Eastonville Road at the Falcon Regional Park.

While the **MDDP** shows a total of 22 basins that were analyzed as part of the overall Grandview Reserve development, for the purposes of this report, 7 of the Basins within the MDDP will be used for analysis. These Basins include A1, B1, B2, C1, B3, and the two off-site Basins situated to the northwest of Eastonville Road.

Please discuss the difference between FEMA flows (at then-existing conditions), 514 cfs in Eastonville report, and Meridian Ranch MDDP - DP-G06 1.45 sq. mi., historic Q100=628, developed 663 cfs. This will need to be resolved with the final drainage report.

Existing upstream tributary analysis (the areas west of Eastonville Road) was performed as part of the **E-FDR** and includes basins EX1, EX2, EX3, EX4, EX5, EX6, and EX7. See the **E-FDR** in **Appendix B** for reference. (page 63 of this report)

For a more in-depth analysis of existing tributary conditions as it pertains to this phase of development, an existing basin map has been prepared. The existing conditions drainage map can be found in **Appendix F** and basins are described below.

Basin EX-1 (16.18 AC, Q_5 = 3.4 cfs, Q_{100} = 24.4 cfs): Located on the southwest portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem channel **(DP 1)**.

Design Point 1 (Q_5 = 4.7 cfs, Q_{100} = 33.3 cfs): Located on the southern portion of the site, this design point accounts for the total combined flows from **Basins OS-1, OS-2 & EX-1**. Flows from this design point are conveyed off-site to the south, via a naturally formed channel, and discharges into the existing main stem tributary channel.

Basin EX-2 (46.06 AC, Q_5 = 7.6 cfs, Q_{100} = 53.7 cfs): Located in the southwest portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the Main Stem channel **(DP 2)**.

Design Point 2 (Q_5 = 79.1 cfs, Q_{100} = 497.2 cfs): Located on the southern portion of the site, this design point accounts for the total combined flows from **Basins OS-3, OS-4 & EX-2** and represents the total existing main stem tributary channel flows at that point. Flows from this design point are conveyed off-site to the south, via the main stem tributary channel.

Basin EX-3 (64.34 AC, Q_5 = 10.0 cfs, Q_{100} = 71.6 cfs): Located in the central portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel **(DP 3)**.

Basin EX-4 (2.68 AC, Q_5 = 0.6 cfs, Q_{100} = 4.4 cfs): Located on the eastern portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the east into Main Stem Tributary #2 channel **(DP 4)**.

Basin EX-5 (26.15 AC, Q_5 = 5.0 cfs, Q_{100} = 35.5 cfs): Located in the north central portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel **(DP 5)**.

Basin EX-6 (31.53 AC, Q_5 = 6.6 cfs, Q_{100} = 46.9 cfs): Located on the northern portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel **(DP 6)**.

Design Point 6 (Q_5 = 14.6 cfs, Q_{100} = 584.9 cfs): Located on the northeast portion of the site, this design point accounts for the total combined flows from **Basins OS-5 & EX-6** and represents the total existing main stem tributary #2 channel flows at that point. Flows from this design point are conveyed off-site to the southeast, via the main stem tributary #2 channel.

Design Point 12 (Q_5 = 89.2 cfs, Q_{100} = 976.3 cfs): Located on the southeast portion of the site, this design point accounts for the total combined flows from **Design Points 3, 4, 5 & 6** and represents the

total existing main stem tributary #2 channel flows at that point. Flows from this design point are conveyed off-site to the south, via the main stem tributary #2 channel.

V. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization and is a vital component of developing a balanced, sustainable project. Below identifies the approach to the four-step process:

1. Employ Runoff Reduction Practices

This step uses low impact development (LID) practices to reduce runoff at the source. Generally, rather than creating point discharges that are directly connected to impervious areas runoff is routed through pervious areas to promote infiltration. The Impervious Reduction Factor (IRF) method was used and calculations can be found in **Appendix E.**

2. Stabilize Channels

This step implements stabilization to channels to accommodate developed flows while protecting infrastructure and controlling sediment loading from erosion in the drainageways. Erosion protection in the form of riprap pads at all outfall points to the channel to prevent scouring of the channel from point discharges. The existing channel analysis and design for the Main Stem Tributary #2 (MST) is to be completed by others and a report for the channel improvements will be submitted for review separately.

3. Provide Water Quality Capture Volume (WQCV)

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. The EURV volume will release in 72 hours, while the WQCV will release in no less than 40 hours. On-site water quality control volume detention ponds will provide water quality treatment for all of the developed areas, prior to the runoff being released into either of the major drainage ways. Refer to WQCV Plan in **Appendix F.**

4. Consider Need for Industrial and Commercial BMPs

As this project is all residential development and no commercial or industrial development is proposed, there will be no need for any specialized BMPs which would be associated with an industrial or commercial site.

VI. Interim Drainage Conditions

In the interim condition, overland grading operations will be taking place within the Grandview Reserve Subdivision in preparation for the ultimate proposed condition. While this activity is taking place within the proposed subdivision, no activity is anticipated west of Eastonville Road. The proposed development lies completely within the Gieck Ranch Drainage Basin and consists of six (6) larger basins (EA, A, B, C, D, & E) which have been broken down into thirteen (13) smaller sub-basins for the Interim Condition. Adjacent Off-site Basins (OS) were also analyzed in the interim condition and have been broken down into five (5) smaller sub-basins. Site runoff will be collected via swales and diverted to one of the eleven proposed temporary sediment basins. All necessary calculations can be found within the appendices of this report.

While the existing upstream tributary analysis (the areas west of Eastonville Road) was performed as part of the **E-FDR** (including basins EX1, EX2, EX3, EX4, EX5, EX6, and EX7) in the Existing Sub-basin Description, additional analysis was conducted for all of the proposed Eastonville Road in conjunction

with the offsite upstream tributary areas in the Proposed Sub-basin Description. This analysis consisted of basins OS1, OS2, OS3, OS4, OS5, OS6, OS7, EA1, EA2, EA3, EA4, EA5. EA6, EA7, EA8, EA9, EA10, EA11, and EA12. See the **E-FDR** in **Appendix B** for reference.

In addition to the upstream tributary analysis, the **E-FDR** also addressed the drainage analysis for all of Eastonville Road.

The proposed institutional use (**Sub-basin A-1**) area flows have been included in this analysis at a preliminary level only. The Sub-basin is located on the northwest corner of the site, East of Eastonville Rd. & south of the proposed extension of Rex Rd. In the interim condition, Sub-basin A-1 encompasses an area of 19.96 acres and interim developed runoff (imperviousness of 2.0%) for the site has been calculated to be Q_5 = 5.5 cfs, Q_{100} = 39.4 cfs. Runoff from this basin will sheet flow from the northwest to the southeast, intercepted by a proposed 4' bottom x 2' deep trapezoidal swale (Swale A-1). The interim runoff will be routed to the existing 100-year FEMA floodplain. Water quality and detention will be addressed with the future development of the institutional site.

Basin TSB-A1 (18.33 AC, Q_5 = 5.1 cfs, Q_{100} = 36.7 cfs): Located at the northern portion of the site, Basin TSB-A1 consists entirely of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the southeast where it is intercepted by proposed TSB-A1. From there, treated runoff enters a proposed 4' bottom x 2' deep trapezoidal swale (Swale A-1). The interim runoff will be routed to the existing 100-year FEMA floodplain.

Design Point 1 (Q_5 = 13.1 cfs, Q_{100} = 44.7 cfs): Located at the northern portion of the site, this design point accounts for the total combined flows from **Basins OS4 & TSB-A1**. Flows from this design point are conveyed in a proposed 4' bottom x 2' deep trapezoidal swale (Swale A-1) that conveys the flow southeast to the existing 100-year FEMA floodplain.

Design Point 2 (Q_5 = 18.7 cfs, Q_{100} = 84.1 cfs): Located at the northern portion of the site and to the southeast of Design Point 1, this design point accounts for the total combined flows from **Basins OS4, A-1, & TSB-A1**. Flows from this design point are conveyed downstream within the existing 100-year FEMA floodplain.

Basin TSB-A2 (4.51 AC, Q_5 = 1.4 cfs, Q_{100} = 10.1 cfs): Located at the northern portion of the site, Basin TSB-A2 consists of future residential lots, future roadways, and future amenity facilities. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the southeast where it is intercepted by proposed TSB-A2 at **Design Point 4**. From there, treated runoff exits the TSB and sheet flows to the existing 100-year FEMA floodplain.

Basin TSB-A3 (9.49 AC, Q_5 = 2.7 cfs, Q_{100} = 19.5 cfs): Located at the north-central portion of the site, Basin TSB-A3 consists of future residential lots, future roadways, and future amenity facilities. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the southeast where it is intercepted by proposed TSB-A3 at **Design Point 5**. From there, treated runoff exits the TSB and sheet flows to the existing 100-year FEMA floodplain.

Basin TSB-B1 (15.73 AC, Q_5 = 4.6 cfs, Q_{100} = 32.4 cfs): Located at the northwestern portion of the site, Basin TSB-B1 consists of future residential lots and future roadways. In the interim overland graded

phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the south where it is intercepted by proposed TSB-B1 at **Design Point 6**. From there, treated runoff exits the TSB and sheet flows downstream to TSB-B3.

Basin TSB-B2 (5.12 AC, Q_5 = 1.6 cfs, Q_{100} = 11.4 cfs): Located at the central portion of the site, Basin TSB-B2 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the southeast where it is intercepted by proposed TSB-B2 at **Design Point 7**. From there, treated runoff exits the TSB and sheet flows downstream to TSB-B3.

Basin TSB-B3 (9.91 AC, Q_5 = 3.0 cfs, Q_{100} = 21.2 cfs): Located at the central portion of the site, Basin TSB-B3 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the south where it is intercepted by proposed TSB-B3 at **Design Point 8**. From there, treated runoff exits the TSB and sheet flows downstream to the existing Geick Ranch Tributary-1 / Channel A (**E-FDR**).

Design Point 8 (Q_5 = 9.1.7 cfs, Q_{100} = 65.0 cfs): Located at the south-central portion of the site and to the south of Design Point 7, this design point accounts for the total combined flows from **Basins TSB-B1, TSB-B2, and TSB-B3**. Flows from this design point are conveyed downstream to the existing Geick Ranch Tributary-1 / Channel A (**E-FDR**).

Basin TSB-C1 (6.84 AC, Q_5 = 2.0 cfs, Q_{100} = 13.8 cfs): Located at the eastern portion of the site, Basin TSB-C1 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the south where it is intercepted by proposed TSB-C1 at **Design Point 9**. From there, treated runoff exits the TSB and sheet flows downstream to TSB-C3 at **Design Point 11**.

Basin TSB-C2 (17.00 AC, Q_5 = 4.8 cfs, Q_{100} = 34.0 cfs): Located at the eastern portion of the site, Basin TSB-C2 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the south where it is intercepted by proposed TSB-C2 at **Design Point 10**. From there, treated runoff exits the TSB and sheet flows downstream to TSB-C3 at **Design Point 11**.

Basin TSB-C3 (18.56.00 AC, Q_5 = 5.1 cfs, Q_{100} = 36.4 cfs): Located at the southeastern portion of the site, Basin TSB-C3 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the southeast where it is intercepted by proposed TSB-C3 at **Design Point 11**. From there, treated runoff exits the TSB and sheet flows downstream to the existing 100-year FEMA floodplain.

Design Point 11 (Q_5 = 11.8 cfs, Q_{100} = 84.3 cfs): Located at the southeastern portion of the site and to the southeast of Design Point 1, this design point accounts for the total combined flows from **Basins TSB-C1, TSB-C2, & TSB-C3**. Flows from this design point exit via sheet flow through the TSB proposed spillway and are conveyed downstream within the existing 100-year FEMA floodplain.

Basin TSB-D1 (10.86 AC, Q_5 = 3.0 cfs, Q_{100} = 21.1 cfs): Located at the southwestern portion of the site, Basin TSB-D1 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%).

Address sizing of TSBs and downstream conveyances

Runoff from this basin will sheet flow to the east where it is intercepted by proposed TSB-D1 at **Design Point 12**. From there, treated runoff exits the TSB and sheet flows downstream to the existing Geick Ranch Tributary-1 / Channel A (**E-FDR**).

Basin TSB-E1 (19.42 AC, Q_5 = 5.1 cfs, Q_{100} = 36.2 cfs): Located at the southern portion of the site, Basin TSB-E1 consists of future residential lots and future roadways. In the interim overland graded phase of development, imperviousness for this sub-basin can be described as nearly bare ground (2%). Runoff from this basin will sheet flow to the east where it is intercepted by proposed TSB-E1 at **Design Point 13**. From there, treated runoff exits the TSB and sheet flows downstream to the existing Geick Ranch Tributary-1 / Channel A (**E-FDR**).

VII. Proposed Drainage Conditions

The proposed development lies completely within the Gieck Ranch Drainage Basin and consists of six (6) larger basins (EA, A, B, C, D, &E) which have been broken down into fifty-three (53) smaller sub-basins. Adjacent Off-site Basins (OS) were also analyzed in the proposed condition and have been broken down into five (5) smaller sub-basins. Site runoff will be collected via inlets & pipes and diverted to one of the six proposed full spectrum detention ponds or two sediment basins. All necessary calculations can be found within the appendices of this report.

According to the **MDDP**, there are two major drainageways that run through the site. As was discussed within the Existing Conditions portion of the report, both the Main Stem (MS) and Main Stem Tributary Number 2 (MST) run through the site conveying runoff from the northwest to the southeast. These drainageways are referred to as Channel A and Channel B within the **E-FDR**. Presently, these channels receive flows from two off-site basins, one from the west (west of Sub-basin OS-3 per this report and Basin B1 per the **MDDP;** 0.17 mi^2, Q_5 = ±67 cfs, Q_{100} = ±413 cfs) and the second from the north (northwest of Sub-basin OS-1 per this report and Basin C1 per the **MDDP;** 0.44 mi^2, Q_5 = ±59 cfs, Q_{100} = ±280 cfs).

Analysis was conducted for all of the proposed Eastonville Road in conjunction with the offsite upstream tributary areas in the Proposed Sub-basin Description. This analysis consisted of basins OS1, OS2, OS3, OS4, OS5, OS6, OS7, EA1, EA2, EA3, EA4, EA5. EA6, EA7, EA8, EA9, EA10, EA11, and EA12. See the **E-FDR** in **Appendix B** for reference.

(Channel A)

Preliminary sizing calculations for the FSD facility have been completed with the E-FDR (Pond B) requiring approximately 1.212 ac-ft of storage capacity. Preliminary sizing for the MS and Eastonville Road crossing has been included within Appendix D, by HR Green. This crossing will require dual 10’ W x 3.5’ H reinforced concrete box culvert (RCBC) with type M riprap for 50’ L x 30’ W at the downstream end.

There are no proposed major channel improvements for MS (**MDDP**) / Channel A (**E-FDR**) associated with this development -however, MST (**MDDP**) / Channel B (**E-FDR**) is proposed to be re-routed. The analysis for both channels and design of MST were done by others and a separate report will be submitted for review for all channel improvements.

The site will provide six (6) Full Spectrum Extended Detention Basins (EDBs). Ponds A, B, C, D, E, & Eastonville Pond will discharge treated runoff at historic rates directly into either the MS (**MDDP**) / Channel A (**E-FDR**) or MST Channel (**MDDP**) / Channel B (**E-FDR**). The project site will also provide two (2) Sediment Basins (SBs). SB-1 at Rex Road and SB-2 at the southern corner of the church property. Both of these SBs have been sized to function as PBMPs (and will remain in place until such time

development east of the proposed site takes place) and will discharge treated runoff at historic rates directly into MST (**MDDP**) / Channel B (**E-FDR**)at the northern portion of the project site.

As has been mentioned previously, the site is proposed to have a land use of single family residential. The site will consist primarily of 1/8 Acre lots, with some 1/4 Acre and 1/3 Acre lots, public roadways, along with dedicated Tracts for amenity and/or institutional uses.

The proposed institutional use (**Sub-basin A-1**) area flows have been included in this analysis at a preliminary level only. The Sub-basin is located on the northwest corner of the site, East of Eastonville Rd. & south of the proposed extension of Rex Rd. It is assumed that the area will have a conservative ultimate imperviousness value of 90%. Sub-basin A-1 encompasses an area of 11.67 acres and proposed developed runoff for the site has been calculated to be Q_5 = 46.4 cfs, Q_{100} = 90.7 cfs. However, in the interim conditions (imperviousness of 2.0%), runoff from this basin (Q_5 = 4.4 cfs, Q_{100} = 31.1 cfs) will sheet flow from the northwest to the southeast, to a separate, onsite detention and water quality facility (SB-2) positioned at the southeastern corner of the property, where treated flows will be released to a proposed modified CDOT Type 'C' inlet on the west side of Ivybridge Boulevard **(DP 1)**. Runoff that originates from the east side of Eastonville Road, outside of the dedicated ROW, will be conveyed to SB-2 via a proposed 4' bottom x 2' deep trapezoidal swale (Swale A-1). Flows will then be routed under Ivybridge Boulevard, via 24" RCP, to the updated Main Stem Tributary 2 channel. It is anticipated that the property will be developed at a later date as a fill in subsequent to the proposed development of the majority of this project site. This property will need to submit a separate drainage report, complete with an updated water quality and detention design, as part of its development. Installation of an internal storm sewer system separate from the outfall for the property will be required. The development is responsible for ensuring the site drainage, once constructed, will not adversely impact any adjacent properties and downstream facilities. Preliminary pond sizing calculations have been provided in Appendix E for reference. As stated above, water quality and detention will be addressed with the future development of the institutional site.

Basin-1 (1.22 AC, Q_5 = 4.2 cfs, Q_{100} = 8.4 cfs): Located at the northern border of the site, Basin-1 contains the proposed Phase 1 improvements to Rex Rd. This drainage basin consists entirely of onsite roadway improvements within the project site. Runoff from this basin will sheet flow to the proposed curb & gutter along Rex Rd. The flows will then be routed to the east where they will be conveyed to a proposed Sediment Basin (SB-1) where runoff will be treated prior to discharging into Main Stem Tributary #2 channel.

Basin A-2a (4.42 AC, Q_5 = 8.5 cfs, Q_{100} = 19.9 cfs): Located on the north portion of the site, this basin consists of residential lots, Tintagel Trail, and a portion of the north half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the northeast side of the intersection of Tintagel Trail and Dawlish Drive **(DP 2a)**.

Basin A-2b (2.75 AC, Q_5 = 8.4 cfs, Q_{100} = 16.7 cfs): Located on the north portion of the site, this basin consists of residential lots, Ivybridge Boulevard, and a portion of the north half of Dawlish Drive. Runoff from this basin will sheet flow from the residential lots to the adjacent Dawlish Drive and directly from within the ROW of Ivybridge Boulevard. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' inlet in sump conditions, located on the northeast side of the intersection of Ivybridge Boulevard and Dawlish Drive **(DP 2b)**.

Basin A-3 (0.36 AC, Q_5 = 1.6 cfs, Q_{100} = 3.2 cfs): Located on the north portion of the site, this basin consists of a portion of the south half of Dawlish Drive. Flows will be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the southeast side of the intersection of Ivybridge Boulevard and Dawlish Drive **(DP 3)**.

Basin A-4a (6.31 AC, Q_5 = 9.8 cfs, Q_{100} = 22.8 cfs): Located on the northwestern portion of the site, this basin consists of residential lots, Primley Woods Path, and a portion of the west half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the west side of Dawlish Drive **(DP 4a),** between Primley Woods Path and St Ives Way. Bypass flows will then be routed downstream to a proposed (public) 15' CDOT Type 'R' sump inlet, located on the west side of Dawlish Drive directly across from Sparkwell Street **(DP4)**. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-4b (3.99 AC, Q_5 = 6.5 cfs, Q_{100} = 15.2 cfs): Located on the northwestern portion of the site, this basin consists of residential lots, St Ives Way, and a portion of the west half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the west side of Dawlish Drive **(DP 4b),** between Primley Woods Path and St Ives Way. Bypass flows will then be routed downstream to a proposed (public) 15' CDOT Type 'R' sump inlet, located on the west side of Dawlish Drive directly across from Sparkwell Street **(DP4)**. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-5 (0.35 AC, Q_5 = 1.6 cfs, Q_{100} = 3.1 cfs): Located on the north portion of the site, this basin consists of a portion of the east half of Dawlish Drive. Flows will be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the east side of Dawlish Drive **(DP 5),** Just north of the intersection of Sparkwell Street and Dawlish Drive. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-6 (2.76 AC, Q_5 = 4.6 cfs, Q_{100} = 10.7 cfs): Located centrally on the site, this basin consists of residential lots, Penryn Circle, and a portion of the south half of Sparkwell Street. Runoff from this basin will sheet flow from the lots to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the south side of Sparkwell Street **(DP 6),** Just southeast of the intersection of Penryn Circle & Sparkwell Street. Emergency overflows will overtop Sparkwell Street crown to Design Point 7 **(DP 7)**, then overtop curb and gutter and be routed downstream via an overflow swale to proposed Pond A.

Basin A-7 (0.23 AC, Q_5 = 1.1 cfs, Q_{100} = 2.0 cfs): Located centrally on the site, this basin consists of a portion of the north half of Sparkwell Street. Runoff from this basin will sheet flow from edge of ROW to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the north side of Sparkwell Street **(DP 7),** Just east of the intersection of Penryn Circle & Sparkwell Street. Emergency overflows will overtop curb and gutter and be routed downstream via an overflow swale to proposed Pond A.

Basin A-8 (5.44 AC, Q_5 = 14.7 cfs, Q_{100} = 30.8 cfs): Located centrally on the site, this basin consists entirely of proposed amenity / park facilities. Runoff from this basin will sheet flow to paved parking lot and drive aisle with curb and gutter. Flows will then be routed, via curb & gutter, to a series of proposed (public) CDOT Type 'R' inlets and area inlets with storm sewer piping conveying generated runoff

downstream to Design Point 8 **(DP 8),** located at the southeast corner of the park site. Emergency overflows will overtop curb and gutter and will sheet flow, across green space, to proposed Pond A.

Basin A-9 (4.91 AC, Q_5 = 7.4 cfs, Q_{100} = 17.3 cfs): Located in the central portion of the site, directly west from Pond A. This basin consists of residential lots, one-half of Pixie Place, a section of Salcombe Trail, and a section of the west half of Sparkwell Street. Runoff from this basin will sheet flow to the proposed roadways, where runoff will be directed downstream, via curb & gutter, a proposed (public) 20' CDOT Type 'R' sump inlet **(DP 7a)**. Runoff is then conveyed downstream to **DP 7b** where additional runoff is added from Sub-basin A-10.

Basin A-10 (1.02 AC, Q_5 = 2.1 cfs, Q_{100} = 4.9 cfs): Located in the central portion of the site, directly west from Pond A. This basin consists of residential lots and the easter half of a section of Sparkwell Street. Runoff from this basin will sheet flow to the proposed roadway, where runoff will be directed downstream, via curb & gutter, a proposed (public) 5' CDOT Type 'R' sump inlet **(DP 7b)**. Runoff is then directed downstream to the northwest corner of Pond A. Flows will then be routed to the outlet structure **(DP 8)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem Tributary #2 channel. Emergency overflows will overtop via an emergency spillway and be routed downstream directly to MST.

Basin A-11 (3.56 AC, Q_5 = 2.0 cfs, Q_{100} = 8.6 cfs): Located on the eastern limits of the site, adjacent to the proposed Main Stem Tributary #2 drainageway. This basin consists of the rear portion of lots along Sparkwell Street and the proposed (private) Full Spectrum Detention Pond A. Runoff from this basin will sheet flow directly to Pond A. Flows will then be routed to the outlet structure **(DP 8)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem Tributary #2 channel. Emergency overflows will overtop via an emergency spillway and be routed downstream directly to MST.

Basin B-1 (3.81 AC, Q_5 = 5.3 cfs, Q_{100} = 12.5 cfs): Located on the western limits of the site, adjacent to Eastonville Road. This basin consists of residential lots and the southwest portion of Pixie Place. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' inlet in sump conditions, located at the end of the Cul-De-Sac of Pixie Place **(DP 9)**. Emergency overflows will overtop curb and gutter and be routed downstream via an overflow swale to Dawlish Drive and then downstream via curb & gutter to Design Point **DP 10b**.

Basin B-2 (4.62 AC, Q_5 = 7.1 cfs, Q_{100} = 16.7 cfs): Located on the western limits of the site, partially adjacent to Eastonville Road. This basin consists of residential lots, the northwest portion of Pixie Place and the northwestern portion of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet **(DP 10a)**, located on the northwest side of Dawlish Drive, northeast of Marazion Way. Bypass flows are conveyed downstream via curb & gutter to **DP 10b** where a proposed (public) 15' CDOT Type 'R' sump inlet captures flows.

Basin B-3 (4.15 AC, Q_5 = 8.0 cfs, Q_{100} = 18.6 cfs): Located on the western portion of the site, this basin consists of residential lots, the northwest portion of Dawlish Drive, and Marazion Way. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet **(DP 10b)**, located northeast from the intersection of Dawlish Drive and Zelda Street. on the northwest side of Dawlish Drive, northeast of Marazion Way.

Emergency overflows will overtop the crown of the roadway and be conveyed downstream via curb and gutter to Design Point **DP 11, DP12b, and DP13**.

Basin B-4 (1.37 AC, Q_5 = 4.6 cfs, Q_{100} = 9.4 cfs): Located in the west-central portion of the site. This basin consists of the southeast portion of Dawlish Drive. Runoff from this basin will sheet flow directly to the curb & gutter and be directed downstream to a proposed (public) 15' CDOT Type 'R' inlet in sump conditions, located east of the intersection of Dawlish Drive & Zelda Street **(DP 11)**. Emergency overflows will overtop the curb return flowline and be conveyed downstream via curb and gutter to Design Point **DP 12b**.

Basin B-5 (5.12 AC, Q_5 = 7.9 cfs, Q_{100} = 18.5 cfs): Located centrally on the site, this basin consists of residential lots, Marazion Way, the northwest portion of Salcombe Trail, and the southwest portion of Pixie Place. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet **(DP 12a)**, located on the northwest side of Salcombe Trail, northeast of the intersection between Zelda Street and Salcombe Trail. Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-6 (2.28 AC, Q_5 = 3.7 cfs, Q_{100} = 8.7 cfs): Located centrally on the site. This basin consists of residential lots and the northwest portion of Plinky Plonk Path. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the northwest side of Plinky Plonk Path **(DP 14)**. Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-7 (0.89 AC, Q_5 = 1.6 cfs, Q_{100} = 3.8 cfs): Located centrally on the site. This basin consists of residential lots and the southeast portion of Plinky Plonk Path. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the southeast side of Plinky Plonk Path **(DP 15)**. Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-8 (3.23 AC, Q_5 = 5.3 cfs, Q_{100} = 12.4 cfs): Located centrally on the site. This basin consists of residential lots, the southeast portion of Plinky Plonk Path, and the northeast portion of Zelda Street. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet, located on the southeast side of the intersection between Plinky Plonk Path and Zelda Street **(DP 12b)**. Emergency overflows will overtop the crown of the roadway and be conveyed downstream via curb and gutter to Design Point **DP 13**.

Basin B-9 (2.42 AC, Q_5 = 3.8 cfs, Q_{100} = 9.0 cfs): Located centrally on the site, adjacent to the Main Stem channel. This basin consists residential lots and the southwest portion of Zelda Street. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' sump inlet, located on the southwest side of the intersection between Plinky Plonk Path and Zelda Street **(DP 13)**. Emergency overflows will overtop the curb & gutter of the roadway and be conveyed downstream via a graded swale into Pond B **(DP 16)**.

Basin B-10 (1.10 AC, Q_5 = 0.5 cfs, Q_{100} = 3.3 cfs): Located centrally on the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond B. Runoff from this basin will sheet flow directly to Pond B. Flows will then be routed to the outlet structure **(DP 16)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin C-1 (4.12 AC, Q_5 = 6.8 cfs, Q_{100} = 16.0 cfs): Located on the east portion of the site, this basin consists of residential lots and the eastern half of a portion of Salcombe Trail. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the southeast side of the intersection of Stoke Gabriel Way and Totness Terrace **(DP 17b)**. Bypass flows are conveyed downstream via curb & gutter to **DP 17e**.

Basin C-2 (2.71 AC, Q_5 = 4.9 cfs, Q_{100} = 11.4 cfs): Located on the eastern portion of the site, this basin consists of residential lots and the southern portion of Roads Stoke Gabriel Way and Glampton Drive, and the full section of Totness Terrace. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 17a)**, located on the southwest side of the intersection of Stoke Gabriel Way and Totness Terrace. Bypass flows are conveyed downstream via curb & gutter to **DP 17c**.

Basin C-3 (1.56 AC, Q_5 = 0.8 cfs, Q_{100} = 4.5 cfs): Located on the southeast portion of the site, this basin consists of the rear portion of residential lots along Stoke Gabriel Way. Runoff from this basin will sheet flow in an eastward direction towards the proposed channel. All roof drains (for lots 409-426 & 443) within this sub-basin will be directed toward Stoke Gabriel Way, no impervious surfaces will be allowed within the rear lot setbacks and runoff reduction will be implemented within this sub-basin.

Basin C-4 (2.47 AC, Q_5 = 4.1 cfs, Q_{100} = 9.6 cfs): Located on the southeast portion of the site, this basin consists of residential lots and the eastern half of Frogmore Lane. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 17c)**, located on the southwest side of the intersection of Stoke Gabriel Way and Frogmore Lane. Bypass flows are conveyed downstream via curb & gutter to **DP 17d**.

Basin C-5 (3.09 AC, Q_5 = 5.5 cfs, Q_{100} = 12.8 cfs): Located on the southeast portion of the site, this basin consists of residential lots and the western half of Stoke Gabriel Way. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 17d)**, located on the northwest side of the intersection of Stoke Gabriel Way and Glampton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 17h**.

Basin C-6 (2.10 AC, Q_5 = 3.2 cfs, Q_{100} = 7.4 cfs): Located on the southeast portion of the site, this basin consists of residential lots and the eastern half of Stoke Gabriel Way. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 17e)**, located on the northeast side of the intersection of Stoke Gabriel Way and Glampton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 17h**.

Basin C-7a (0.81 AC, Q_5 = 1.1 cfs, Q_{100} = 3.2 cfs): Located in the central portion of the site, this basin consists of the rear portion of residential lots, existing gas main, and proposed drainage swale (Swale C-7). Runoff from this basin will sheet flow to the proposed swale which will direct runoff to the adjacent roadway **(DP 18a)**.

Basin C-7b (5.91 AC, Q_5 = 9.9 cfs, Q_{100} = 23.2 cfs): Located in the central portion of the site, this basin consists of residential lots, the western half of Glampton Drive, and a portion of Zelda Drive & Sparkwell Street. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 18b)**, located on the southwest side of the intersection of Totness Terrace and Glampton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 18c**.

Basin C-8 (5.11 AC, Q_5 = 8.6 cfs, Q_{100} = 20.0 cfs): Located in the central portion of the site, this basin consists of residential lots, a portion of Totness Terrace, and a portion of Glampton Drive to the west and south of the sub-basin. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 17f)**, located on the southeast side of the intersection of Totness Terrace and Glampton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 17g and DP 17h**.

Basin C-9a (3.5 AC, Q_5 = 5.6 cfs, Q_{100} = 13.1 cfs): Located on the southeast corner of the site, this basin consists of residential lots, a portion of Frogmore Lane, and the northern half of Glampton Drive. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet **(DP 17g)**, located on the northeast corner of Glampton Drive and Frogmore Lane. Bypass flows are conveyed downstream via curb & gutter to **DP 17h.** Emergency overflows will overtop the crown of Glampton Drive and be routed downstream via proposed curb and gutter to Design Point **18b** within Glampton Drive.

Basin C-9b (3.69 AC, Q_5 = 5.9 cfs, Q_{100} = 13.7 cfs): Located on the southeast corner of the site, this basin consists of residential lots and the northern half of Glampton Drive. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet **(DP 17h)**, located on the north side of Glampton Drive just north of Hope Cove Loop. Emergency overflows will overtop the crown of Glampton Drive and be routed downstream via proposed curb and gutter to Design Point **18b** within Glampton Drive.

Basin C-10 (3.47 AC, Q_5 = 5.2 cfs, Q_{100} = 12.1 cfs): Located on the southeast corner of the site, this basin consists of residential lots and the southern half of Glampton Drive. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet **(DP 18c)**, located on the south side of Glampton Drive just north of Hope Cove Loop. Emergency overflows will overtop the curb & gutter of Glampton Drive and be routed downstream via a graded grassed swale and curb & gutter within Hope Cove Loop to Design Point **19** within Hope Cove Loop.

Basin C-11 (0.46 AC, Q_5 = 1.0 cfs, Q_{100} = 2.3 cfs): Located on the southeast corner of the site, this basin consists of a grassed amenity area and the north half of Hope Cove Loop. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' sump inlet **(DP 19)**, located on the north side of Hope Cove Loop. Emergency overflows will overtop the crown of Hope Cove Loop and be routed downstream via curb & gutter to Design Point **20** within Hope Cove Loop.

Basin C-12 (1.66 AC, Q_5 = 2.9 cfs, Q_{100} = 6.7 cfs): Located on the southeast corner of the site, this basin consists of residential lots and the south portion of Hope Cove Loop. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' sump inlet **(DP 20)**, located on the south side of Hope Cove Loop. Emergency overflows will overtop the curb & gutter of Hope Cove Loop and be routed downstream via a graded swale to Design Point **21** within Pond C.

Basin C-13 (2.37 AC, Q_5 = 0.8 cfs, Q_{100} = 5.5 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond C. Runoff from this basin will sheet flow directly to Pond C. Flows will then be routed to the outlet structure

(DP 21), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin C-14 (1.53 AC, Q_5 = 0.5 cfs, Q_{100} = 3.8 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond C. Runoff from this basin will sheet flow directly to the Main Stem Tributary Number 2 (MST).

Basin C-15 (0.16 AC, Q_5 = 0.1 cfs, Q_{100} = 0.5 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the rear portion of Lot 444. Runoff from this basin will sheet flow directly to the Main Stem Tributary Number 2 (MST). Runoff from this basin will sheet flow in an eastward direction towards the proposed channel. All roof drains (for lot 444) within this sub-basin will be directed toward Glampton Drive, no impervious surfaces will be allowed within the rear lot setbacks and runoff reduction will be implemented within this sub-basin.

Basin D-1 (3.48 AC, Q_5 = 5.4 cfs, Q_{100} = 12.7 cfs): Located on the southwest portion of the site, adjacent to Eastonville Road. This basin consists of residential lots and the west half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the west side of Kate Meadow Lane **(DP 22)**, just south of the intersection of Kate Meadow Lane & Farm Close Court. Flows will continue downstream to Design Point **24** within Farm Close Court.

Basin D-2 (0.87 AC, Q_5 = 1.7 cfs, Q_{100} = 4.0 cfs): Located on the southwest portion of the site, this basin consists of residential lots and the eastern half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' flow by inlet, located on the east side of Kate Meadow Lane **(DP 23)**, just southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will pool up and be routed around the curb return at the intersection of Kate Meadow Lane and Farm Close Court downstream via curb & gutter to Design Point **24** within Farm Close Court.

Basin D-3 (3.62 AC, Q_5 = 5.9 cfs, Q_{100} = 13.8 cfs): Located on the southwest portion of the site, this basin consists of residential lots and the western half of Farm Close Court. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' inlet in sump conditions, located on the west side of Farm Close Court **(DP 24)**, southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will overtop the crown and be routed downstream via curb & gutter in Farm Close Court to Design Point **25**.

Basin D-4 (1.77 AC, Q_5 = 3.3 cfs, Q_{100} = 7.7 cfs): Located on the southwest portion of the site, this basin consists of residential lots and the eastern half of Farm Close Court. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the east side of Farm Close Court **(DP 25)**, just southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will overtop curb & gutter and be routed downstream via a graded swale within the maintenance access path to Pond D at Design Point **26**.

Basin D-5 (1.53 AC, Q_5 = 2.0 cfs, Q_{100} = 6.0 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists partially of residential lots and the proposed (private) Full Spectrum Detention Pond D. Runoff from this basin will sheet flow directly to Pond D. Flows will then be

routed to the outlet structure **(DP 26)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin D-6 (0.83 AC, Q_5 = 0.3 cfs, Q_{100} = 2.1 cfs): Located on the southwest corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond D. Runoff from this basin will sheet flow directly to the Main Stem channel (MS).

Basin D-7a (0.25 AC, Q_5 = 0.2 cfs, Q_{100} = 0.8 cfs): Located on the southwest corner of the site, adjacent to the Main Stem channel. This basin consists of the back portions of residential lots. Runoff from this basin will sheet flow directly to the Main Stem Channel. All roof drains (for lots 18-20) within this sub-basin will be directed toward Farm Close Court, no impervious surfaces will be allowed within the rear lot setbacks and runoff reduction will be implemented within this sub-basin.

Basin D-7b (0.88 AC, Q_5 = 1.7 cfs, Q_{100} = 4.0 cfs): Located on the southwest corner of the site, adjacent to the Main Stem channel. This basin consists of the back portions of residential lots and a drainage swale (Swale D-7). Runoff from this basin will sheet flow from the residential lots, into the adjacent swale and will be routed directly to Pond D.

Basin E-1 (5.33 AC, Q_5 = 9.8 cfs, Q_{100} = 22.9 cfs): Located on the southern portion of the site, this basin consists of residential lots, the southern half of Brixham Drive, Starcross Court, and the southern half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the southwest corner of the intersection between Kate Meadow Lane and Mill Yard Circle **(DP 27)**, just north of the cul-de-sac. Bypass flows are conveyed downstream via curb & gutter to **DP 29**.

Basin E-2 (5.42 AC, Q_5 = 10.1 cfs, Q_{100} = 23.6 cfs): Located on the southern portion of the site, this basin consists of residential lots, a small portion of Mill Yard Circle, and the north half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the northwest corner of the intersection between Kate Meadow Lane and Mill Yard Circle **(DP 28)**, just north of the cul-de-sac. Bypass flows are conveyed downstream via curb & gutter to **DP 29**.

Basin E-3 (3.20 AC, Q_5 = 6.0 cfs, Q_{100} = 14.0 cfs): Located on the southern portion of the site, this basin consists of residential lots and the western half of Mill Yard Circle. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet, located just northeast from the cul-de-sac of Mill Yard Circle **(DP 29)**. Emergency overflows will overtop the crown of Mill Yard Circle and be routed downstream via curb & gutter to Design Point **30**.

Basin E-4 (6.28 AC, Q_5 = 9.0 cfs, Q_{100} = 21.0 cfs): Located on the southern portion of the site, this basin consists of residential lots and the eastern half of Mill Yard Circle. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet, located just northeast from the cul-de-sac of Mill Yard Circle **(DP 30)**. Emergency overflows will overtop the curb & gutter and be routed downstream via a graded swale within the maintenance access to Pond E at Design Point **31**.

Basin E-5 (1.13 AC, Q_5 = 0.4 cfs, Q_{100} = 3.0 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond E.

Runoff from this basin will sheet flow directly to Pond E. Flows will then be routed to the outlet structure **(DP 31)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin E-6 (0.74 AC, Q_5 = 0.3 cfs, Q_{100} = 1.8 cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond E. Runoff from this basin will sheet flow directly to the Main Stem channel (MS) and offsite to the south.

Basin EA-1 (7.79 AC, Q_5 = 9.2 cfs, Q_{100} = 19.5 cfs): Located on the western side of the site. This basin consists of the public right of way (Eastonville Road). Runoff from this basin will sheet flow to proposed curb & gutter and be conveyed downstream to a public 10' CDOT Type R inlet in sump conditions **(EA1)** located just west from Lots 17 & 18 at the end of the cul-de-sac for Farm Close Court. Emergency overflows will overtop the crown of Eastonville Road to Design Point **EA2**.

Basin EA-2 (5.59 AC, Q_5 = 7.0 cfs, Q_{100} = 14.9 cfs): Located on the western side of the site. This basin consists of the public right of way (Eastonville Road). Runoff from this basin will sheet flow to proposed curb & gutter and be conveyed downstream to a public 10' CDOT Type R inlet in sump conditions **(EA2)** located just west from Lots 16 & 17 at the end of the cul-de-sac for Farm Close Court. Emergency overflows will overtop the curb & gutter on the east side of Eastonville Road and be directed into the proposed Eastonville Pond via swale.

Basin EA-3 (0.94 AC, Q_5 = 0.4 cfs, Q_{100} = 3.1 cfs): Located immediately adjacent to the Main Stem Tributary on the south side, just east of Eastonville Road. This basin consists of the proposed (private) Eastonville Full Spectrum Detention Pond. Runoff from this basin will sheet flow directly to the Pond.

VIII. Storm Sewer System

All development is anticipated to be urban and will include storm sewer & street inlets. Storm sewers collect storm water runoff and convey the water to the water quality facilities prior to discharging. Storm sewer systems will be designed to the 100-year storm and checked with the 5-year storm. Inlets will be placed at sump areas and intersections where street flow is larger than street capacity. UDFCD Inlet spreadsheet has been used to determine the size of all sump inlets.

There will be a minimum of 5 proposed storm systems within the site. Each of the five storm sewer systems will discharge storm water into its correlated WQCV pond. Additionally, there will be two bypass storm sewer systems that collect off-site basin flows at **DP 32 & DP 35.**

The bypass system at **DP 32** will cross through on-site sub-basins **EA-1, EA-2, EA-3, D-1, D-3 & D-4,** and tie-into the outfall pipe from the Eastonville Road Pond, discharging directly into the main stem tributary channel. This bypass system will only convey flows from **DP 32** and will not be connected to any storm systems within any of the on-site sub-basins it crosses.

The bypass system at **DP 35** will cross through on-site sub-basins **EA-1, EA-2, A-4a, A-5 & A-8** and discharge directly main stem tributary #2. This bypass system will only convey flows from **DP 35** and will not be connected to any storm systems within any of the on-site sub-basins it crosses.

Each system will consist of reinforced concrete pipe (RCP), CDOT Type 'R' inlets, and storm sewer manholes.

Furthermore, there are three (3) proposed drainage swales that runs along the back of the residential lots in Basins A-1, C-7a, and D-7. The swales were analyzed using the Bentley software FlowMaster to properly size a trapezoidal channel (4' W x 2.0' D), (1' W x 1.50' D), & (1' W x 1.54' D), respectively, to convey the 100-year flows from the basin to corresponding outfall locations (SB-2, Glampton Drive, & Pond D), while providing 1.0-ft of freeboard. The sizing calculations can be found in **Appendix D.**

The Final drainage report will include details concerning at-grade inlet locations, street capacity, storm sewer sizing, outlet protection and location. Preliminary sump inlets have been sized and the calculations can be found in **Appendix D**. As mentioned, these sump inlets sizes are preliminary and are currently oversized. It is anticipated that the inlets will reduce in size with the addition of at-grade inlets at the time of the Final Drainage Report.

IX. Proposed Water Quality Detention Ponds

Eight (8) Water Quality Capture Volume Detention Ponds will be provided for the proposed site, six (6) of which are full spectrum ponds and two (2) of which are sediment basins. Of These, all six (6) of the ponds and the (2) Sediment Basins on-site are private and will be maintained by the DISTRICT, once established. These detention ponds are proposed to be full spectrum and will provide water quality and detention. The WQCV and EURV release will be controlled with an orifice plate. The release rates for the WQCV and EURV will be 40-hours and 72-hours, respectively. The 100-year volume will be controlled by orifice and/or restrictor plate and will be designed to release at or below the pre-development flow rate. Outlet structures, forebays, trickle channels, etc. will be designed with the final drainage report during final plat. The required FSD pond volumes are as described below:

Eastonville Road Pond: Located along the southwest side of the site. This pond will discharge into the Main Stem Tributary. The required volume WQCV and EURV are 0.233 Ac-Ft & 0.614 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.234 Ac-Ft & 0.850 Ac-Ft, respectively. The total required detention basin volume is 1.301 Ac-Ft. The total provided detention basin storage is 1.320 Ac-Ft.

Pond A: Located to the north of the site, just west of the newly routed Main Stem Tributary #2 channel. This pond will discharge into the Main Stem Tributary #2, ultimately merging with Main Stem to the south, off-site. The required volume WQCV and EURV are 0.756 Ac-Ft & 2.115 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.761 Ac-Ft & 2.882 Ac-Ft, respectively. The total required detention basin volume is 4.290 Ac-Ft. The total provided detention basin storage is 4.626 Ac-Ft.

Pond B: Located centrally on the site, just east of the Main Stem drainage way. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.586 Ac-Ft & 1.610 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.587 Ac-Ft & 2.197 Ac-Ft, respectively. The total required detention basin volume is 3.310 Ac-Ft. The total provided detention basin storage is 3.449 Ac-Ft.

Pond C: Located on the southeast portion of the site, between the Main Stem & Main Stem Tributary #2 channels. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.828 Ac-Ft & 2.256 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.831 Ac-Ft & 3.088 Ac-Ft, respectively. The total required detention basin volume is 4.633 Ac-Ft. The total provided detention basin storage is 5.040 Ac-Ft.

Pond D: Located centrally on the site, just west of the Main Stem channel. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.244 Ac-Ft & 0.666 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.246 Ac-Ft & 0.913 Ac-Ft, respectively. The total required detention basin volume is 1.373 Ac-Ft. The total provided detention basin storage is 1.373 Ac-Ft.

Pond E: Located on the south side of the site, just west of the Main Stem channel. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.431 Ac-Ft & 1.163 Ac-Ft, respectively. The provided storage for the WQCV and EURV are 0.437 Ac-Ft & 1.601 Ac-Ft, respectively. The total required detention basin volume is 2.421 Ac-Ft. The total provided detention basin storage is 2.583 Ac-Ft.

SB-1: Located on the far north side of the site, just east of the extension of Rex Road. This TSB will discharge into the Main Stem Tributary Number 2 (MST). The TSB has been sized to treat the developed runoff for water quality prior to releasing into MST. This TSB captures an upstream tributary area of approximately 1.22 acres and per the MHFD standard, this TSB has been upsized to 2-acre tributary area.

SB-2: Located on the north side of the site, at the southeast corner of the church property. This TSB will discharge into the Main Stem Tributary Number 2 (MST This TSB captures an upstream tributary area of approximately 11.23 acres and per the MHFD standard, this TSB has been upsized to 12-acre tributary area.

X. Proposed Channel Improvements

According to the **MDDP**, there are two major drainage ways that run through the site. As was discussed within the Existing Conditions portion of the report, both the Main Stem channel (MS) and Main Stem Tributary #2 channel (MST) run through the site. There are no proposed major channel improvements for MS as part of this project (to be determined with CDR-22-008). An analysis has been done for the Main Stem channel (MS) with both existing and future condition flows as described within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022 (**CLOMR**). All HEC-RAS modelling, velocities, shear, depths, etc. are included within the CLOMR, which can be found in Appendix D. Both scenarios, throughout the channel fall within the channel stability criteria.

The MST is proposed to be rerouted. As part of this rerouting of MST, offsite upstream tributary flows will be captured upstream from the proposed Rex Road extension and be conveyed via culvert to the rerouted MST. An analysis has been done for the Main Stem Tributary Number 2 (MST) with both existing and future condition flows as described within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022 (**CLOMR**). Both scenarios, throughout the channel fall within the channel stability criteria.

A majority of the developed runoff will be captured and conveyed to one of the corresponding water quality and detention facilities and release at or below historic levels. Some basins will release directly into the respective adjacent channels. These basins are contained within the backs of lots and will provide water quality through runoff reduction; impervious areas will not be permitted in the back of these lots and roof drains are to drain to the front. Therefore, there will be no adverse impact to downstream facilities. The analysis for both drainage ways (MS and MST), offsite upstream tributary capture, and design of MST were done by HR Green within the *Grandview Reserve CLOMR Report*, HR Green;

September 2021; revised January 2022 (**CLOMR**) which will be submitted separately for review. A copy of this report is included in Appendix D.

Additional channel stabilization may be required for erosion control prevention measures, pending the channel design review with the County.

XI. Maintenance

After completion of construction and upon the Board of County Commissioners acceptance, it is anticipated all drainage facilities within the public Right-of-Way are to be owned and maintained by El Paso County.

All private detention ponds are to be owned and maintained by the Grandview Reserve Metropolitan District No. 2 (DISTRICT), once established, unless an agreement is reached stating otherwise. The proposed Main Stem channel (MS) and Main Stem Tributary Number 2 (MST) will be maintained by the DISTRICT. Maintenance access for all full spectrum detention facilities will be provided from public Right-of-Way. Maintenance access for MS and MST will be provided along the respective eastern top of channel bank within the proposed tracts.

XII. Wetlands Mitigation

There are two existing wetlands on site associated with the two major channels, MS and MST. The wetlands are both contained within the existing channels with the wetland in MS being classified as jurisdictional and the wetland in MST classified as non-jurisdictional. The wetlands USACE determination will be provided with the *Grandview Reserve CLOMR Report*, HR Green; April 2022, which can be found in Appendix D. Wetlands maintenance will be the responsibility of the Grandview Reserve Metropolitan District No. 2 (DISTRICT).

XIII. Floodplain Statement

A portion of the project sit lies with Zone A Special Flood Hazard Area as defined by the FIRM Map number 08041C0552G and 08041C0556G effective December 7, 2018. A copy of the FIRM Panel is included in **Appendix A.** FEMA-approved floodplain elevations are required to be shown on final plats.

XIV. Drainage Fees & Maintenance

Gieck Ranch Basin is not listed as part of the El Paso County drainage basin fee program. Unless otherwise instructed, no drainage fees will be assessed. If it is found drainage basin fees are required, these will be included in the Final Drainage Report.

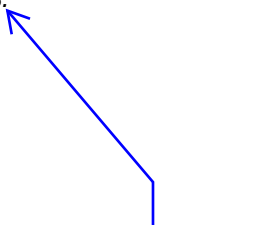
XV. Conclusion

The Grandview Reserve residential subdivision lies within the Gieck Ranch Drainage Basin. Water quality for the site is provided in six on-site Full Spectrum Detention Ponds; Ponds A, B, C, D, E, & Eastonville Pond as well as two Sediment Basins; SB-1 and SB-2. Both of these SBs have been sized to function as PBMPs (and will remain in place until such time development east of the proposed site takes place) and will discharge treated runoff at historic rates directly into MST at the northern portion of the project site. All drainage facilities within this report were sized according to the El Paso County Drainage Criteria Manuals. The proposed facilities are adequate to protect the site from generated runoff. The site runoff will not adversely affect the downstream facilities and surrounding developments. There are two

major channels passing through the site Main Stem channel and Main Stem Tributary Number 2, which will be addressed by HR Green within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022. The six (6) WQCV ponds will be maintained by a newly established Grandview Reserve Metropolitan District No. 2 (DISTRICT). A Final Drainage Report will be submitted along with the final plat and construction drawings.

XVI. References

1. *El Paso County Drainage Criteria Manual*, 1990.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, 2002.
3. *El Paso County Drainage Criteria Manual Update*, 2015.
4. *El Paso County Engineering Criteria Manual*, 2020.
5. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
6. *Gieck Ranch Drainage Basin Study (DBPS),* Drexel Barrell, October 2010 (Not adopted by County).
7. *Grandview Reserve Master Development Drainage Plan (MDDP),* HR Green, November 2020.
8. *Grandview Reserve CLOMR Report*, HR Green; April 2022.
9. *Meridian Ranch MDDP,* January 2018.



APPENDIX D

Hydraulic Computations

Provide calculations for this report, provide a separate Appendix for the Eastonville Road FDR

HRGreen

HRGREEN.COM

Eastonville Road
Final Drainage Report

(See separate comments on this report)

September 2022

HR Green Project No: 201662.08

Prepared For:

D.R. Horton

Contact: Riley Hillen, P.E.

9555 S. Kingston Ct.

Englewood, CO 80112

Prepared By:

HR Green Development, LLC

Contact: Colleen Monahan, PE

cmonahan@hrgreen.com

(719) 394-2433

APPENDIX B – HYDROLOGIC CALCULATIONS

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**NQJ**
	EXISTING CONDITIONS	**Checked by:**	
	EL PASO COUNTY, CO	**Date:**	**9/2/2022**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EX1	85.16	2	11.0	74.1
EX2	18.28	6	4.8	25.3
EX3	51.06	7	13.7	69.7
EX4	62.67	2	4.1	27.2
EX5	22.53	2	6.4	42.7
EX6	3.24	2	1.0	6.9
EX7	1.67	2	0.6	4.2
EX8	13.17	2	3.3	21.9
EX9	2.11	2	0.6	4.1

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	EX1	11.0	74.1
2	EX2	4.8	25.3
3	EX3	26.3	148.4
4	EX4	4.1	27.2
5	EX5	6.4	42.7
6	EX6	1.0	6.9
7	EX7	0.6	4.2
8	EX8	3.3	21.9
9	EX9	0.6	4.1

Include all offsite basins and DPs

HRGreen	**EASTONVILLE ROAD**						**Calc'd by:**	**NQJ**	
	EXISTING CONDITIONS						**Checked by:**		
	EL PASO COUNTY, CO						**Date:**	**9/2/2022**	

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	WALKS & DRIVES	SINGLE FAMILY	TOTAL	SOIL TYPE	UNDEVELOPED			WALKS & DRIVES			SINGLE FAMILY			COMPOSITE IMPERVIOUSNESS & C		
	ACRES					%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}
EX1	85.16	0.00	0.00	85.16	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX2	17.58	0.70	0.00	18.28	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	6	0.12	0.38
EX3	48.70	2.36	0.00	51.06	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	7	0.13	0.39
EX4	62.67	0.00	0.00	62.67	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX5	22.53	0.00	0.00	22.53	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX6	3.24	0.00	0.00	3.24	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX7	1.67	0.00	0.00	1.67	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX8	13.17	0.00	0.00	13.17	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EX9	2.11	0.00	0.00	2.11	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
Total				259.89													

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**NQJ**
	EXISTING CONDITIONS	**Checked by:**	
	EL PASO COUNTY, CO	**Date:**	**9/2/2022**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)
EX1	0.09	85.16	253	5.2	17.0	10	4000	2.4	1.5	43.0	60.0
EX2	0.12	18.28	220	2.3	20.2	10	1560	2.3	1.5	17.1	37.3
EX3	0.13	51.06	300	4.4	18.8	10	1921	2.6	1.6	19.9	38.7
EX4	0.09	62.67	300	1.0	32.1	10	3900	1.0	1.0	65.0	97.1
EX5	0.09	22.53	117	11.6	8.8	10	1162	3.4	1.8	10.5	19.4
EX6	0.09	3.24	207	9.0	12.8	10	250	4.0	2.0	2.1	14.9
EX7	0.09	1.67	50	3.4	8.7	10	174	4.4	2.1	1.4	10.1
EX8	0.09	13.17	125	3.1	14.2	10	1219	3.5	1.9	10.9	25.1
EX9	0.09	2.11	148	4.0	14.2	10	418	3.0	1.7	4.0	18.2

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

* For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

EASTONVILLE ROAD
EXISTING CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	NQJ
Checked by:	
Date:	9/2/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (in)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	EX1	85.16	0.09	60.0	7.66	1.44	11.0															BASIN 1 CAPTURED IN GIECK RANCH TRIB #2
	2	EX2	18.28	0.12	37.3	2.21	2.15	4.8															BASIN EX2 CAPTURED IN 24" RCP CULVERT, PIPED TO BASIN EX3
	3	EX3	51.06	0.13	38.7	6.51	2.10	13.7	38.7	8.72	2.10	26.3											BASIN EX2, DP2 & DPG15 (MERIDIAN RANCH Q5 = 8 CFS) CAPTURED IN 24" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD
	4	EX4	62.67	0.09	97.1	5.64	0.72	4.1				29.2											BASIN EX4 & DPG12 (MERIDIAN RANCH Q5 = 25.1 CFS) CAPTURED IN 18" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD TO GIECK RANCH TRIB #1
	5	EX5	22.53	0.09	19.4	2.03	3.14	6.4															BASIN EX5 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	6	EX6	3.24	0.09	14.9	0.29	3.53	1.0															BASIN EX6 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	7	EX7	1.67	0.09	10.1	0.15	4.12	0.6															BASIN EX7 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	8	EX8	13.17	0.09	25.1	1.19	2.75	3.3															BASIN EX8 CAPTURED IN 24" CMP, PIPED ACROSS EASTONVILLE ROAD
	9	EX9	2.11	0.09	18.2	0.19	3.23	0.6															BASIN EX9 CAPTURED IN 36" CMP, PIPED ACROSS EASTONVILLE ROAD

HRGreen

EASTONVILLE ROAD
EXISTING CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by: NQJ
Checked by:
Date: 9/2/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	1	EX1	85.16	0.36	60.0	30.66	2.42	74.1															BASIN 1 CAPTURED IN GIECK RANCH TRIB #2
	2	EX2	18.28	0.38	37.3	7.00	3.61	25.3															BASIN EX2 CAPTURED IN 24" RCP CULVERT, PIPED TO BASIN EX3
	3	EX3	51.06	0.39	38.7	19.80	3.52	69.7	38.7	26.80	3.52	148.4											BASIN EX2, DP2 & DPG15 (MERIDIAN RANCH Q100 = 54 CFS) CAPTURED IN 24" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD
	4	EX4	62.67	0.36	97.1	22.56	1.20	27.2				514.2											BASIN EX4 & DPG12 (MERIDIAN RANCH Q100 = 487 CFS) CAPTURED IN 18" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD TO GIECK RANCH TRIB #1
	5	EX5	22.53	0.36	19.4	8.11	5.27	42.7															BASIN EX5 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	6	EX6	3.24	0.36	14.9	1.17	5.93	6.9															BASIN EX6 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	7	EX7	1.67	0.36	10.1	0.60	6.91	4.2															BASIN EX7 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	8	EX8	13.17	0.36	25.1	4.74	4.62	21.9															BASIN EX8 CAPTURED IN 24" CMP, PIPED ACROSS EASTONVILLE ROAD
	9	EX9	2.11	0.36	18.2	0.76	5.42	4.1															BASIN EX9 CAPTURED IN 36" CMP, PIPED ACROSS EASTONVILLE ROAD

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**NQJ**
	PROPOSED CONDITIONS	**Checked by:**	
	EL PASO COUNTY, CO	**Date:**	**9/8/2022**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
OS1	77.26	2	10.0	67.2
OS2	15.03	7	4.1	21.1
OS3	1.00	2	0.2	1.2
OS4	9.60	9	3.8	17.3
OS5	40.26	8	11.7	56.2
OS6	60.97	2	3.9	27.4
OS7	24.03	2	6.8	45.8
OS8	13.46	2	3.2	21.6
OS9	1.25	2	0.4	2.5
OS10	11.42	2	2.8	19.2
EA1	0.22	73	0.7	1.3
EA2	0.25	73	0.8	1.5
EA3	0.20	71	0.7	1.4
EA4	0.17	65	0.5	1.1
EA5	0.16	2	0.1	0.4
EA6	0.70	100	3.1	5.5
EA7	0.65	89	2.5	4.7
EA8	2.08	99	5.0	9.0
EA9	2.99	64	4.6	9.5
EA10	1.34	94	4.0	7.4
EA11	1.99	66	4.1	8.5
EA12	0.92	4	0.5	2.9
EA13	0.44	84	1.8	3.3
EA14	0.81	70	2.6	5.2
EA15	0.31	84	1.2	2.3
EA16	0.64	86	2.6	4.9
EA17	0.34	91	1.4	2.6
EA18	0.60	54	1.4	3.1
EA19	1.08	98	4.9	8.9
EA20	0.13	100	0.6	1.1

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	OS1	10.0	67.2
2	EA1	0.7	1.3
3	EA2	0.8	1.5
3.1	DP2 & DP3	1.4	2.8
4	EA5 & DP3.1	0.1	0.4
5	EA3	0.7	1.4
6	EA4	0.5	1.1
6.1	DP5 & DP6	1.2	2.5
7	OS2	4.1	21.1
8	OS3	0.2	1.2
8.1	DP7 & DP8	3.9	22.4
9.1	DP6.1 & DP8.1	4.3	23.4
10	EA7	2.5	4.7
11	OS4	3.8	17.3
12	OS5	11.7	56.2
12.1	DP11 & DP12	19.0	92.5
13	OS10	2.8	19.2
13.1	DP12.1 & DP13	20.6	106.6
14	EA8	5.0	9.0
15	EA9	4.6	9.5
15.1	DP14 & DP15	9.3	17.9
16	OS6	57.9	514.4
17	EA10	4.0	7.4
18	EA11	4.1	8.5
18.1	DP17 & DP18	8.0	15.4
19.1	DP15.1 & DP18.1	15.0	29.5
20	EA12	0.5	2.9
21	OS7	6.8	45.8
22	EA13	1.8	3.3
23	EA14	2.6	5.2
23.1	DP22 & DP23	4.3	8.4
24	EA15	1.2	2.3
25	EA16	2.6	4.9
25.1	DP24 & DP25	3.8	7.2
26.1	DP23.1 & DP25.1	7.8	15.2
27	EA17	1.4	2.6
28	EA18	1.4	3.1
28.1	DP27 & DP28	2.7	5.4
29.1	DP26.1 & DP28.1	9.9	19.3
30	EA19	4.9	8.9
31	EA20	0.6	1.1
32	OS8	3.2	21.6
33	OS9	0.4	2.5

Include all offsite basins and DPs

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
EL PASO COUNTY, CO

Calc'd by: NQJ
Checked by:
Date: 9/8/2022

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED	SINGLE FAMILY	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED			SINGLE FAMILY			COMPOSITE IMPERVIOUSNESS & C		
	ACRES					%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}
OS1	77.26	0.00	0.00	77.26	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS2	14.33	0.70	0.00	15.03	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	7	0.13	0.39
OS3	1.00	0.00	0.00	1.00	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS4	8.90	0.70	0.00	9.60	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	9	0.15	0.40
OS5	37.90	2.36	0.00	40.26	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	8	0.14	0.40
OS6	60.97	0.00	0.00	60.97	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS7	24.03	0.00	0.00	24.03	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS8	13.46	0.00	0.00	13.46	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS9	1.25	0.00	0.00	1.25	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS10	11.42	0.00	0.00	11.42	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EA1	0.06	0.16	0.00	0.22	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	73	0.68	0.80
EA2	0.07	0.18	0.00	0.25	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	73	0.67	0.79
EA3	0.06	0.14	0.00	0.20	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	71	0.66	0.78
EA4	0.06	0.11	0.00	0.17	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	65	0.61	0.75
EA5	0.16	0.00	0.00	0.16	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EA6	0.00	0.70	0.00	0.70	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	100	0.90	0.96
EA7	0.07	0.58	0.00	0.65	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	89	0.81	0.90
EA8	0.02	2.06	0.00	2.08	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	99	0.89	0.95
EA9	1.11	1.88	0.00	2.99	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	64	0.60	0.74
EA10	0.08	1.26	0.00	1.34	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	94	0.85	0.92
EA11	0.69	1.30	0.00	1.99	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	66	0.62	0.75
EA12	0.90	0.02	0.00	0.92	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	4	0.11	0.37
EA13	0.07	0.37	0.00	0.44	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	84	0.77	0.86
EA14	0.25	0.56	0.00	0.81	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	70	0.65	0.77
EA15	0.05	0.26	0.00	0.31	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	84	0.77	0.86
EA16	0.09	0.55	0.00	0.64	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	86	0.79	0.88
EA17	0.03	0.31	0.00	0.34	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	91	0.83	0.91
EA18	0.28	0.32	0.00	0.60	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	54	0.52	0.68
EA19	0.02	1.06	0.00	1.08	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	98	0.89	0.95
EA20	0.00	0.13	0.00	0.13	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	100	0.90	0.96
POND A				0.63											55		
POND B				9.32											71		
POND C				4.22											82		
TSB #1				1.35											90		
TSB #2				0.13											100		
Total				270.17													

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**NQJ**
	PROPOSED CONDITIONS	**Checked by:**	
	EL PASO COUNTY, CO	**Date:**	**9/8/2022**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)
OS1	0.09	77.26	253	5.2	17.0	10	4000	2.4	1.5	43.0	60.0
OS2	0.13	15.03	220	2.3	20.0	10	1560	2.3	1.5	17.1	37.2
OS3	0.09	1.00	300	2.1	25.0	10	1670	2.3	1.5	18.4	43.4
OS4	0.15	9.60	153	3.1	14.8	10	1124	2.5	1.6	11.8	26.6
OS5	0.14	40.26	300	4.4	18.7	10	1921	2.6	1.6	19.9	38.5
OS6	0.09	60.97	300	1.0	32.1	10	3900	1.0	1.0	65.0	97.1
OS7	0.09	24.03	117	11.6	8.8	10	1162	3.4	1.8	10.5	19.4
OS8	0.09	13.46	132	3.2	14.4	10	1420	3.5	1.9	12.7	27.1
OS9	0.09	1.25	148	4.0	14.2	10	418	3.0	1.7	4.0	18.2
OS10	0.09	11.42	168	2.9	16.8	10	840	3.1	1.8	8.0	24.8
EA1	0.68	0.22	34	2.0	3.6	20	595	1.4	2.4	4.2	7.8
EA2	0.67	0.25	34	2.0	3.6	20	583	1.4	2.4	4.1	7.7
EA3	0.66	0.20	34	2.0	3.8	20	152	1.4	2.4	1.1	5.0
EA4	0.61	0.17	34	2.0	4.1	20	164	3.8	3.9	0.7	5.0
EA5	0.09	0.16	26	2.0	7.5	20	385	0.5	1.4	4.5	12.0
EA6	0.90	0.70	26	2.0	1.5	20	700	1.7	2.6	4.5	6.0
EA7	0.81	0.65	24	2.0	2.0	20	700	1.7	2.6	4.5	6.5
EA8	0.89	2.08	26	2.0	1.5	20	2500	0.7	1.7	24.9	26.4
EA9	0.60	2.99	26	2.0	3.7	20	2500	0.7	1.7	24.9	28.6
EA10	0.85	1.34	26	2.0	1.8	20	1220	0.6	1.5	13.1	15.0
EA11	0.62	1.99	26	2.0	3.6	20	1220	0.6	1.5	13.1	16.7
EA12	0.11	0.92	30	10.0	4.6	20	95	0.5	1.4	1.1	5.7
EA13	0.77	0.44	26	2.0	2.4	20	600	4.0	4.0	2.5	5.0
EA14	0.65	0.81	26	2.0	3.3	20	600	4.0	4.0	2.5	5.8
EA15	0.77	0.31	26	2.0	2.5	20	275	1.7	2.6	1.8	5.0
EA16	0.79	0.64	26	2.0	2.3	20	260	2.4	3.1	1.4	5.0
EA17	0.83	0.34	26	2.0	2.0	20	506	1.5	2.4	3.4	5.5
EA18	0.52	0.60	26	2.0	4.3	20	506	1.5	2.4	3.4	7.7
EA19	0.89	1.08	30	25.0	0.7	20	90	0.5	1.4	1.1	5.0
EA20	0.90	0.13	26	2.0	1.5	20	90	1.0	2.0	0.8	5.0

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

* For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: NQJ
Checked by:
Date: 9/8/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	OS1	77.26	0.09	60.0	6.95	1.44	10.0															BASIN OS1 CAPTURED IN EXISTING SWALE @ DP1, FOLLOWS HISTORIC DRAINAGE PATTERNS TO CHANNEL B
	2	EA1	0.22	0.68	7.8	0.15	4.51	0.7								0.7	0.15	2.0	1.5	56	10.2	0.09	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
	3	EA2	0.25	0.67	7.7	0.17	4.52	0.8								0.8	0.17						BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
	3.1								7.9	0.32	4.49	1.4				1.4	0.32	2.0	1.5	85	10.2	0.14	COMBINED DP2 & DP3 @ DP3.1, PIPE TO DP4 (POND A)
	4	EA5	0.16	0.09	12.0	0.01	3.85	0.1	12.0	0.33	3.85	1.3											**COMBINED DP3.1 & BASIN 3, TOTAL FLOW ENTERING POND A**

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: NQJ
Checked by:
Date: 9/8/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	5	EA3	0.20	0.66	5.0	0.13	5.17	0.7								0.7	0.13	2.0	1.5	48	10.2	0.08	BASIN EA3 CAPTURED IN 5' TYPE R INLET @ DP5, PIPE TO DP6.1
	6	EA4	0.17	0.61	5.0	0.10	5.17	0.5								0.5	0.10	2.0	1.5				BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
	6.1								5.1	0.24	5.15	1.2				0.0	0.24	2.0	1.5	1146	10.2	1.88	DP3 & DP4 FLOW @ DP5.1, PIPE TO DP9.1
	7	OS2	15.03	0.13	37.2	1.92	2.16	4.1								4.1	1.92	2.0	1.5	44	10.2	0.07	BASIN OS2 CAPTURED IN 18" FES, PIPE TO DP8.1
	8	OS3	1.00	0.09	43.4	0.09	1.93	0.2								0.2	0.09	2.0	1.5	38	10.2	0.06	BASIN OS3 CAPTURED IN 18" FES, PIPE TO DP8.1
	8.1								43.4	2.01	1.93	3.9				0.0	2.01	2.0	1.5	183	10.2	0.30	COMBINED DP7 & DP8 @ DP8.1, PIPE TO DP9.1
	9.1								43.7	2.25	1.92	4.3	4.3	2.25	1.7					620	2.6	3.96	COMBINED DP6.1 & DP8.1 @ DP9.1, DISCHARGE TO ROADSIDE SWALE TO DP11
		EA6	0.70	0.90	6.0	0.63	4.91	3.1															BASIN EA6 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
	10	EA7	0.65	0.81	6.5	0.53	4.77	2.5	6.5	1.16	4.77	5.5											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
	11	OS4	9.60	0.15	26.6	1.43	2.66	3.8	47.7	3.68	1.79	6.6				6.6	3.68	2.0	2.0	85	10.2	0.14	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (54 CFS) IN 30" FES @ DP11, PIPE TO DP12.1
	12	OS5	40.26	0.14	38.5	5.54	2.11	11.7								11.7	5.54	2.0	2.0	616	10.2	1.01	BASIN OS5 CAPTUREDI N 48" FES @ DP12, PIPE TO DP12.1
	12.1								39.5	9.21	2.07	19.0				19.0	9.21	2.0	3.5	891	10.2	1.46	COMBINED DP11 & DP12 @ DP12.1, PIPE TO DP13.1
	13	OS10	11.42	0.09	24.8	1.03	2.77	2.8								2.8	1.03	2.0	2.0	28	10.2	0.05	BASIN OS10 CAPTURED @ DP13 IN TYPE C INLET, PIPE TO DP13.1
	13.1								41.0	10.24	2.01	20.6											COMBINED DP12.1 & DP13, PIPE TO CHANNEL B
	14	EA8	2.08	0.89	26.4	1.86	2.67	5.0								5.0	1.86	2.0	2.0	8	10.2	0.01	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
	15	EA9	2.99	0.60	28.6	1.79	2.55	4.6								4.6	1.79	2.0	2.0	54	10.2	0.09	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
	15.1								28.7	3.65	2.55	9.3				9.3	3.65	2.0	2.0	641	10.2	1.05	COMBINED DP14 & DP15, PIPE TO DP19.1
	16	OS6	60.97	0.09	97.1	5.49	0.72	3.9				57.9											BASIN OS6 BASIN & MERIDIAN DPG12 (54 CFS), BYPASSED UNDER EASTONVILLE ROAD IN DUAL 10' x 3.5' CULVERTS
	17	EA10	1.34	0.85	15.0	1.14	3.52	4.0								4.0	1.14	2.0	2.0	52	10.2	0.09	BASIN EA10 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
	18	EA11	1.99	0.62	16.7	1.23	3.36	4.1								4.1	1.23	2.0	2.0	52	10.2	0.09	BASIN EA11 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
	18.1								16.8	2.37	3.35	8.0				8.0	2.37	2.0	2.0	157	10.2	0.26	COMBINED DP17 & DP18 @ DP18.1, PIPE TO DP19.1
	19.1								29.8	6.02	2.49	15.0				15.0	6.02	2.0	2.0	42	10.2	0.07	COMBINED DP15.1 & DP18.1, PIPE TO DP20
	20	EA12	0.92	0.11	5.7	0.10	4.96	0.5	29.8	6.12	2.49	15.2											**COMBINED DP19.1 & BASIN EA12, TOTAL FLOW ENTERING POND B**

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: NQJ
Checked by:
Date: 9/8/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	21	OS7	24.03	0.09	19.4	2.16	3.14	6.8															BASIN OS7 CAPTURED IN 30" FES, PIPED TO CHANNEL A
	22	EA13	0.44	0.77	5.0	0.34	5.17	1.8								1.8	0.34	2.0	2.0	93	10.2	0.15	BASIN EA13 CAPTURED IN 5' TYPE R SUMP @ DP22, PIPE TO DP23.1
	23	EA14	0.81	0.65	5.8	0.53	4.94	2.6								2.6	0.53	2.0	2.0				BASIN EA14 CAPTURED IN 5' TYPE R SUMP @ DP23, PIPE TO DP23.1
	23.1								5.8	0.87	4.94	4.3				4.3	0.87	2.0	2.0	268	10.2	0.44	COMBINED DP22 & DP23, PIPE TO DP26.1
	24	EA15	0.31	0.77	5.0	0.24	5.17	1.2								1.2	0.24	2.0	2.0	54	55.0	0.02	BASIN EA15 CAPTURED IN 5' TYPE R SUMP @ DP24, PIPE TO DP25.1
	25	EA16	0.64	0.79	5.0	0.50	5.17	2.6								2.6	0.50	2.0	2.0				BASIN EA16 CAPTURED IN 5' TYPE R SUMP @ DP25, PIPE TO DP25.1
	25.1								5.0	0.74	5.16	3.8				3.8	0.74	2.0	2.0	50	55.0	0.02	COMBINED DP24 & DP25, PIPE TO DP26.1
	26.1								6.3	1.61	4.83	7.8				7.8	1.61	2.0	2.0	350	55.0	0.11	COMBINED DP23.1 & DP25.1, PIPE TO DP29.1
	27	EA17	0.34	0.83	5.5	0.28	5.04	1.4								1.4	0.28	2.0	2.0	54	55.0	0.02	BASIN EA17 CAPTURED IN 5' TYPE R SUMP @ DP27, PIPE TO DP28.1
	28	EA18	0.60	0.52	7.7	0.31	4.52	1.4								1.4	0.31	2.0	2.0				BASIN EA18 CAPTURED IN 5' TYPE R SUMP @ DP28, PIPE TO DP28.1
	28.1								7.7	0.59	4.52	2.7				2.7	0.59	2.0	2.0	385	55.0	0.12	COMBINED DP27 & DP28, PIPE TO DP29.1
	29.1								7.8	2.20	4.49	9.9				9.9	2.20	2.0	2.0	802	55.0	0.24	COMBINED 26.1 & DP28.1, PIPE TO DP30
	30	EA19	1.08	0.89	5.0	0.96	5.17	4.9	8.1	3.16	4.45	14.0											**COMBINED DP29.1 & BASIN EA19, TOTAL FLOW ENTERING POND C**
	31	EA20	0.13	0.90	5.0	0.12	5.17	0.6															**BASIN EA20 FLOW DIRECTLY TO TSB #2**
	32	OS8	13.46	0.09	27.1	1.21	2.63	3.2															BASIN OS8 CAPTURED IN 24" FES, BYPASSED UNDER EASTONVILLE, FOLLOWS HISTORIC DRAINAGE PATTERNS
	33	OS9	1.25	0.09	18.2	0.11	3.23	0.4															BASIN OS9 CAPTURED IN 24" FES, BYPASSED UNDER EASTONVILLE, FOLLOWS HISTORIC DRAINAGE PATTERNS

HRGreen

EASTONVILLE ROAD

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**AXB**
Checked by:	
Date:	**9/8/2022**

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	1	OS1	77.26	0.36	60.0	27.81	2.42	67.2															BASIN OS1 CAPTURED IN EXISTING SWALE @ DP1, FOLLOWS HISTORIC DRAINAGE PATTERNS TO CHANNEL B
	2	EA1	0.22	0.80	7.8	0.18	7.57	1.3								1.3	0.18	2.0	1.5	56	45.4	0.02	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
	3	EA2	0.25	0.79	7.7	0.20	7.58	1.5								1.5	0.20						BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
	3.1								7.8	0.37	7.56	2.8				2.8	0.37	2.0	1.5	85	45.4	0.03	COMBINED DP2 & DP3 @ DP231, PIPE TO DP4 (POND A)
	4	EA5	0.16	0.36	12.0	0.06	6.47	0.4	12.0	0.43	6.47	2.8											**COMBINED DP3.1 & BASIN 3, TOTAL FLOW ENTERING POND A**

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by: AXB
Checked by:
Date: 9/8/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	5	EA3	0.20	0.78	5.0	0.16	8.68	1.4								1.4	0.16	2.0	1.5	48	45.4	0.02	BASIN EA3 CAPTURED IN 5' TYPE R INLET @ DP5, PIPE TO DP6.1
	6	EA4	0.17	0.75	5.0	0.13	8.68	1.1								1.1	0.13	2.0	1.5				BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
	6.1								5.0	0.28	8.67	2.5				0.0	0.28	2.0	1.5	1146	45.4	0.42	DP3 & DP4 FLOW @ DP5.1, PIPE TO DP9.1
	7	OS2	15.03	0.39	37.2	5.83	3.62	21.1								21.1	5.83	2.0	1.5	44	45.4	0.02	BASIN OS2 CAPTURED IN 18" FES, PIPE TO DP8.1
	8	OS3	1.00	0.36	43.4	0.36	3.23	1.2								1.2	0.36	2.0	1.5	38	45.4	0.01	BASIN OS3 CAPTURED IN 18" FES, PIPE TO DP8.1
	8.1								37.2	6.19	3.62	22.4				0.0	6.19	2.0	1.5	183	45.4	0.07	COMBINED DP7 & DP8 @ DP8.1, PIPE TO DP9.1
	9.1								37.2	6.47	3.62	23.4	23.4	6.47	1.7					620	2.6	3.96	COMBINED DP6.1 & DP8.1 @ DP9.1, DISCHARGE TO ROADSIDE SWALE TO DP11
		EA6	0.70	0.96	6.0	0.67	8.24	5.5															BASIN EA6 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
	10	EA7	0.65	0.90	6.5	0.58	8.01	4.7	6.5	1.25	8.01	10.0											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
	11	OS4	9.60	0.40	26.6	3.88	4.46	17.3	41.2	10.35	3.36	88.8				88.8	10.35	2.0	2.0	85	55.0	0.03	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (54 CFS) IN 30" FES @ DP11, PIPE TO DP12.1
	12	OS5	40.26	0.40	38.5	15.91	3.53	56.2								56.2	15.91	2.0	2.0	616	55.0	0.19	BASIN OS5 CAPTUREDI N 48" FES @ DP12, PIPE TO DP12.1
	12.1								38.7	26.26	3.52	92.5				92.5	26.26	2.0	3.5	891	79.9	0.19	COMBINED DP11 & DP12 @ DP12.1, PIPE TO DP13.1
	13	OS10	11.42	0.36	24.8	4.11	4.68	19.2								19.2	4.11	2.0	2.0	28	55.0	0.01	BASIN OS10 CAPTURED @ DP13 IN TYPE C INLET, PIPE TO DP13.1
	13.1								38.9	30.37	3.51	106.6											COMBINED DP12.1 & DP13, PIPE TO CHANNEL B
	14	EA8	2.08	0.95	26.4	1.98	4.51	9.0								9.0	1.98	2.0	2.0	8	55.0	0.00	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
	15	EA9	2.99	0.74	28.6	2.20	4.32	9.5								9.5	2.20	2.0	2.0	54	55.0	0.02	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
	15.1								28.6	4.19	4.28	17.9				17.9	4.19	2.0	2.0	641	55.0	0.19	COMBINED DP14 & DP15, PIPE TO DP19.1
	16	OS6	60.97	0.36	97.1	21.95	1.25	27.4				514.4											BASIN OS6 BASIN & MERIDIAN DPG12 (487 CFS), BYPASSED UNDER EASTONVILLE ROAD IN DUAL 10' x 3.5' CULVERTS
	17	EA10	1.34	0.92	15.0	1.24	5.94	7.4								7.4	1.24	2.0	2.0	52	55.0	0.02	BASIN EA10 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
	18	EA11	1.99	0.75	16.7	1.50	5.67	8.5								8.5	1.50	2.0	2.0	52	55.0	0.02	BASIN EA11 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
	18.1								16.7	2.73	5.64	15.4				15.4	2.73	2.0	2.0	157	55.0	0.05	COMBINED DP17 & DP18 @ DP18.1, PIPE TO DP19.1
	19.1								28.8	6.92	4.26	29.5				29.5	6.92	2.0	2.0	42	55.0	0.01	COMBINED DP15.1 & DP18.1, PIPE TO DP20
	20	EA12	0.92	0.37	5.7	0.34	8.35	2.9	28.8	7.27	4.26	31.0											**COMBINED DP19.1 & BASIN EA12, TOTAL FLOW ENTERING POND B**

HRGreen

EASTONVILLE ROAD

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by: AXB

Checked by:

Date: 9/8/2022

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	21	OS7	24.03	0.36	19.4	8.65	5.30	45.8															BASIN OS7 CAPTURED IN 30" FES, PIPED TO CHANNEL A
	22	EA13	0.44	0.86	5.0	0.38	8.70	3.3								3.3	0.38	2.0	2.0	93	55.0	0.03	BASIN EA13 CAPTURED IN 5' TYPE R SUMP @ DP22, PIPE TO DP23.1
	23	EA14	0.81	0.77	5.8	0.63	8.31	5.2								5.2	0.63	2.0	2.0				BASIN EA14 CAPTURED IN 5' TYPE R SUMP @ DP23, PIPE TO DP23.1
	23.1								5.8	1.01	8.29	8.4				8.4	1.01	2.0	2.0	268	55.0	0.08	COMBINED DP22 & DP23, PIPE TO DP26.1
	24	EA15	0.31	0.86	5.0	0.27	8.70	2.3								2.3	0.27	2.0	2.0	54	55.0	0.02	BASIN EA15 CAPTURED IN 5' TYPE R SUMP @ DP24, PIPE TO DP25.1
	25	EA16	0.64	0.88	5.0	0.56	8.70	4.9								4.9	0.56	2.0	2.0				BASIN EA16 CAPTURED IN 5' TYPE R SUMP @ DP25, PIPE TO DP25.1
	25.1								5.0	0.83	8.67	7.2				7.2	0.83	2.0	2.0	50	55.0	0.02	COMBINED DP24 & DP25, PIPE TO DP26.1
	26.1								5.9	1.84	8.25	15.2				15.2	1.84	2.0	2.0	350	55.0	0.11	COMBINED DP23.1 & DP25.1, PIPE TO DP29.1
	27	EA17	0.34	0.91	5.5	0.31	8.48	2.6								2.6	0.31	2.0	2.0	54	55.0	0.02	BASIN EA17 CAPTURED IN 5' TYPE R SUMP @ DP27, PIPE TO DP28.1
	28	EA18	0.60	0.68	7.7	0.41	7.60	3.1								3.1	0.41	2.0	2.0				BASIN EA18 CAPTURED IN 5' TYPE R SUMP @ DP28, PIPE TO DP28.1
	28.1								7.7	0.72	7.58	5.4				5.4	0.72	2.0	2.0	385	55.0	0.12	COMBINED DP27 & DP28, PIPE TO DP29.1
	29.1								7.8	2.55	7.54	19.3				19.3	2.55	2.0	2.0	802	55.0	0.24	COMBINED 26.1 & DP28.1, PIPE TO DP30
	30	EA19	1.08	0.95	5.0	1.02	8.70	8.9	8.1	3.58	7.47	26.7											**COMBINED DP29.1 & BASIN EA19, TOTAL FLOW ENTERING POND C**
	31	EA20	0.13	0.96	5.0	0.12	8.70	1.1															**BASIN EA20 FLOW DIRECTLY TO TSB #2**
	32	OS8	13.46	0.36	27.1	4.85	4.45	21.6															BASIN OS8 CAPTURED IN 24" FES, BYPASSED UNDER EASTONVILLE, FOLLOWS HISTORIC DRAINAGE PATTERNS
	33	OS9	1.25	0.36	18.2	0.45	5.45	2.5															BASIN OS9 CAPTURED IN 24" FES, BYPASSED UNDER EASTONVILLE, FOLLOWS HISTORIC DRAINAGE PATTERNS

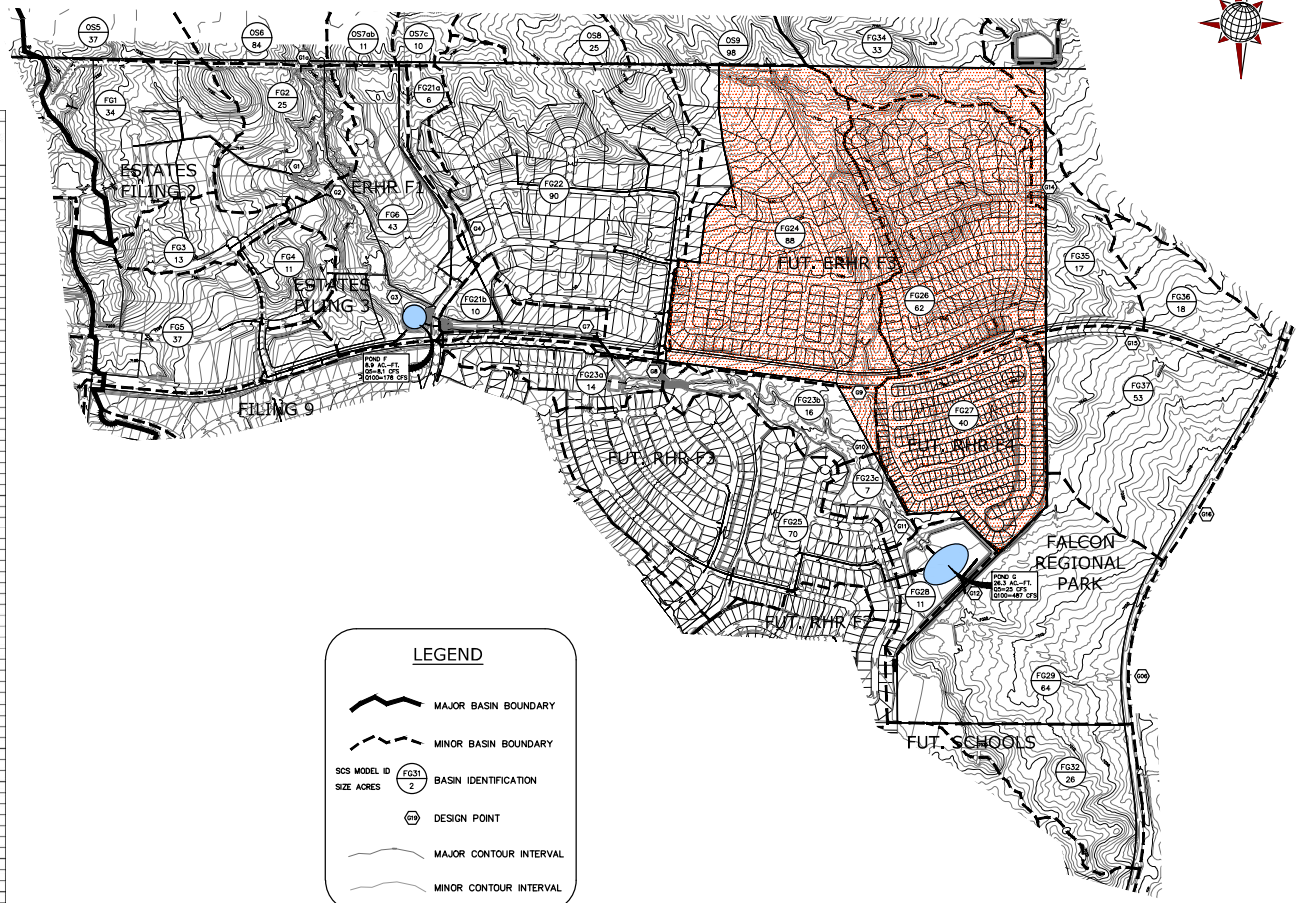
Include all offsite basins and DPs

APPENDIX C – HYDRAULIC CALCULATIONS

APPENDIX E – REFERENCE MATERIAL

MERIDIAN RANCH 2021
MDDP AMENDMENT

GRAPHIC SCALE
500 0 250 500 1000 2000
(IN FEET)
1 inch = 500 ft.



LEGEND
- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY
- SCS MODEL ID / SIZE ACRES — FG31 / 2 — BASIN IDENTIFICATION
- DP1 — DESIGN POINT
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL

FUTURE SCS (Full Spectrum)

	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE C5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	11.6	3.8	0.5
G1a	0.1313	80	52	11.6	3.8	0.5
G1a-G2	0.1313	79	52	11.5	3.7	0.5
OS05	0.0578	39	26	5.3	1.8	0.2
OS35-C1	0.0578	39	25	5.5	1.7	0.2
FG01	0.0538	31	22	7.3	3.4	0.9
FG01-C1	0.0538	31	22	7.3	3.4	0.9
G1	0.1116	61	41	11.0	4.9	1.1
G1-G2	0.1116	61	41	10.9	4.8	1.1
FG02	0.0391	32	22	6.4	2.7	0.5
G2	0.2820	167	112	27.3	10.3	1.9
G2-G3	0.2820	164	109	27.1	10.2	1.9
FG03	0.0203	24	17	5.9	3.0	0.8
FG04	0.0172	22	16	5.8	3.1	0.9
G3	0.3195	185	123	30.9	12.1	2.4
FG06	0.0675	56	40	12.2	5.8	1.3
FG05	0.0580	45	33	12.2	6.7	2.4
OS07ab	0.0170	14	9	2.5	0.9	0.1
OS07a-POND F	0.0170	13	9	2.3	0.9	0.1
POND F IN	0.4620	286	202	55.8	23.4	5.1
POND F	0.4620	178	122	16.4	8.1	2.1
POND F-G7	0.4620	178	121	16.4	8.1	2.1
OS07c	0.0156	15	10	2.3	1.0	0.1
OS07c-G4	0.0156	14	9	2.3	0.9	0.1
FG21a	0.0095	6	4	1.3	0.4	0.1
G4	0.0251	20	13	3.3	1.3	0.2
G4-G7	0.0251	18	13	3.3	1.2	0.2
FG21c	0.0150	21	16	6.3	3.9	1.7
G7	0.5021	192	130	18.0	8.9	2.3
G7-G8	0.5021	191	130	18.0	8.9	2.3
FG22	0.1409	125	90	32.4	17.1	5.4
OS08	0.0394	34	24	7.5	3.3	0.7
OS38-G8	0.0394	33	23	7.3	3.3	0.7
FG23a	0.0216	21	15	5.2	2.7	0.8
G8	0.7040	285	181	50.6	26.8	8.3
G8-G10	0.7040	284	181	49.7	26.2	8.1
OS09	0.1527	90	62	18.3	8.2	1.9
OS39-G9	0.1527	89	62	18.0	8.2	1.9
FG24	0.1372	134	100	41.1	24.2	10.4
G9	0.2899	200	141	44.2	24.2	10.4
G9-G10	0.2899	176	120	32.3	12.9	2.6
FG23c	0.0247	17	11	2.9	0.9	0.1
G10	1.0186	470	302	65.8	21.6	6.5
G10-G11	1.0186	486	300	65.8	27.7	8.2
FG23e	0.0113	11	7	2.4	1.1	0.2
G11	1.0299	470	302	66.4	28.3	8.3
FG25	0.1086	112	85	36.0	21.6	5.9
FG26	0.0970	101	77	35.2	22.7	11.3
FG26-POND G	0.0970	100	77	35.0	22.4	11.1
FG27	0.0614	82	55	33.8	23.7	14.9
FG28	0.0166	13	9	2.9	1.0	0.2
POND G IN	1.3135	697	449	151.5	81.3	34.8
POND G	1.3135	487	342	61.7	25.1	5.6
G12	1.3135	487	342	61.7	25.1	5.6
G12-G06	1.3135	487	342	61.6	25.1	5.6
FG29	0.0997	64	42	10.3	3.6	0.6
FG32	0.0402	72	57	28.7	16.8	11.1
FG32-G06	0.0402	69	54	26.6	16.2	10.5
G06	1.4534	514	360	66.1	27.0	10.6
FG37	0.0638	58	90	41.4	26.8	13.4
FG34	0.0516	40	86	40.6	26.5	13.1
G14	0.0516	40	67	30.9	20.1	10.2
G14-G15	0.0516	39	65	29.5	19.5	10.0
FG35	0.0263	15	36	14.3	8.3	3.2
G15	0.0779	54	36	14.0	8.0	3.2
G15-G08	0.0779	52	31	12.2	7.0	2.7
FG36	0.0273	17	215	94.1	56.8	28.7
FG38-G08	0.0273	17	77	32.4	16.8	6.6
G16	0.1880	124	56	28.1	16.6	9.8

*NOTE: PRELIMINARY STORAGE VOLUMES AND OUTFLOW QUANTITIES HAVE BEEN PROVIDED FOR EACH OF THE FUTURE DETENTION FACILITIES LOCATED WITHIN THE DEVELOPMENT. THE ACTUAL STORAGE VOLUMES AND DISCHARGE RATES WILL BE DETERMINED UPON A COMPLETE ANALYSIS FOR EACH DETENTION FACILITY PRIOR TO CONSTRUCTION. THE VALUES GIVEN FOR DISCHARGE AND VOLUME ARE ESTIMATES FOR PLANNING PURPOSES ONLY.

FUTURE CONDITIONS - SCS MAP

FIGURE 5

No.	Revisions	Date	Init.	Appr.	Date
-					
-					
-					

TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.3349

MERIDIAN RANCH

FUTURE CONDITIONS - SCS MAP
2021 SKETCH PLAN AMENDMENT
REVISED MDDP

Drawn by TJK
Checked by RG
Date MAR 2022
Scale AS SHOWN
- of -

HRGREEN.COM

Please only include one set of each item in these appendices. Add a note to the appendix title sheet of whichever is deleted to see the other set in the other report appendix.

Grandview Reserve
CLOMR REPORT

July 2022

HR Green Project No: 201662.03

Prepared By:

HR Green Development, LLC

Contact: Greg Panza, PE

gpanza@hrgreen.com

720-602-4999

Table of Contents

Grandview Reserve CLOMR Report

Project Narrative

This report was prepared by HR Green to support the submission of MT-2 forms and documents in a request for a Conditional Letter of Map Revision (CLOMR) for channel improvements along Geick Ranch Tributary 1 and Geick Ranch Tributary 2. This request impacts the current delineation of the 100-year boundary on Flood Insurance Rate Maps (FIRMs) 08041C0552G and 08041C0556G.

Grandview Reserve is located in Falcon, Colorado within El Paso County and contains approximately 776 acres within the south half of section 21 and 22 and the north half of section 27 and 28, Township 12 South, and Range 66 West of the Sixth Principal Meridian in Ela Paso County, Colorado.

Grandview Reserve (GVR) falls within the Gieck Ranch Drainage Basin which covers approximately 22 square miles. This drainage basin is tributary to Black Squirrel Creek and joins said creek just to the south of Elicott, CO about 18 miles to the south. Black Squirrel Creek eventually drains to the Arkansas River in Pueblo Colorado. Much of the Gieck Ranch Drainage basin is undeveloped consisting of rural farmland. The Gieck Ranch Drainage basin lies north of the Haegler Ranch drainage basin. The channels through the Grandview property can all be described as gently sloping drainages that roll through the site towards the creeks, they are tributary too.

Per the NRCS web soil survey, the site is made up entirely of Type A and B soils. The majority of which are Type A soils. The predominate soils are Blakeland loamy sand, Columbine gravelly sandy loam, and Stapleton sandy loam. The first two soils are Type A soil and cover approximately 55.1% of the site and the later soil is a Type B soil and covers the remaining 44.9% of the site.

The vegetation found within Grandview Reserve consists of wetland communities in the floodplain with a transitional area to shortgrass prairie communities that dominate the site. The primary species found in the shortgrass prairie regions include little bluestem, blue grama, and buffalograss. The transitional area between the wetlands and shortgrass prairie includes patches of snowberry, and wood's rose. There are a few plains cottonwoods along the main channels. The area has historically been heavily grazed and there are weeds throughout the site. Weeds found onsite include Canada thistle, Russian thistle, common mullein and yellow toadflax spp.

Observations of the existing channels suggest that by and large they are equilibrium with their watershed flows; evidence including relatively stable bankfull channels, adequate floodplain (above bankfull channel elevations) and in-tact plant communities that would be expected in this type of reach support the notion that the reach is in equilibrium.

At present, the preliminary analysis and design of Geick Ranch Tributary 1 (GRT1) and Geick Ranch Tributary 2 (GRT2) has been completed. Geick Ranch Tributary 1 is to by and large be left in its current state with the exception of the reach surrounding the existing breached stock pond berm. This berm is to be removed and the surrounding region is to be regraded and stabilized to match the existing channel conditions.

Proposed improvements for Geick Ranch Tributary 2 include the realignment of the channel, generally shifting the channel towards the west to accommodate the proposed land plan. There is to be a dedicated 100' wide corridor in which the valley will meander. The valley is the area needed to fully contain the 100 year event plus freeboard requirements. Preliminary analysis indicates the valley will have an average width of approximately 63'; initial sizing approximates the bankfull width to be 8.8' – 13.8'. The valley and channel thalweg will generally follow the same profile, with some deviation as the bankfull channel meanders through the valley in turn decreasing the low

flow channels average slope. The average valley profile is to be approximately 1% with a series of grade control structures to both decrease elevation and dissipate energy to meet natural channel criteria as outline in El Paso County criteria and agreed upon channel parameters.

Hydrology

For modeling the floodplain, flows were assumed to remain the same as presented in the 4 Way Ranch LOMR completed by Kiowa Engineering in March of 2004. Flows are to remain the same and increased runoff attributed to development will be controlled by the various ponds that are to be constructed near the channel.

Per the existing LOMR completed in March 2004, the 100-year flow corresponds to ~280 cfs as GRT2 enters the north boundary of the site (station 45+30 along the existing channel alignment). As the channel works through the existing site, the 100 year flows increase to ~391 cfs at station 22+59 along the existing channel alignment and ~597 cfs at station 6+14 along the existing channel alignment. Along GRT1 in the existing condition there is a minor increase in flow attributed to overland flow from the basin. See Table 1 and Table 2 for summaries of existing flows for GRT1 and GRT2 respectively.

Table 1 - EXISTING FLOWS FOR GEICK RANCH TRIBUTARY 1

STATION	2-YR STORM	5-YR STORM	100-YR STORM
37+13	23 cfs	67 cfs	413 cfs
25+92	26.45 cfs	80.03 cfs	479.80 cfs
15+57	26.45 cfs	80.03 cfs	479.80 cfs

Table 2 - EXISTING FLOWS FOR GEICK RANCH TRIBUTARY 2

STATION	2-YR STORM	5-YR STORM	100-YR STORM
45+30	19 cfs	59 cfs	280 cfs
22+59	20.14 cfs	68.95 cfs	390.70 cfs
6+14	22.14 cfs	85.99 cfs	597.42 cfs

Future hydrology derived via CUHP was modeled in SWMM to determine future flow rates anticipated along GRT1 and the realigned GRT2 channel. Table 3 and Table 4 summarize all future flows for GRT1 and the realigned portion of GRT2 respectively.

Table 3 - FUTURE FLOWS FOR GEICK RANCH TRIBUTARY 1

STATION	2-YR STORM	5-YR STORM	100-YR STORM
37+13	23 cfs	67 cfs	413 cfs
25+92	23 cfs	67 cfs	413 cfs
15+57	27.75 cfs	67.69 cfs	466.95 cfs

Table 4- FUTURE FLOWS FOR GEICK RANCH TRIBUTARY 2

STATION	2-YR STORM	5-YR STORM	100-YR STORM
47+49	19 cfs	59 cfs	280 cfs
36+50	31.72 cfs	60.52 cfs	395.83 cfs
5+54	33.53 cfs	63.16 cfs	553.68 cfs

(See previous comments about Meridian Ranch MDDP flows. A note should be made on this page regarding the differences.)

Hydraulics

Design criteria were developed to guide a preliminary layout of channel dimension, planform, and profile for the realigned segment of GRT2. Published criteria from the Urban Stormwater Drainage Criteria Manual, Volume 1 (USDCM; Urban Drainage and Flood Control District, 2016), El Paso County DCM and various other reports currently in process for the drainages through GVR and completed for GVR drainages were used for initial design parameter and flow rates. Parameters used and minimum bankfull geometry is summarized in Table 5.

Table 5 - DESIGN PARAMETERS

Design Parameter	Design Value
Roughness values	EPC Table 10-2
Maximum 5-year velocity, main channel (within bankfull channel width) (ft/s)	EPC: 2.5 ft/s MHFD: 5 ft/s*
Maximum 100-year velocity, main channel (within bankfull channel width) (ft/s)	EPC: 2.5 ft/s MHFD: 7 ft/s*
Froude No., 5-year, main channel (within bankfull channel width)	0.7
Froude No., 100-year, main channel (within bankfull channel width)	0.85
Maximum shear stress, 100-year, main channel (within bankfull channel width)	1.2 lb/sf
Minimum bankfull capacity of bankfull channel (based on future development conditions)	2 year, 19 - 33.5 cfs
Minimum bankfull channel geometry[1]	
Design Channel Type	C4
Entrenchment Ratio	2.7-31.65 (x=5.26)
Width to depth ratio	13.5-75.0 (x=29.28)
Sinuosity	1.43-2.80 (x=1.92)
Slope	0.0001-0.0184 (x=0.0045)
D_{50}	12-14mm (~0.5 in)
d_{84}	32-48mm (~1.6in)
Meander Length[2]	34-92 (x=56)
Belt Width[2]	18-55 (x=32)
Radius of Curvature[2]	7-28 (x=11)
Minimum Floodplain Terrace	6 ft
Maximum overbank side slope	4(H):1(V)
Maximum bankfull side slope	2.5(H):1(V)
Maximum bankfull side slope	2.5(H):1(V)
Minimum bottom width[3]	4.8 ft
Freeboard	1.5 ft

[1] These values were derived from empirical data and will be used as guidelines for design and will be used in conjunction with hydraulic regime equations as outlined in "Spreadsheet Tools for River Evaluation, Assessment, and Monitoring: The STREAM Diagnostic Modules"
[2] These values are derived from "Spreadsheet Tools for River Evaluation, Assessment, and Monitoring: The STREAM Diagnostic Modules"
[3] Minimum bottom width shown is for the low flow channel only. The main channel will be ~41 ft wide

The 2-year frequency was selected for the design of the bankfull channel to approximate the flow most likely to govern a stable geometry. Prior reports estimated future 2-year flow as ~15-cfs and assumes no culvert effects; i.e., open channel flow un-affected by a culvert. The future 2-year flow (19-33.5 cfs) was used to size the low flow

HRGreen

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Grandview Reserve
CLOMR REPORT

July 2022

HR Green Project No: 201662.03

Prepared By:

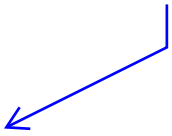
HR Green Development, LLC

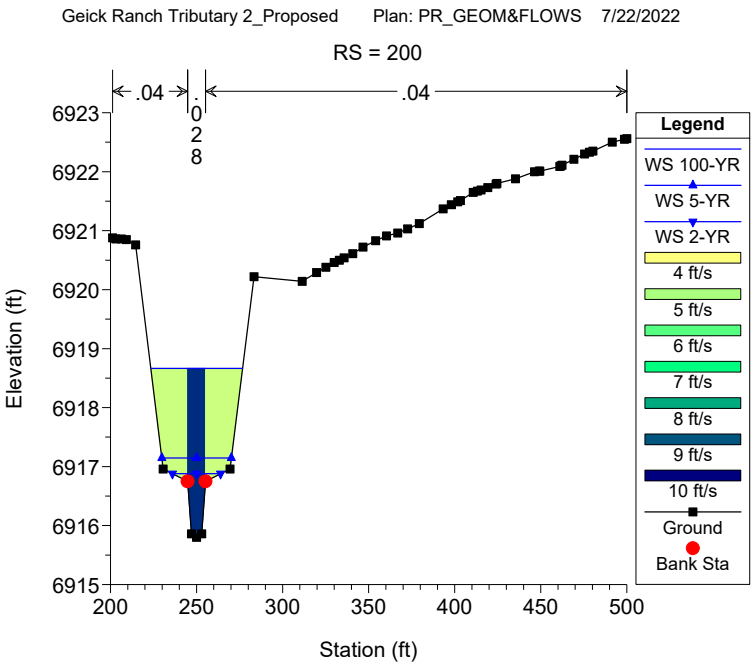
Contact: Greg Panza, PE

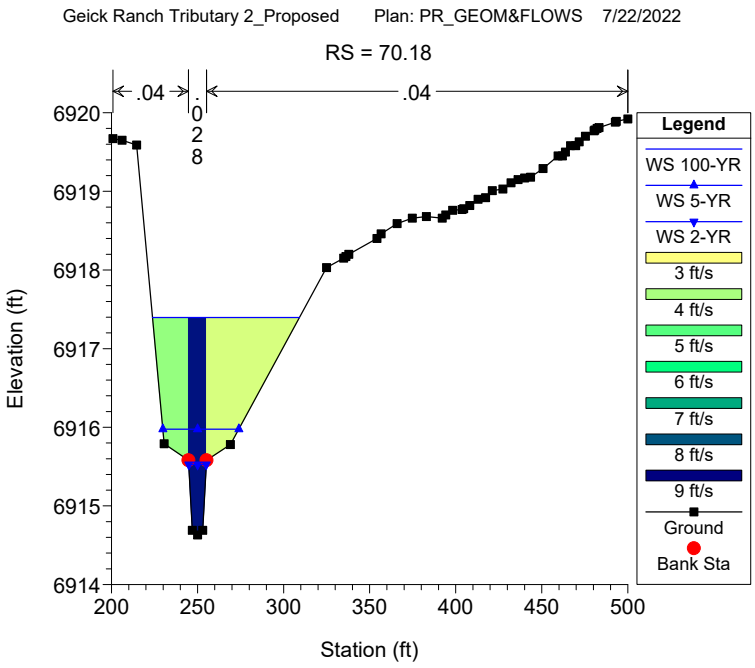
gpanza@hrgreen.com

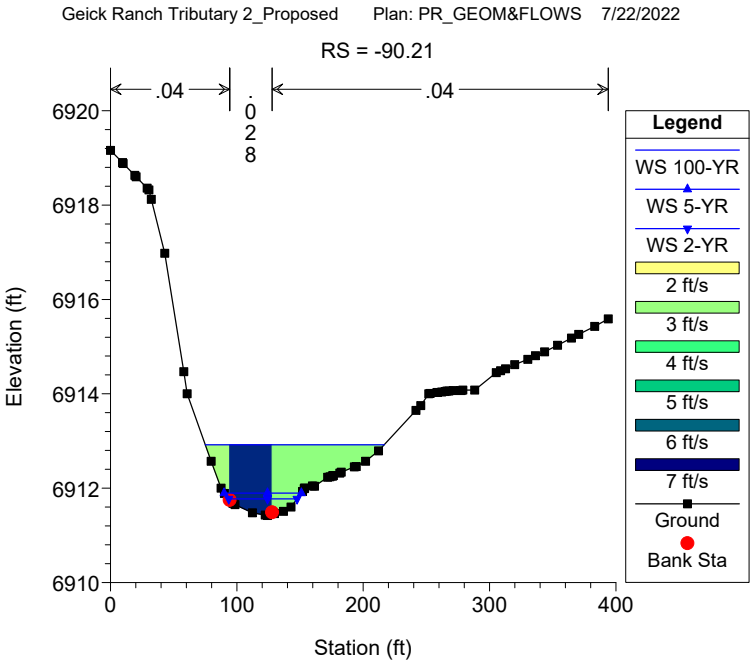
720-602-4999

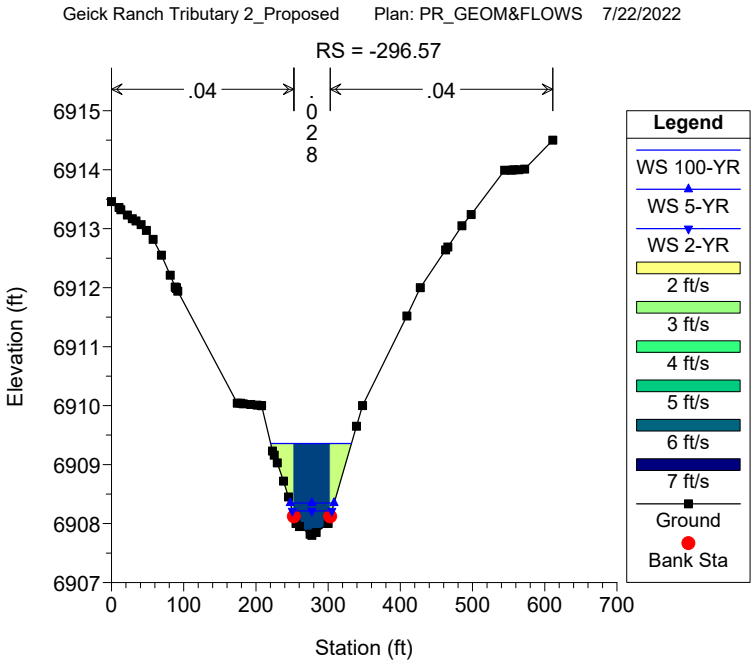
Please only include one set of each item in these appendices. Add a note to the appendix title sheet of whichever is deleted to see the other set in the other report.

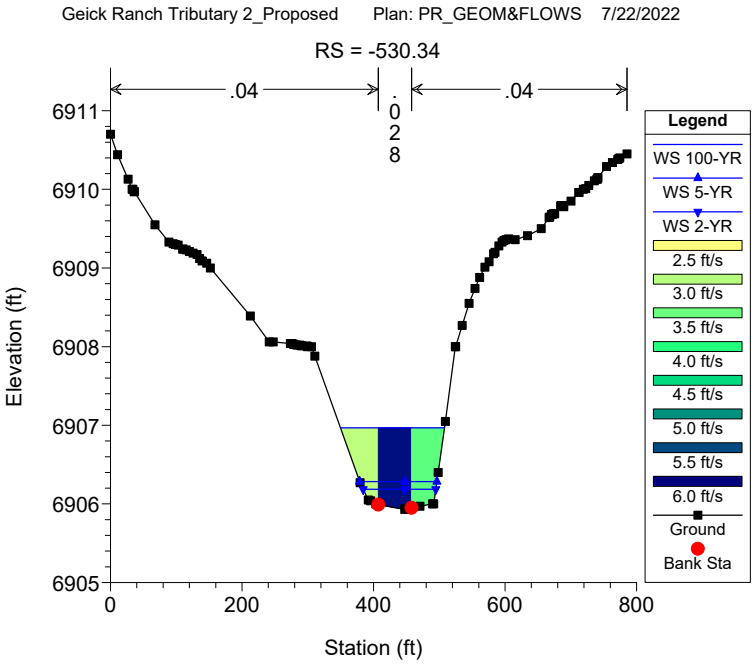


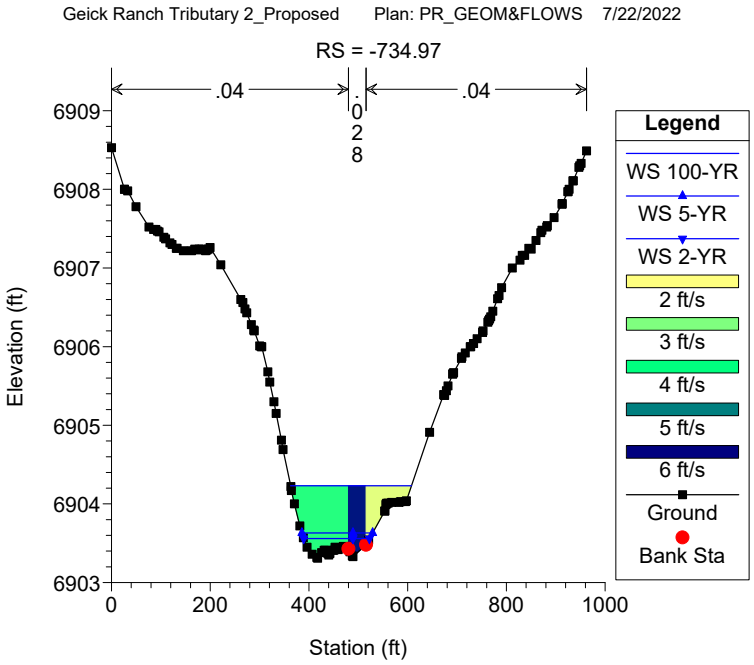












Provide HEC-RAS summary tables somewhere in the PDR

Channel Report

Move these up under Appendix D cover sheet? Include inlet capacity chart, etc. from previous report.

PROPOSED OFFSITE BASIN 0S-1 SWALE

Trapezoidal

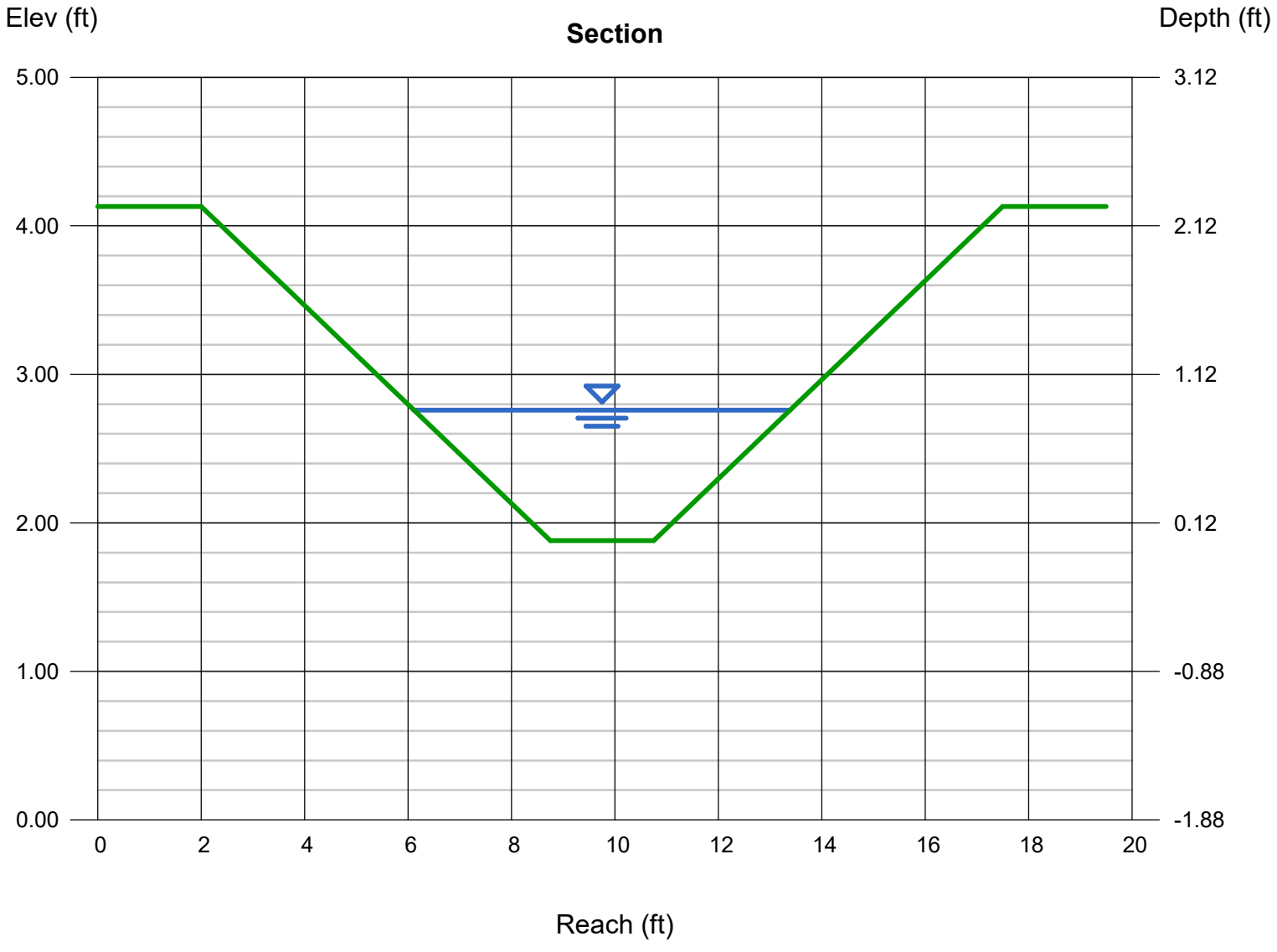
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.25
Invert Elev (ft)	= 1.88
Slope (%)	= 0.78
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.70

Highlighted

Depth (ft)	= 0.88
Q (cfs)	= 8.700
Area (sqft)	= 4.08
Velocity (ft/s)	= 2.13
Wetted Perim (ft)	= 7.57
Crit Depth, Yc (ft)	= 0.62
Top Width (ft)	= 7.28
EGL (ft)	= 0.95

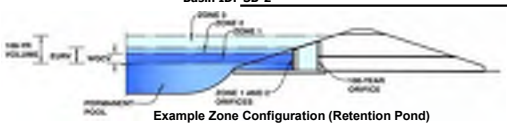


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Grandview

Basin ID: SB-2



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	SF	
Watershed Area =	11.67	acres
Watershed Length =	930	ft
Watershed Length to Centroid =	465	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	2.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	12.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.012	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.011	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.006	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.012	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.016	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.146	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.294	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.496	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	1.453	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.006	acre-feet		
Approximate 5-yr Detention Volume =	0.009	acre-feet		
Approximate 10-yr Detention Volume =	0.012	acre-feet		
Approximate 25-yr Detention Volume =	0.019	acre-feet		
Approximate 50-yr Detention Volume =	0.046	acre-feet		
Approximate 100-yr Detention Volume =	0.126	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.012	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.012	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Total detention volume is less than 100-year volume.

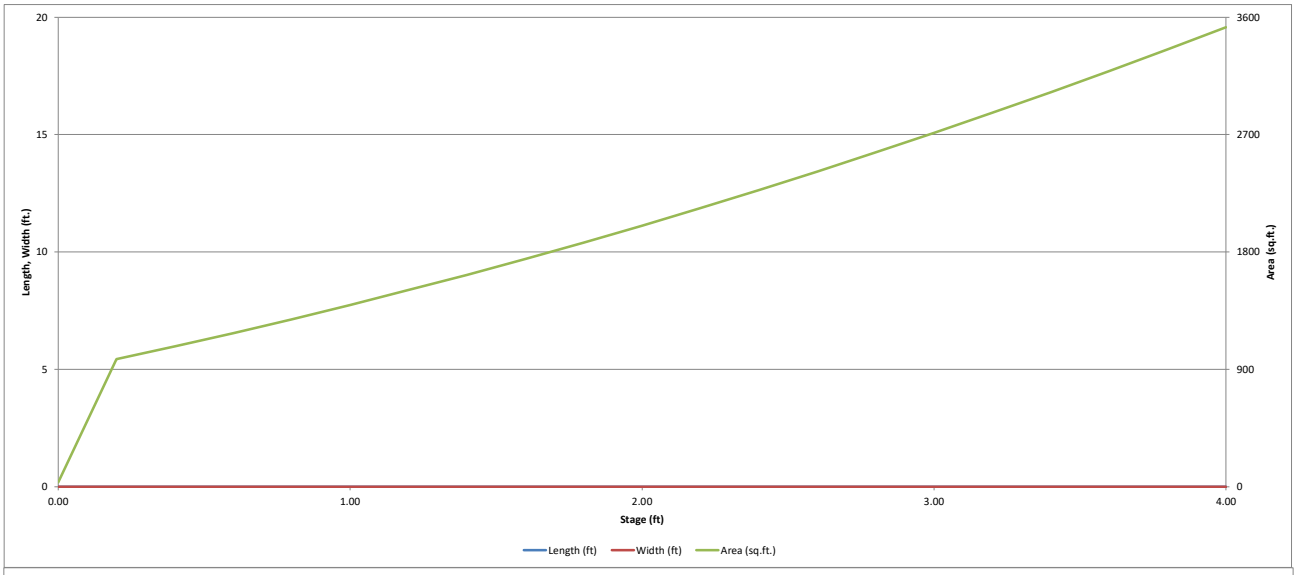
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

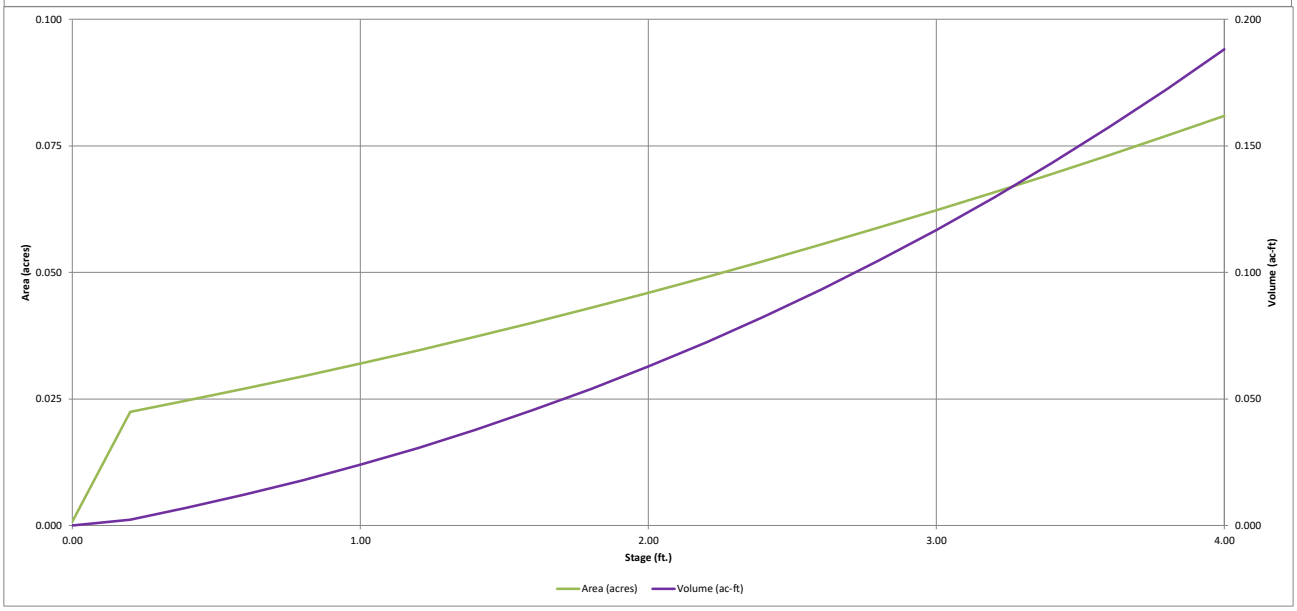
Depth Increment = 0.20 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	35	0.001		
	--	0.20	--	--	--	979	0.022	101	0.002
	--	0.40	--	--	--	1,076	0.025	307	0.007
	--	0.60	--	--	--	1,178	0.027	532	0.012
	--	0.80	--	--	--	1,284	0.029	778	0.018
	--	1.00	--	--	--	1,394	0.032	1,046	0.024
	--	1.20	--	--	--	1,508	0.035	1,336	0.031
	--	1.40	--	--	--	1,626	0.037	1,650	0.038
	--	1.60	--	--	--	1,748	0.040	1,987	0.046
	--	1.80	--	--	--	1,874	0.043	2,349	0.054
	--	2.00	--	--	--	2,003	0.046	2,737	0.063
	--	2.20	--	--	--	2,138	0.049	3,151	0.072
	--	2.40	--	--	--	2,276	0.052	3,592	0.082
	--	2.60	--	--	--	2,418	0.056	4,062	0.093
	--	2.80	--	--	--	2,564	0.059	4,560	0.105
	--	3.00	--	--	--	2,714	0.062	5,087	0.117
	--	3.20	--	--	--	2,868	0.066	5,646	0.130
	--	3.40	--	--	--	3,026	0.069	6,235	0.143
	--	3.60	--	--	--	3,188	0.073	6,856	0.157
	--	3.80	--	--	--	3,354	0.077	7,511	0.172
	--	4.00	--	--	--	3,525	0.081	8,199	0.188

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



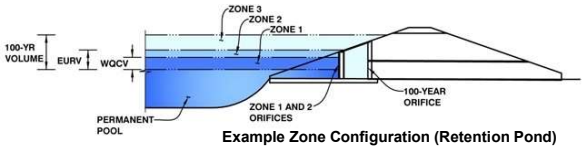


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Grandview

Basin ID: SB-2



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.59	0.012	Filtration Media
Zone 2			Not Utilized
Zone 3			Not Utilized
Total (all zones)		0.012	

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

Underdrain Orifice Invert Depth =	2.00	ft (distance below the filtration media surface)	Underdrain Orifice Area =	0.1	ft^2
Underdrain Orifice Diameter =	3.42	inches	Underdrain Orifice Centroid =	0.14	feet

Calculated Parameters for Underdrain

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)

Invert of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Not Selected	Not Selected			Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	N/A	N/A	feet
Overflow Weir Front Edge Length =	N/A	N/A	feet	Overflow Weir Slope Length =	N/A	N/A	feet
Overflow Weir Grate Slope =	N/A	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	N/A	N/A	
Horiz. Length of Weir Sides =	N/A	N/A	feet	Overflow Grate Open Area w/o Debris =	N/A	N/A	ft^2
Overflow Grate Type =	N/A	N/A		Overflow Grate Open Area w/ Debris =	N/A	N/A	ft^2
Debris Clogging % =	N/A	N/A	%				

Calculated Parameters for Overflow Weir

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

	Not Selected	Not Selected			Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	N/A	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	N/A	N/A	ft^2
Circular Orifice Diameter =	N/A	N/A	inches	Outlet Orifice Centroid =	N/A	N/A	feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=		ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	feet
Spillway Crest Length =		feet	Stage at Top of Freeboard =	feet
Spillway End Slopes =		H:V	Basin Area at Top of Freeboard =	acres
Freeboard above Max Water Surface =		feet	Basin Volume at Top of Freeboard =	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

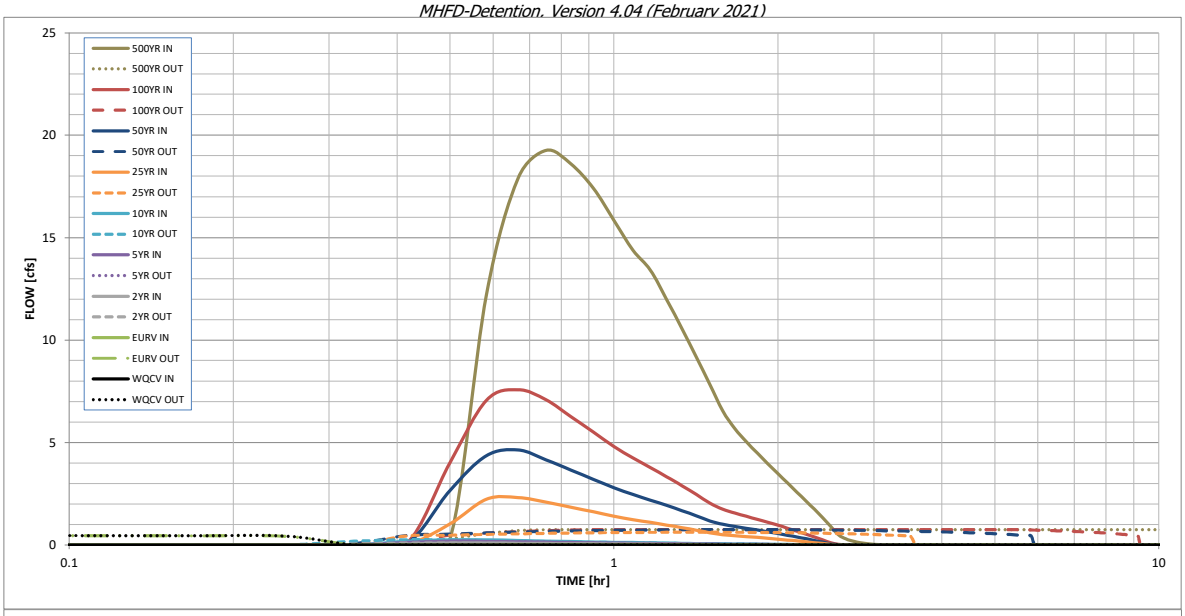
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

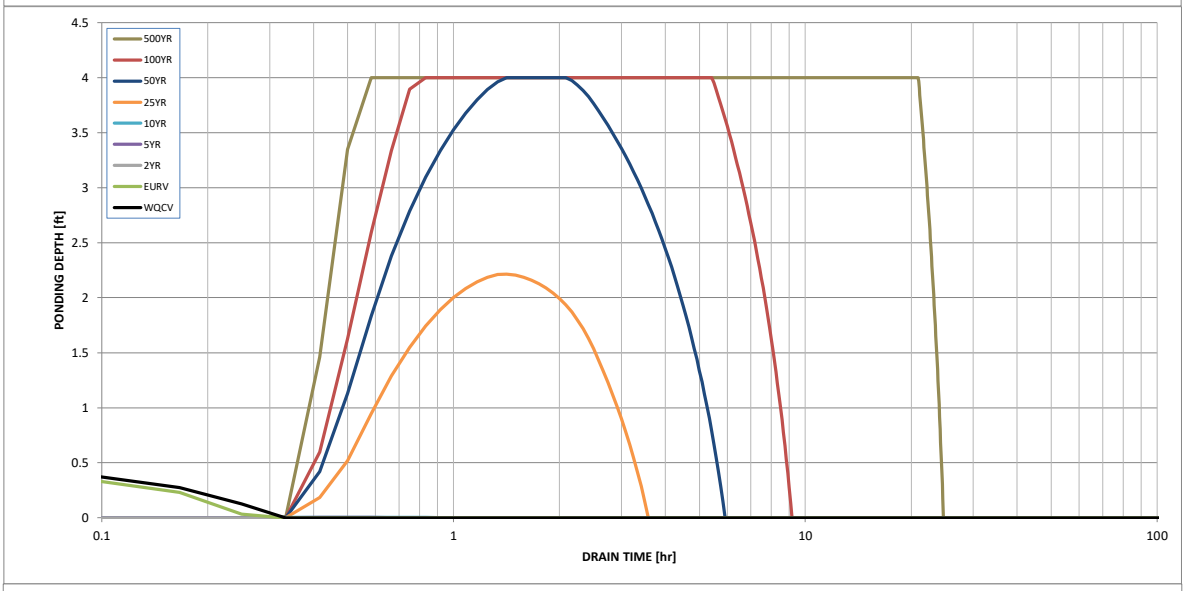
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.012	0.011	0.006	0.012	0.016	0.146	0.294	0.496	1.453
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.006	0.012	0.016	0.146	0.294	0.496	1.453
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	2.3	4.6	7.6	19.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.02	0.20	0.40	0.65	1.65
Peak Inflow Q (cfs) =	N/A	N/A	0.1	0.2	0.3	2.3	4.6	7.6	19.3
Peak Outflow Q (cfs) =	0.5	0.5	0.1	0.2	0.3	0.6	0.7	0.7	0.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.0	1.0	0.3	0.2	0.1	0.0
Structure Controlling Flow =	Filtration Media	Filtration Media	Filtration Media	Filtration Media	Filtration Media	Filtration Media	N/A	N/A	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 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) =	0	0	1	1	1	3	6	9	24
Time to Drain 99% of Inflow Volume (hours) =	0	0	1	1	1	4	6	9	24
Maximum Ponding Depth (ft) =	0.60	0.56	0.00	0.00	0.01	2.21	4.00	4.00	4.00
Area at Maximum Ponding Depth (acres) =	0.03	0.03	0.00	0.00	0.00	0.05	0.08	0.08	0.08
Maximum Volume Stored (acre-ft) =	0.012	0.011	0.000	0.000	0.000	0.073	0.188	0.188	0.188

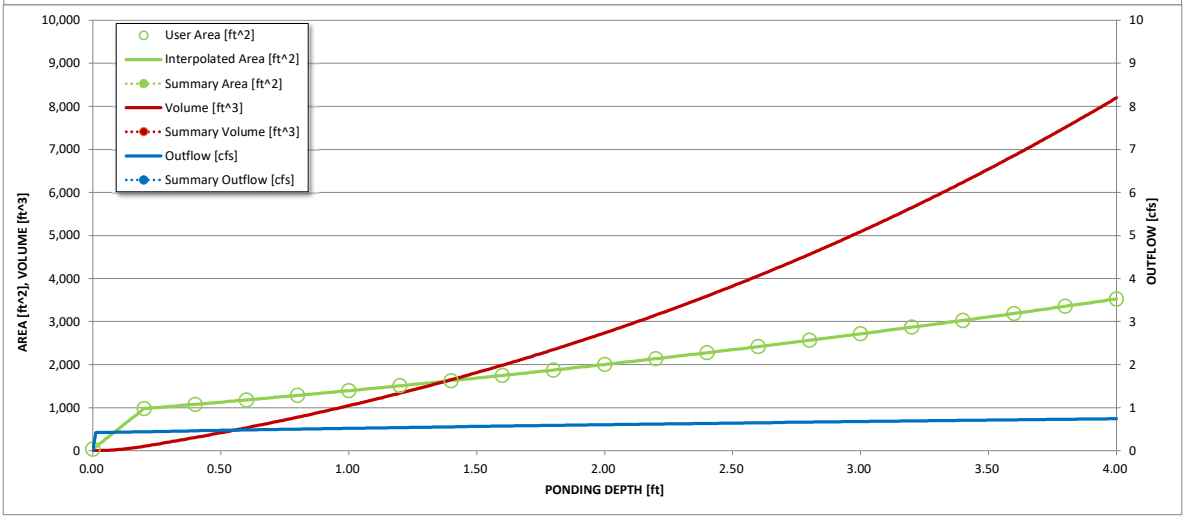
Calculations aren't working correctly without the spillway

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:20:00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	0:25:00	0.00	0.00	0.05	0.12	0.18	0.03	0.07	0.09	0.30
	0:30:00	0.00	0.00	0.09	0.19	0.25	1.02	2.66	4.01	12.22
	0:35:00	0.00	0.00	0.09	0.18	0.25	2.23	4.35	7.06	17.90
	0:40:00	0.00	0.00	0.08	0.16	0.22	2.32	4.63	7.58	19.26
	0:45:00	0.00	0.00	0.07	0.14	0.19	2.10	4.16	7.09	18.60
	0:50:00	0.00	0.00	0.06	0.12	0.17	1.84	3.66	6.26	17.41
	0:55:00	0.00	0.00	0.05	0.10	0.15	1.62	3.21	5.51	15.85
	1:00:00	0.00	0.00	0.05	0.09	0.13	1.41	2.79	4.81	14.39
	1:05:00	0.00	0.00	0.04	0.08	0.12	1.23	2.46	4.25	13.42
	1:10:00	0.00	0.00	0.04	0.07	0.10	1.10	2.19	3.77	11.98
	1:15:00	0.00	0.00	0.03	0.06	0.09	0.97	1.93	3.33	10.56
	1:20:00	0.00	0.00	0.03	0.05	0.08	0.85	1.68	2.89	9.17
	1:25:00	0.00	0.00	0.02	0.05	0.07	0.72	1.42	2.46	7.84
	1:30:00	0.00	0.00	0.02	0.04	0.06	0.60	1.17	2.04	6.55
	1:35:00	0.00	0.00	0.02	0.04	0.05	0.50	1.01	1.74	5.68
	1:40:00	0.00	0.00	0.02	0.03	0.05	0.45	0.90	1.56	5.04
	1:45:00	0.00	0.00	0.02	0.03	0.04	0.41	0.82	1.40	4.48
	1:50:00	0.00	0.00	0.01	0.03	0.04	0.37	0.73	1.25	3.97
	1:55:00	0.00	0.00	0.01	0.02	0.03	0.32	0.64	1.11	3.49
	2:00:00	0.00	0.00	0.01	0.02	0.03	0.28	0.56	0.96	3.02
	2:05:00	0.00	0.00	0.01	0.02	0.02	0.24	0.47	0.82	2.58
	2:10:00	0.00	0.00	0.01	0.01	0.02	0.20	0.39	0.67	2.16
	2:15:00	0.00	0.00	0.01	0.01	0.01	0.16	0.30	0.53	1.74
	2:20:00	0.00	0.00	0.00	0.01	0.01	0.11	0.22	0.39	1.32
	2:25:00	0.00	0.00	0.00	0.00	0.00	0.07	0.13	0.25	0.90
	2:30:00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.11	0.50
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.29
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.18
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**Treven Edwards**
Company:	**Galloway & Company**
Date:	**May 4, 2022**
Project:	**Grandview**
Location:	**Basins C-3 & C-15**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	C-3	C-15												
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam												
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	1.560	0.160												
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000												
Unconnected Impervious Area (UIA, acres)	0.109	0.013												
Receiving Pervious Area (RPA, acres)	1.451	0.147												
Separate Pervious Area (SPA, acres)	0.000	0.000												
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C												

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	1.560	0.160												
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%												
Unconnected Impervious Area (UIA, %)	7.0%	8.2%												
Receiving Pervious Area (RPA, %)	93.0%	91.8%												
Separate Pervious Area (SPA, %)	0.0%	0.0%												
A_R (RPA / UIA)	13.286	11.195												
I_a Check	0.070	0.080												
f / I for WQCV Event:	1.7	1.7												
f / I for 5-Year Event:	0.5	0.5												
f / I for 100-Year Event:	0.3	0.3												
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.18	0.21												
IRF for 5-Year Event:	0.30	0.34												
IRF for 100-Year Event:	0.31	0.35												
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	7.0%	8.2%												
Effective Imperviousness for WQCV Event:	1.3%	1.7%												
Effective Imperviousness for 5-Year Event:	2.1%	2.8%												
Effective Imperviousness for 100-Year Event:	2.2%	2.9%												
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	80.1%	77.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	96.6%	87.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**7.1%**
Total Site Effective Imperviousness for WQCV Event:	**1.3%**
Total Site Effective Imperviousness for 5-Year Event:	**2.1%**
Total Site Effective Imperviousness for 100-Year Event:	**2.2%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

				Designer:	**TJE**
				Company:	**Galloway & Co.**
***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches	**Date:**	**May 4, 2022**
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches	**Project:**	**Grandview Reserve**
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches	**Location:**	**Basin D-7a**
Optional User Defined Storm	CUHP				
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event				
Max Intensity for Optional User Defined Storm	0				

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**D-7a**														
Receiving Pervious Area Soil Type	Sandy Loam														
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.250														
Directly Connected Impervious Area (DCIA, acres)	0.000														
Unconnected Impervious Area (UIA, acres)	0.025														
Receiving Pervious Area (RPA, acres)	0.226														
Separate Pervious Area (SPA, acres)	0.000														
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C														

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.250														
Directly Connected Impervious Area (DCIA, %)	0.0%														
Unconnected Impervious Area (UIA, %)	9.8%														
Receiving Pervious Area (RPA, %)	90.2%														
Separate Pervious Area (SPA, %)	0.0%														
A_R (RPA / UIA)	9.204														
I_a Check	0.100														
f / I for WQCV Event:	1.7														
f / I for 5-Year Event:	0.5														
f / I for 100-Year Event:	0.3														
f / I for Optional User Defined Storm CUHP:															
IRF for WQCV Event:	0.26														
IRF for 5-Year Event:	0.42														
IRF for 100-Year Event:	0.44														
IRF for Optional User Defined Storm CUHP:															
Total Site Imperviousness: I_{total}	9.8%														
Effective Imperviousness for WQCV Event:	2.6%														
Effective Imperviousness for 5-Year Event:	4.1%														
Effective Imperviousness for 100-Year Event:	4.3%														
Effective Imperviousness for Optional User Defined Storm CUHP:															

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	70.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	69.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:															

Total Site Imperviousness:	**9.8%**
Total Site Effective Imperviousness for WQCV Event:	**2.6%**
Total Site Effective Imperviousness for 5-Year Event:	**4.1%**
Total Site Effective Imperviousness for 100-Year Event:	**4.3%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

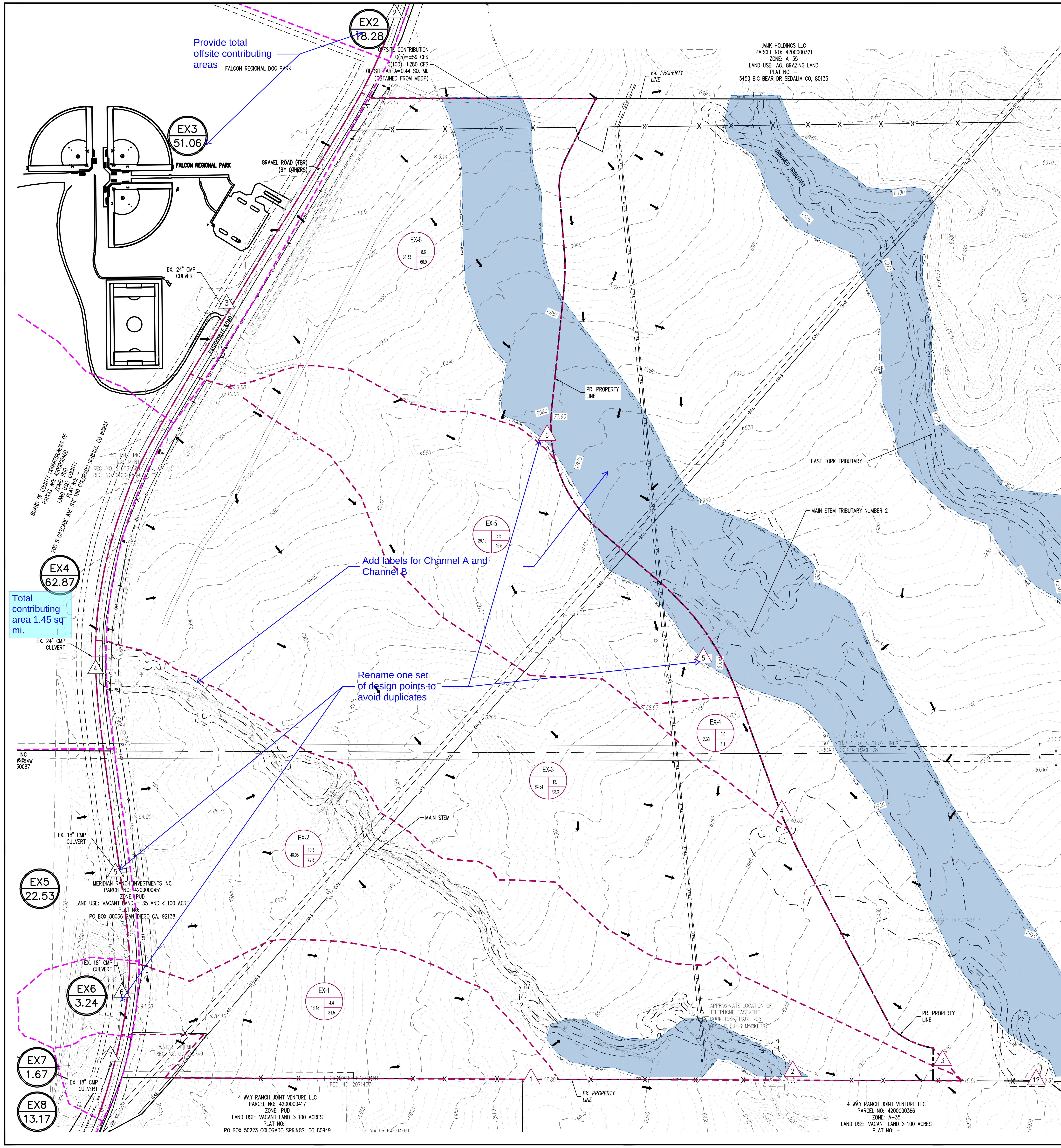
* Use Green-Ampt average infiltration rate values from Table 3-3.

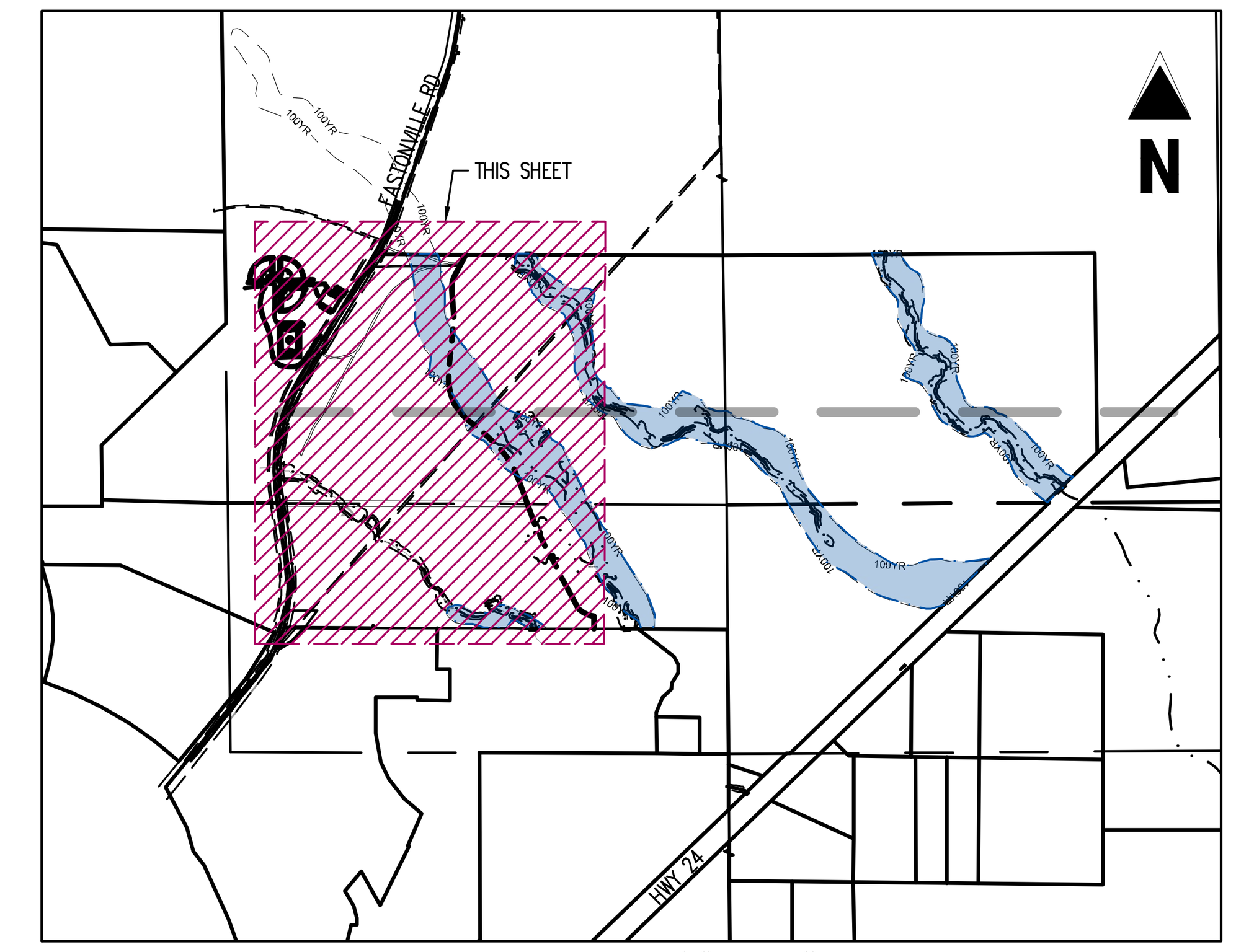
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

APPENDIX F

Drainage Maps





KEY MAP SCALE: (1"=2,000')

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- BASIN BOUNDARY LINE
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF
- EXISTING BOUNDARY EASEMENT
- EXISTING TELEPHONE LINE
- EXISTING POWER LINE
- EXISTING FENCE
- EXISTING GAS LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

Provide table for offsite / Eastonville Road basins also

Include all design points

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
EX-1	16.18	3.4	24.4
EX-2	46.06	7.6	53.7
EX-3	64.34	10.0	71.6
EX-4	2.68	0.6	4.4
EX-5	26.15	5.0	35.5
EX-6	31.53	6.6	46.9

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	4.7	33.3
2	79.1	497.2
3	10.0	71.6
4	0.6	4.4
5	5.0	35.5
6	14.6	584.9
7	8.0	125.0
8	67.0	413.0
9	4.5	30.5
10	0.8	5.3
11	0.5	3.6
12	89.2	976.3

Galloway
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

PRELIMINARY DRAINAGE PLAN
GRANDVIEW RESERVE
FOR
HR GREEN, INC

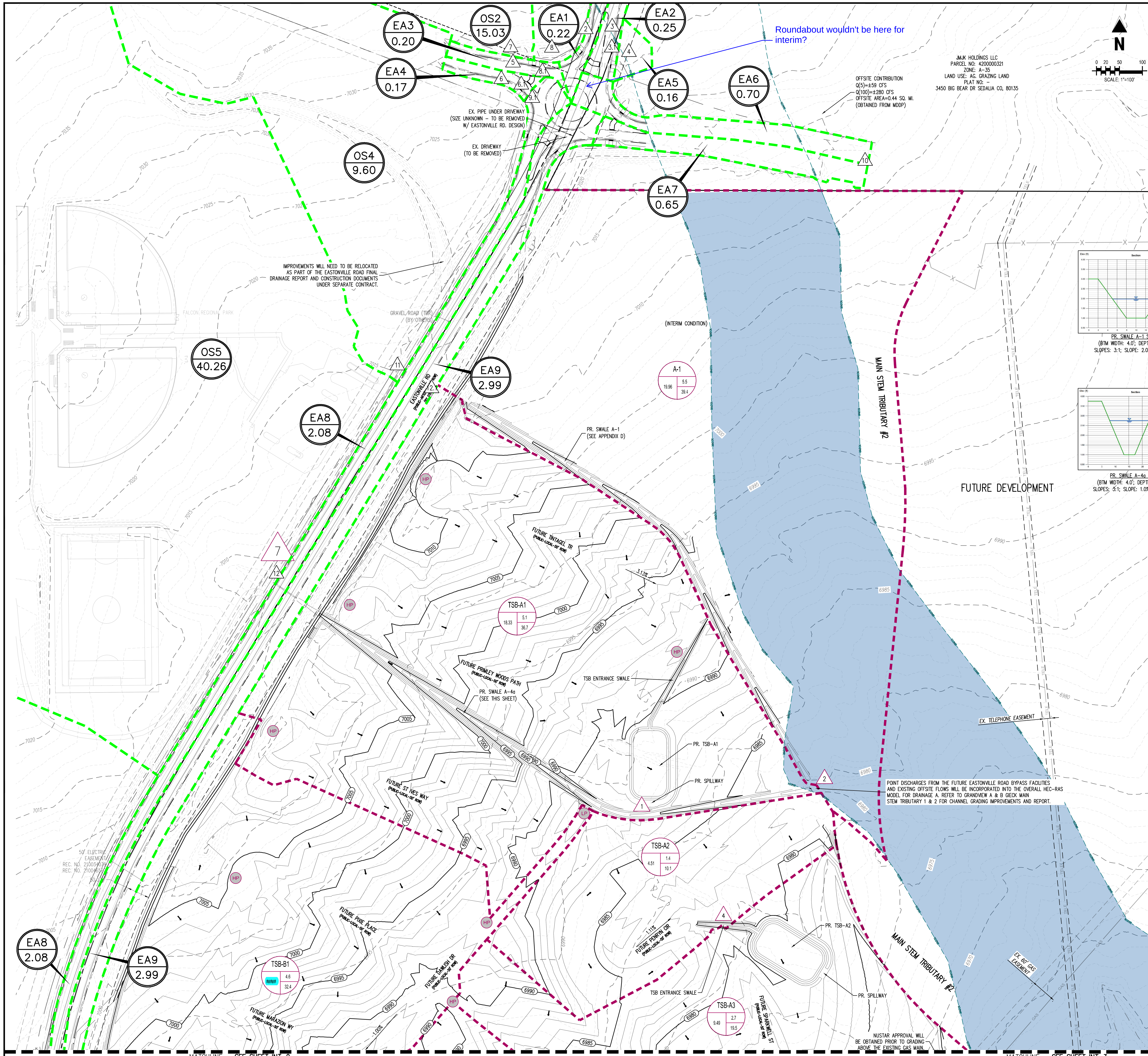
EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

#	Date	Issue / Description	Init.

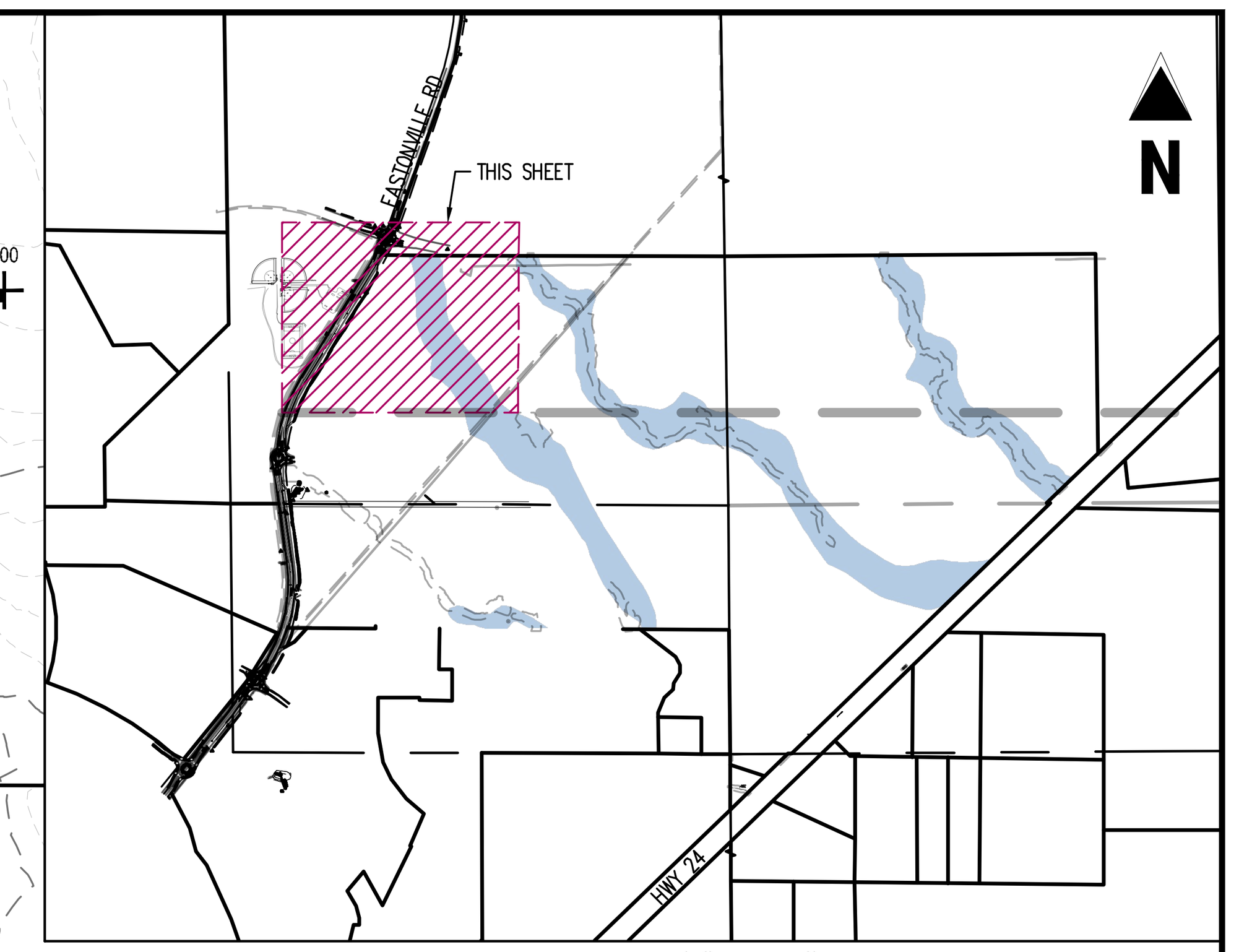
Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

EXISTING DRAINAGE MAP

EX-1



Roundabout wouldn't be here for interim?
OS2 15.03
EA1 0.22
EA2 0.25
EA3 0.20
EA4 0.17
EA5 0.16
EA6 0.70
EA7 0.65
OS4 9.60
OS5 40.26
EA8 2.08
EA9 2.99
EX. PIPE UNDER DRIVEWAY (SIZE UNKNOWN – TO BE REMOVED W/ EASTONVILLE RD. DESIGN)
EX. DRIVEWAY (TO BE REMOVED)
OFFSITE CONTRIBUTION Q(5)=±59 CFS Q(100)=±280 CFS OFFSITE AREA=0.44 SQ. MI. (OBTAINED FROM MDDP)
JMJK HOLDINGS LLC PARCEL NO. 4200000321 ZONE: A-35 LAND USE: AG. GRAZING LAND PLAT NO.: – 3450 BIG BEAR DR SEDALIA CO, 80135
IMPROVEMENTS WILL NEED TO BE RELOCATED AS PART OF THE EASTONVILLE ROAD FINAL DRAINAGE REPORT AND CONSTRUCTION DOCUMENTS UNDER SEPARATE CONTRACT.
(INTERIM CONDITION)
MAIN STEM TRIBUTARY #2
FUTURE DEVELOPMENT
PR. SWALE A-1 (SEE APPENDIX D)
PR. SWALE A-4a (SEE THIS SHEET)
TSB ENTRANCE SWALE
PR. TSB-A1
PR. SPILLWAY
PR. TSB-A2
EX. TELEPHONE EASEMENT
POINT DISCHARGES FROM THE FUTURE EASTONVILLE ROAD BYPASS FACILITIES AND EXISTING OFFSITE FLOWS WILL BE INCORPORATED INTO THE OVERALL HEC-RAS MODEL FOR DRAINAGE A. REFER TO GRANDVIEW A & B GIECK MAIN STEM TRIBUTARY 1 & 2 FOR CHANNEL GRADING IMPROVEMENTS AND REPORT.
NUSTAR APPROVAL WILL BE OBTAINED PRIOR TO GRADING ABOVE THE EXISTING GAS MAIN
MATCHLINE – SEE SHEET INT-2
MATCHLINE – SEE SHEET INT-3



KEY MAP SCALE: (1"=2,000')

PR. SWALE A-1 SECTION
(BTM WIDTH: 4.0'; DEPTH: 1.0'; SIDE SLOPES: 3:1; SLOPE: 2.0%; Q: 31.1 cfs)

PR. SWALE A-4a SECTION
(BTM WIDTH: 4.0'; DEPTH: 1.75'; SIDE SLOPES: 3:1; SLOPE: 1.0%; Q: 125.0 cfs)

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- 6480 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100YR 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- 1 / 0.71 / 1.8 / 4.8: BASIN DESIGNATION; 5-YEAR RUNOFF IN CUBIC FEET PER SECOND; 100-YEAR RUNOFF IN CUBIC FEET PER SECOND; BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

NOTE:

1. PROPOSED CHANNEL DESIGN AND ANALYSIS FOR BOTH ON-SITE TRIBUTARIES (MAIN STEM AND MAIN STEM TRIBUTARY NUMBER 2) IS PROVIDED IN A SEPARATE REPORT "GRANDVIEW RESERVE CLOMR REPORT", BY HR GREEN, JULY 2022. ALL CHANNEL CULVERTS ARE SHOWN FOR REFERENCE ONLY AND ACTUAL SIZING AND ANALYSIS IS PROVIDED WITHIN THE CLOMR REPORT.

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
A-1	19.96	5.5	39.4
TSB-A1	18.33	5.1	36.7
TSB-A2	4.51	1.4	10.1
TSB-A3	9.49	2.7	19.5
TSB-B1	15.73	4.6	32.4
OS-4	112.71	19.5	134.6
OS-5	51.01	8.0	125.0

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	13.1	44.7
2	18.7	84.1
4	1.4	10.1
7	8.0	125.0

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PRELIMINARY DRAINAGE PLAN
GRANDVIEW RESERVE FILING NO. 1
FOR
HR GREEN, INC

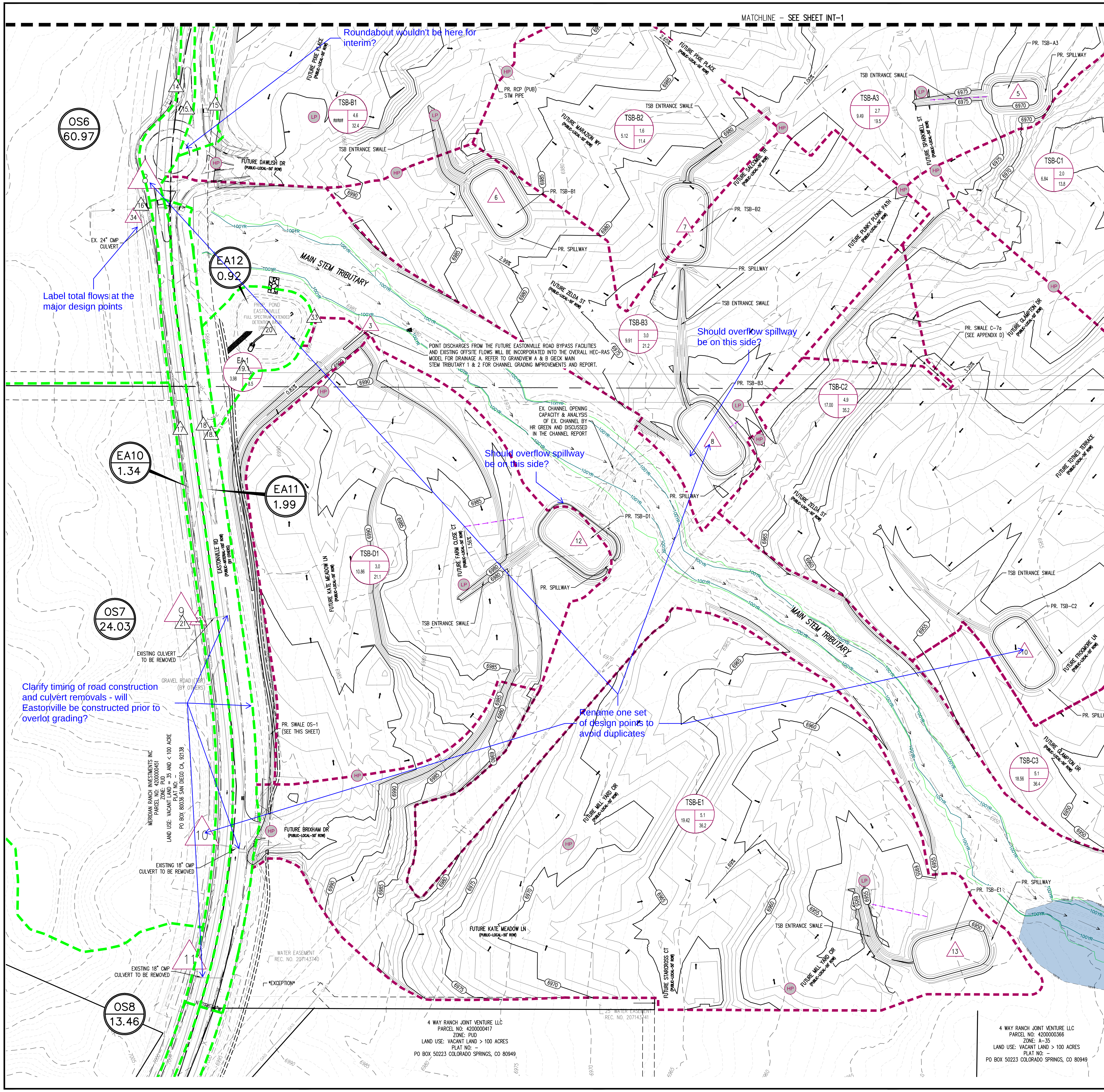
EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

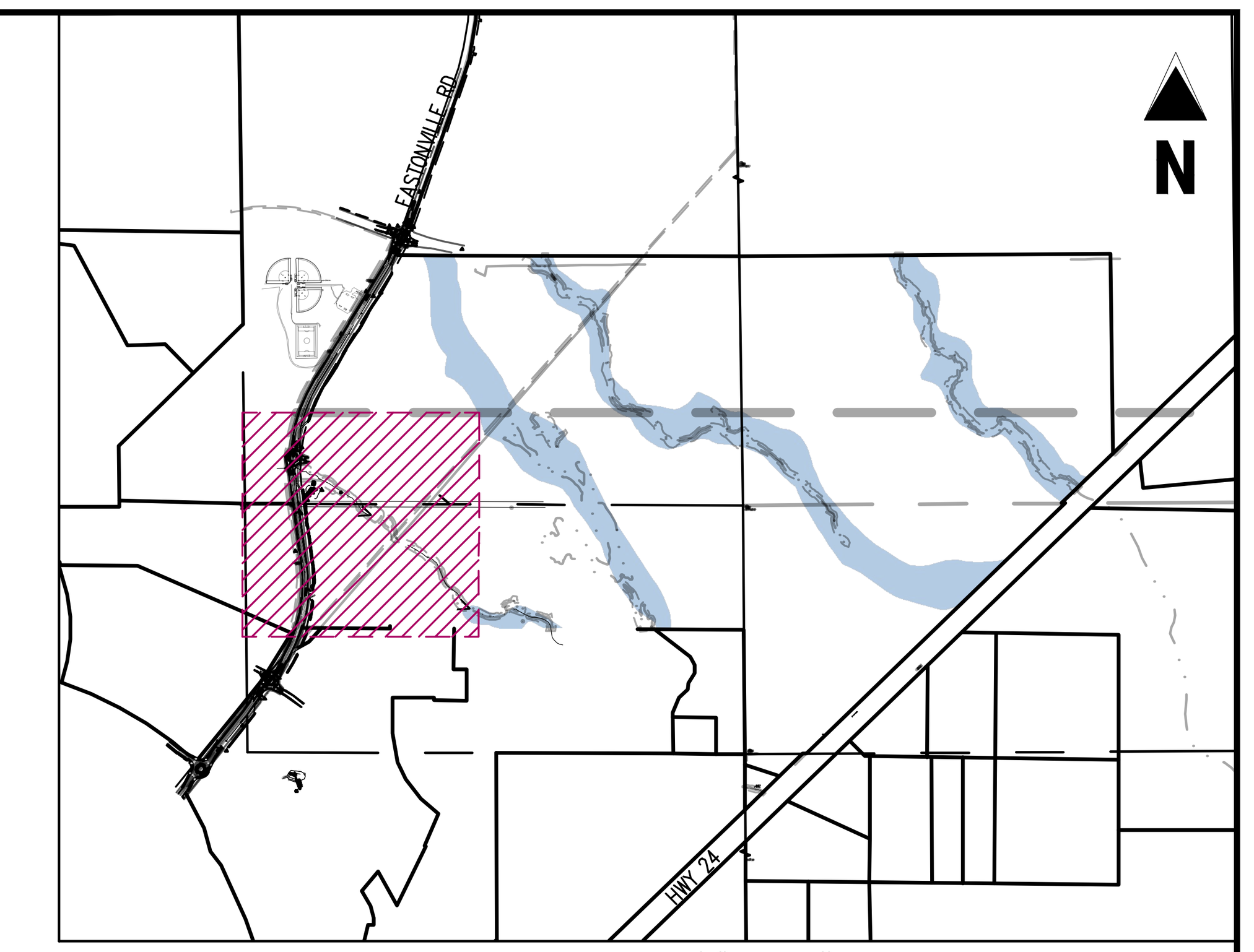
#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

INTERIM DRAINAGE MAP

INT-1





N

SCALE: 1"=100'

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

NOTE:

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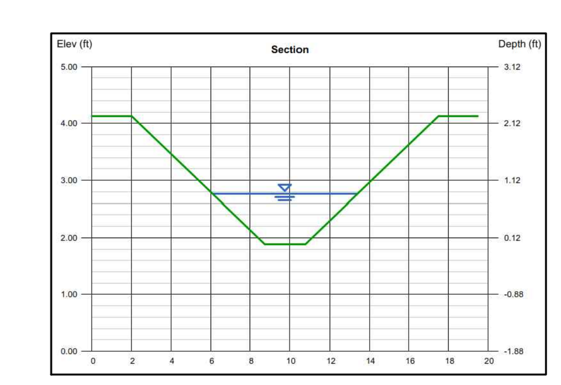
Include all DPs along Eastonville also

DESIGN POINT SUMMARY TABLE

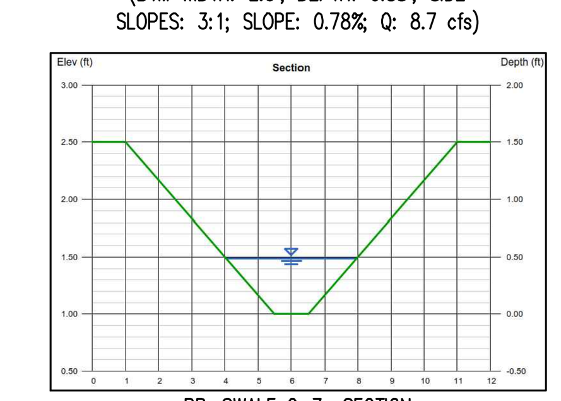
Design Point	Q_5 (cfs)	Q_{100} (cfs)
3	5.7	13.0
5	2.7	19.5
6	4.6	32.4
7	1.6	11.4
8	9.1	65.0
10	4.8	34.0
12	3.0	21.1
13	5.1	36.2
32	3.6	24.0
35	8.0	125.0

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
EA-1	3.98	1.2	8.5
TSB-A3	9.49	2.7	19.5
TSB-B1	15.73	4.6	32.4
TSB-B2	5.12	1.6	11.4
TSB-B3	9.91	3.0	21.2
TSB-C1	6.84	2.0	13.8
TSB-C2	17.00	4.8	34.0
TSB-C3	18.56	5.1	36.4
TSB-D1	10.86	3.0	21.1
TSB-E1	19.42	5.1	36.2
OS-1	1.57	0.5	3.6
OS-2	2.86	0.8	5.3
OS-3	21.61	4.5	30.5
OS-4	112.71	19.5	134.6



PR. SWALE OS-1 SECTION
(BTM WIDTH: 2.0'; DEPTH: 0.88'; SIDE SLOPES: 3:1; SLOPE: 0.78%; Q: 8.7 cfs)



PR. SWALE C-7a SECTION
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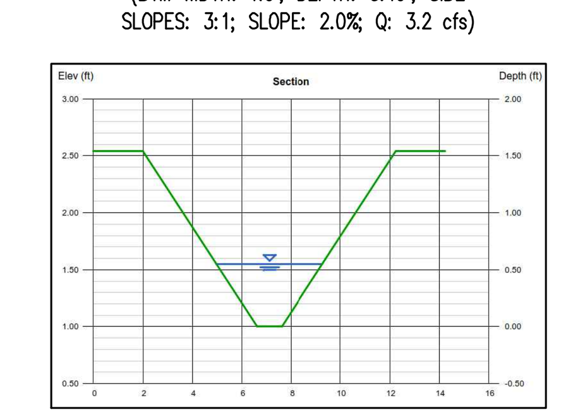

PR. SWALE D-7 SECTION
(BTM WIDTH: 1.0'; DEPTH: 0.55'; SIDE SLOPES: 3:1; SLOPE: 2.0%; Q: 4.0 cfs)

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PRELIMINARY DRAINAGE PLAN GRANDVIEW RESERVE FILING NO. 1 FOR HR GREEN, INC

EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

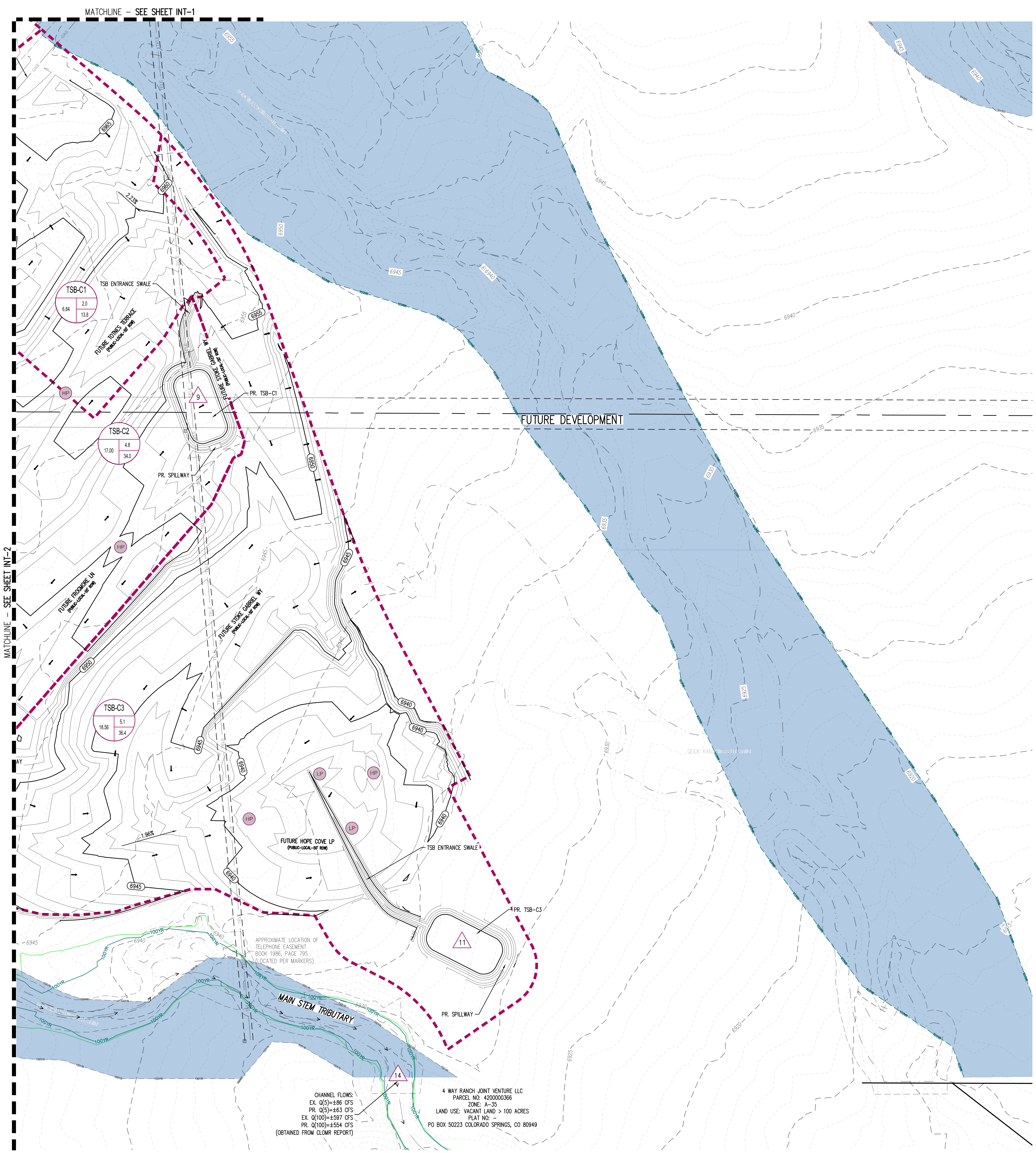
#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

INTERIM DRAINAGE MAP

INT-2

Sheet 2 of 3



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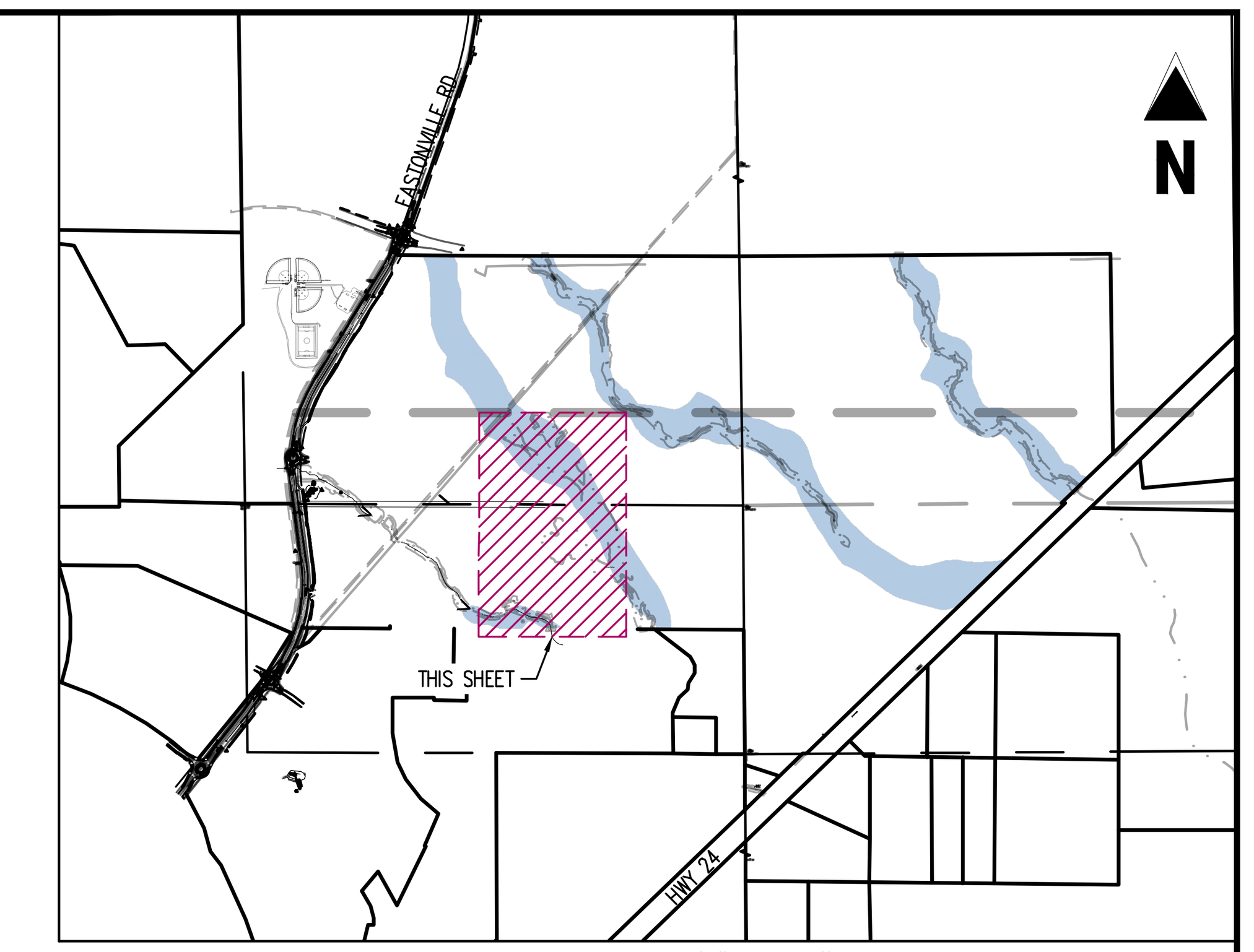
SCALE: 1"=100'



KEY MAP SCALE: (1"=2,000')

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DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- EXISTING MAJOR CONTOUR (6480)
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (6480)
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN (100YR)
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

NOTE:

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RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
TSB-C1	6.84	2.0	13.8
TSB-C2	17.00	4.8	34.0
TSB-C3	18.56	5.1	36.4

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
9	2.0	13.8
11	11.8	84.3
14	86.0	597.0

PRELIMINARY DRAINAGE PLAN
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FOR
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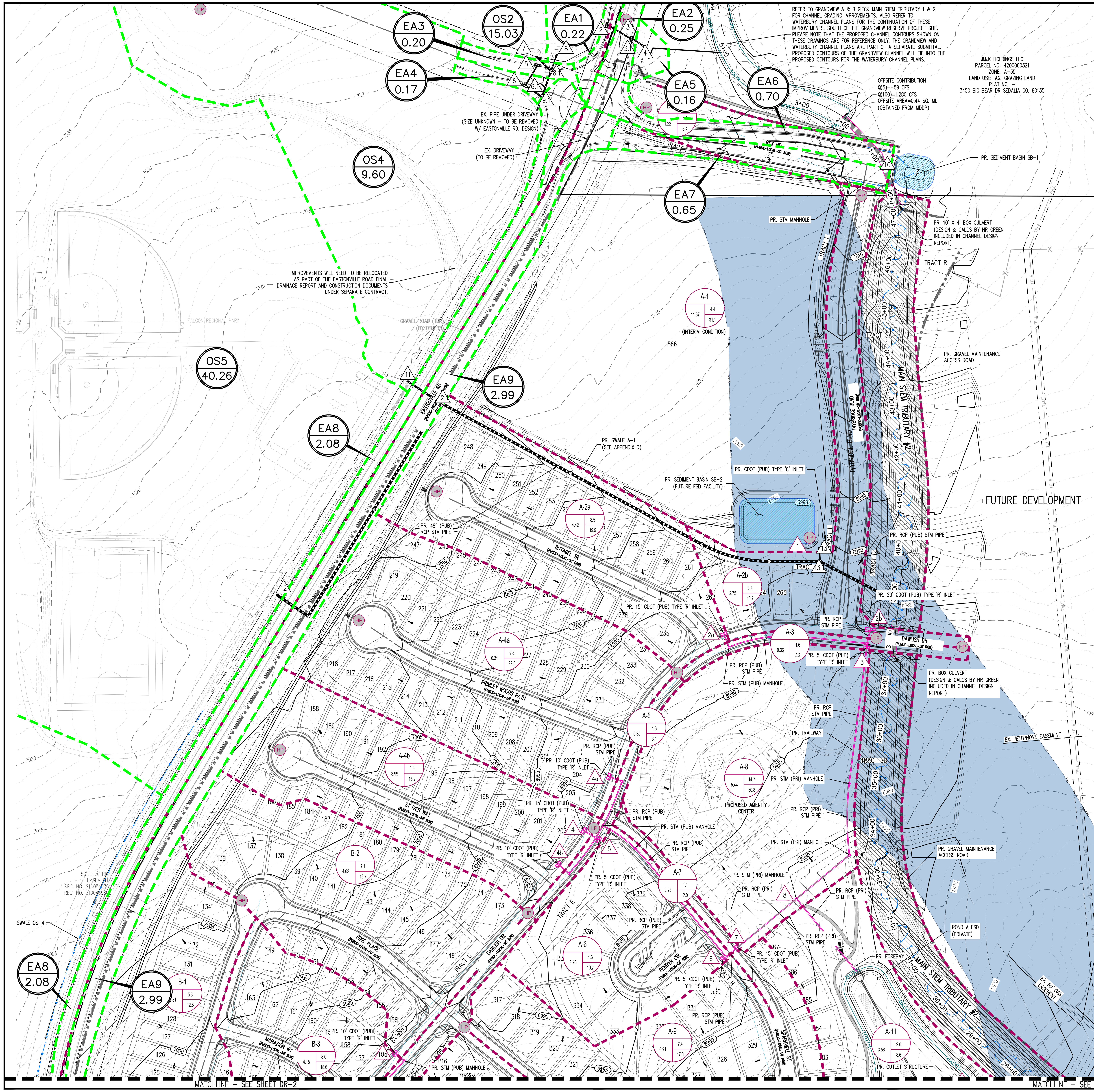
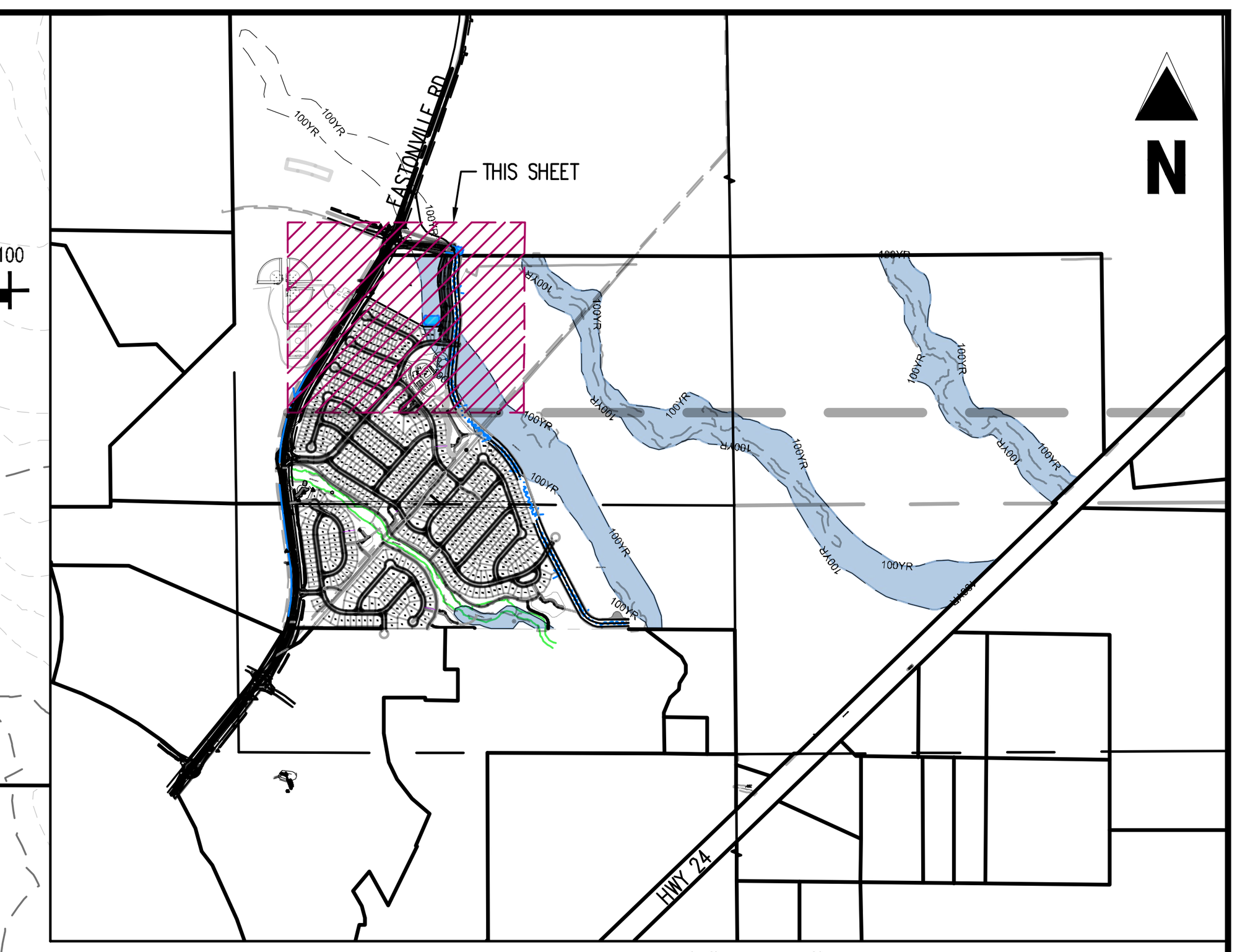
Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

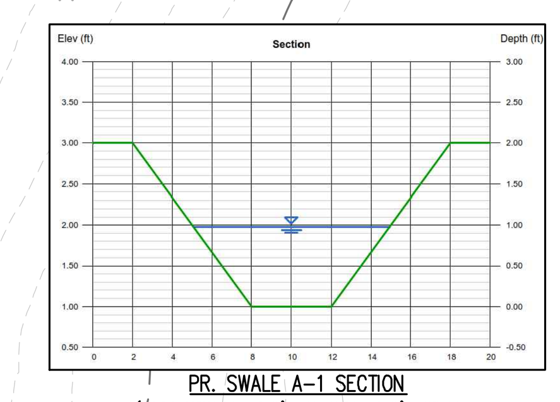
INTERIM DRAINAGE MAP

INT-3

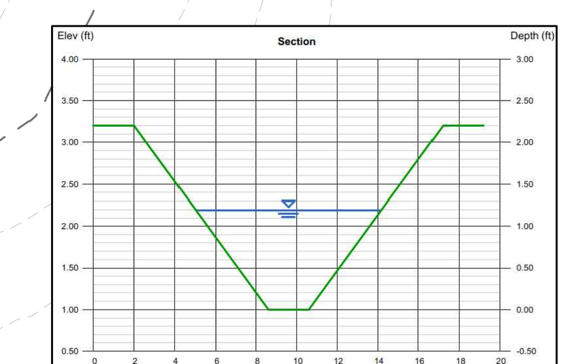

REFER TO GRANDVIEW A & B GIECK MAIN STEM TRIBUTARY 1 & 2 FOR CHANNEL GRADING IMPROVEMENTS. ALSO REFER TO WATERBURY CHANNEL PLANS FOR THE CONTINUATION OF THESE IMPROVEMENTS, SOUTH OF THE GRANDVIEW RESERVE PROJECT SITE. PLEASE NOTE THAT THE PROPOSED CHANNEL CONTOURS SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY. THE GRANDVIEW AND WATERBURY CHANNEL PLANS ARE PART OF A SEPARATE SUBMITTAL. PROPOSED CONTOURS OF THE GRANDVIEW CHANNEL WILL TIE INTO THE PROPOSED CONTOURS FOR THE WATERBURY CHANNEL PLANS.
JMJK HOLDINGS LLC
PARCEL NO: 4200000321
ZONE: A-35
LAND USE: AG. GRAZING LAND
PLAT NO: -
3450 BIG BEAR DR SEDALIA CO, 80135
OFFSITE CONTRIBUTION
OFFSITE AREA=0.44 SQ. MI.
(OBTAINED FROM MDDP)
EA3 0.20
OS2 15.03
EA1 0.22
EA2 0.25
EA4 0.17
EA5 0.16
EA6 0.70
OS4 9.60
EA7 0.65
OS5 40.26
EA9 2.99
EA8 2.08
EX. PIPE UNDER DRIVEWAY (SIZE UNKNOWN – TO BE REMOVED W/ EASTONVILLE RD. DESIGN)
EX. DRIVEWAY (TO BE REMOVED)
PR. SEDIMENT BASIN SB-1
PR. STM MANHOLE
PR. 10' X 4' BOX CULVERT (DESIGN & CALCS BY HR GREEN INCLUDED IN CHANNEL DESIGN REPORT)
TRACT R
IMPROVEMENTS WILL NEED TO BE RELOCATED AS PART OF THE EASTONVILLE ROAD FINAL DRAINAGE REPORT AND CONSTRUCTION DOCUMENTS UNDER SEPARATE CONTRACT.
(INTERIM CONDITION)
PR. GRAVEL MAINTENANCE ACCESS ROAD
MAIN STEM TRIBUTARY #2
PR. SWALE A-1 (SEE APPENDIX D)
PR. SEDIMENT BASIN SB-2 (FUTURE FSD FACILITY)
PR. CDOT (PUB) TYPE 'C' INLET
FUTURE DEVELOPMENT
PR. 48" (PUB) RCP STM PIPE
PR. RCP (PUB) STM PIPE
PR. 20' CDOT (PUB) TYPE 'R' INLET
PR. 15' CDOT (PUB) TYPE 'R' INLET
PR. 5' CDOT (PUB) TYPE 'R' INLET
PR. STM (PUB) MANHOLE
PR. BOX CULVERT (DESIGN & CALCS BY HR GREEN INCLUDED IN CHANNEL DESIGN REPORT)
PR. TRAILWAY
EX. TELEPHONE EASEMENT
PR. 10' CDOT (PUB) TYPE 'R' INLET
PROPOSED AMENITY CENTER
PR. STM (PRI) MANHOLE
PR. RCP (PRI) STM PIPE
SWALE OS-4
POND A FSD (PRIVATE)
NUSTAR APPROVAL WILL BE OBTAINED PRIOR TO GRADING ABOVE THE EXISTING GAS MAIN.
PR. FOREBAY
PR. OUTLET STRUCTURE
EX. 8" GAS EASEMENT
MATCHLINE – SEE SHEET DR-2
MATCHLINE – SEE SHEET DR-3



KEY MAP SCALE: (1"=2,000')



PR. SWALE A-1 SECTION
(BTM WIDTH: 4.0'; DEPTH: 1.0'; SIDE SLOPES: 3:1; SLOPE: 2.0%; Q: 31.1 cfs)



PR. SWALE OS-4 SECTION
(BTM WIDTH: 2.0'; DEPTH: 1.19'; SIDE SLOPES: 3:1; SLOPE: 1.0%; Q: 19.1 cfs)

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- PROPOSED RIPRAP
- PROPOSED GRAVEL ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – SEE NOTE #1)

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

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RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
Basin-1	1.22	4.2	8.4
A-1	11.67	4.4	31.1
A-2a	4.42	8.5	19.9
A-2b	2.75	8.4	16.7
A-3	0.36	1.6	3.2
A-4a	6.31	9.8	22.8
A-4b	3.99	6.5	15.2
A-5	0.35	1.6	3.1
A-6	2.76	4.6	10.7
A-7	0.23	1.1	2.0
A-8	5.44	14.7	30.8
A-9	4.91	7.4	17.3
A-11	3.56	2.0	8.6
B-1	3.81	5.3	12.5
B-2	4.62	7.1	16.7
B-3	4.15	8.0	18.6
EA-1	7.79	9.2	19.5
EA-2	5.59	7.0	14.9
OS-4	20.30	-	-
OS-5	47.27	8.0.	125.0

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	4.4	31.1
2a	8.5	19.9
2b	9.0	23.7
3	1.6	3.2
4a	9.8	22.8
4b	6.5	15.2
4	2.5	16.1
5	1.6	3.1
6	4.6	10.7
7	1.1	2.0
8	14.7	30.8
10a	7.1	16.7
35	8.0	125.0
34	36.0	628.0

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
EA1	9.2	19.5
EA2	7.0	14.9
EA2.1	14.1	30.0
32	3.6	24.0
33	3.9	25.8
34	67.0	413.0
35	8.0	125.0

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#	Date	Issue / Description	Init.

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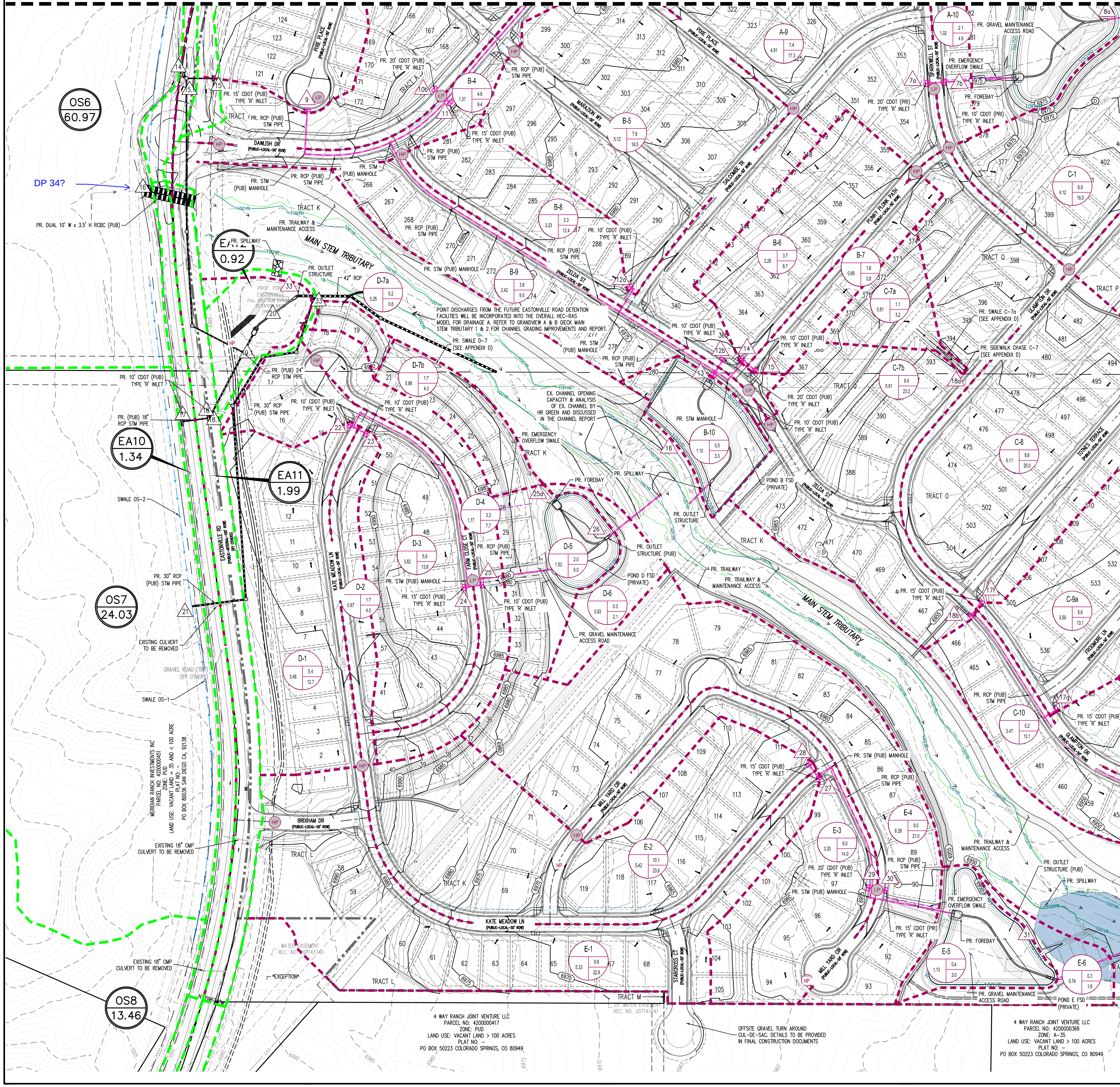
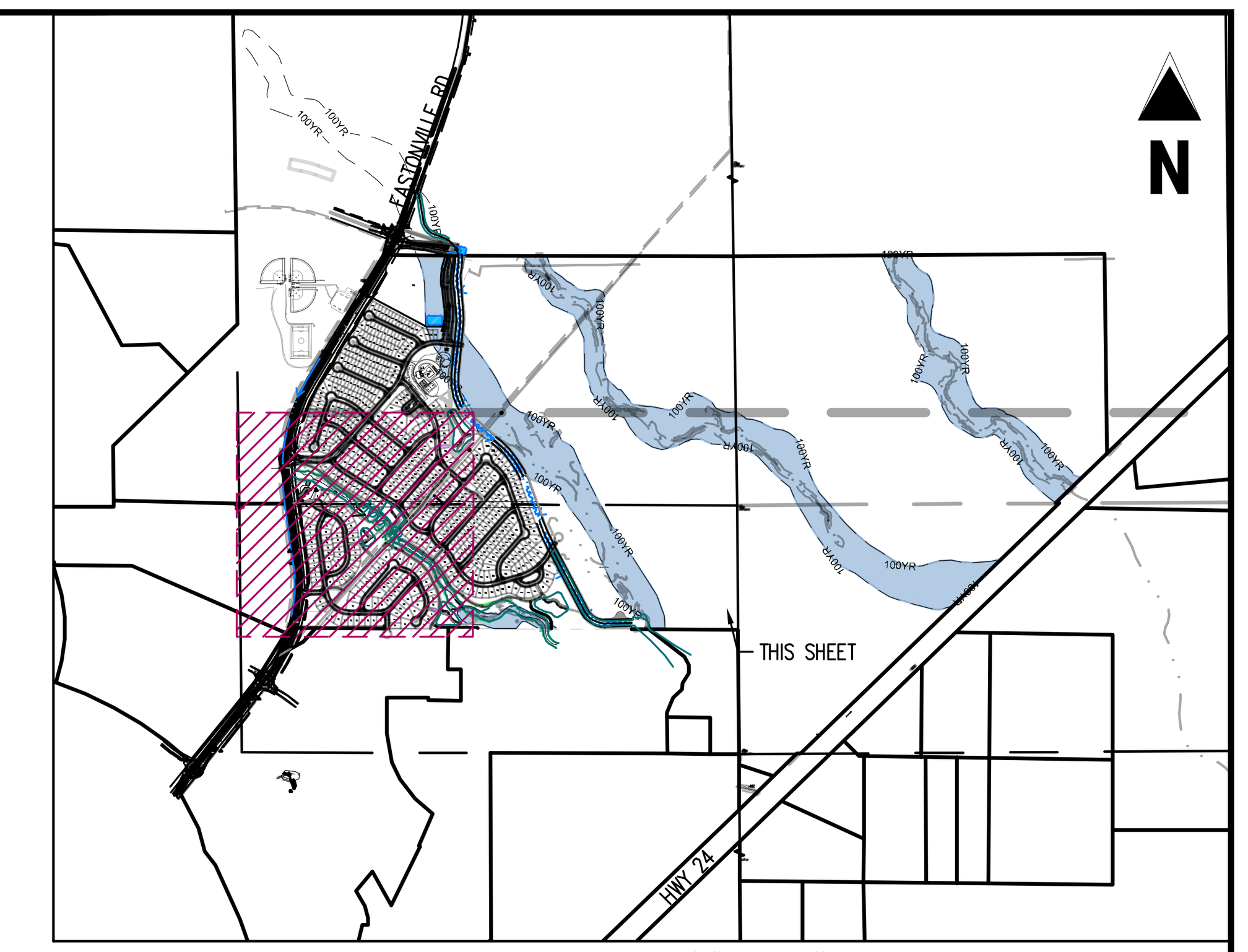
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

PROPOSED DRAINAGE MAP

DR-1

MATCHLINE – SEE SHEET DR-1





KEY MAP SCALE: (1"=2,000')

N

0 20 50 100

SCALE: 1"=100'

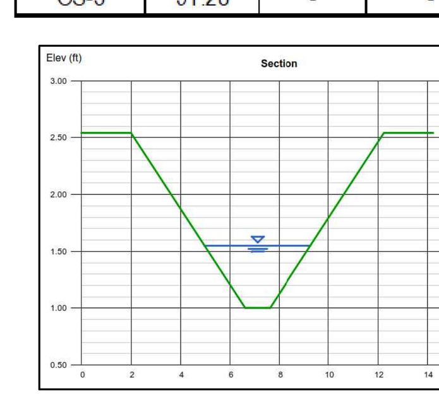
DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
7a	7.8	21.1
7b	2.2	5.3
8a	58.9	134.9
9	5.3	12.5
10b	9.6	26.9
11	4.6	9.4
12a	7.9	18.5
12b	7.4	24.5
13	3.8	9.0
14	3.7	8.7
15	1.6	3.8
16	43.7	103.2
17f	8.6	20.0
17g	6.2	20.0
18a	1.1	3.2
18b	11.0	26.0
22	5.4	12.7
23	1.7	4.0
24	6.6	19.2
25	3.3	7.7
26	18.1	43.2
27	9.8	22.9
28	10.1	23.6
29	8.1	32.1
30	9.0	21.0
31	29.3	69.9
32	3.6	24.0
33	3.9	25.8
34	67.0	414.0
EA1	9.2	19.5
EA2	7.0	14.9
EA2.1	15.8	33.4

Add a note that 663 cfs should be used for "emergency conditions" analysis, per Meridian Ranch MDDP (or that updated final calculations for offsite flows will be provided in the FDR)

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
A-9	4.91	7.4	17.3
A-10	1.02	2.1	4.9
B-4	1.37	4.6	9.4
B-5	5.12	7.9	18.5
B-6	2.28	3.7	8.7
B-7	0.89	1.6	3.8
B-8	3.23	5.3	12.4
B-9	2.42	3.8	9.0
B-10	1.10	0.5	3.3
C-1	4.12	6.8	16.0
C-7a	0.81	1.1	3.2
C-7b	5.91	9.9	23.2
C-8	5.11	8.6	20.0
C-9a	3.50	5.6	13.1
C-10	3.47	5.2	12.1
D-1	3.48	5.4	12.7
D-2	0.87	1.7	4.0
D-3	3.62	5.9	13.8
D-4	1.77	3.3	7.7
D-5	1.53	2.0	6.0
D-6	0.83	0.3	2.1
D-7a	0.25	0.2	0.8
D-7b	0.88	1.7	4.0
E-1	5.33	9.8	22.9
E-2	5.42	10.1	23.6
E-3	3.20	6.0	14.0
E-4	6.28	9.0	21.0
E-5	1.13	0.4	3.0
E-6	0.74	0.3	1.8
EA-1	7.79	9.2	19.5
EA-2	5.59	7.0	14.9
EA-3	0.94	0.4	3.1
OS-1	6.73	1.3	8.7
OS-2	17.28	2.6	17.3
OS-3	91.28	-	-



PR. SWALE D-7 SECTION
(BTM WIDTH: 1.0'; DEPTH: 0.55'; SIDE SLOPES: 3:1; SLOPE: 2.0%; Q: 4.0 cfs)

DRAINAGE LEGEND

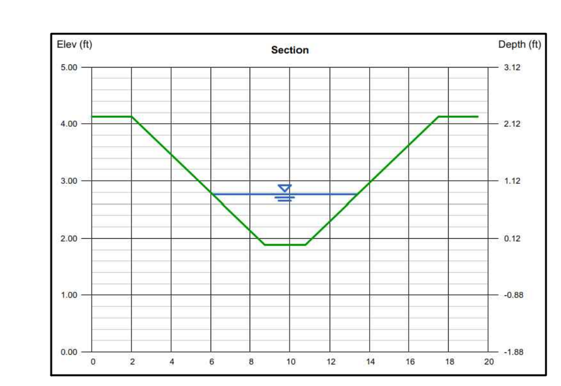
- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- PROPOSED RIPRAP
- PROPOSED GRAVEL ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – SEE NOTE #1)

NOTE:

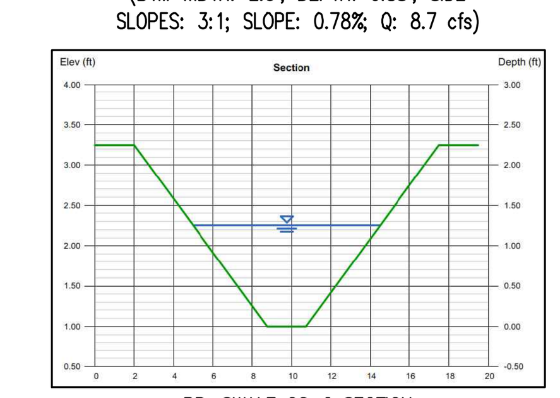
1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

NOTE:

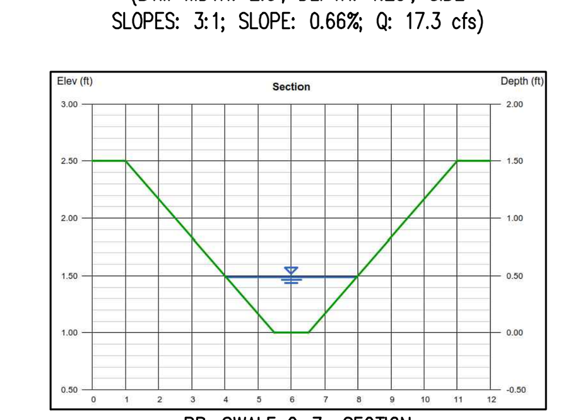
1. PROPOSED CHANNEL DESIGN AND ANALYSIS FOR BOTH ON-SITE TRIBUTARIES (MAIN STEM AND MAIN STEM TRIBUTARY NUMBER 2) IS PROVIDED IN A SEPARATE REPORT "GRANDVIEW RESERVE CLOMR REPORT", BY HR GREEN, JULY 2022. ALL CHANNEL CULVERTS ARE SHOWN FOR REFERENCE ONLY AND ACTUAL SIZING AND ANALYSIS IS PROVIDED WITHIN THE CLOMR REPORT.



PR. SWALE OS-1 SECTION
(BTM WIDTH: 2.0'; DEPTH: 0.88'; SIDE SLOPES: 3:1; SLOPE: 0.78%; Q: 8.7 cfs)



PR. SWALE OS-2 SECTION
(BTM WIDTH: 2.0'; DEPTH: 1.25'; SIDE SLOPES: 3:1; SLOPE: 0.66%; Q: 17.3 cfs)



PR. SWALE C-7a SECTION
(BTM WIDTH: 1.0'; DEPTH: 0.49'; SIDE SLOPES: 3:1; SLOPE: 2.0%; Q: 3.2 cfs)

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PRELIMINARY DRAINAGE PLAN
GRANDVIEW RESERVE FILING NO. 1
FOR
HR GREEN, INC

EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

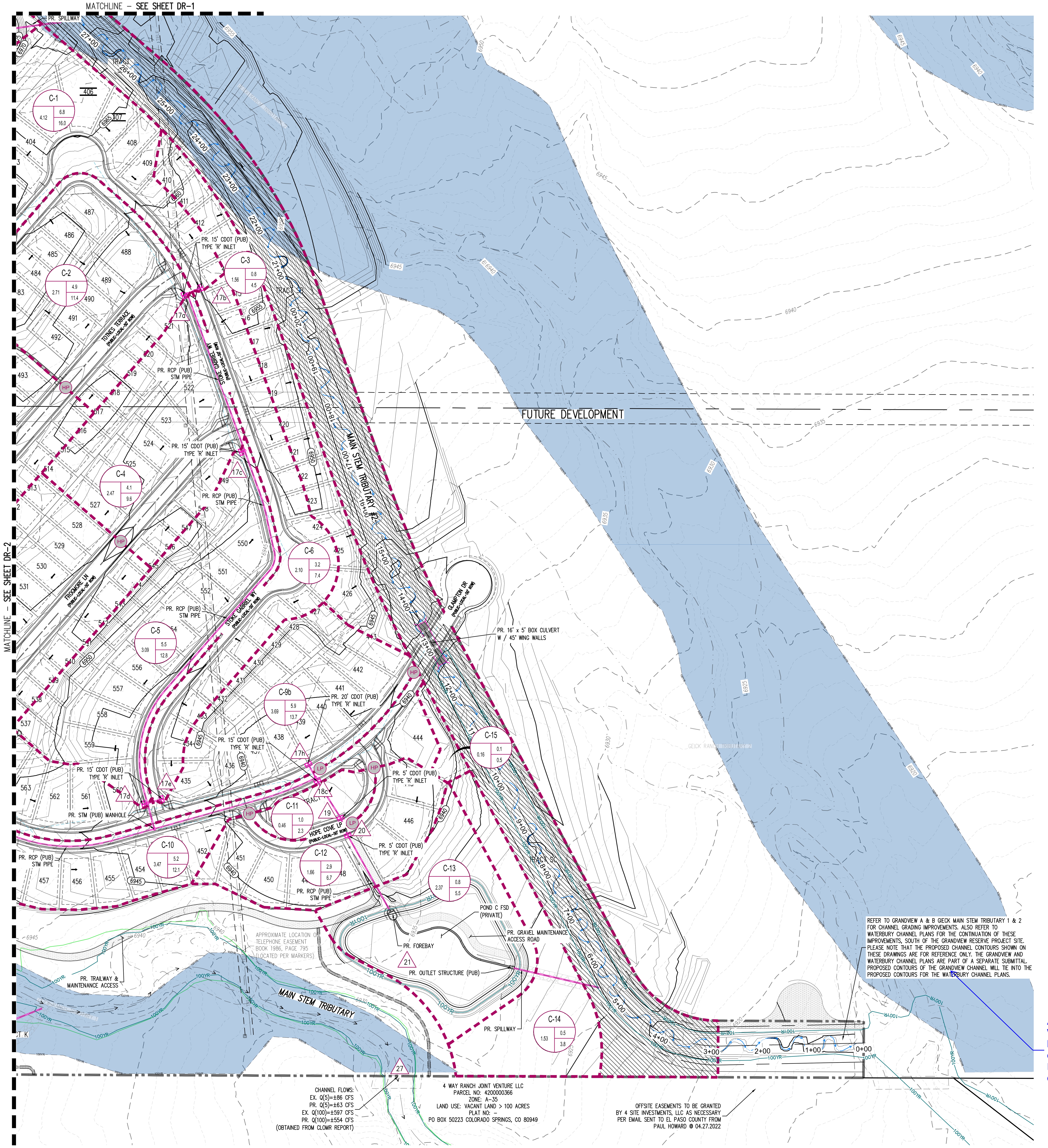
#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	9/9/2022

PROPOSED DRAINAGE MAP

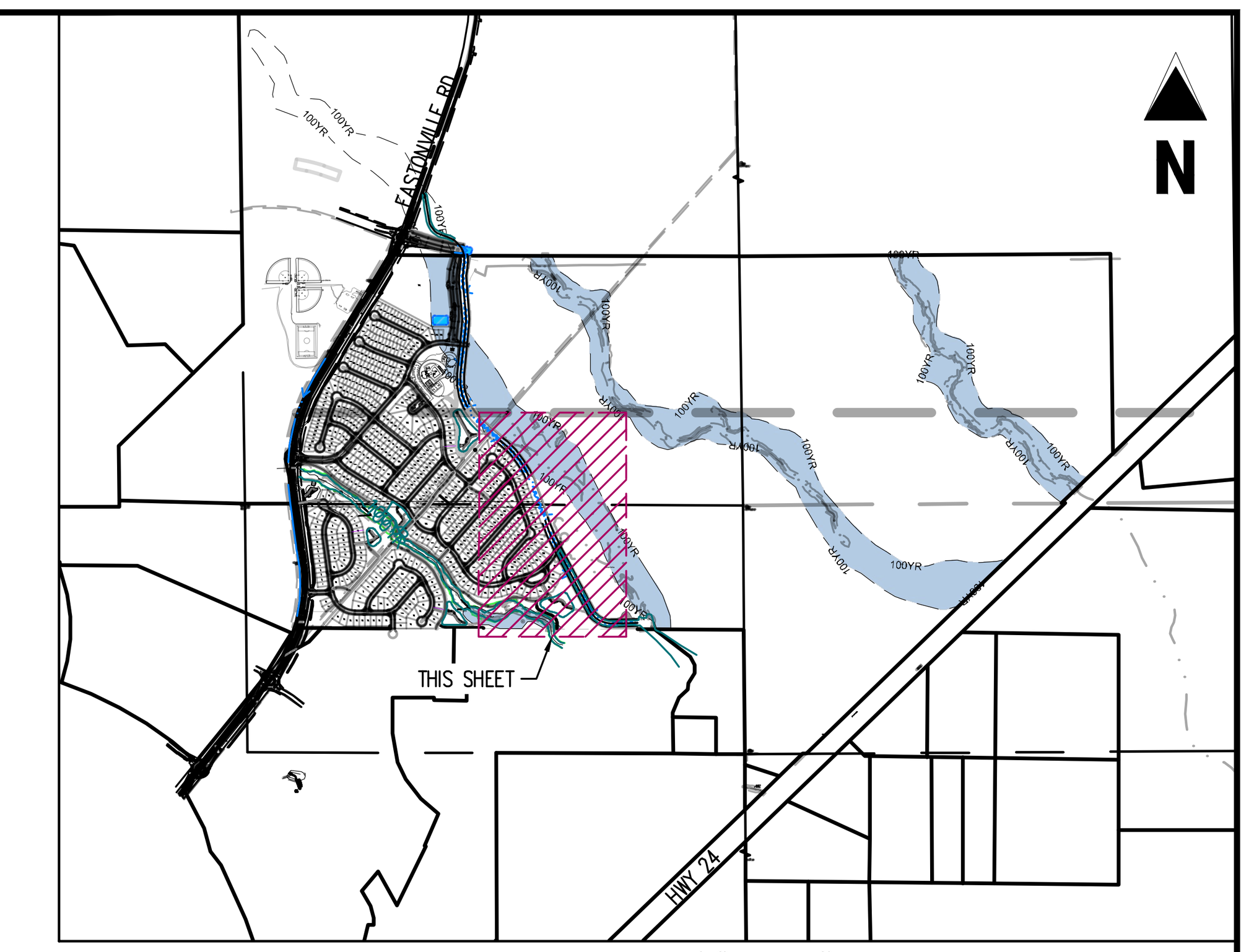
DR-2

Sheet 2 of 3



N
0 20 50 100
SCALE: 1"=100'

As this note is worded, the Waterbury channel plans will need to be approved and constructed prior to or concurrently with this channel. Provide the proposed Waterbury contours (a separate exhibit is fine).



KEY MAP SCALE: (1"=2,000')

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- PROPOSED EMERGENCY OVERFLOW ROUTE
- CENTERLINE OF STREAM
- 100-YEAR WATER SURFACE ELEVATION AND FLOODPLAIN
- EMERGENCY FLOW CONDITION HIGH WATER LIMIT (100-YR)
- PROPOSED RIPRAP
- PROPOSED GRAVEL ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – SEE NOTE #1)

NOTE:

1. FOR EXISTING WESTERN OFFSITE SUB-BASIN ANALYSIS AS WELL AS PROPOSED EASTONVILLE ROAD SUB-BASIN ANALYSIS, SEE "EASTONVILLE ROAD FINAL DRAINAGE REPORT", BY HR GREEN, SEPTEMBER 2022.

NOTE:

1. PROPOSED CHANNEL DESIGN AND ANALYSIS FOR BOTH ON-SITE TRIBUTARIES (MAIN STEM AND MAIN STEM TRIBUTARY NUMBER 2) IS PROVIDED IN A SEPARATE REPORT "GRANDVIEW RESERVE CLOMR REPORT", BY HR GREEN, JULY 2022. ALL CHANNEL CULVERTS ARE SHOWN FOR REFERENCE ONLY AND ACTUAL SIZING AND ANALYSIS IS PROVIDED WITHIN THE CLOMR REPORT.

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
C-1	4.12	6.8	16.0
C-2	2.71	4.9	11.4
C-3	1.56	0.8	4.5
C-4	2.47	4.1	9.6
C-5	3.09	5.5	12.8
C-6	2.10	3.2	7.4
C-9b	3.69	5.9	13.7
C-10	3.47	5.2	12.1
C-11	0.46	1.0	2.3
C-12	1.66	2.9	6.7
C-13	2.37	0.8	5.5
C-14	1.53	0.5	3.8
C-15	0.16	0.1	0.5

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
17a	4.9	11.4
17b	6.8	16.0
17c	5.8	20.8
17d	5.5	20.2
17e	3.3	11.7
17h	5.9	29.5
18c	6.9	23.3
19	1.0	2.3
20	2.9	6.7
21	58.7	140.8

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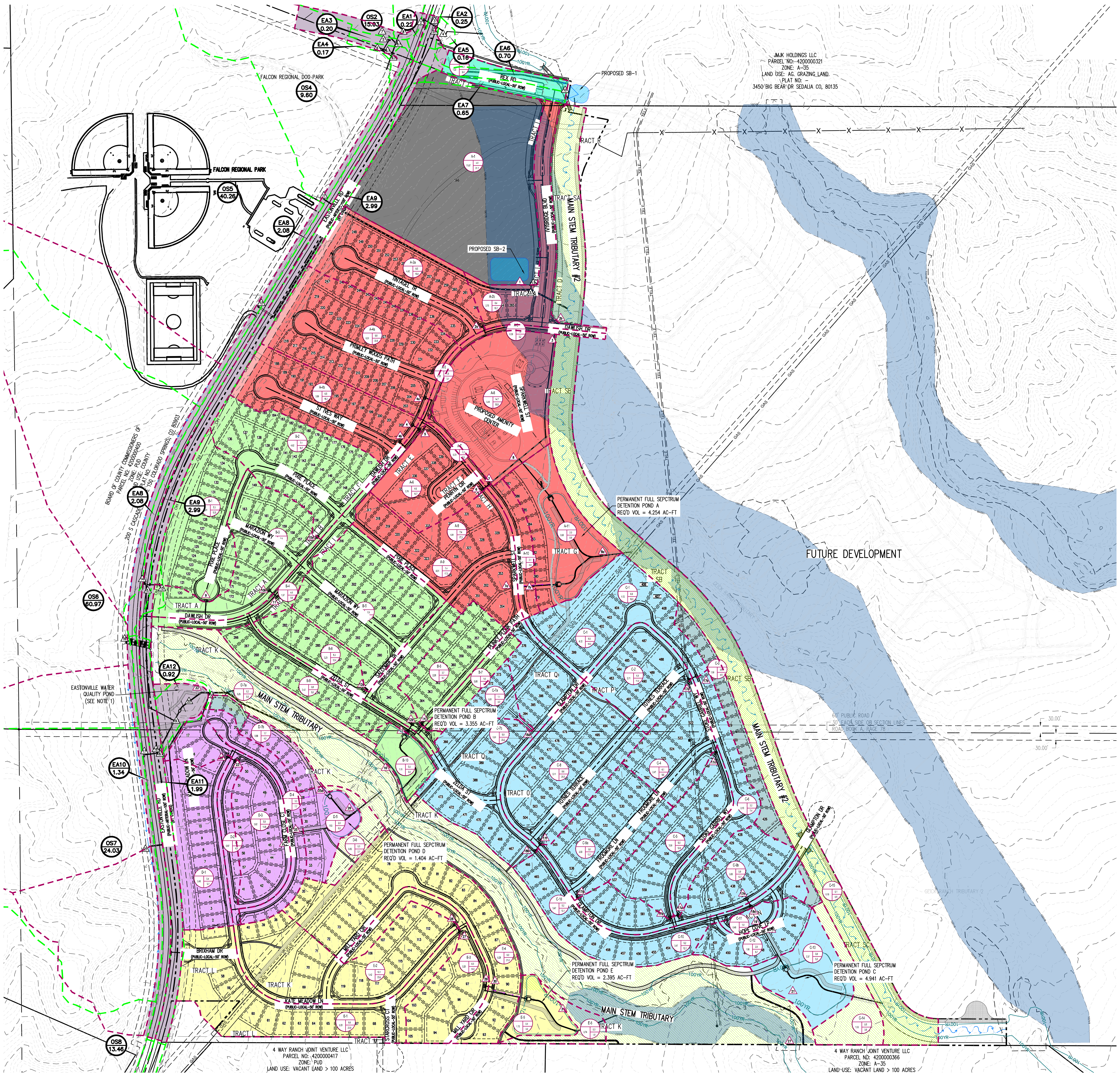
Checked By:	GRD
Date:	9/9/2022

PROPOSED DRAINAGE MAP

DR-3
Sheet 3 of 3



DRAINAGE LEGEND

- PROPERTY LINE
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED MAINTENANCE ACCESS
- BASIN DESIGNATION (1)
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND (1.8)
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND (4.8)
- BASIN AREA IN ACRES (0.71)
- FUTURE DEVELOPMENT (NOT PART – TSB PROVIDED)
- ROADWAY (DESIGN BY OTHERS – SEE NOTE 1)
- AREA TO BE DETAINED IN PBMP (POND A)
- AREA TO BE DETAINED IN PBMP (POND B)
- AREA TO BE DETAINED IN PBMP (POND C)
- AREA TO BE DETAINED IN PBMP (POND D)
- AREA TO BE DETAINED IN PBMP (POND E)
- AREA NOT TO BE DETAINED IN PBMP PER SECTION I.7.1.B.7 (LAND DISTURBANCE TO UNDEVELOPED LAND THAT WILL REMAIN UNDEVELOPED)
- AREA TO BE DETAINED IN FUTURE PBMP WITH THE REMAINDER OF THE REX RD DEVELOPMENT – TSB PROVIDED
- AREA WHERE WATER QUALITY IS ACHIEVED THROUGH RUNOFF REDUCTION (ROOF DRAINS & IMPERVIOUS SURFACES NOT PERMITTED ON BACK OF THESE LOTS)
- AREA TO BE DETAINED IN PUBLIC PBMP (EASTONVILLE ROAD)

NOTES:

1. EASTONVILLE ROAD AND THE WESTERN PORTION OF REX ROAD AT EASTONVILLE IS TO BE CONSTRUCTED CONCURRENTLY WITH THIS DEVELOPMENT. DRAINAGE FOR THESE AREAS WILL BE CAPTURED AND TREATED BY OFFSITE INFRASTRUCTURE AND PONDS AS DESCRIBED IN THE "FINAL DRAINAGE REPORT FOR EASTONVILLE ROAD FROM FUTURE REX ROAD TO LONDONDERRY DRIVE", BY HR GREEN, MARCH 2022. BASIN SHOWN ARE FOR REFERENCE ONLY.

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Checked By:	GRD
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WQ MAP

DR-4