Falcon Highlands Filing No. 3

Master Development Drainage Plan

Owner/Developer
Challenger Homes
8605 Explorer Drive Ste. 250
Colorado Springs, CO 80920
(719) 598-5192
Contact: Jim Byers

Engineer
Atwell, LLC
143 Union Blvd., Suite 700
Lakewood, CO 80228
303-462-1100
Contact: Richard Lyon, PE

Atwell Project Number
21000656

Submitted by: Atwell, LLC

March 18, 2022

SKP-21-004

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 City/County for drainage reports and said report is in conformity with the 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.

Richard D. Lyon, PE 53921 Date Seal:

Developer's Statement:

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

Business Name: Challenger Homes

By:

Title:

Address:

El Paso County Approval:

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

Jennifer Irvine / County Engineer, Director Date

Conditions:

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INTRODUCTION

This Master Development Drainage Plan Report has been completed for Challenger Homes in order to present an effective storm water management plan for the Falcon Highlands Filing No. 3 development, hereinafter referred to as the Site. This report is intended to guide the development of the site and recommend general drainage concepts that can be implemented as development progresses. Included within this report is a proposed drainage plan for the Site along with reference information for drainage basins and storm water conveyance facilities.

The Site was most recently studied in the *Falcon Highlands Filing No. 2 & 3 Final Drainage Report* by Terra Nova Engineering, Inc., latest revision August 2010 for the development of Filing No. 2. Prior to that Final Drainage Report, a Master Development Drainage Plan report entitled *Falcon Highlands Phase 2, Filing No. 2 & 3 Master Development Drainage Plan and Preliminary Drainage Report* by Terra Nova Engineering, Inc. latest revision September 2005 was developed. This new Master Development Drainage Plan (MDDP) acts as an update of the previous MDDP for the development of Falcon Highlands Filing No. 3 area and basins.

The entire site for Falcon Highlands Filing No. 3 is approximately 125.6 acres and will include a total of approximately 380 units. This is an additional 224 units from the previously approved reports of 156 units which had more quarter-acre and half-acre lots. In addition to greater lot density, roadway alignments have changed to accommodate the new lot layouts with approximately 2.75 miles of right-of-way improvements for paved roadways, curb and gutter, and attached sidewalks with 12.2 acres of open space interior to the subdivision not including tracts for drainage easements, with a dedicated park area central to the subdivision. This compares to the previously approved plans which had approximately 2.5 miles of right-of-way improvements and 7.0 acres of open space interior to the subdivision not including tracts for drainage easements, with no designated park areas. The drainage exhibits and calculations within the appendix present Filing No. 2 and other off-site basins consistent with that of previous reports. The total acreage of Filing No. 2 and 3 is approximately 257.7 acres and a portion of Filing No. 1 area totaling 10.6 acre was included for consistency in presenting tributary areas to existing detention ponds with that of previous studies.

Proposed herein is a network of storm infrastructure, ponds and channels that will meet the relevant criteria for storm water quality and detention, but also allow for aesthetically pleasing landscape and enjoyable green spaces within the PUD community.

GENERAL LOCATION AND DESCRIPTION

The Site is located within Section 12, Township 13 South, Range 65 West of the Sixth Principal Meridian, County of El Paso, State of Colorado. The Site is bounded by Tamlin Road to the south and east, Birch Hollow Way to the north and Bridal Vail Way to the west for the northern portion of the Site and Antelope Meadow Circle to the north for the western end of the Site. The Site, or Filing No. 3 specifically, is directly adjacent and south of Falcon Highlands Filing No. 2 and adjacent to the east and north of Banning Lewis Ranch subdivisions. The overall area consists of

approximately 125.6 acres that is proposed to be developed into approximately 380 single-family residential units including 24 nearly half-acre lots, 243 eighth-acre lots, 113 smaller (one-twelfth acre) lots. In addition to the single-family residential units and lots, there is proposed development for approximately 37 acres of open space, a well site, and associated roadways and landscaping. Of this 37 acres, approximately 12.2 acres is interior to the development which includes a park area of 3.53 acres. An off-site lift station property subject to potential upgrades to serve the development exists to the south central area of the Site.

The filing is initially planned to be built in three phases to plan for and accommodate water supply by the Metro District for what is anticipated to be approximately 55 water service taps in the initial Phase 1 of the development based on available water and an additional 191 taps following the new well connection, which includes Phases 1 and 2. Future Phases are included within this study to encompass the development of the entire Filing No. 3 as well as off-site, upstream Filing No. 2.

A map displaying the location and delineation of the Falcon Highlands Filings 1, 2, and 3 is shown below.

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SOILS AND EXISTING SITE CONDITIONS

The majority of the Site is currently undeveloped. Of the development within the Site, there are existing dirt roadways and sanitary sewer infrastructure installed per the Preliminary Plan and Development Plan for Falcon Highlands Phase 2, Filing No. 2 & 3 prepared by Terra Nova Engineering, most recent revised date of September 15, 2005. The ALTA survey conducted by Atwell, LLC., shows the existing conditions of Filing No. 3 and adjacent development of Filing No. 2. The Site is nearly 100% existing natural grass vegetation typical of the eastern plains with sparse vegetative cover at its outer limits to the south and southeast. There is an existing regional drainage pond referred to as Pond WU, east of the Site within Falcon Highlands Filing No. 2 dedicated to water quality and detention for storm water runoff from Falcon Highlands Filing No. 1, 2, and a small portion (Basin D) of Filing No. 3. There are two existing water quality and detention ponds to the south of the Site that were cut in during the construction of Filing No. 2 that were designed for development of both Filings Nos. 2 and 3. The on site slopes range from 0 percent to 10 percent and generally sheet flows from west to east. A Historic Drainage Map is included in Appendix F showing the delineated drainage basins.

The west edge of the Site has existing electric power lines and natural gas main within an existing utility easement. The south side of the Site has a 12" water main and a fiber optic line within what is considered future Tamlin Road right of way.

The Site is made up of mostly loamy sand soils with 100 percent of the soils being Hydrologic Soil Group A. The on-site soils are specified as Blakeland loamy sand (8), Blakeland Complex (8), and Columbine (19) as mapped by the Soil Conservation Service (SCS). The Natural Resources Conservation Service of the United State Department of Agriculture Web Soil Survey has been included in Appendix B for reference.

The western two thirds of the Site are contained within the Sand Creek Basin, the rest within the Falcon Basin.

Per previous drainage studies for the Site and the environmental study for Filing No. 1, there is a high ground water table that should be addressed with the final soils reports for this development. It is recommended that subsurface drains be installed for proposed structures.

Drainage improvements for the Site will include storm sewer infrastructure to capture runoff before street capacities are exceeded and at sump locations as well as channels and swales for potential overflow areas. The existing detention and water quality ponds south of the Site are assessed in this report and are to be constructed according to engineered construction drawings and a Final Drainage Report for Filing No. 3. More specific details regarding the proposed drainage improvements for the Site will be provided in the Final Drainage Report.

FLOODPLAIN

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map No. 08041C0561G and 08041C0545G dated December 7, 2018, the vast majority of the Site lies

within Zone X, which is designated as "Areas determined to be outside the 0.2% annual chance flood hazard area", a portion of the site to the east that is proposed open space is located within a Zone A, which is designated as "Areas determined to be within the 0.2% annual chance flood hazard area". The Zone A designation to the east of Tamlin Road is comprised of an Unnamed Tributary that drains to the Black Squirrel Creek No. 2. The FEMA FIRM, Community Panels Nos. 08041 C 0561 G and 08041 C 0545 G (effective December 7,2018) are included in Appendix C for reference.

El Paso County is involved with the Colorado Hazard Mapping Program (CHAMP) because the CWCB delegates its authority to the County to enforce the regulatory floodplain. El Paso County is part of the NFIP (National Flood Insurance Program) which provides assistance to property owners affected by flooding. Inclusion into this program requires that the County enforce floodplain regulations and any changes made to the regulatory maps. Failure to implement these changes could result in the County losing its NFIP status as such a Preliminary FEMA FIRM panel is also included in Appendix C that was remapped as part of CHAMP. Drainage Maps of existing and proposed conditions can be found in Appendix F.

The site falls within the Sand Creek Drainage Basin as well as partially within the Falcon Drainage Basin. The Drainage Basin Planning Study (DBPS) for Sand Creek Drainage Basin by Stantec HDR Dewberry, dated January 2021 and the City of Colorado Springs Sand Creek Basin GIS website show that the nearest creek EF1R9-T1R1 is located approximately 400 feet west of the site, located on the Banning Lewis Ranch Property. The Falcon Drainage Study by Matrix Design Group, dated September 2015, shows no existing or future drainageway improvements within the Site. Drainage from the site will outflow per existing conditions.

DRAINAGE DESIGN CRITERIA

The El Paso County Drainage Criteria Manual and El Paso County Engineering Criteria Manual were used in conjunction with the Mile High Flood District Criteria Manual. The rational method was used for drainage basin less than 100-acres. The 5-year design frequency was used for the minor storm and a 100-year design frequency was used for the major storm in calculating onsite storm facility hydraulics. The one-hour point rainfall depth used for the 5-year storm was 1.50 inches and 2.52 inches for the 100-year event. The City of Colorado Springs IDF Curve (Figure 6-5 of the Drainage Criteria Manual Volume 1) was used for calculating rainfall intensity.

EXISTING AND OFFSITE DRAINAGE BASINS

The Site has been assessed previously via the *Falcon Highlands Phase 2, Filing No. 2 & 3 Master Development Drainage Plan and Preliminary Drainage Report* developed by Terra Nova Engineering, Inc. latest revision September 2005 as well as a Final Drainage Report for Filing No. 2 & 3 by Terra Nova Engineering, Inc. dated August 2010.

The developments of Falcon Highlands Filing No. 1 & 2 remained consistent with their respective Master Development Drainage Plans and Final Drainage Reports and therefore offsite drainage basin descriptions and delineations provided in this report are based on those previous County

approved reports. The FDR for Filing No. 2 was utilized for off-site basin information within this MDDP. The FDR for Filing No. 2 was completed after the development of Filing No. 1 and therefore utilized the developed conditions for Filing No. 1 as the existing conditions within the Filing No. 2 report. Relevant excerpts from these reports including hydrologic calculations are included in Appendix D.

All off-site drainage basin runoff data and calculations have been updated for current codes and standards consistent with the El Paso County Drainage Criteria Manual. Part of the Site lies within the Sand Creek Basin and the other part within the Falcon Basin. Therefore, the *Sand Creek Drainage Basin Study* and the *Falcon Basin Drainage Basin Planning Study* were both referenced as well as the El Paso County Master Plan approved in May of 2021. Previous studies show the delineation between the two basins. This delineation is shown on the Drainage Basin Map.

The site has been broken down into eight major off-site basins upstream of Filing No. 3, within the existing development of Filing No. 2 and relatively small portions of Filing No. 1. Descriptions of the major basins and their respective sub-basins are below. The off-site basins match the naming convention of the previous Final Drainage Report for Filing No. 2 and 3 to be consistent. A drainage map is in the appendix.

OS-1 (6.38 ac, Q_5 = 10.7 cfs, Q_{100} = 21.7 cfs) is an off-site basin located on the northwestern part of Falcon Highlands Filing No. 2 and consists of the rear yard areas of PUD residential zoned lots. The historic drainage pattern sheet flows southwesterly where it is captured by basin OS-5 at **Design Point 7**.

OS-2 (3.12 ac, Q_5 = 7.8 cfs, Q_{100} = 13.6 cfs) is an off-site sub-basin within the developed area of Filing No. 1 for quarter-acre lots and is an off-site basin that was included in the MDDP for Filing No. 2. The basin's runoff sheet flows due south in Filing No. 2 and is captured by the roadways and storm system in Filing No. 2 that runs through Filing No. 3, and ultimately outfalls into the existing Pond 1. The basin flows to OS-5 at **Design Point 8**.

OS-3 (1.14 ac, Q_5 = 3.4 cfs, Q_{100} = 6.0 cfs) is an off-site basin within Filing No. 1 that includes the developed right-of-way of Rolling Thunder Way. This sub-basin was included in the previous MDDP as an off-site basin and represents a portion of the landscaped right-of-way on the south side of Rolling Thunder Way that sheet flows due south into the developed areas of Filing No. 2 at **Design Point 9** and ultimately into the public storm system shared with Filing No. 3, outfalling to existing Detention Pond 2.

OS-4 (13.09 ac, Q_5 = 12.3 cfs, Q_{100} = 26.3 cfs) is an off-site basin located on the southwestern part of Falcon Highlands Filing No. 2 and consists of mostly Tract A and portions of PUD residential zoned lots rear yard areas. The historic drainage pattern sheet flows south where it is captured by basin A at **Design Point 10**.

OS-5 (59.62 ac, Q_5 = 80.1 cfs, Q_{100} = 160.7 cfs) is an off-site basin that stretches from the eastern border of basin OS-4 to the eastern edge of Bridal Vail Way within Filing No. 2. The basin is zoned as PUD residential lots of about quarter-acre size. Runoff is carried in the public rights-of-

way where the flow travels south through a series of public curb and gutters, sump inlets and storm infrastructure within Filing No. 2. The flow outfalls into the existing Pond 1 through the public 60" RCP storm pipe that runs through Filing No. 3, the pipe run at **Design Point 11**.

OS-6 (35.75 ac, Q_5 = 31.9 cfs, Q_{100} = 58.4 cfs) is off-site basin located between Bridal Vail Way and Antelope Meadows Circle within Filing 2. This basin includes PUD residential zoned lots of half-acre size and contains drainage tracts. The basin is captured by a series of public curb and gutter systems in the rights-of-way where inlets and various size RCPs convey storm water to the end of the cul-de-sac of Wagon Track Drive where the public storm system of Filing No. 2 (**Design Point 12)** connects and daylights to Filing No. 3 within future Antelope Meadows Circle right-of-way.

In existing conditions, note that DP 12 releas
the existing diversion ditch, running through E

Language adde

OS-7 (6.47 ac, Q_5 = 5.2 cfs, Q_{100} = 18.3 cfs) is the off-site basi
of Basin D of Filing 3. The basin includes PUD residential zoned lots of half-acre size with
of way. The basin runoff is captured in the public right-of-way curb and gutter where it travels south and is released at the road end at **Deign Point 13** where it continues south through Antelope Meadows Circle and then due east through Filing 3's Basin D in the existing access path where it outfalls to Pond WU.

OS-8 (13.79 ac, Q_5 = 4.6 cfs, Q_{100} = 31.1 cfs) is an off-site basin located east of Basin D. The basin consists of native grasses and an existing Regional Pond WU. Runoff within the basin flows into the Pond WU (**Design Point 4**) and drains to the northwest side of Highway 24 via the existing private 42" and three 60" RCP outlet pipes to the low point in the offsite grasslined swale at **Design Point 6**.

Basin A (3.74 ac, Q_5 = 1.2 cfs, Q_{100} = 7.7 cfs) is the basin located southwest of Antelope Meadow Circle, just below basin OS-4, west of Basin B. The majority of the basin is comprised of Tract A and consists of some rear yard runoff from the PUD lots at the western edge of Basin B. The storm water runoff sheet flows south and off-site at **Design Point 1** with the cor
per existing drainage patterns is not tributary to on-site detention ponds.

Expand on existing drainage pattern. Is it sheetflow, and if so to where, or channel/swale, etc?

Basin B (38.93 ac, Q_5 = 10.2 cfs, Q_{100} = 68.6 cfs) is located south of Antelope Meadow Circle,
adjacent to basin A. The site is covered in native grasses with limited grad
Language added.
us development. Runoff from the site sheet flows southwesterly overland to existing Pond 1 **(Design Point 2**). The private 42" RCP outlet pipe from the outlet structure of the pond daylights at the grassland swale south of the abandoned future Tamlin Road right-of-way at **Design Point 5**.

Basin C (57.81 ac, Q_5 = 16.3 cfs, Q_{100} = 109.7 cfs) is located adjacent to Basin B and covered in native grasses and weeds. The site has limited grading due to work from a previous development that did not finish. Runoff from the site sheet flows southwesterly overland to an existing diversion ditch that spans from an existing public 24" RCP storm sewer main that daylights within Filing No. 3 south of Wagon Track Way. The diversion ditch flows directly to existing Pond 2 (**Design Point 3**).

Basin D (10.54 ac, Q_5 = 3.3 cfs, Q_{100} = 22.4 cfs) is located to the northeast of the Filing and consists of undeveloped area with native grasses. The basin's runoff drains directly to existing Pond WU (**Design Point 4**).

Flows do not match hydrology spreadsheet

Basin E (3.14 ac, Q_5 = 1.1 cfs, Q_{100} = 7.5 cfs) is the undeveloped, natural landscaped area between Tamlin Road and the existing Pond 1. Runoff fro[illegible]y a ditch section to a low point between the future Tamlin Road and Highw[illegible]5). This drainage concept and its associated storm infrastructure is presente[illegible]r plan and is to remain as the intended plan. The 2010 FDR suggested that [illegible]e installed but there is no evidence that this was installed. The existing drai[illegible]f pooling within the local low point of the ditch that surcharges and is directed south through the grassland swale.

Summary calcs were correct, updated hydrology sheets inserted.

Basin F (3.67 ac, Q_5 = 1.2 cfs, Q_{100} = 8.0 cfs) is the undeveloped area between Tamlin Road and the existing Detention Pond 2. The runoff from Basin F is directed to the low point in the downstream grasslined swale between the Site and Tamlin Road (**Design Point 6**). This drainage concept and its associated storm infrastructure is presented in the previous master plan and is to remain as the intended plan. The 2010 FDR suggested that a 4'x4' area inlet be constructed but there is no evidence that this was installed. The existing drainage pattern consists of pooling within the local low point of the ditch that surcharges and is directed south through the grassland swale.

Basin G (8.84 ac, Q_5 = 6.8 cfs, Q_{100} = 16.0 cfs) is the area east of Basin C that is not to be disturbed and remain as open, natural landscape. The runoff from Basin G is collected in a local topographic low point and when overtopping the low point, the runoff continues southeast to the low point in the grasslined swale along Highway 24, **Design Point 6**.

PROPOSED DRAINAGE BASINS

This report has been prepared in accordance with the El Paso County Drainage Criteria Manual and the Mile High Flood District Criteria Manual. The 5-year storm was used as the minor storm event, while the 100-year storm was used as the major event. The one-hour point rainfall depth used for the 5-year storm was 1.50 inches and 2.52 inches for the 100-year event.

Grading design is preliminary or has not begun for much of the site. Due to this, the assumption has been made that the developed conditions drainage patterns presented in the previous MDDP (Terra Nova Engineering, Inc., September 2005) and FDR (Terra Nova Engineering, Inc., August 2010) will remain for all relevant developed areas consistent with the updated design plan and assumed drainage patterns within altered design areas will conform with the design intent. As design and development progress, this should be revisited to confirm the proposed drainage patterns used in this analysis are still applicable. Since the development of Filing No. 2, sketch plans for Filing No. 3 have been altered from the previous MDDP and FDR. Due to the change in the layout of Filing No. 3 from previous design plans and reports, this report serves to provide updated drainage information for the planned development based on new concept grading and drainage patterns. However, as mentioned previously, the drainage concept for the new layout aims to follow previous master plans as closely as possible including basin delineation areas and pond routing in order to keep with previous detention and water quality pond designs.

The overarching premise of the drainage design is to route overland flow from residential lots and units to adjacent rights-of-way where public storm infrastructure will be installed and ultimately convey the storm water to respective ponds to provide water quality treatment as well as flow attenuation and detention. Previous studies designed the existing Ponds 1 and 2 in order to provide full spectrum detention and water quality for Filing Nos. 2 and 3. The analysis within this report provides more defined pond sizing requirements due to the change in layout for Filing No. 3 as well as preliminary locations and sizes for culverts and/or open channels and the public storm system. This idea is intended to be followed for the entirety of the developed site. Basins which are not along the main drainageways within the proposed developed areas or which are expected to flow offsite have been analyzed. There are no engineered channels that exit the Site.

There is a proposed grass-lined, natural ditch to convey stormwater from the rear of B-lot sites within Basin C to existing Pond 2. The design of this swale is to be included in the Final Drainage Report. All Pond outlets daylight to the southern open space of the Site, but are not directed to any formal channels or drainageways.

Preliminary pond sizing and conveyance structures will be analyzed as development progresses to ensure that the final design meets the standards set forward in the El Paso County Engineering Criteria Manual as well as the Mile-High Flood Control Criteria Manual.

As with the existing conditions. the thirteen existing major drainage basins have been delineated into six major basins based on preliminary grading of the Site – basins A through G within the limits of Filing No. 3 and basins OS-1 through OS-6 for off-site basins consistent with the existing conditions for the developed areas of Filing No. 2 and relatively small developed area of Filing No. 1. Of the major basins within the Site, basins B, C, D, and E are consistent with previous reports for Filing Nos. 2 and 3 as those basins are not to be altered during the development of Filing No. 3. Basins B and C are the basins in which development of Filing No. 3 is to occur. Sub-basin analysis within these major basins will be provided as a part of the hydrology calculations in the Preliminary and Final Drainage Reports for design of proposed storm infrastructure and channels on the Site.

The rational method was used to estimate runoff rates for the proposed development and are in accordance to El Paso County Drainage Criteria Manual and any references within the County criteria to the City of Colorado Springs Drainage Criteria Manuals, volumes 1, 2, and 3. These calculations can be found in Appendix D.

OS-1 (6.38 ac, Q_5 = 10.7 cfs, Q_{100} = 21.7 cfs) is an off-site basin located on the northwestern part of Falcon Highlands Filing No. 2 and consists of the rear yard areas of PUD residential zoned lots. The historic drainage pattern sheet flows southwesterly where it is captured by basin OS-5 at **Design Point 7**.

OS-2 (3.12 ac, Q_5 = 7.8 cfs, Q_{100} = 13.6 cfs) is an off-site sub-basin within the developed area of Filing No. 1 for quarter-acre lots and is an off-site basin that was included in the MDDP for Filing No. 2. The basin's runoff sheet flows due south in Filing No. 2 and is captured by the roadways

and storm system in Filing No. 2 that runs through Filing No. 3, and ultimately outfalls into the existing Pond 1. The basin flows to OS-5 at **Design Point 8**.

OS-3 (1.14 ac, Q_5 = 3.4 cfs, Q_{100} = 6.0 cfs) is an off-site basin within Filing No. 1 that includes the developed right-of-way of Rolling Thunder Way. This sub-basin was included in the previous MDDP as an off-site basin and represents a portion of the landscaped right-of-way on the south side of Rolling Thunder Way that sheet flows due south into the developed areas of Filing No. 2 at **Design Point 9** and ultimately into the public storm system shared with Filing No. 3, outfalling to existing Detention Pond 2.

OS-4 (13.09 ac, Q_5 = 14.9 cfs, Q_{100} = 31.7 cfs) is an off-site basin located on the southwestern part of Falcon Highlands Filing No. 2 and consists of mostly Tract A and portions of PUD residential zoned lots rear yard areas. The historic drainage pattern sheet flows south where it is captured by basin A at **Design Point 10**.

OS-5 (59.62 ac, Q_5 = 80.1 cfs, Q_{100} = 160.7 cfs) is an off-site basin that stretches from the eastern border of basin OS-4 to the eastern edge of Bridal Vail Way within Filing No. 2. The basin is zoned as PUD residential lots of about quarter-acre size. Runoff is carried in the public rights-of-way where the flow travels south through a series of public curb and gutters, sump inlets and storm infrastructure within Filing No. 2. The flow outfalls into the existing Pond 1 through the public 60" RCP storm pipe that runs through Filing No. 3, the pipe run at **Design Point 11**.

OS-6 (35.75 ac, Q_5 = 31.9 cfs, Q_{100} = 58.4 cfs) is off-site basin located between Bridal Vail Way and Antelope Meadows Circle within Filing 2. This b
Flow from DP 12 was previously routed through a diversion channel. How is it directed now, until future system in Antelope Meadows Cir is built?
half-acre size and contains drainage tracts. The basin
gutter systems in the rights-of-way where inlets and v
end of the cul-de-sac of Wagon Track Drive where the public s
Language added specifying conditions for Filing No. 3 prior to and after Phase 2.
Point 12) connects and daylights to Filing No. 3 within future
way.

OS-7 (6.47 ac, Q_5 = 5.2 cfs, Q_{100} = 18.3 cfs) is the off-site basin located within Filing 2, just north of Basin D of Filing 3. The basin includes PUD residential zoned lots of half-acre size with right of way. The basin runoff is captured in the public right-of-way curb and gutter where it travels south and is released at the road end at **Deign Point 13** wh
From this description, Basin has been re-routed. Ensure Pond design has accounted for additional area and flow.
Meadows Circle and across a cross pan adjacent to Basin D
in a proposed public storm system that outfalls to Pond 2.

OS-8 (13.79 ac, Q_5 = 4.6 cfs, Q_{100} = 31.1 cfs) is an off-site basin locate
Language added.
basin consists of native grasses and an existing Regional Pond WU. Runoff within the basin flows into the Pond WU (**Design Point 4**) and drains to the northwest side of Highway 24 via the existing private 42" and three 60" RCP outlet pipes to the low poi
Indicate roadside ditch will be analyzed for developed flows with PDR & FDR's.
Point 6.

Basin A (3.74 ac, Q_5 = 1.7 cfs, Q_{100} = 8.2 cfs) is the western most basin
Language added.
s of the open space Tract A and some small portions of the rear lots of the one-eighth acre single family

replace detention with water quality treatment

lots. The runoff from Basin A Language added. site and onto the adjacent open space. Runoff reductions via grass buffers and natural landscape to **Design Point 1** allow for no required detention of this basin.

Basin B (40.37 ac, Q_5 = 73.5 cfs, Q_{100} = 176.7 cfs) is the southwestern portion of Filing No. 3 consisting of the area south of Antelope Meadows Circle and west of Basin C. Basin B is laid out with several 50' public right of way roadways with curb and gutter, detached pedestrian sidewalk, and landscape areas. The PUD residential developments within Basin B are shown as 123 lots, varying from 50'x110' to 60'x110'. The roadways consist of high points at the eastern and western edges and low points central to the basin with a drainage Tract that flows north to south. The general drainage pattern is due south to the existing Pond 1. Within the roadways is a public storm system and a series of sump inlets at the low points to capture surface runoff and convey storm water to forebays within the existing Pond 1 (Design Point 2). A relatively small portion of the northern half-acre lots east of Bridal Vail Way are included in Basin B where a low point in the western cul-de-sac is to have a sump inlet for surface runoff collection that connects to the existing Pond 1 storm system.

Basin C (57.12 ac, Q_5 = 64.8 cfs, Q_{100} = 170.6 cfs) is the more central to east basin within Filing No. 3 that is tributary to Pond 2. The basin includes the majority of the half-acre PUD residential lots in the northern area south of Filing No. 2 and east of Bridal Vail Way, and stretches south to the very south and east edges of the Filing with the exception of Pond WU areas and Basin D. Basin C areas south of Antelope Meadows Circle consists of approximately 248 lots with some lots of 35'x110' and others of 50'x110' and 60'x110' in size. A public storm system is to be designed within the roadways to convey storm water from the off-site Basin OS-5 and Basin OS-6 within Filing No. 2 and the runoff from the entire Basin C areas. The storm system is to outfall into the existing Pond 2 (Design Point 3).

Basin D (7.96 ac, Q_5 = 9.8 cfs, Q_{100} = 24.8 cfs) is the northeast area of the Filing for one-eighth acre PUD residential lots at the extension of Birch Hollow Way. The basin is tributary to existing Pond WU which is an existing and recently improved pond under the jurisdiction of El Paso County. The basin d isting pond (Design Point 4) via overland flow.

existing Language added.

Basin E (3.14 ac, Q_5 = 1.1 cfs, Q_{100} = 7.5 cfs) is the undeveloped, natural landscaped area between Tamlin Road and existing Detention Pond 1. Runoff from Basin E is directed by Language added. a low point where an inline inlet captures flow and direct it south offsit release rate of the existing pond. This drainage concept and its associa presented in the previous master plan and is to remain as the intende offsite is accounted for in existing Pond 1. The basin drains to Design Po at the southwest corner of the Filing.

Make note that if existing inlet wasn't installed, it may need to be. It will be furthered analyzed in the PDR & FDR's, as well as the capacity of the existing swale.

Basin F (5.50 ac, Q_5 = 2.2 cfs, Q_{100} = 12.5 cfs) is the area south of Basin C that is not to be disturbed and remain as open, natural landscape. The runoff from Basin F sheet flows downstream and is undetained. There is no increase runoff and the drainage pattern remains that of its existing flow

path in the channel south to the box culverts at Highway 24. The flow directed offsite is accounted for in existing Pond 1. The basin drains to Design Point 6 and is directed offsite through Tract K.

Basin G (8.80 ac, Q_5 = 6.8 cfs, Q_{100} = 16.0 cfs) is an open, undeveloped area east of Basin C within Tract Z that is to remain undisturbed. The basin drains southeast to the ditch between dedicated future Tamlin Road and Highway 24. The basin drains to Design Point 7 which and is dir offsite due southwest.

Detention Spread shows 16 ac-ft to embankment (ele

Corrected

Existing Pond 1: The existing Detention Pond 1 (Design Point 2) was designed as a 17 acre-foot pond for water quality and detention basin for the 100-year storm event according to the 2010 FDR. The basins that are tributary to Pond 1 are Offsite Basins OS-1, OS-2, and OS-5 and On-site Basin B. The undetained storm water runoff from Basin A is accounted for within the pond as disturbance will occur within that basin.

Existing Pond 1 was sized using Haestad's Pondpack program in the previous study by Terra Nova, dated September of 2010. The pond will need to have more detail taken into account at the time of the Final Drainage Report when runoff calculations are finalized and the required pond volumes for WQCV (Water Quality Capture Volume), EURV (Excess Urban Runoff Volume), and 100-year detention and release rates are determined. The Existing Pond will be assessed for final conditions to determine if earthwork for volume adjustments is required and if retrofitting of existing pond infrastructure is required including the outlet structure, orifice plate, micropool, and spillway. The existing infrastructure will be as-built to verify elevations and sizes. The required WQCV, EURV, and 100-year detention volumes are listed in a table in the next section of this report.

An existing 42" RCP outlet pipe from the existing outlet structure discharges flow from existing Pond 1 due south under the future dedicated right-of-way of Tamlin Road (that has been abandoned) onto the adjacent undeveloped Banning Lewis Ranch property. Rip rap protection was to be constructed at the end of the outlet pipe at the time of final construction and is to be inspected for the Final Drainage Report as-built conditions. According to the previous study from 2010, "the released runoff drains south across a defined broad open grassland swale to Highway 24. A 72' wide emergency spillway set at 6817.00 will pass the complete 100-year developed flow safely over the proposed riprap lined weir." Downstream drainage patterns mentioned in the previous report are to be assessed in the Final Drainage Report. The previous FDR and Construction Drawings detailed an outlet structure and orifice plates to meet the required release rates of 40 hours for WQCV, approximately 68 hours for EURV, and 72 hours for the 100-year storm event. It is anticipated that new outlet structures with orifice plate, a micropool, and trickle channel will be required to be designed in order to satisfy release rate requirements for the proposed developed conditions. Some earthwork may be required to provide permanent stabilization of more defined contouring within the pond to ensure that runoff reaches the outlet structure. A maintenance path exists that accesses the outlet structure and future forebay areas but it may require alterations to meet current criteria for slopes and width.

Preliminary calculations for the adjusted site layout can be found in Appendix E of this report including effective imperviousness calculations using the UD-BMP IRF calculator and WQCV, EURV, and 100-year detention calculations using the UD-Detention spreadsheet by the Mile High Flood District.

Existing Pond 2: The existing Detention Pond 2 (Design Point 3) was designed as a 7 acre-foot pond for water quality and detention basin for the 100-year storm event according to the 2010 FDR. The basins that are tributary to the existing pond are Offsite Basins OS-3 and OS-6 and On-site Basin C.

Existing Pond 2 was sized using Haestad's Pondpack program in the previous study by Terra Nova, dated September of 2010. The pond will need to have more detail taken into account at the time of the Final Drainage Report when runoff calculations are finalized and the required pond volumes for WQCV, EURV, and 100-year detention and release rates are determined. The Existing Pond will be assessed for final conditions to determine if earthwork for volume adjustments is required and if retrofitting of existing pond infrastructure is required including the outlet structure, orifice plate, micropool, and spillway. The existing infrastructure will be as-built to verify elevations and sizes. The required WQCV, EURV, and 100-year detention volumes are listed in a table in the next section of this report.

The 2010 FDR proposed an 42" RCP outlet pipe from the existing outlet structure to discharge flow from existing Pond 2 due south under the future dedicated right-of-way of Tamlin Road onto the adjacent undeveloped Banning Lewis Ranch property. It was proposed that rip rap protection will need to be provided at the end of the outlet pipe at the time of final construction and this is to be verified for the Final Drainage Report. From here the runoff drains south to an existing channel and then is directed to an existing Highway 24 culvert. These proposed offsite improvements are to be assessed further in the Final Drainage Report. Current survey field data suggests that these improvements were not constructed as a part of Filing No. 2 and are to be verified in further studies. According to the 2010 study, "a 50' wide emergency spillway set at 6817.50 will pass the complete 100-year developed flow." Impervious factors and extended detention basin calculations for this pond can be found in Appendix E of this report. The previous FDR and Construction Drawings detailed an outlet structure and orifice plates to meet the required release rates of 40 hours for WQCV, approximately 68 hours for EURV, and 72 hours for the 100-year storm event. It is anticipated that new outlet structures with orifice plate, a micropool, and trickle channel will be required to be designed in order to satisfy release rate requirements for the proposed developed conditions. Some earthwork may be required to provide permanent stabilization of more defined contouring within the pond to ensure that runoff reaches the outlet structure. Maintenance paths are to be established for access to future forebays and the outlet structure.

Existing Pond WU: The existing Detention Pond WU is a recently improved storm water quality and detention facility that is owned and maintained by El Paso County. The previous MDDP called for developed flow conditions to drain to this existing facility and it was accounted for in the recent improvements by Galloway and Company. The new layout has more density and effective imperviousness in Basin D of Filing No. 3 but the developed conditions will route Offsite Basin

OS-7 due south in Antelope Meadows Circle instead of turning into Filing No. 3 at Basin D to drain directly to Pond WU. As a result, there is less runoff to Pond WU in the proposed plan, therefore there is no increase to water quality capture volume or 100-year detention volume from the previous study or from recent improvements. A table within Appendix E compares the developed conditions for the current proposed conditions to that of the 2010 FDR.

It may be warranted that pond infrastructure will need to be constructed within Pond WU to meet current criteria, particularly a concrete trickle channel. This is to be assessed in the Preliminary and Final Drainage Reports.

Due to the revised layout and grading of the site, approximately 31 acres of area that was tributary to the Falcon Basin will now be tributary to the Sand Creek Basin. This cross-basin transfer should not cause any downstream problems as detention of the additional runoff and release rates conforming to drainage standards will be implemented.

The Developed Condition's runoff flows are kept at or below historic flows by way of detention within existing Pond WU, existing Detention Pond 1, and existing Detention Pond 2; all of which are designed for water quality capture and to release storm water at rates conforming to the El Paso County Drainage Criteria Manual. It is anticipated that there will be no negative affects to downstream areas due to developed drainage conditions.

STORM WATER CONVEYANCE AND STORAGE FACILITIES

existing
evised.

The proposed on-site conveyance facilities will consist of a combination of storm pipe, swales/channels, curb/gutter, and inlets. Proposed drainage patterns will generally follow the historic drainage patterns outlined in the previous sections of this report, including previous master plans and reports for upstream filings. Within the proposed roadway network, stormwater runoff will be conveyed overland via surface flow of streets in the curb and gutter until street capacities have been exceeded or where storm sewer inlets have been designed. At sump locations, inlets will be sized to collect 100-year flows. Runoff entering the inlets will be conveyed within the storm sewer system to detention and water quality ponds. The general onsite drainage paths and patterns were previously discussed in the Proposed Drainage Basins section of this report.

The existing pond outfalls are routed to the Sand Creek Basin. These outfalls have been preliminarily sized based on standard pond release rates required by the MHFD criteria. Release rates will be further evaluated during the preliminary and final drainage studies. The sizing of the facilities will be assessed in the Preliminary and Final Drainage Reports.

Detention and Water Quality Ponds for the Site have been preliminarily designed based on previous MDDP and FDR studies for off-site basins and for Filing No. 3 with the methods outlined in the MHFD Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3 along with the MHFD MHFD-Detention_v4.00. The ponds are designed to detain the EURV and the 100-year Detention Volume.

The existing ponds have outlet structures that contain 2.5-ft deep micro-pools. EURV release rates will be controlled by an orifice plate designed to meet the MHFD release rate criteria. The 100-year storage volume is routed through a grate and restricted by a plate that was sized to limit the release rate to the allowable release rate.

The existing ponds have been previously designed using the runoff data from the Final Drainage Reports from Filing No. 1 and Filing No. 2 as well as assumed runoff data for Filing No. 3 via the most recent FDR in August of 2010 for the development of Filing No. 2. The existing infrastructure is to be assessed for final conditions within a Final Drainage Report to determine if retrofits are required.

This report provides more concise drainage calculations for Filing No. 3, consistent with the new layout and grading concept and thus for the tributary areas to Ponds 1 and 2. The MHFD UD-Detention calculator was used to determine existing Pond 1 and Pond 2's required WQCV, EURV, the 100-year detention volumes. The ponds are to be designed and updated to function as full-spectrum detention facilities as needed. These designs are to be presented in the Preliminary and Final Drainage Reports.

A summary of the required pond volumes is presented in the table below.

Extended Detention Pond Volumes				
	Zone 1 (WQCV)	**Zone 2 (EURV - Zone 1)**	**Zone 3 (100-Year - Zones 1 & 2)**	**Total Volume Required**
Pond 1	1.855 ac-ft	3.377 ac-ft	3.731 ac-ft	8.962 ac-ft
Pond 2	1.393 ac-ft	2.235 ac-ft	2.824 ac-ft	6.452 ac-ft

This MDDP consists of the most up to date calculations for percent imperviousness for the tributary areas to existing Ponds 1 and 2 and therefore has new, adjusted volume requirements compared to that of previous reports.

The existing Pond 1 was calculated to require 8.985 ac-ft and was sized for a 17 ac-ft pond using Haestad's Pondpack Program and HEC modeling according to the 2010 report. The as-built conditions for the constructed pond have the spillway weir at an elevation of 6416.5 and top of pond berm at 6817, yielding a total pond size of approximately 15.77 ac-ft. A Final Drainage Report for Filing No. 3 will require analysis of Pond 1's infrastructure to adjust to final hydrology and hydraulic conditions tributary to the pond for the new, more dense site layout.

Our calculations require 6.452 ac-ft within existing Pond 2 and the original report sized the pond for 9.43 ac-ft according to the Haestad's Pondpack Program and HEC modeling. The as-built conditions for the constructed pond have the spillway weir at an elevation of 6816.5 and top of pond berm at 6817.5 yielding a total pond size of approximately 10.45. A Final Drainage Report for Filing No. 3 will require analysis of Pond 2's size and infrastructure to adjust to final hydrology and hydraulic conditions tributary to the pond.

A Final Drainage Report for Filing No. 3 will require analysis of both existing ponds for size and infrastructure to adjust to final hydrology and hydraulic conditions tributary to the respective facilities.

Existing Regional Detention Pond WU was designed and built as a part of Filing No. 2 and accounted for the future development within Basin D of Filing No. 3 according to the previous MDDP and FDR. Total runoff from Basin D is reduced as a result of the new layout as shown in the hydrology tabulations. It is anticipated that a concrete trickle channel is to be installed within this regional pond and no other improvements are required.

WATER QUALITY ENHANCEMENT BEST MANAGEMENT PRACTICES

The existing detention ponds discussed in the previous section have been designed in accordance with the MHFD Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3 as well as the El Paso County and City of Colorado Springs Drainage Criteria Manuals. The ponds are designed to provide WQCV and detain the EURV and the 100-year Detention Volume. Runoff from the upstream tributary areas will be conveyed to the ponds via storm sewer and designed channels as emergency overflow routes directed to the ponds.

Non-structural Best Management Practices that will be incorporated into the project are anticipated to include grass swales. Water quality is provided via side yard grass swales between lots in developed areas throughout the subdivision. It is provided for basins that drain directly offsite and are not tributary to the ponds by way of grass-lined swales, and by having minimal grading with no developed imperviousness in these areas as either open space or permanently seeded and landscaped rear yard areas.

Structural Best Management Practices that are incorporated in the Site design include storm infrastructure within the extended detention basins such as outlet structures and spillways.

MAINTENANCE

Maintenance of the existing Detention Ponds 1 and 2 shall be by the Falcon Highlands Metro District along with the outlet works for the pond. Public Pond WU will be maintained by El Paso County along with the channel on the east side of the property. The proposed storm sewer system in the internal streets will be owned and maintained by El Paso County once approved.

FLOODPLAIN MODIFICATIONS

A portion of the Site that is not to be developed is within a FEMA Flood Zone AE, within Basin G. Basin G is an open natural landscaped area not to be disturbed therefore there will be no modifications to the 100-year floodplain, nor will the development be impacted by said floodplain.

CONCLUSION

This Master Development Drainage Plan report covers the conceptual storm water management plan for the Falcon Highlands Filing No. 3 development. Detailed design will be required to develop individual portions of the site, but this document will provide guidance so that the drainage infrastructure constructed throughout the Falcon Highlands Filing No. 3 development will function efficiently and effectively. This report follows all standard criteria set forth by the El Paso County Drainage Criteria Manual, El Paso County Engineering Criteria Manual, the City of Colorado Springs Drainage Criteria Manuals Volumes 1, 2, and 3, and the Mile High Flood District Urban Storm Drainage Criteria Manual, with no requested variances. Downstream drainage facilities will not be negatively affected, as existing drainage patterns and allowable release rates are planned to be maintained. The Drainage Basin Planning Studies for both Sand Creek and Falcon have no existing or future plans within The Site. Furthermore, Pond WU will remain undisturbed and has the capacity for the basin that is to be developed in Filing No. 3 that is tributary to it.

REFERENCES

1) Urban Storm Drainage Criteria Manuals; Mile High Flood District; latest edition

2) El Paso County Engineering Criteria Manual (ECM), latest revision 6 dated December 13, 2016

3) El Paso County Drainage Criteria Manual (DCM), latest revision October 31, 2018

4) City of Colorado Springs Drainage Criteria Manuals, Volumes 1, 2, and 3, latest revision May 2014

5) Flood Insurance Rate Map of El Paso County Colorado, Federal Emergency Management Agency, Flood Insurance Rate Map No. 08041C0561G and 08041C0545G dated December 7, 2018.

6) Hydrologic Soil Group – El Paso County, Colorado, Web Soil Survey, National Cooperative Soils Survey, May 21, 2021

7) *Falcon Highlands Filing No. 2 & 3 Final Drainage Report* by Terra Nova Engineering, Inc., latest revision August 2010.

8) *Falcon Highlands Phase 2, Filing No. 2 & 3 Master Development Drainage Plan and Preliminary Drainage Report* by Terra Nova Engineering, Inc. latest revision September 2005

9) URS Section for Regional Detention Pond WU, developed by Galloway & Company

10) Sand Creek DBPS, developed by Stantec, HDR, and Dewberry dated January 2021

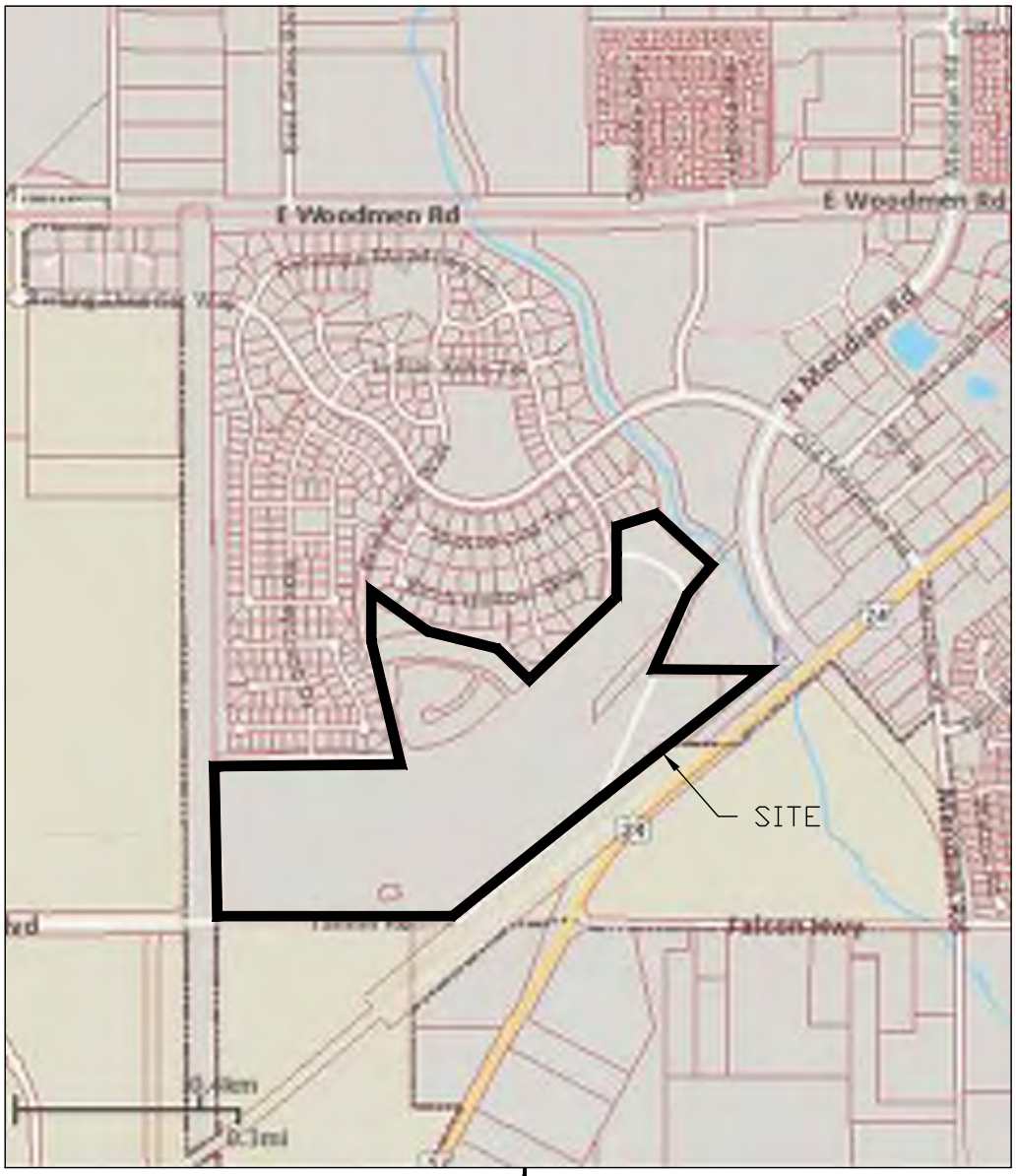
11) Falcon DBPS, developed by Matrix Design Group dated September 2015

APPENDIX A

VICINITY MAP

Falcon Highlands - Filing No. 3

A PART OF SECTION 12, TOWNSHIP 13 SOUTH, RANGE 65 WEST
OF THE SIXTH PRINCIPAL MERIDIAN,
COUNTY OF EL PASO,
STATE OF COLORADO



PROJECT NO.: 21000656
DATE: 01/28/2022

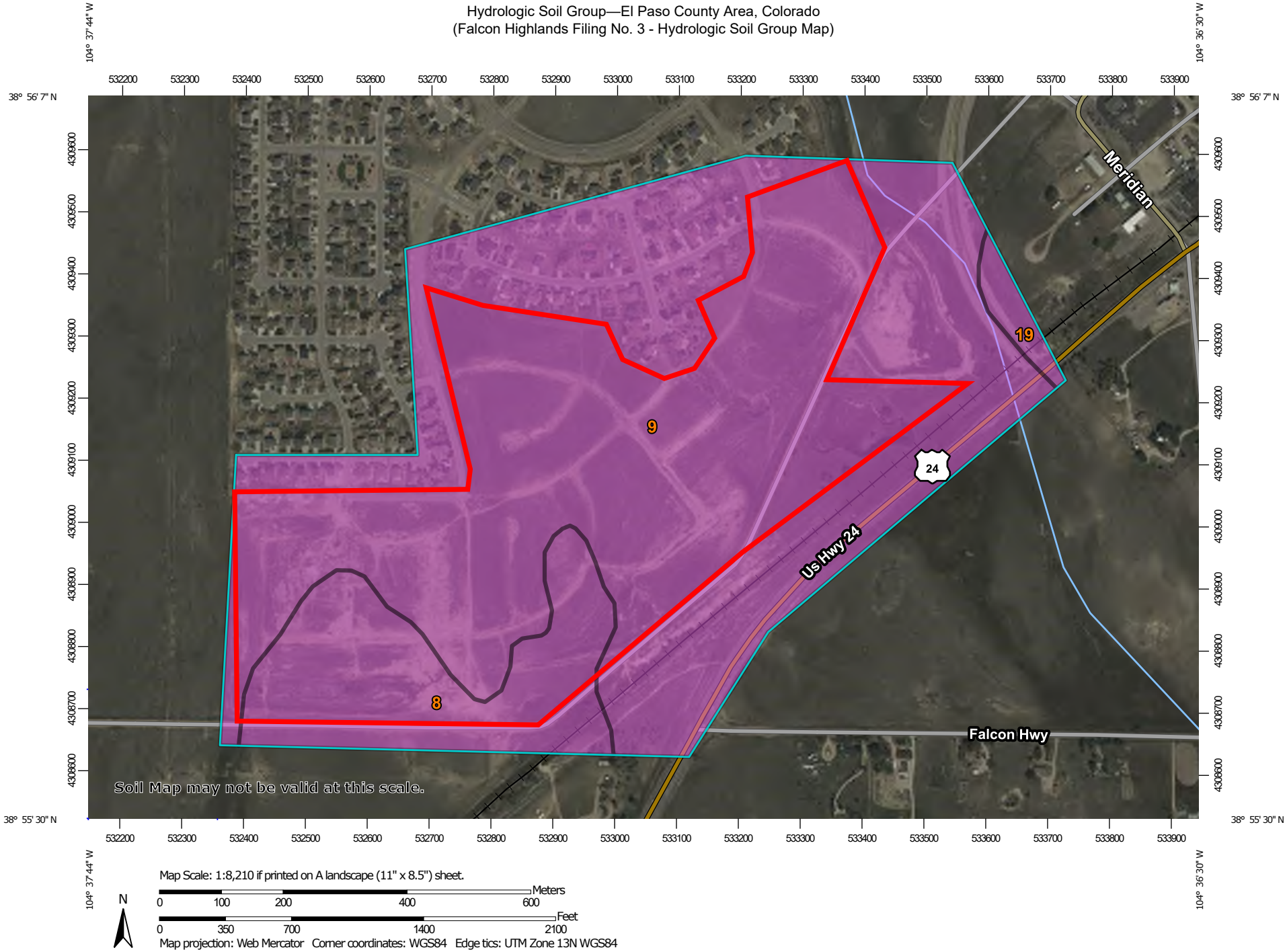
SCALE: 1" = 0.3mi

ATWELL
866.850.4200 www.atwell-group.com
6200 S. SYRACUSE WAY, SUITE470
GREENWOOD VILLAGE, CO 80111
303.825.7100
CONTACT: DANIEL MADRYGA
DMADRYGA@ATWELL-GROUP.COM

APPENDIX B

SOILS SURVEY

Hydrologic Soil Group—El Paso County Area, Colorado
(Falcon Highlands Filing No. 3 - Hydrologic Soil Group Map)



Map Scale: 1:8,210 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	31.0	14.2%
9	Blakeland-Fluvaquentic Haplaquolls	A	184.2	84.5%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	2.8	1.3%
Totals for Area of Interest			**218.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

FEMA FIRMETTE

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FEMA

/HJHQG

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

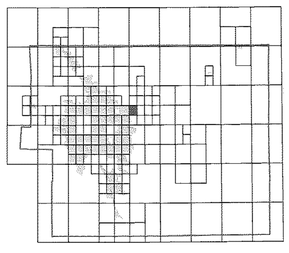
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

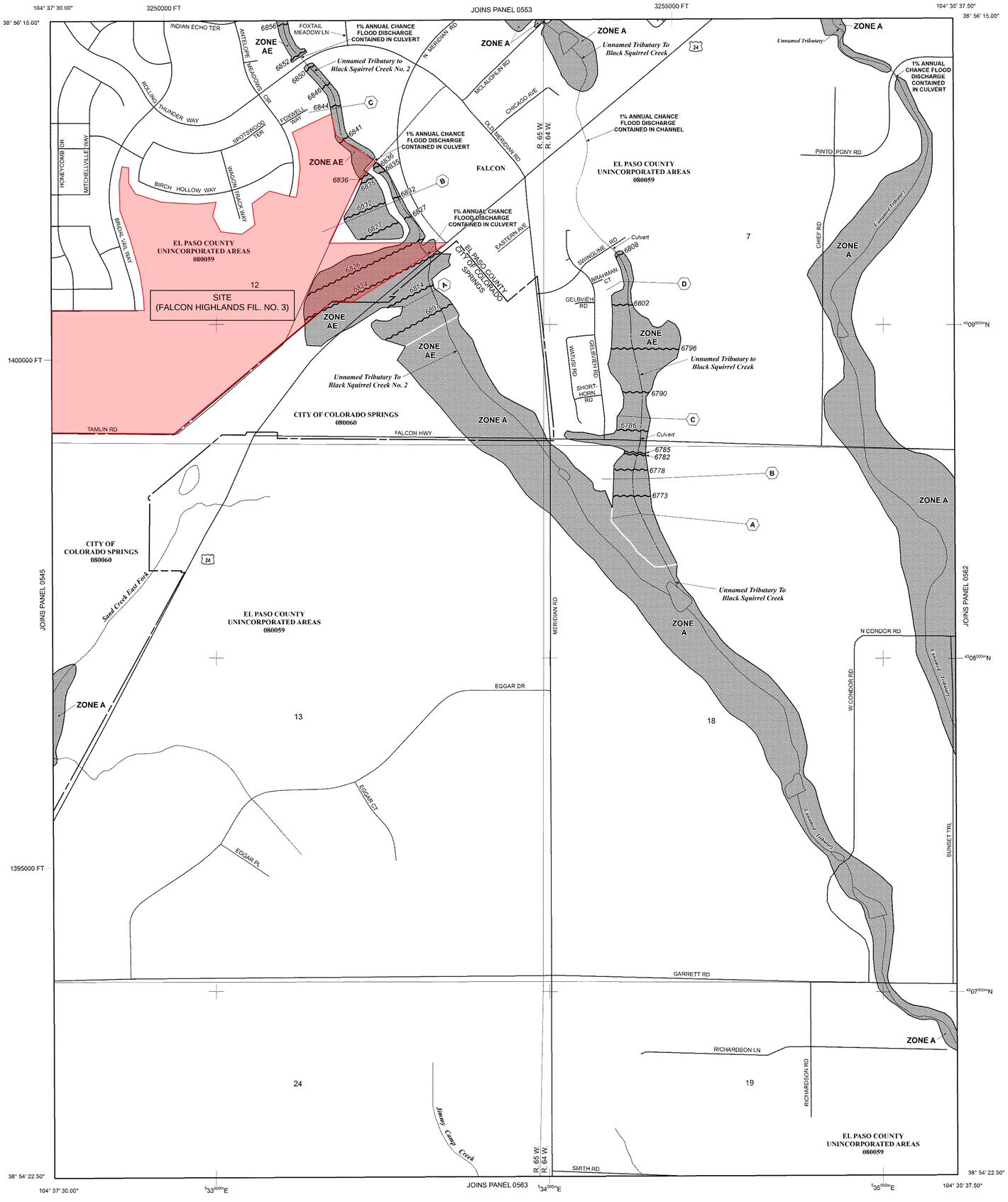
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 64 WEST, AND TOWNSHIP 13 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 — 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0561G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 561 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0561	G
EL PASO COUNTY	080059	0561	G

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

MAP NUMBER 08041C0561G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

APPENDIX D

HYDROLOGICAL CALCULATIONS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY			
		10		100	
		A&B*	C&D*	A&B*	C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
⅛ Acre or less	65	0.60	0.70	0.70	0.80
¼ Acre	40	0.50	0.60	0.60	0.70
⅓ Acre	30	0.40	0.50	0.55	0.60
½ Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY			
		10		100	
		A&B*	C&D*	A&B*	C&D*
Undeveloped Areas					
Historic Flow Analysis-Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45
*Hydrologic Soil Group					

RUNOFF COEFFICIENTS AND IMPERVIOUSNESS
Falcon Highlands Filing No. 3 - EXISTING CONDITIONS
El Paso County, Colorado

Basin No	Hydrologic Grouping	Total Area	1/8 Acre or Less			Paved			Drive and Walks			Lawns			1/2 Acre			1/4 Acre			Historic Flow Analysis -- Greenbelts, Agriculture			Runoff Coefficient		Imperviousness
			65%			100%			100%			0%			25%			40%			2%					
		(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	5-Year	100-Year	(%)
A	A	3.74	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	3.74	0.09	0.36	2.0%
B	A	38.93	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	38.93	0.09	0.36	2.0%
C	A	57.81	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	57.81	0.09	0.36	2.0%
D	A	10.54	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	10.54	0.09	0.36	2.0%
E	A	3.14	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	3.14	0.09	0.36	2.0%
F	A	3.67	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	3.67	0.09	0.36	2.0%
G	A	8.84	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	8.84	0.09	0.36	2.0%
OS-1	A	6.38	0.45	0.59	1.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	3.77	0.09	0.36	1.61	0.27	0.48	34.3%
OS-2	A	3.12	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	3.12	0.09	0.36	0.00	0.30	0.50	40.0%
OS-3	A	1.14	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	1.14	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	0.00	0.90	0.96	100.0%
OS-4	A	13.09	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	7.50	0.09	0.36	5.59	0.34	0.44	23.8%
OS-5	A	59.62	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	63.24	0.09	0.36	0.00	0.32	0.53	42.4%
OS-6	A	35.75	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	35.75	0.30	0.50	0.00	0.09	0.36	0.00	0.22	0.46	25.0%
OS-7	A	6.47	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	6.47	0.30	0.50	0.00	0.09	0.36	0.00	0.22	0.46	25.0%
OS-8	A	13.79	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.50	0.00	0.09	0.36	13.79	0.09	0.36	2.0%
TOTAL		**266.0**			**1.0**			**0.0**			**1.1**			**0.0**			**42.2**			**77.6**			**133.9**			**17.3%**

TIME OF CONCENTRATION

Falcon Highlands Filing No. 3 - EXISTING CONDITIONS

El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: AMC/ARP

PROJECT: 21000656
DESIGN STORM: 5 Year

			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)			FINAL t_c
TRIBUTARY BASINS	AREA Ac (2)	C5 (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	Conveyance Coefficient	VEL fps (9)	t_t Min. (10)	COMP. t_c (11)	TOTAL LENGTH (12)	(L/180)+10 Min. (13)	Min. (14)
A	3.74	0.09	202	1.00	25.92	910	1.00	15	1.50	10.11	36.03	1112	16.18	16.18
B	38.93	0.09	1256	1.00	64.63	979	1.00	15	1.50	10.88	75.50	2235	22.42	22.42
C	57.81	0.09	1104	2.00	48.20	571	1.00	15	1.50	6.34	54.55	1675	19.31	19.31
D	10.54	0.09	540	1.00	42.38	360	1.00	15	1.50	4.00	46.38	900	15.00	15.00
E	3.14	0.09	90	6.00	9.58	1080	1.00	15	1.50	12.00	21.58	1170	16.50	16.50
F	3.67	0.09	125	3.00	14.19	630	1.60	15	1.90	5.53	19.72	755	14.19	14.19
G	8.84	0.09	200	3.00	17.95	360	1.10	15	1.57	3.81	21.76	560	13.11	13.11
OS-1	6.38	0.27	25	2.00	5.96	650	2.00	20	2.83	3.83	9.79	675	13.75	9.79
OS-2	3.12	0.30	50	2.00	8.13	2180	1.00	20	2.00	18.17	26.29	2230	22.39	22.39
OS-3	1.14	0.90	20	2.00	1.28	1190	2.00	20	2.83	7.01	8.30	1210	16.72	8.30
OS-4	13.09	0.34	80	2.00	9.76	2300	2.00	20	2.83	13.55	23.32	2380	23.22	23.22
OS-5	59.62	0.32	100	2.00	11.23	608	2.00	20	2.83	3.58	14.81	708	13.93	13.93
OS-6	35.75	0.22	100	2.00	12.64	0	0.60	20	1.55	0.00	12.64	100	10.56	10.56
OS-7	6.47	0.22	350	2.00	23.65	300	0.60	15	1.16	4.30	27.95	650	13.61	13.61
OS-8	13.79	0.09	550	2.00	34.02	0	0.60	15	1.16	0.00	34.02	550	13.06	13.06

5-YEAR RUNOFF CALCULATIONS
Falcon Highlands Filing No. 3 - EXISTING CONDITIONS
El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: RDL

PROJECT: 21000656
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	1	3.74	0.09	0.34	16.18	3.41	1.15	0.00	**1.15**	-	-	-	-	-	-	-	-	-	-	-	-
B	2	38.93	0.09	3.50	22.42	2.92	10.22	0.00	**10.22**	-	-	-	-	-	-	-	-	-	-	-	-
C	3	57.81	0.09	5.20	19.31	3.14	16.35	0.00	**16.35**	-	-	-	-	-	-	-	-	-	-	-	-
D	4	10.54	0.09	0.95	15.00	3.52	3.34	0.00	**3.34**	-	-	-	-	-	-	-	-	-	-	-	-
E	5	3.14	0.09	0.28	16.50	3.38	0.95	0.00	**0.95**	-	-	-	-	-	-	-	-	-	-	-	-
F	6	3.67	0.09	0.33	14.19	3.60	1.19	0.00	**1.19**	-	-	-	-	-	-	-	-	-	-	-	-
G	6	8.84	0.09	0.80			6.80	0.00	**6.80**	-	-	-	-	-	-	-	-	-	-	-	-
OS-1	7	6.38	0.27	1.73			10.70	0.00	**10.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-2	8	3.12	0.30	0.94			7.80	0.00	**7.80**	-	-	-	-	-	-	-	-	-	-	-	-
OS-3	9	1.14	0.90	1.03			3.40	0.00	**3.40**	-	-	-	-	-	-	-	-	-	-	-	-
OS-4	10	13.09	0.34	4.45			12.30	0.00	**12.30**	-	-	-	-	-	-	-	-	-	-	-	-
OS-5	11	59.62	0.32	18.97			80.10	0.00	**80.10**	-	-	-	-	-	-	-	-	-	-	-	-
OS-6	12	35.75	0.22	7.87			31.90	0.00	**31.90**	-	-	-	-	-	-	-	-	-	-	-	-
OS-7	13	6.47	0.22	1.42	13.61	3.67	5.22	0.00	**5.22**	-	-	-	-	-	-	-	-	-	-	-	-
OS-8	4	13.79	0.09	1.24	13.06	3.73	4.63	0.00	**4.63**	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
***DATA IN RED REPRESENTS VALUES PER PREVIOUS DRAINAGE REPORTS FOR SUBDIVISION**

Basin E corrected. This sheet replaced.

100-YEAR RUNOFF CALCULATIONS
Falcon Highlands Filing No. 3 - EXISTING CONDITIONS
El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: RDL

PROJECT: 21000656
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	1	3.74	0.36	1.35	16.18	5.72	7.70	0.00	**7.70**	-	-	-	-	-	-	-	-	-	-	-	-
B	2	38.93	0.36	14.01	22.42	4.90	68.65	0.00	**68.65**	-	-	-	-	-	-	-	-	-	-	-	-
C	3	57.81	0.36	20.81	19.31	5.27	109.77	0.00	**109.77**	-	-	-	-	-	-	-	-	-	-	-	-
D	4	10.54	0.36	3.79	15.00	5.91	22.42	0.00	**22.42**	-	-	-	-	-	-	-	-	-	-	-	-
E	5	3.14	0.36	1.13	16.50	5.67	6.41	0.00	**6.41**	-	-	-	-	-	-	-	-	-	-	-	-
F	6	3.67	0.36	1.32	14.19	6.05	7.99	0.00	**7.99**	-	-	-	-	-	-	-	-	-	-	-	-
G	6	8.84	0.36	3.18			16.00	0.00	**16.00**	-	-	-	-	-	-	-	-	-	-	-	-
OS-1	7	6.38	0.48	3.05			21.70	0.00	**21.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-2	8	3.12	0.50	1.56			13.60	0.00	**13.60**	-	-	-	-	-	-	-	-	-	-	-	-
OS-3	9	1.14	0.96	1.09			6.00	0.00	**6.00**	-	-	-	-	-	-	-	-	-	-	-	-
OS-4	10	13.09	0.44	5.76			26.30	0.00	**26.30**	-	-	-	-	-	-	-	-	-	-	-	-
OS-5	11	59.62	0.53	31.62			160.70	0.00	**160.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-6	12	35.75	0.46	16.45			58.40	0.00	**58.40**	-	-	-	-	-	-	-	-	-	-	-	-
OS-7	13	6.47	0.46	2.98	13.61	6.16	18.32	0.00	**18.32**	-	-	-	-	-	-	-	-	-	-	-	-
OS-8	4	13.79	0.36	4.96	13.06	6.26	31.08	0.00	**31.08**	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
***DATA IN RED REPRESENTS VALUES PER PREVIOUS DRAINAGE REPORTS FOR SUBDIVISION**

Basin E corrected. This sheet replaced.

EXISTING CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	1	3.74	0.09	0.36	1.15	7.70
B	2	38.93	0.09	0.36	10.22	68.65
C	3	57.81	0.09	0.36	16.35	109.77
D	4	10.54	0.09	0.36	3.34	22.42
E	5	3.14	0.09	0.36	1.12	7.50
F	6	3.67	0.09	0.36	1.19	7.99
G	6	8.84	0.09	0.36	6.80	16.00
OS-1	7	6.38	0.27	0.48	10.70	21.70
OS-2	8	3.12	0.30	0.50	7.80	13.60
OS-3	9	1.14	0.90	0.96	3.40	6.00
OS-4	10	13.09	0.34	0.44	12.30	26.30
OS-5	11	59.62	0.32	0.53	80.10	160.70
OS-6	12	35.75	0.22	0.46	31.90	58.40
OS-7	13	6.47	0.22	0.46	5.22	18.32
OS-8	4	13.79	0.09	0.36	4.63	31.08
TOTAL		**266.0**			**196.2**	**576.1**

Flows do not ma
hydrology
spreadsheet

These #'s are correct on this page. Old #'s were in the calculations sheets.

EXISTING CONDITIONS DESIGN POINT SUMMARY (CUMULATIVE FLOW)

Design Point	Contributing Basins	Q_5 (cfs)	Q_{100} (cfs)
1	A, DP 10 (OS-4)	13.4	34.0
Revised.	B, DP 11 (OS-2, OS-5)	98.1	242.9
3	C, DP 12 (OS-3, OS-6) OS-7	51.6	174.2
4	D, ~~OS-7,~~ OS-8	13.2	71.8
5	E, DP 2 (B, OS-2, OS-5)	99.2	250.4
6	F, G, DP 3 (C, OS-3, OS-6), DP 4(D, OS-7, OS-8)	3	246.0
7	OS-1	10.7	21.7
8	OS-2	7.8	13.6
9	OS-3	3.4	6.0
10	OS-4	12.3	26.3
11	OS-2, OS-5	87.9	174.3
12	OS-3, OS-6	35.3	64.4
13	OS-7	5.2	18.3

Does OS-7 combine with D and OS-8 at DP 4 or travel through site down to DP 6? Clarify and update table.

Travels through down to DP3 (Pond 2) and DP6 (outlet of Pond 2). Revised.

RUNOFF COEFFICIENTS AND IMPERVIOUSNESS
Falcon Highlands Filing No. 3 - PROPOSED CONDITIONS
El Paso County, Colorado

Basin No	Hydrologic Grouping	Total Area	1/8 Acre or Less			Paved			Drive and Walks			Lawns			1/2 Acre			1/4 Acre			Historic Flow Analysis -- Greenbelts, Agriculture			Runoff Coefficient		Imperviousness
			65%			100%			100%			0%			25%			40%			2%					
		(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	5-Year	100-Year	(%)
A	A	3.74	0.45	0.59	0.50	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	3.24	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	0.00	0.13	0.38	8.7%
B	A	40.37	0.45	0.59	31.28	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	4.23	0.22	0.46	4.86	0.30	0.5	0.00	0.09	0.36	0.00	0.38	0.55	53.4%
C	A	57.12	0.45	0.59	34.24	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	3.80	0.22	0.46	10.32	0.30	0.5	0.00	0.09	0.36	8.75	0.33	0.52	43.8%
D	A	7.96	0.45	0.59	5.74	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	2.22	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	0.00	0.35	0.52	46.9%
E	A	3.14	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	3.14	0.09	0.36	2.0%
F	A	5.50	0.45	0.59	0.34	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	5.16	0.11	0.37	5.9%
G	A	8.80	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	8.80	0.09	0.36	2.0%
OS-1	A	6.38	0.45	0.59	1.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	3.77	0.09	0.36	1.61	0.27	0.48	34.3%
OS-2	A	3.12	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	3.12	0.09	0.36	0.00	0.30	0.50	40.0%
OS-3	A	1.14	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	1.14	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	0.00	0.90	0.96	100.0%
OS-4	A	13.09	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	7.50	0.09	0.36	5.59	0.34	0.44	23.8%
OS-5	A	59.62	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	59.62	0.09	0.36	0.00	0.30	0.50	40.0%
OS-6	A	35.75	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	35.75	0.30	0.5	0.00	0.09	0.36	0.00	0.22	0.46	25.0%
OS-7	A	6.47	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	6.47	0.30	0.5	0.00	0.09	0.36	0.00	0.22	0.46	25.0%
OS-8	A	13.79	0.45	0.59	0.00	0.90	0.96	0.00	0.90	0.96	0.00	0.08	0.35	0.00	0.22	0.46	0.00	0.30	0.5	0.00	0.09	0.36	13.79	0.09	0.36	2.0%
TOTAL		**266.0**			**73.1**			**0.0**			**1.1**			**13.5**			**57.4**			**74.0**			**46.8**			**35.2%**

TIME OF CONCENTRATION

Falcon Highlands Filing No. 3 - PROPOSED CONDITIONS

El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: RDL

PROJECT: 21000656
DESIGN STORM: 5 Year

			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)			FINAL t_c
TRIBUTARY BASINS	AREA Ac (2)	C5 (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	Conveyance Coefficient	VEL fps (9)	t_t Min. (10)	COMP. t_c (11)	TOTAL LENGTH (12)	(L/180)+10 Min. (13)	Min. (14)
A	3.74	0.13	100	2.00	13.94	980	1.00	20	2.00	8.17	22.11	1080	16.00	16.00
B	40.37	0.38	0	0.00	0.00	907	1.30	20	2.28	6.63	6.63	907	15.04	6.63
C	57.12	0.33	100	1.50	12.18	924	1.00	20	2.00	7.70	19.88	1024	15.69	15.69
D	7.96	0.35	100	1.00	13.60	750	1.00	20	2.00	6.25	19.85	850	14.72	14.72
E	3.14	0.09	75	2.00	12.56	150	3.50	15	2.81	0.89	13.45	225	11.25	11.25
F	5.50	0.11	125	3.00	13.87	630	1.60	15	1.90	5.53	19.41	755	14.19	14.19
G	8.80	0.09	200	3.00	17.95	360	1.10	15	1.57	3.81	21.76	560	13.11	13.11
OS-1	6.38	0.27	25	2.00	5.96	650	2.00	20	2.83	3.83	9.79	675	13.75	9.79
OS-2	3.12	0.30	50	2.00	8.13	2180	1.00	20	2.00	18.17	26.29	2230	22.39	22.39
OS-3	1.14	0.90	20	2.00	1.28	1190	2.00	20	2.83	7.01	8.30	1210	16.72	8.30
OS-4	13.09	0.34	80	2.00	9.76	2300	2.00	20	2.83	13.55	23.32	2380	23.22	23.22
OS-5	59.62	0.30	100	2.00	11.49	608	2.00	20	2.83	3.58	15.07	708	13.93	13.93
OS-6	35.75	0.22	100	2.00	12.64	0	0.60	20	1.55	0.00	12.64	100	10.56	10.56
OS-7	6.47	0.22	100	2.00	12.64	550	0.60	20	1.55	5.92	18.56	650	13.61	13.61
OS-8	13.79	0.09	100	2.00	14.51	450	0.60	20	1.55	4.84	19.35	550	13.06	13.06

5-YEAR RUNOFF CALCULATIONS

Falcon Highlands Filing No. 3 - PROPOSED CONDITIONS

El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: RDL

PROJECT: 21000656
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	1	3.74	0.13	0.48	16.00	3.42	1.66	0.00	**1.66**	-	-	-	-	-	-	-	-	-	-	-	-
B	2	40.37	0.38	15.48	6.63	4.75	73.48	0.00	**73.48**	-	-	-	-	-	-	-	-	-	-	-	-
C	3	57.12	0.33	18.77	15.69	3.45	64.83	0.00	**64.83**	-	-	-	-	-	-	-	-	-	-	-	-
D	4	7.96	0.35	2.76	14.72	3.55	9.80	0.00	**9.80**	-	-	-	-	-	-	-	-	-	-	-	-
E	5	3.14	0.09	0.28	11.25	3.95	1.12	0.00	**1.12**	-	-	-	-	-	-	-	-	-	-	-	-
F	6	5.50	0.11	0.62	14.19	3.60	2.23	0.00	**2.23**	-	-	-	-	-	-	-	-	-	-	-	-
G	6	8.80	0.09	0.79			6.80	0.00	**6.80**	-	-	-	-	-	-	-	-	-	-	-	-
OS-1	7	6.38	0.27	1.73			10.70	0.00	**10.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-2	8	3.12	0.30	0.94			7.80	0.00	**7.80**	-	-	-									
OS-3	9	1.14	0.90	1.03			3.40	0.00	**3.40**	-	-	-	-	-	-	-	-	-	-	-	-
OS-4	10	13.09	0.34	4.45			14.90	0.00	**14.90**	-	-	-	-	-	-	-	-	-	-	-	-
OS-5	11	59.62	0.30	17.89			80.10	0.00	**80.10**	-	-	-	-	-	-	-	-	-	-	-	-
OS-6	12	35.75	0.22	7.87			31.90	0.00	**31.90**	-	-	-	-	-	-	-	-	-	-	-	-
OS-7	13	6.47	0.22	1.42	13.61	3.67	5.22	0.00	**5.22**	-	-	-	-	-	-	-	-	-	-	-	-
OS-8	4	13.79	0.09	1.24	13.06	3.73	4.63	0.00	**4.63**	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

***DATA IN RED REPRESENTS VALUES PER PREVIOUS DRAINAGE REPORTS FOR SUBDIVISION**

100-YEAR RUNOFF CALCULATIONS
Falcon Highlands Filing No. 3 - PROPOSED CONDITIONS
El Paso County, Colorado

DATE: 3/18/2022
CALCULATED BY: RDL

PROJECT: 21000656
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	1	3.74	0.38	1.43	16.00	5.75	8.21	0.00	**8.21**	-	-	-	-	-	-	-	-	-	-	-	-
B	2	40.37	0.55	22.17	6.63	7.97	176.67	0.00	**176.67**	-	-	-	-	-	-	-	-	-	-	-	-
C	3	57.12	0.52	29.43	15.69	5.80	170.64	0.00	**170.64**	-	-	-	-	-	-	-	-	-	-	-	-
D	4	7.96	0.52	4.16	14.72	5.96	24.80	0.00	**24.80**	-	-	-	-	-	-	-	-	-	-	-	-
E	5	3.14	0.36	1.13	11.25	6.64	7.50	0.00	**7.50**	-	-	-	-	-	-	-	-	-	-	-	-
F	6	5.50	0.37	2.06	14.19	6.05	12.46	0.00	**12.46**	-	-	-	-	-	-	-	-	-	-	-	-
G	6	8.80	0.36	3.17			16.00	0.00	**16.00**	-	-	-	-	-	-	-	-	-	-	-	-
OS-1	7	6.38	0.48	3.05			21.70	0.00	**21.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-2	8	3.12	0.50	1.56			13.60	0.00	**13.60**	-	-	-	-	-	-	-	-	-	-	-	-
OS-3	9	1.14	0.96	1.09			6.00	0.00	**6.00**	-	-	-	-	-	-	-	-	-	-	-	-
OS-4	10	13.09	0.44	5.76			31.70	0.00	**31.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-5	11	59.62	0.50	29.81			160.70	0.00	**160.70**	-	-	-	-	-	-	-	-	-	-	-	-
OS-6	12	35.75	0.46	16.45			58.40	0.00	**58.40**	-	-	-	-	-	-	-	-	-	-	-	-
OS-7	13	6.47	0.46	2.98	13.61	6.16	18.32	0.00	**18.32**	-	-	-	-	-	-	-	-	-	-	-	-
OS-8	4	13.79	0.36	4.96	13.06	6.26	31.08	0.00	**31.08**	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
***DATA IN RED REPRESENTS VALUES PER PREVIOUS DRAINAGE REPORTS FOR SUBDIVISION**

PROPOSED CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	1	3.74	0.13	0.38	1.7	8.2
B	2	40.37	0.38	0.55	73.5	176.7
C	3	57.12	0.33	0.52	64.8	170.6
D	4	7.96	0.35	0.52	9.8	24.8
E	5	3.14	0.09	0.36	1.1	7.5
F	6	5.50	0.11	0.37	2.2	12.5
G	6	8.80	0.09	0.36	6.8	16.0
OS-1	7	6.38	0.27	0.48	10.7	21.7
OS-2	8	3.12	0.30	0.50	7.8	13.6
OS-3	9	1.14	0.90	0.96	3.4	6.0
OS-4	10	13.09	0.34	0.44	14.9	31.7
OS-5	11	59.62	0.30	0.50	80.1	160.7
OS-6	12	35.75	0.22	0.46	31.9	58.4
OS-7	13	6.47	0.22	0.46	5.2	18.3
OS-8	4	13.79	0.09	0.36	4.6	31.1
TOTAL		**266.0**			**318.6**	**757.8**

See comment under existing condition summary table for Basin OS-7. Revise design point summary here accordingly.

Missing Basin F

PROPOSED CONDITIONS DESIGN POINT SUMMARY (CUMULATIVE FLOWS)			
Design Point	**Contributing Basins**	**Cumulative Q_5 (cfs)**	**Cumulative Q_{100} (cfs)**
1	A, DP 10 (OS-4)	16.6	39.9
2	B, DP 11 (OS-2, OS-5)	161.4	351.0
3	C, DP 12 (OS-3, OS-6), DP 13 (OS-7)		253.4
4	D, OS-8	14.4	55.9
5	B, E, OS-2, OS-5	162.5	358.5
6	G, DP 3 (C, OS-3, OS-6, OS-7), DP 4 (D, OS-8)	126.6	325.2
7	OS-1	10.7	21.7
8	OS-2	7.8	13.6
9	OS-3	3.4	6.0
10	OS-4	14.9	31.7
11	OS-5, DP 8 (OS-2)	87.9	174.3
12	OS-6, DP 9 (OS-3)	35.3	64.4
13	OS-7	5.2	18.3

Revised as suggested. Correct, OS-7 drains to DP3 as shown. Basin F added (drains to DP6).

DEVELOPED CONDITIONS - SUMMARY OF FILING NO. 3, 2022 MDDP COMPARED TO 2010 FDR

2022 FIL NO. 3 MDDP (ATWELL)			2010 FDR (TERRA NOVA)			DIFFERENCE		ULTIMATE DESIGN POINT
	Q5 (CFS)	Q100 (CFS)		Q5 (CFS)	Q100 (CFS)	Q5 (CFS)	Q100 (CFS)	
BASIN A + OS-4	16.6	39.9	BASIN A	14.9	31.7	1.7	8.2	OFF-SITE
BASIN B + E + OS-1 + OS-2 + OS-5	173.2	380.2	BASIN B + E + OS-1 + OS-2	133.6	259.8	39.6	120.4	POND 1
BASIN C + F + G + OS-3 + OS-6 + OS-7	114.4	281.8	BASIN C + D + F + G + OS-3	102.6	209.2	11.8	72.6	POND 2
BASIN D	9.8	24.8	BASIN D (LESS D3)	20.0	40.3	-10.2	-15.5	POND WU
TOTAL	**313.9**	**726.7**		**271.1**	**541.0**	**42.8**	**185.7**	

APPENDIX E

HYDRAULIC CALCULATIONS

Put Pond Tributary Area and Imperviousness spreadsheets back into Appendix.

Provided as before. Included non-tributary basins for purposes of over-detention to account for developed areas that drain directly offsite.

Worksheet Protected

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	10-Year Event	1.19	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: Richard Lyon, PE
Company: Atwell, LLC
Date: March 18, 2022
Project: Falcon Highlands - Pond 1 Tributary Basins
Location: El Paso County

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A	B	OS-1	OS-2	OS-4	OS-5								
Receiving Pervious Area Soil Type	Clay Loam	Sand	Clay Loam	Sand	Sand	Sand								
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	3.740	40.370	6.380	3.120	9.530	59.620								
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000								
Unconnected Impervious Area (UIA, acres)	0.551	18.972	2.158	1.248	0.644	23.848								
Receiving Pervious Area (RPA, acres)	0.000	21.398	4.222	1.872	8.886	35.772								
Separate Pervious Area (SPA, acres)	3.189	0.000	0.000	0.000	0.000	0.000								
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V	V	V	V								

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	3.740	40.370	6.380	3.120	9.530	59.620								
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								
Unconnected Impervious Area (UIA, %)	14.7%	47.0%	33.8%	40.0%	6.8%	40.0%								
Receiving Pervious Area (RPA, %)	0.0%	53.0%	66.2%	60.0%	93.2%	60.0%								
Separate Pervious Area (SPA, %)	85.3%	0.0%	0.0%	0.0%	0.0%	0.0%								
A_R (RPA / UIA)	0.000	1.128	1.956	1.500	13.798	1.500								
I_a Check	1.000	0.470	0.340	0.400	0.070	0.400								
f / I for WQCV Event:	0.4	9.8	0.4	9.8	9.8	9.8								
f / I for 10-Year Event:	0.3	0.6	0.3	0.6	0.6	0.6								
f / I for 100-Year Event:	0.1	0.6	0.1	0.6	0.6	0.6								
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00	0.00	0.00	0.00								
IRF for 10-Year Event:	1.00	0.83	0.90	0.81	0.25	0.81								
IRF for 100-Year Event:	1.00	0.84	0.95	0.83	0.25	0.83								
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	14.7%	47.0%	33.8%	40.0%	6.8%	40.0%								
Effective Imperviousness for WQCV Event:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								
Effective Imperviousness for 10-Year Event:	14.7%	39.0%	30.3%	32.4%	1.7%	32.4%								
Effective Imperviousness for 100-Year Event:	14.7%	39.6%	32.0%	33.0%	1.7%	33.0%								
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	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
10-Year Event CREDIT**: Reduce Detention By:	0.0%	17.9%	11.0%	19.9%	106.9%	19.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	15.6%	5.4%	17.7%	106.2%	17.7%	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:	**38.6%**
Total Site Effective Imperviousness for WQCV Event:	**0.0%**
Total Site Effective Imperviousness for 10-Year Event:	**31.5%**
Total Site Effective Imperviousness for 100-Year Event:	**32.2%**
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.

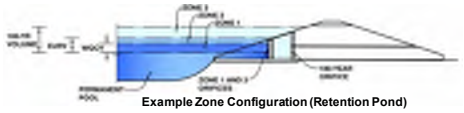
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: FALCON HIGHLANDS FILING NO. 3

Basin ID: DETENTION POND 1 (BASINS A, B, OS-1, OS-2, OS-4, OS-5)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	126.38	acres
Watershed Length =	3,600	ft
Watershed Length to Centroid =	800	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	38.60%	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 =	40.0	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) =	1.855	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	5.232	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.933	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.308	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	6.402	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	8.551	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	10.629	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	13.365	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	19.250	acre-feet	inches
Approximate 2-yr Detention Volume =	3.326	acre-feet	
Approximate 5-yr Detention Volume =	4.408	acre-feet	
Approximate 10-yr Detention Volume =	5.445	acre-feet	
Approximate 25-yr Detention Volume =	6.771	acre-feet	
Approximate 50-yr Detention Volume =	7.678	acre-feet	
Approximate 100-yr Detention Volume =	8.962	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.855	acre-feet
Zone 2 Volume (EURV - Zone 1) =	3.377	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	3.731	acre-feet
Total Detention Basin Volume =	8.962	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

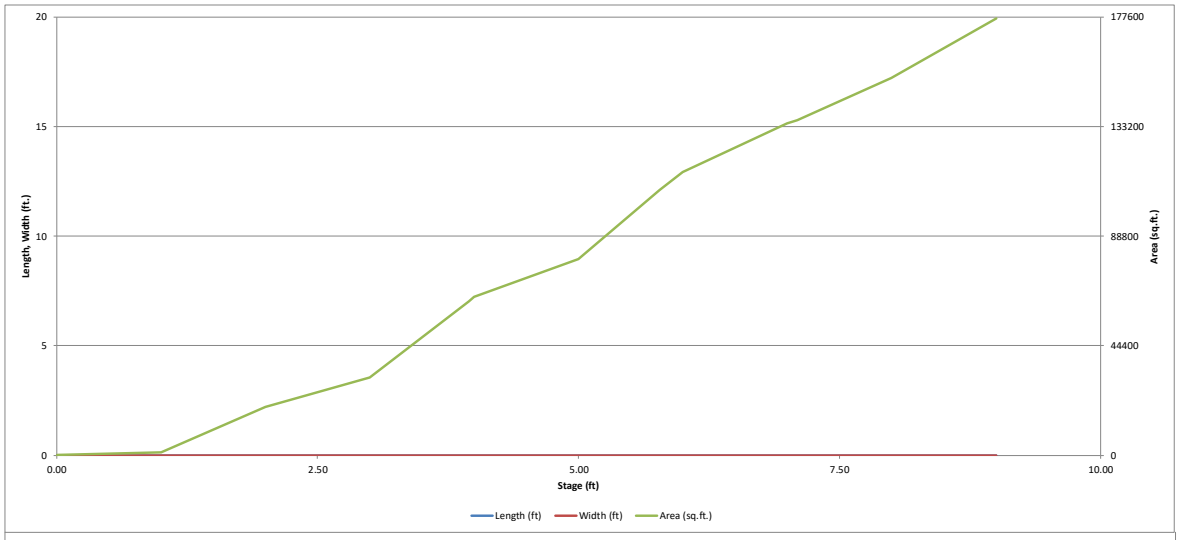
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	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

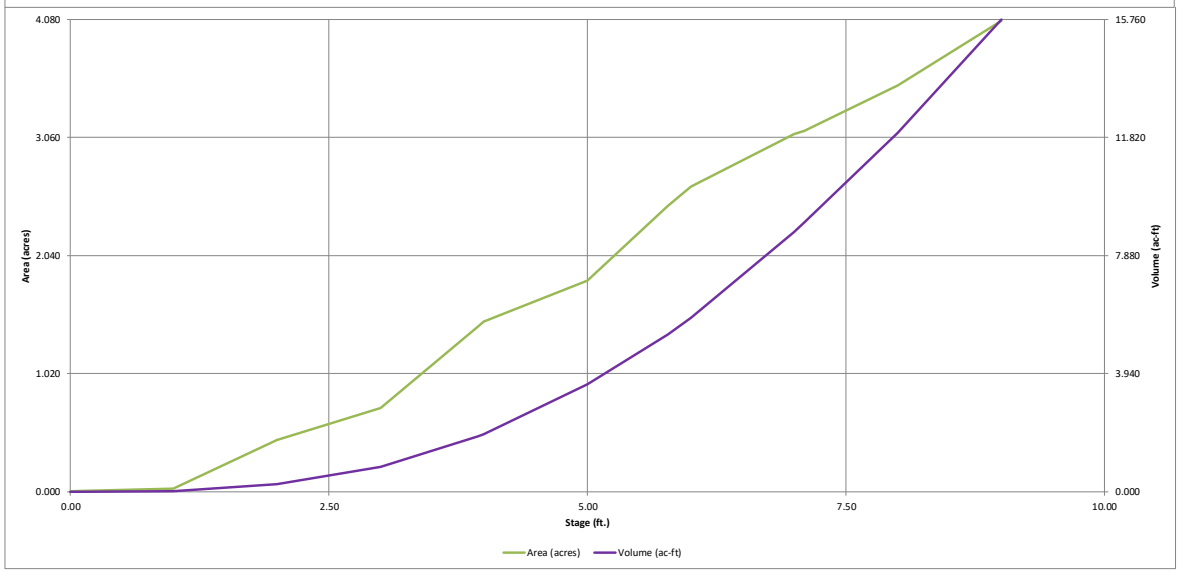
Depth Increment = 0.50 ft

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)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6808	--	0.01	--	--	--	130	0.003	0	0.000
6809	--	1.00	--	--	--	1,115	0.026	617	0.014
6810	--	2.00	--	--	--	19,471	0.447	10,909	0.250
6811	--	3.00	--	--	--	31,417	0.721	36,353	0.835
WQCV: 6811.95	--	3.95	--	--	--	62,250	1.429	80,845	1.856
6812	--	4.00	--	--	--	64,054	1.470	84,003	1.928
6813	--	5.00	--	--	--	79,388	1.822	155,724	3.575
EURV: 6813.78	--	5.78	--	--	--	107,566	2.469	228,636	5.249
6814	--	6.00	--	--	--	114,850	2.637	253,102	5.810
6815	--	7.00	--	--	--	134,572	3.089	377,813	8.673
100-YR: 6815.5	--	7.10	--	--	--	135,660	3.114	391,324	8.984
6816	--	8.00	--	--	--	152,967	3.512	521,206	11.965
TOP: 6817	--	9.00	--	--	--	177,276	4.070	686,328	15.756

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)





Worksheet Protected

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	10-Year Event	1.19	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: Richard Lyon, PE
Company: Atwell, LLC
Date: March 15, 2022
Project: Falcon Highlands - Pond 2 Tributary Basins
Location: El Paso County

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	C	OS-3	OS-6											
Receiving Pervious Area Soil Type	Sand	Sand	Sand											
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	64.680	1.140	35.750											
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000											
Unconnected Impervious Area (UIA, acres)	24.836	1.140	8.938											
Receiving Pervious Area (RPA, acres)	39.844	0.000	26.813											
Separate Pervious Area (SPA, acres)	0.000	0.000	0.000											
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V	V											

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	64.680	1.140	35.750											
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%											
Unconnected Impervious Area (UIA, %)	38.4%	100.0%	25.0%											
Receiving Pervious Area (RPA, %)	61.6%	0.0%	75.0%											
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%											
A_R (RPA / UIA)	1.604	0.000	3.000											
I_a Check	0.380	1.000	0.250											
f / I for WQCV Event:	9.8	9.8	9.8											
f / I for 10-Year Event:	0.6	0.6	0.6											
f / I for 100-Year Event:	0.6	0.6	0.6											
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.00	0.00	0.00											
IRF for 10-Year Event:	0.80	1.00	0.73											
IRF for 100-Year Event:	0.82	1.00	0.75											
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	38.4%	100.0%	25.0%											
Effective Imperviousness for WQCV Event:	0.0%	0.0%	0.0%											
Effective Imperviousness for 10-Year Event:	30.8%	100.0%	18.4%											
Effective Imperviousness for 100-Year Event:	31.3%	100.0%	18.7%											
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	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
10-Year Event CREDIT**: Reduce Detention By:	21.0%	0.0%	28.8%	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:	18.8%	0.0%	26.7%	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:	**34.4%**
Total Site Effective Imperviousness for WQCV Event:	**0.0%**
Total Site Effective Imperviousness for 10-Year Event:	**27.2%**
Total Site Effective Imperviousness for 100-Year Event:	**27.7%**
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.

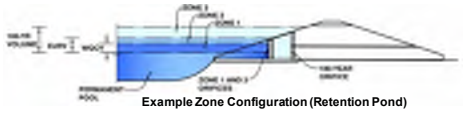
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: FALCON HIGHLANDS FILING NO. 3

Basin ID: DETENTION POND 2 (BASINS C, OS-3, OS-6)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	101.57	acres
Watershed Length =	2,450	ft
Watershed Length to Centroid =	1,500	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	34.40%	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 =	40.0	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) =	1.393	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.628	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.642	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.596	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	4.369	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	6.102	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	7.738	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	9.913	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	14.576	acre-feet		inches
Approximate 2-yr Detention Volume =	2.295	acre-feet		
Approximate 5-yr Detention Volume =	3.051	acre-feet		
Approximate 10-yr Detention Volume =	3.789	acre-feet		
Approximate 25-yr Detention Volume =	4.746	acre-feet		
Approximate 50-yr Detention Volume =	5.426	acre-feet		
Approximate 100-yr Detention Volume =	6.452	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.393	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.235	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.824	acre-feet
Total Detention Basin Volume =	6.452	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

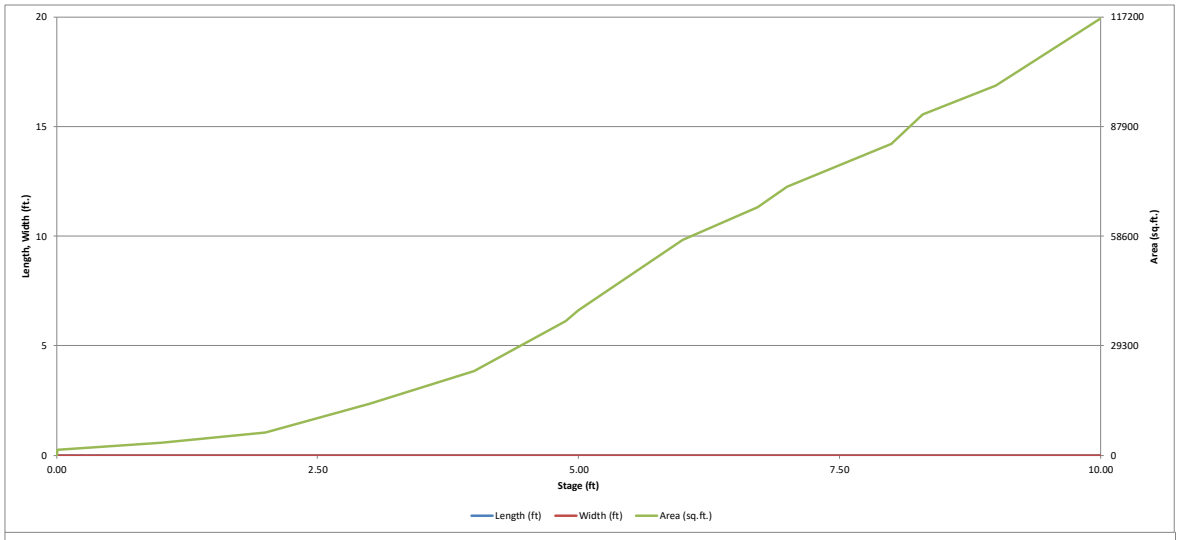
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	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

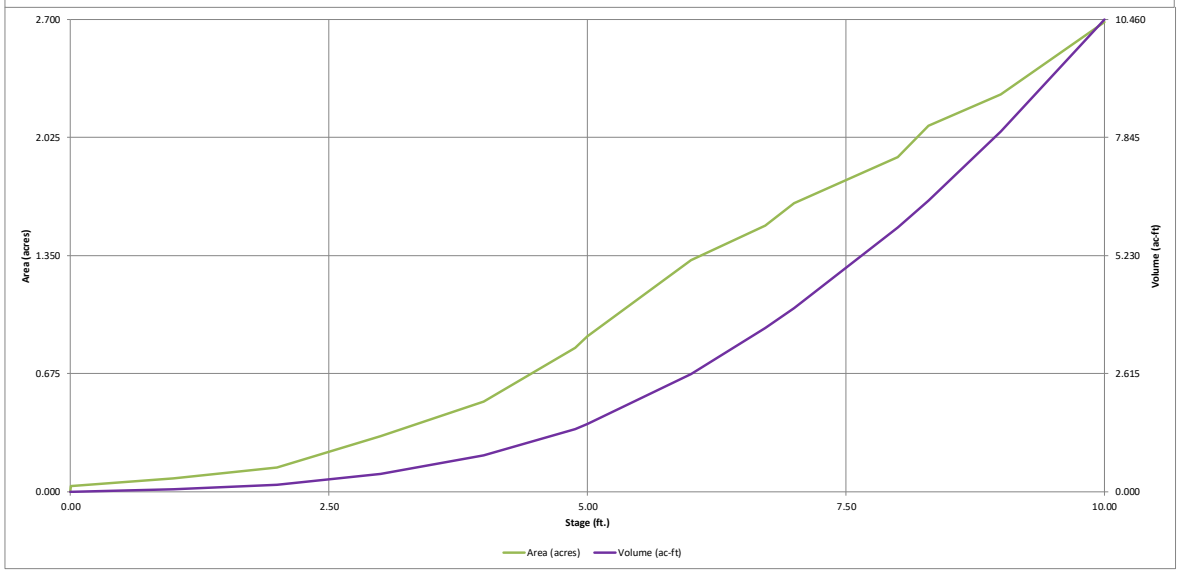
Depth Increment = 0.50 ft

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)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6807.5	--	0.01	--	--	--	1,425	0.033	5	0.000
6808.5	--	1.00	--	--	--	3,320	0.076	2,354	0.054
6809.5	--	2.00	--	--	--	6,004	0.138	7,016	0.161
6810.5	--	3.00	--	--	--	13,803	0.317	16,919	0.388
6811.5	--	4.00	--	--	--	22,457	0.516	35,049	0.805
WQCV: 6812.38	--	4.88	--	--	--	35,840	0.823	60,700	1.393
6812.5	--	5.00	--	--	--	38,755	0.890	65,175	1.496
6813.5	--	6.00	--	--	--	57,667	1.324	113,386	2.603
EURV: 6814.22	--	6.72	--	--	--	66,330	1.523	158,025	3.628
6814.5	--	7.00	--	--	--	71,775	1.648	177,360	4.072
6815.5	--	8.00	--	--	--	83,300	1.912	254,897	5.852
100-YR: 6815.8	--	8.30	--	--	--	91,100	2.091	281,057	6.452
6816.5	--	9.00	--	--	--	98,912	2.271	347,562	7.979
TOP: 6817.5	--	10.00	--	--	--	116,945	2.685	455,490	10.457

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)





APPENDIX F

REFERENCE CALCULATIONS AND MAPS

(SF-05-033)

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Runoff Coefficient Summary)

		STREETS / DEVELOPED			OVERLAND / UNDEVELOPED			COMPOSITE C	
BASIN	TOTAL AREA (Acres)	AREA (Acres)	C_5	C_{100}	AREA (Acres)	C_5	C_{100}	C_5	C_{100}
A	13.09	4.67	0.50	0.60	8.41	0.25	0.35	0.34	0.44
B1.1	7.39	7.39	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B1.2	7.22	7.22	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B2	4.00	4.00	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B3	7.97	7.97	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B4.1	4.13	4.13	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B4.2	13.98	13.36	0.50	0.60	0.62	0.25	0.35	0.49	0.59
B5	11.63	11.63	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B6.1	5.44	5.44	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B6.2	3.23	2.73	0.50	0.60	0.50	0.25	0.35	0.46	0.56
B6.3	4.61	4.11	0.50	0.60	0.50	0.25	0.35	0.47	0.57
B6.4	1.39	1.39	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B7.1	4.36	4.36	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B7.2	3.80	3.04	0.50	0.60	0.76	0.25	0.35	0.45	0.55
B7.3	5.64	5.64	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B8	7.44	7.44	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B9.1	5.06	5.06	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B9.2	3.40	3.40	0.50	0.60	0.00	0.25	0.35	0.50	0.60
B10.1	5.40	5.40	0.45	0.55	0.00	0.25	0.35	0.45	0.55
B10.2	1.04	1.04	0.45	0.55	0.00	0.25	0.35	0.45	0.55

2010 FDR TABULATIONS WERE USED TO QUANTIFY FILING NO. 2 OFFSITE RUNOFF AS DEVELOPED CONDITIONS FOR THE EXISTING CONDITIONS OF THIS REPORT.

THESE CALCULATION SHEETS ARE FROM THE 2010 FINAL DRAINAGE REPORT BY TERRA NOVA. THE TITLE SAYS "PDR BASINS" BUT THESE ARE FDR CALCULATIONS WITHIN THE FDR.

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Runoff Coefficient Summary)

C1.1	7.80	7.04	0.45	0.55	0.75	0.25	0.35	0.43	0.53
C1.2	4.34	4.34	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C2.1	5.05	5.05	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C2.2	6.52	6.52	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C2.3	1.39	1.39	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C3	2.52	2.52	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C4	13.26	10.01	0.45	0.55	3.25	0.25	0.35	0.40	0.50
C5	8.68	7.47	0.45	0.55	1.21	0.25	0.35	0.42	0.52
C6	4.81	4.81	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C7	7.09	4.87	0.45	0.55	2.23	0.25	0.35	0.39	0.49
C8.1	8.70	8.70	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C8.2	3.45	3.45	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C9.1	6.29	6.29	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C9.2	3.14	3.14	0.45	0.55	0.00	0.25	0.35	0.45	0.55
C10	3.67	3.67	0.45	0.55	0.00	0.25	0.35	0.45	0.55
D1.1	10.81	10.81	0.45	0.55	0.00	0.25	0.35	0.45	0.55
D1.2	1.19	1.19	0.45	0.55	0.00	0.25	0.35	0.45	0.55
D2	4.48	4.48	0.45	0.55	0.00	0.25	0.35	0.45	0.55
D3	14.62	14.62	0.90	0.95	0.00	0.25	0.35	0.90	0.95
E	1.95	0.00	0.50	0.60	1.95	0.25	0.35	0.25	0.35
F	6.51	0.00	0.50	0.60	6.51	0.25	0.35	0.25	0.35
G	8.84	0.00	0.50	0.60	8.84	0.25	0.35	0.25	0.35
OS-1	6.38	6.38	0.50	0.60	0.00	0.25	0.35	0.50	0.60
OS-2	3.12	3.12	0.90	0.95	0.00	0.25	0.35	0.90	0.95
OS-3	1.14	1.14	0.90	0.95	0.00	0.25	0.35	0.90	0.95

Calculated by: QNA

Date: 07/15/05

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_i	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Colcs See Runoff Summary															
A	13.09	0.34	0.44	0.25	105	2.1	13.0	1625	1.5%	2.4	11.3	24.2	24.2	2.8	4.6	*12.3*	*26.3*
B1.1	7.39	0.50	0.60	0.25	170	3.4	16.5	1700	1.5%	2.4	11.8	28.3	28.3	2.6	4.2	*9.5*	*18.6*
B1.2	7.22	0.50	0.60	0.25	170	3.4	16.5	1400	2.0%	2.9	8.0	24.5	24.5	2.8	4.6	*10.0*	*19.7*
B2	4.00	0.50	0.60	0.25	200	4.0	17.9	333	0.9%	1.9	2.9	20.8	20.8	3.0	5.0	*6.0*	*11.9*
B3	7.97	0.50	0.60	0.25	135	2.7	14.7	885	0.9%	1.9	7.8	22.5	22.5	2.9	4.8	*11.5*	*22.8*
B4.1	4.13	0.50	0.60	0.25	165	3.3	16.2	1550	1.3%	2.2	11.7	28.0	28.0	2.6	4.2	*5.3*	*10.5*
B4.2	13.98	0.49	0.59	0.25	165	3.3	16.2	1551	1.3%	2.2	11.8	28.0	28.0	2.6	4.2	*17.6*	*34.7*
B5	11.63	0.50	0.60	0.25	210	4.2	18.3	1100	2.0%	2.9	6.3	24.6	24.6	2.8	4.5	*16.0*	*31.7*
B6.1	5.44	0.50	0.60	0.25	160	3.2	16.0	1180	0.7%	1.8	10.9	26.9	26.9	2.6	4.3	*7.1*	*14.1*
B6.2	3.23	0.46	0.56	0.25	140	2.8	15.0	850	0.7%	1.8	7.9	22.8	22.8	2.9	4.7	*4.3*	*8.6*
B6.3	4.61	0.47	0.57	0.25	60	1.2	9.8	1150	0.6%	1.6	12.0	21.8	21.8	2.9	4.9	*6.4*	*12.8*
B6.4	1.39	0.50	0.60	0.25	60	1.2	9.8	700	0.7%	1.8	6.5	16.3	16.3	3.3	5.7	*2.3*	*4.7*

OS-4

OS-5, PIPE RUN USED

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_t	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
B7.1	4.36	0.50	0.60	0.25	135	2.7	14.7	660	1.0%	2.0	5.5	20.2	20.2	3.0	5.1	6.6	13.2
B7.2	3.80	0.45	0.55	0.25	140	2.8	15.0	790	0.8%	1.9	6.9	21.9	21.9	2.9	4.8	5.0	10.1
B7.3	5.64	0.50	0.60	0.25	175	3.5	16.7	1165	0.9%	1.9	10.2	26.9	26.9	2.6	4.3	7.4	14.6
B8	7.44	0.50	0.60	0.25	265	7.0	18.8	860	0.9%	1.9	7.5	26.3	26.3	2.7	4.4	9.9	19.5
B9.1	5.06	0.50	0.60	0.25	112	5.0	10.3	2500	1.3%	2.2	18.9	29.2	29.2	2.5	4.1	6.4	12.5
B9.2	3.40	0.50	0.60	0.25	50	1.0	8.9	1610	1.4%	2.3	11.7	20.6	20.6	3.0	5.0	5.1	10.2
B10.1	5.40	0.45	0.55	0.25	250	5.0	20.0	405	0.5%	1.5	4.5	24.5	24.5	2.8	4.6	6.7	13.5
B10.2	1.04	0.45	0.55	0.25	50	1.0	8.9	525	0.5%	1.5	5.8	14.8	14.8	3.5	5.9	1.6	3.4
C1.1	7.80	0.43	0.53	0.25	180	3.6	17.0	1145	1.4%	2.3	8.3	25.3	25.3	2.7	4.5	9.1	18.5
C1.2	4.34	0.45	0.55	0.25	180	3.6	17.0	550	1.1%	2.1	4.4	21.3	21.3	3.0	4.9	5.8	11.7
C2.1	5.05	0.45	0.55	0.25	150	3.0	15.5	1485	1.1%	2.1	11.8	27.3	27.3	2.6	4.3	5.9	11.9
C2.2	6.52	0.45	0.55	0.25	190	3.8	17.4	780	1.0%	2.0	6.5	23.9	23.9	2.8	4.6	8.2	16.6
C2.3	1.39	0.45	0.55	0.25	50	2.0	7.1	900	1.6%	2.5	6.0	13.1	13.1	3.7	6.3	2.3	4.8
C3	2.52	0.45	0.55	0.25	190	4.0	17.1	140	1.6%	2.5	0.9	18.1	18.1	3.2	5.4	3.6	7.4

OS-5, PIPE RUN USED

OS-7, PIPE RUN USED

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_i	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
C4	13.26	0.40	0.50	0.25	250	4.0	21.5	1530	1.0%	2.0	12.8	34.3	34.3	2.3	3.7	12.3	24.8
C5	8.68	0.42	0.52	0.25	300	7.0	20.8	286	1.7%	2.6	1.8	22.6	22.6	2.9	4.8	10.5	21.6
C6	4.81	0.45	0.55	0.25	180	3.6	17.0	390	1.8%	2.8	2.3	19.3	19.3	3.1	5.2	6.7	13.7
C7	7.09	0.39	0.49	0.25	180	3.6	17.0	670	1.0%	2.0	5.6	22.5	22.5	2.9	4.8	7.9	16.5
C8.1	8.70	0.45	0.55	0.25	200	4.0	17.9	1170	1.0%	2.0	9.8	27.6	27.6	2.6	4.3	10.2	20.3
C8.2	3.45	0.45	0.55	0.25	170	3.4	16.5	645	1.2%	2.2	4.9	21.4	21.4	3.0	4.9	4.6	9.3
C9.1	6.29	0.45	0.55	0.25	165	3.3	16.2	530	1.0%	2.0	4.4	20.7	20.7	3.0	5.0	8.5	17.3
C9.2	3.14	0.45	0.55	0.25	180	3.6	17.0	540	1.0%	2.0	4.5	21.5	21.5	2.9	4.9	4.2	8.5
C10	3.67	0.45	0.55	0.25	185	10.0	12.4	100	2.0%	2.3	0.7	13.1	13.1	3.7	6.3	6.1	12.7
D1.1	10.81	0.45	0.55	0.25	200	4.0	17.9	1340	1.2%	2.2	10.2	28.0	28.0	2.6	4.2	12.5	25.1
D1.2	1.19	0.45	0.55	0.25	180	3.6	17.0	630	1.0%	2.0	5.3	22.2	22.2	2.9	4.8	1.5	3.1
D2	4.48	0.45	0.55	0.25	200	4.0	17.9	320	1.6%	2.5	2.1	20.0	20.0	3.0	5.1	6.1	12.5
D3	14.62	0.90	0.95	0.25	185	10.0	12.4	103	1.9%	2.9	0.6	13.0	13.0	3.7	6.3	48.4	87.6
E	1.95	0.25	0.35	0.25	90	5.0	8.6	1080	1.0%	2.0	9.0	17.6	17.6	3.2	5.4	1.6	3.7

OS-7, PIPE RUN USED

OS-7 AND OS-8 REVISED

BASIN E RECALCULATED

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_i	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5 * For Calcs See Runoff Summary	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
BASIN F RECALCULATED																	
F	6.51	0.25	0.35	0.25	125	4.0	12.1	630	1.6%	2.5	4.2	16.3	16.3	3.3	5.7	*5.4*	*12.9*
G	8.84	0.25	0.35	0.25	200	5.0	16.6	360	1.1%	2.1	2.9	19.5	19.5	3.1	5.2	*6.8*	*16.0*
OS-1	6.38	0.50	0.60	0.25	100	2.0	12.6	608	2.0%	2.8	3.6	16.3	16.3	3.4	5.7	*10.7*	*21.7*
OS-2	3.12	0.90	0.95	0.25	100	2.0	12.6	1525	1.2%	2.2	11.6	24.2	24.2	2.8	4.6	*7.8*	*13.6*
OS-3	1.14	0.90	0.95	0.25	20	0.4	5.7	1190	0.6%	1.8	11.0	16.7	16.7	3.3	5.6	*3.4*	*6.0*

Calculated by: QNA
Date: 07/15/05

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Surface Routing Summary)

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
1	**B1.1 B1.2 & OS-1**	10.49	12.59	28.3	2.6	4.2	*26.9*	*52.8*
2	**B2 & DP1 F.B.**	6.51	8.39	28.3	2.6	4.2	*16.7*	*35.2*
3	**B3 AND DP2 F.B.**	6.03	8.31	28.3	2.6	4.2	*15.4*	*34.9*
4	**B4.1 & B4.2**	8.90	10.71	28.0	2.6	4.2	*22.9*	*45.2*
5	**B5, DP 4 F.B. & DP 13 F.B.**	8.38	11.47	28.0	2.6	4.2	*21.6*	*48.4*
*3 & 5**	**DP-3 & 5**	14.41	19.79	28.3	2.6	4.2	*36.9*	*82.9*
6	**B6.1, B6.2, B6.3, & B6.4**	7.08	8.55	26.9	2.6	4.3	*18.6*	*36.9*
7	**B7.1, B7.2 & B7.3**	6.71	8.09	26.9	2.6	4.3	*17.6*	*34.9*
8	**C1.1 & C1.2**	5.31	6.52	25.3	2.7	4.5	*14.4*	*29.2*
9	**C2.1 , C2.2 & C2.3**	5.83	7.13	27.3	2.6	4.3	*15.2*	*30.5*
10	**C3, DP8 & DP9 F.B.**	4.27	6.60	27.3	2.6	4.3	*11.1*	*28.3*
11	**C4**	5.32	6.64	34.3	2.3	3.7	*12.3*	*24.8*
12	**B10.1& B10.2**	2.90	3.54	24.5	2.8	4.6	*8.0*	*16.1*
13	**B9.1 & B9.2**	4.23	5.07	18.9	3.1	5.2	*13.2*	*26.6*
14	**C5**	3.66	4.53	22.6	2.9	4.8	*10.5*	*21.6*

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Surface Routing Summary)

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
15	C6	2.16	2.64	19.3	3.1	5.2	*6.7*	*13.7*
15A	C7	2.75	3.45	22.5	2.9	4.8	*7.9*	*16.5*
16	C8.1 & C8.2	5.47	6.69	27.6	2.6	4.3	*14.2*	*28.4*
17	C9.1 & C9.2	4.24	5.19	21.5	2.9	4.9	*12.5*	*25.4*
18	D1.1 & D1.2	5.40	6.60	28.0	2.6	4.2	*13.9*	*27.8*
19	D2	2.02	2.47	20.0	3.0	5.1	*6.1*	*12.5*
20	E	0.49	0.68	17.6	3.2	5.4	*1.6*	*3.7*
21	F	1.63	2.28	16.3	3.3	5.7	*5.4*	*12.9*
POND 1	BASINS B1.1 THRU B10.2	52.64	63.35	29.2	2.5	4.1	*132.5*	*260.7*
POND 2	BASINS C1.1 THRU C10	37.53	46.20	34.3	2.3	3.7	*86.5*	*172.7*

*Used to calculate the combined flow at DP-3 & DP-5 for split flow between inlets.

Calculated by: QNA
Date: 07/15/05
Checked by: _____

PIPE RUN 5 USED TO QUANTIFY OS-5 RUNOFF MINUS OS-1 AND OS-2 RUNOFF

PIPE RUN 7 USED TO QUANTIFY OS-6 RUNOFF MINUS OS-3

FALCON HIGHLANDS FILING NO. 2
PDR BASINS
(Pipe Routing Summary)

Pipe Routes	Contributing Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}
1	DP-1 & DP-4	13.43	14.99	28.3	2.6	4.2	34.4	62.8
2	PR-1 & DP-2	17.90	19.95	28.3	2.6	4.2	45.8	83.7
3	PR-2, DP-3 & DP-5	32.31	39.74	28.3	2.6	4.2	82.7	166.6
4	DP-12 & DP-13 PICK UP	6.21	7.01	24.5	2.8	4.6	17.1	31.9
5	PR-3 & PR-4	38.51	46.76	28.3	2.6	4.2	98.6	196.0
6	DP-8 & DP-9	9.24	8.44	27.3	2.6	4.3	24.1	36.1
7	PR-6 & DP-10	13.51	15.04	27.3	2.6	4.3	35.3	64.4
8	PR-7 & DP-14	17.17	19.57	27.3	2.6	4.3	44.8	83.8
9	PR-8 & DP-15	19.34	22.21	27.3	2.6	4.3	50.5	95.1
10	PR-9 & DP-15A	22.08	25.67	27.3	2.6	4.3	57.6	109.9
11	DP-11, DP-16 & DP-17	15.03	18.52	34.3	2.3	3.7	34.6	69.2
12	DP-18	5.40	6.60	28.03	2.6	4.2	13.9	27.8
13	DP-19	2.02	2.47	20.02	3.0	5.1	6.1	12.5

Calculated by: QNA
Date: 07/15/05
Checked by: _____

PIPE RUNS 12 AND 13 USED TO QUANTIFY POND WU TRIBUTARY AREA AND RUNOFF FOR COMPARISON TO 2022 MDDP

THE 2010 FDR UTILIZED THE MDDP MAJOR BASINS FOR FILING NO. 1 DEVELOPED CONDITIONS / FILING NO. 2 & 3 EXISTING CONDITIONS FOR THE FILING NO. 1 OFFSITE AREAS.

FALCON HIGHLANDS PHASE 2
FILING No. 2 and 3
MDDP MAJOR BASINS
(Area Runoff Coefficient Summary)

HISTORIC

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*COMPOSITE C*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
EX-1	21 75	0 00	0 60	0 70	21 75	0 25	0 35	0 25	0 35
EX-2	64 61	0 00	0 60	0 70	64 61	0 25	0 35	0 25	0 35
EX-3	99 57	0 00	0 60	0 70	99 57	0 25	0 35	0 25	0 35
EX-4	71 71	0 00	0 60	0 70	71 71	0 25	0 35	0 25	0 35

EX-1 and EX-2 areas are part of Basin 78 from the Sand Creek DBPS and will use rational method to find the Historic Runoff
EX-3 is the area in Phase 2 that is tributary to Design Point 38 of the Sand Creek DBPS, and will use rational method to find the Historic Runoff
EX-4 is the area in Phase 2 that is tributary to Pond WU in the Falcon Basin DBPS

PROPOSED

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*COMPOSITE C*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
A	14 81	6 21	0 50	0 60	8 60	0 25	0 35	0 35	0 45
B	105 45	101 13	0 50	0 60	4 32	0 25	0 35	0 49	0 59
C	88 47	77 31	0 45	0 55	11 16	0 25	0 35	0 42	0 52
D	27 78	27 00	0 45	0 55	0 78	0 25	0 35	0 44	0 54
E	2 20	0 00	0 50	0 60	2 20	0 25	0 35	0 25	0 35
F	6 34	0 00	0 50	0 60	6 34	0 25	0 35	0 25	0 35
G	12 61	0 00	0 50	0 60	12 61	0 25	0 35	0 25	0 35
OS-1	6 38	6 38	0 50	0 60	0 00	0 25	0 35	0 50	0 60
OS-2	3 12	3 12	0 90	0 95	0 00	0 25	0 35	0 90	0 95
OS-3	1 14	1 14	0 90	0 95	0 00	0 25	0 35	0 90	0 95

Calculated by QNA
Date 5/5/05

FALCON HIGHLANDS PHASE 2
FILING No. 2 and 3
MDDP MAJOR BASINS
(Area Drainage Summary)

HISTORIC

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	Tc USED	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
EX-1	21 75	0 25	0 35	0 25	360	10 0	21 5	0	0 0%	0 0	0 0	21 5	21 5	2 9	4 9	*16 0*	*37 2*
EX-2	64 61	0 25	0 35	0 25	300	10 0	18 5	3750	1 5%	3 0	20 8	39 3	39 3	2 1	3 4	*34 4*	*77 6*
EX-3	99 57	0 25	0 35	0 25	300	8 0	19 9	2770	1 7%	3 2	14 4	34 3	34 3	2 3	3 7	*57 3*	*130 1*
EX-4	71 71	0 25	0 35	0 25	280	8 0	18 8	1900	1 3%	2 7	11 7	30 5	30 5	2 5	4 0	*44 0*	*100 6*

EX-1 and EX-2 area is planimetered from Sand Creek DBPS and will use rational method to find the Historic Runoff
EX-3 is the area in Phase 2 that is tributary to Design Point 38 of the Sand Creek DBPS
EX-4 is the area in Phase 2 that is tributary to Pond WU in the Falcon Basin DBPS

PROPOSED

		WEIGHTED		*OVERLAND*				*STREET / CHANNEL FLOW*				T_t	Tc USED	*INTENSITY*		*TOTAL FLOWS*	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
A	14 81	0 35	0 45	0 25	300	6 0	21 9	233	3 0%	3 3	1 2	23 1	23 1	2 8	4 7	*14 9*	*31 7*
B	105 45	0 49	0 59	0 25	170	3 4	16 5	3890	2 5%	3 1	20 9	37 4	37 4	2 2	3 5	*113 3*	*220 3*
C	88 47	0 42	0 52	0 25	110	4 0	10 9	3255	1 3%	2 2	24 7	35 5	35 5	2 3	3 7	*84 9*	*169 7*

FALCON HIGHLANDS PHASE 2
FILING No. 2 and 3
MDDP MAJOR BASINS
(Area Drainage Summary)

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_t	Tc USED	INTENSITY		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	(min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (cfs)	Q_{100} (cfs)
		* For Calcs See Runoff Summary															
D	27 78	0 44	0 54	0 25	180	3 6	17 0	1420	1 5%	2 4	9 9	26 8	26 8	2 6	4 3	32 5	65 4
E	2 20	0 25	0 35	0 25	90	5 0	8 6	1080	1 0%	2 0	9 0	17 6	17 6	3 2	5 4	1 8	4 2
F	6 34	0 25	0 35	0 25	125	4 0	12 1	630	1 6%	2 5	4 2	16 3	16 3	3 3	5 7	5 3	12 5
G	12 61	0 25	0 35	0 25	300	7 0	20 8	285	1 8%	2 6	1 8	22 6	22 6	2 9	4 8	9 0	21 0
OS-1	6 38	0 50	0 60	0 25	100	2 0	12 6	608	2 0%	2 8	3 6	16 3	16 3	3 4	5 7	10 7	21 7
OS-2	3 12	0 90	0 95	0 25	100	2 0	12 6	1525	1 2%	2 2	11 6	24 2	24 2	2 8	4 6	7 8	13 6
OS-3	1 14	0 90	0 95	0 25	20	0 4	5 7	1190	0 6%	1 8	11 0	16 7	16 7	3 3	5 6	3 4	6 0

Calculated by QNA
Date 5/5/05

FALCON HIGHLANDS PHASE 2
FILING No. 2 and 3
MDDP MAJOR BASINS
(Surface Routing Summary)

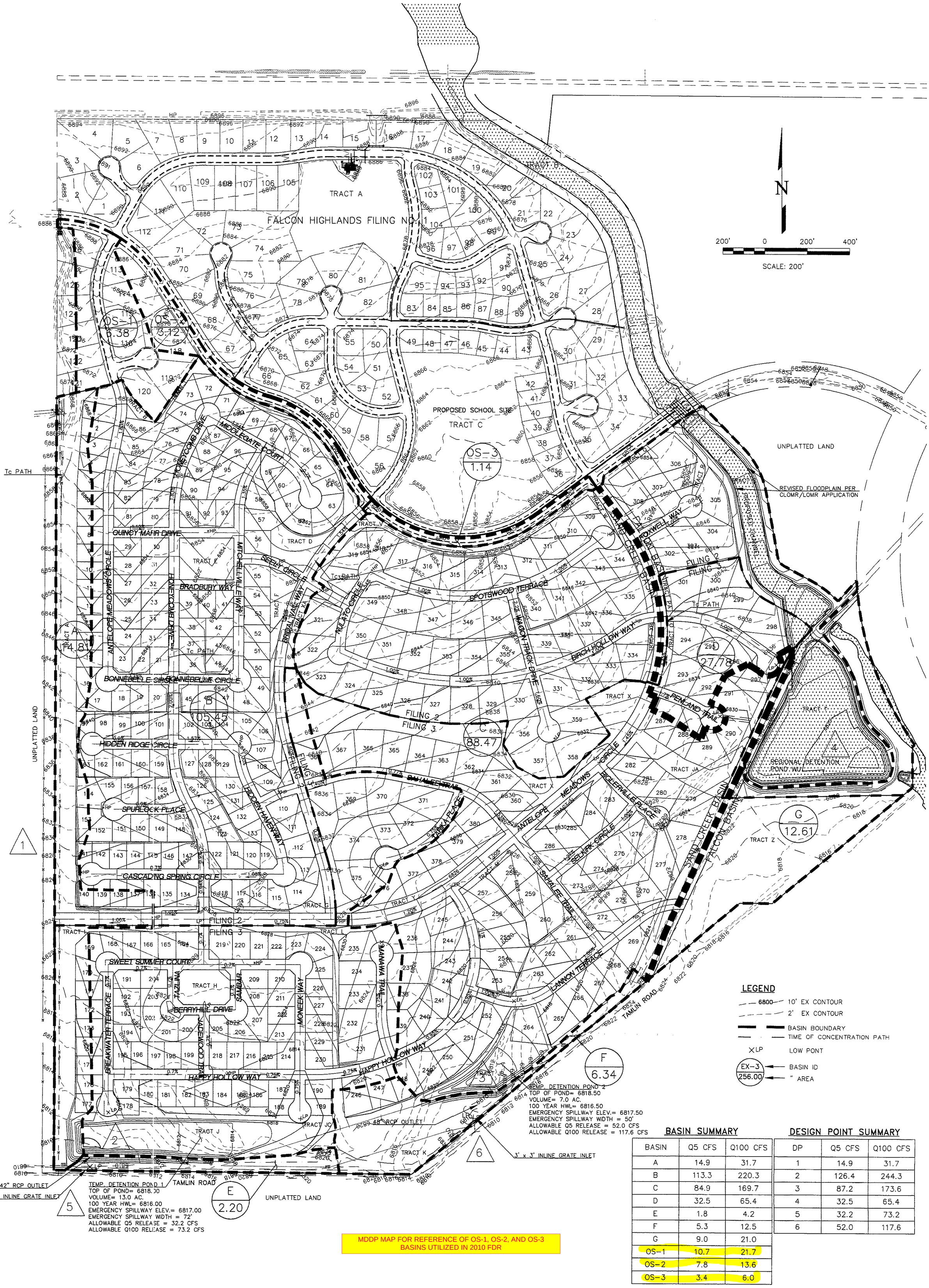
HISTORIC

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
1	"EX-1"	5 44	7 61	21 5	2 9	4 9	*16 0*	*37 2*
2	"EX-2"	16 15	22 61	39 3	2 1	3 4	*34 4*	*77 6*
3	"EX-3"	24 89	34 85	34 3	2 3	3 7	*57 3*	*130 1*
4	"EX-4"	17 93	25 10	30 5	2 5	4 0	*44 0*	*100 6*

PROPOSED

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
1	"A"	5 25	6 73	23 1	2 8	4 7	*14 9*	*31 7*
2	"B", "OS-1" & "OS-2",	57 64	68 98	37 4	2 2	3 5	*126 4*	*244 3*
3	"C", & "OS-3"	38 60	47 51	35 5	2 3	3 7	*87 2*	*173 6*
4	"D"	12 35	15 12	26 8	2 6	4 3	*32 5*	*65 4*

Calculated by QNA
Date 5/5/05
Checked by _____



BASIN SUMMARY

BASIN	Q5 CFS	Q100 CFS
A	14.9	31.7
B	113.3	220.3
C	84.9	169.7
D	32.5	65.4
E	1.8	4.2
F	5.3	12.5
G	9.0	21.0
OS-1	10.7	21.7
OS-2	7.8	13.6
OS-3	3.4	6.0

DESIGN POINT SUMMARY

DP	Q5 CFS	Q100 CFS
1	14.9	31.7
2	126.4	244.3
3	87.2	173.6
4	32.5	65.4
5	32.2	73.2
6	52.0	117.6

MDDP MAP FOR REFERENCE OF OS-1, OS-2, AND OS-3 BASINS UTILIZED IN 2010 FDR

SHEET NO. 1 OF 1
JOB NO. 0429.00
DATE ISSUED 9/16/05
V-SCALE
H-SCALE 1" = 200'
CHECKED BY BEB
DRAWN BY
DESIGNED BY QNA

FALCON HIGHLANDS PHASE 2

FILINGS NO. 2 & 3
DEVELOPED MDDP MAP
PROPOSED MAJOR BASINS

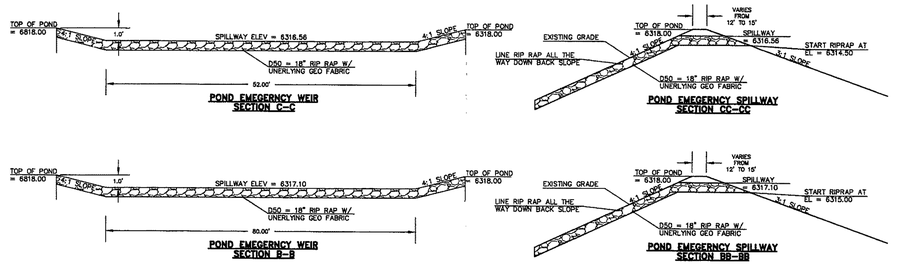
125 N. WAHSATCH AVE., SUITE 101
COLORADO SPRINGS, CO. 80903
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnesinc.com
"Creative Civil Engineering"

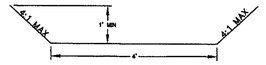
PREPARED FOR:
FALCON HIGHLANDS
ATTN: MR. MIKE SCOTT
25 N. TEJON, SUITE 300
COORADO SPRINGS, CO 80903
(719) 227-1022

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

REVISIONS

NO.	DESCRIPTION	DATE
1	PER COUNTY DP COMMENTS	5/05/05
2	PER COUNTY DP COMMENTS	9/16/05





DESIGN POINT 1	Q5	Q100
1	26.9	52.8
2	16.7	35.2
3	15.4	34.9
4	22.9	45.2
5	21.6	48.4
6	18.6	36.9
7	17.6	34.9
8	14.4	29.2
9	15.2	30.5
10	11.1	28.3
11	12.3	24.8
12	8.0	16.1
13	13.2	26.6
14	10.5	21.6
15	6.7	13.7
15A	7.9	16.5
16	14.2	28.4
17	12.5	25.4
18	13.9	27.8
19	6.1	12.5
20	1.8	4.3
21	5.4	12.9
POND 1	132.5	260.7
POND 1	88.5	172.7

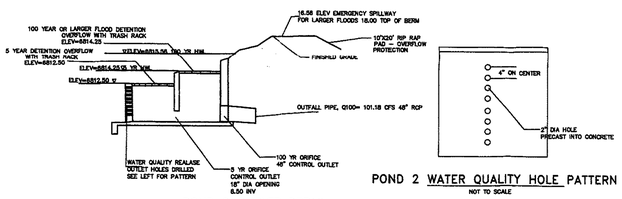
PIPE FLOW SUMMARY

PIPE ROUTES	STORM EVENT FLOWS Q5	STORM EVENT FLOWS Q100	PIPE INFORMATION % SLOPE	PIPE INFORMATION SIZE
1	34.4	82.8	1.97	36"
2	45.8	83.7	0.90	42"
3	82.7	166.6	0.50	60"
4	17.1	31.9	0.50	36"
5	98.6	196.0	0.50	60"
6	24.1	36.1	0.90	30"
7	35.3	64.4	0.87	36"
8	44.8	83.8	0.60	42"
9	50.5	95.1	0.50	48"
10	57.6	109.9	0.50	54"
11	34.6	69.2	0.50	42"
12	13.9	27.8	0.62	30"
13	6.1	12.5	4.11	24"

PIPE RUN 5 USED TO QUANTIFY OS-5 RUNOFF MINUS OS-1 AND OS-2 RUNOFF

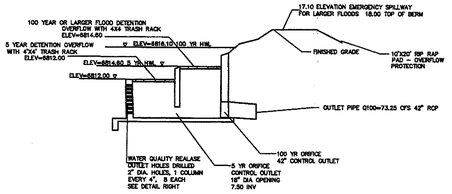
PIPE RUN 7 USED TO QUANTIFY OS-6 RUNOFF MINUS OS-3

PIPE RUNS 12 AND 13 USED TO QUANTIFY POND WU TRIBUTARY AREA AND RUNOFF FOR COMPARISON TO 2022 MDDP



POND 2 OUTLET DETAIL
SEE ALSO FIG. 2-A DROP BOX OUTLET OPTION IN DCM VOLUME 2
NOT TO SCALE

POND 2 WATER QUALITY HOLE PATTERN
NOT TO SCALE



POND 1 OUTLET DETAIL
SEE ALSO FIG. 2-A DROP BOX OUTLET OPTION IN DCM VOLUME 2
NOT TO SCALE

POND 1 WATER QUALITY HOLE PATTERN
NOT TO SCALE

LEGEND

- 6800 — 10' EX CONTOUR
- 2' EX CONTOUR
- 10' PROP. CONTOUR
- 2' PROP. CONTOUR
- BASIN BOUNDARY
- MAJOR BASIN BOUNDARYS PER MDDP
- LP — LOW PONT
- HP — HIGH PONT
- A / 1.2 — BASIN ID
- DESIGN POINT ID
- PROPOSED FLOODPLAIN AREA
- EXISTING FLOODPLAIN AREA

N

200' 0 200' 400'

SCALE: 200'

NO.	DESCRIPTION	DATE
1	PER COUNTY/INHOUSE COMMENTS	10/16/05

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE GOVERNMENTAL AGENCIES, TERRA NOVA ENGINEERING AND SURVEYING, INC. CANNOT AUTHORIZE USE FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
TAMLIN VENTURES, LLC
ATTN: MIKE SCOTT
25 N. TEJON ST., SUITE 300
COLORADO SPRINGS
(719) 227-1022

TERRA NOVA Engineering & Surveying, Colorado Springs Company
125 N. WAHSATCH AVE., SUITE 101
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OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnsinc.com

FALCON HIGHLANDS FILING 2 & 3

FINAL DRAINAGE MAP
PROPOSED DRAINAGE CONDITIONS

DESIGNED BY	QNA
DRAWN BY	QNA
CHECKED BY	
H-SCALE	1"=200'
V-SCALE	NA
JOB NO.	0429.00
DATE ISSUED	11/11/05
SHEET NO.	1 OF 1

APPENDIX G

DRAINAGE MAPS

143 Union Boulevard, Suite 700, Lakewood, CO 80228 Tel: 303.462.1100 Fax: 303.825.7110
www.atwell-group.com

EXISTING CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	1	3.74	0.09	0.36	1.15	7.70
B	2	38.93	0.09	0.36	10.22	68.65
C	3	57.81	0.09	0.36	16.35	109.77
D	4	10.54	0.09	0.36	3.34	22.42
E	5	3.14	0.09	0.36	1.12	7.50
F	6	3.67	0.09	0.36	1.19	7.99
G	6	8.84	0.09	0.36	6.80	16.00
OS-1	7	6.38	0.27	0.48	10.70	21.70
OS-2	8	3.12	0.30	0.50	7.80	13.60
OS-3	9	1.14	0.90	0.96	3.40	6.00
OS-4	10	13.09	0.34	0.44	12.30	26.30
OS-5	11	59.62	0.32	0.53	80.10	160.70
OS-6	12	35.75	0.22	0.46	31.90	58.40
OS-7	13	6.47	0.22	0.46	5.22	18.32
OS-8	4	13.79	0.09	0.36	4.63	31.08
TOTAL		**266.0**			**196.2**	**576.1**

Flows do not match hydrology spreadsheet

Spreadsheets were revised.

EXISTING CONDITIONS DESIGN POINT SUMMARY (CUMULATIVE FLOW)

Design Point	Contributing Basins	Q_5 (cfs)	Q_{100} (cfs)
1	A, OS-4	13.4	34.0
2	B, OS-2, OS-5	98.1	242.9
3	C, OS-3, OS-6	51.6	174.2
4	D, OS-7, OS-8	13.2	71.8
5	B, E, OS-2, OS-5	99.2	250.4
6	C, D, G, OS-3, OS-6, OS-7, OS-8	64.8	246.0
7	OS-1	10.7	21.7
8	OS-2	7.8	13.6
9	OS-3	3.4	6.0
10	OS-4	12.3	26.3
11	OS-2, OS-5	87.9	174.3
12	OS-3, OS-6	35.3	64.4
13	OS-7	5.2	18.3

Update table per comments on summary table in Appendix D

Updated.

ROW line does not match plan

Updated.

List release rates from Pond WU

Now provided based on FDR by Galloway and Company dated March 2020.

Spreadsheet revised.

Flows do not match hydrology spreadsheet

Put Pond As-Built information here **Added.**

Put pond As-Built Information here **Added.**

Show and label culverts at Highway 24 **Added.**

Label existing area inlet

Labeled as discussed.

LEGEND

- PROPERTY BOUNDARY
- EXISTING RIGHT-OF-WAY
- EXISTING LOT LINE
- EXISTING SECTION LINE
- EXISTING EASEMENT
- EXISTING CONTOURS
- DRAINAGE BASIN DELINEATION (SAND CREEK AND FALCON)
- BASIN ID (BASIN, AREA, 5YR, 100YR)
- DESIGN POINT ID (X)
- MAJOR BASIN BOUNDARY
- FLOW ARROW

(IN FEET)
1 inch = 200 ft.

ATWELL
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143 UNION BLVD, SUITE 700
LAKEWOOD, CO 80228
303.462.1100

CHALLENGER HOMES
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COLORADO SPRINGS, CO 80920
(719) 598-5192
JIM BYERS

CLIENT

FALCON HIGHLANDS FILING NO. 3
EL PASO COUNTY, COLORADO

DRAINAGE MAP
EXISTING CONDITIONS

DATE 03/20/2022

A	1st SUBMITTAL TO EPC 08/04/2021 – RDL
B	2ND SUBMITTAL TO EPC 01/20/2022 – RDL
C	3RD SUBMITTAL TO EPC 03/20/2022 – RDL

REVISIONS

DR. RDL | CH. RDL
P.M. RDL
JOB 21000656
SHEET NO. 1
EX-01

CAD FILE: 21000656-DRAINAGE MAPS-EXISTING CONDITIONS.DWG

Basin Summary Table

Updated.

PROPOSED CONDITIONS DESIGN POINT SUMMARY (CUMULATIVE FLOWS)			
Design Point	Contributing Basins	Cumulative Q_5 (cfs)	Cumulative Q_{100} (cfs)
1	A, OS-4	16.6	39.9
2	B, OS-2, OS-5	161.4	351.0
3	C, OS-3, OS-6, OS-7	105.3	253.4
4	D, OS-8	14.4	55.9
5	B, E, OS-2, OS-5	162.5	358.5
6	C, D, G, OS-3, OS-6, OS-7, OS-8	126.6	325.2
7	OS-1	10.7	21.7
8	OS-2	7.8	13.6
9	OS-3	3.4	6.0
10	OS-4	14.9	31.7
11	OS-2, OS-5	87.9	174.3
12	OS-3, OS-6	35.3	64.4
13	OS-7	5.2	18.3

Update table per comments on summary table in Appendix D

Updated.

Flows do not match hydrology spreadsheet

Updated.

Overlapping text

Updated.

Move flow arrow so DP label is readable

Moved.

What is carrying this released flow until Filing 3 system is built?

The ex. diversion ditch, label added.

List release rates from Pond WU

Added.

Flows do not match hydrology spreadsheet

Updated, this is corrected. Revised in summary/hydrology tables to match 2010 FDR.

Added to existing map too.

As-built information should be on existing map. Note ponds will be analyzed for Full-Spectrum requirements at time of PDR & FDR.

Overlapping text

Revised.

Label proposed swale

Added.

Removed.

What is leader for?

Added to existing map too.

As-built information should be on existing map. Note ponds will be analyzed for Full-Spectrum requirements at time of PDR & FDR.

Show and label culverts at Highway 24

Labeled as discussed.

Label existing area inlet

Labeled as discussed.

LEGEND

- PROPERTY BOUNDARY
- EXISTING RIGHT-OF-WAY
- EXISTING LOT LINE
- EXISTING SECTION LINE
- EXISTING EASEMENT
- EXISTING CONTOURS
- DRAINAGE BASIN DELINEATION (SAND CREEK AND FALCON)
- BASIN ID (AREA, 5YR, 100YR)
- DESIGN POINT ID
- MAJOR BASIN BOUNDARY
- FLOW ARROW

(IN FEET)
1 inch = 200 ft.

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(719) 598-5192
JIM BYERS

CLIENT
CHALLENGER HOMES
FALCON HIGHLANDS FILING NO. 3
EL PASO COUNTY, COLORADO
DRAINAGE MAP
PROPOSED CONDITIONS

DATE 03/20/2022

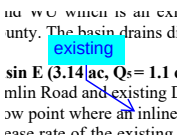
REVISIONS
A 1st SUBMITTAL TO EPC 08/04/2021 - RDL
B 2nd SUBMITTAL TO EPC 01/20/2022 - RDL
C 3rd SUBMITTAL TO EPC 03/20/2022 - RDL

DR. RDL CH. RDL
P.M. RDL
JOB 21000656
SHEET NO. 1
EX-02

CAD FILE: 21000656-DRAINAGE MAPS-OVERALL SITE.DWG

MDDP _V3.pdf Markup Summary

CDurham (54)



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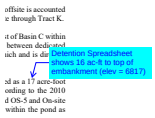

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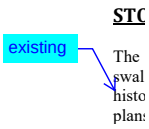
Detention Spreadsheet shows 16 ac-ft to top of embankment (elev = 6817)



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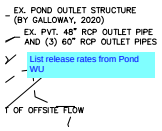

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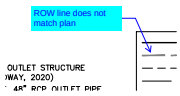
List release rates from Pond WU



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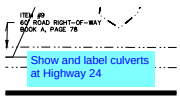
ROW line does not match plan



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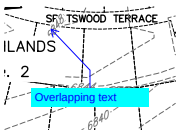
Show and label culverts at Highway 24



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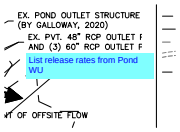

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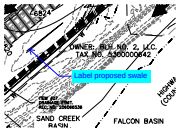
List release rates from Pond WU



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Label proposed swale

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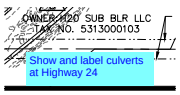

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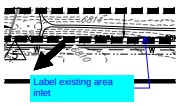
Show and label culverts at Highway 24



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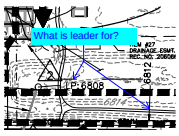
Label existing area inlet



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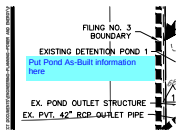
What is leader for?



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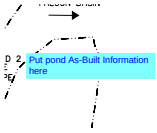
Layer:
Space:

Put Pond As-Built information here



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Author: CDurham
Date: 4/11/2022 4:42:01 PM
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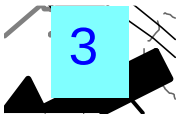
Put pond As-Built Information here



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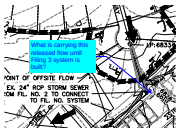
3



Subject: Callout
Page Label: 72
Author: CDurham
Date: 4/11/2022 4:44:33 PM
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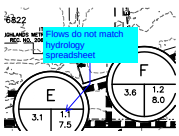
Space:

What is carrying this released flow until Filing 3 system is built?



Subject: Callout
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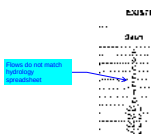
Flows do not match hydrology spreadsheet



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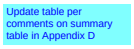
Flows do not match hydrology spreadsheet



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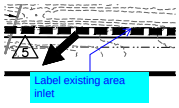
Update table per comments on summary table in Appendix D



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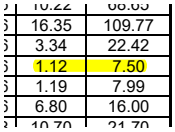
Label existing area inlet



16.35	109.77
3.34	22.42
1.12	7.50
1.19	7.99
6.80	16.00

Subject: Highlight
Page Label: 38
Author: CDurham
Date: 4/11/2022 5:42:43 PM
Status:
Color:
Layer:
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1.12 7.50

Subject: Callout
Page Label: 38
Author: CDurham
Date: 4/11/2022 5:43:07 PM
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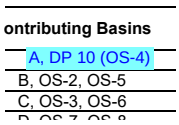
Flows do not match hydrology spreadsheet



ontributing Basins
A, DP 10 (OS-4)
B, OS-2, OS-5
C, OS-3, OS-6

Subject: Text Box
Page Label: 39
Author: CDurham
Date: 4/11/2022 5:50:16 PM
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Layer:
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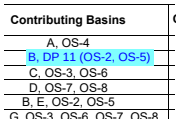
A, DP 10 (OS-4)



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Date: 4/11/2022 5:50:49 PM
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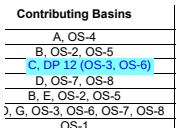
B, DP 11 (OS-2, OS-5)



Subject: Text Box
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Date: 4/11/2022 5:51:10 PM
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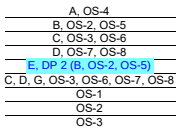
Space:

C, DP 12 (OS-3, OS-6)



Subject: Text Box
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Date: 4/11/2022 5:52:28 PM
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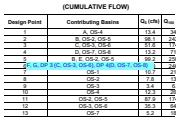
Layer:
Space:

E, DP 2 (B, OS-2, OS-5)

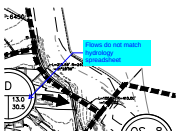


Subject: Text Box
Page Label: 39
Author: CDurham
Date: 4/11/2022 5:54:55 PM
Status:
Color:
Layer:
Space:

F, G, DP 3 (C, OS-3, OS-6), DP 4(D, OS-7, OS-8)

Subject: Text Box
Page Label: 72
Author: CDurham
Date: 4/11/2022 5:56:02 PM
Status:
Color:
Layer:
Space:

Basin Summary Table



Subject: Callout
Page Label: 72
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Date: 4/11/2022 5:56:14 PM
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Color:
Layer:
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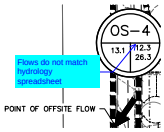
Flows do not match hydrology spreadsheet



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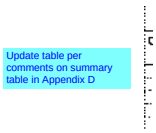
Flows do not match hydrology spreadsheet



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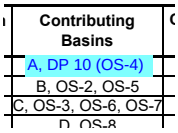
Update table per comments on summary table in Appendix D



Subject: Text Box
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Author: CDurham
Date: 4/11/2022 5:57:58 PM
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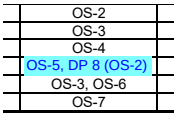
A, DP 10 (OS-4)



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Status:
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Layer:
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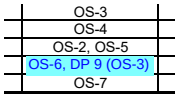
OS-5, DP 8 (OS-2)



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Date: 4/11/2022 5:59:20 PM
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Layer:
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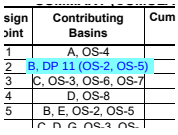
OS-6, DP 9 (OS-3)



Subject: Text Box
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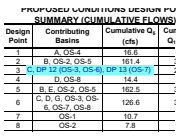
Date: 4/11/2022 5:59:58 PM
Status:
Color:
Layer:
Space:

B, DP 11 (OS-2, OS-5)



PROPOSED CONDITIONS DESIGN PO

SUMMARY (CUMULATIVE FLOWS)

Design Point	Contributing Basins	Cumulative Q_5 (cfs)	Cur Q_5
1	A, OS-4	16.6	
2	B, OS-2, OS-5	161.4	
3	C, DP 12 (OS-3, OS-6), DP 13 (OS-7)		
4	D, OS-8	14.4	
5	B, E, OS-2, OS-5	162.5	
6	C, D, G, OS-3, OS-6, OS-7, OS-8	126.6	
7	OS-1	10.7	
8	OS-2	7.8	

Subject: Text Box
Page Label: 45
Author: CDurham
Date: 4/11/2022 6:00:49 PM
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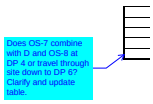
Layer:
Space:

C, DP 12 (OS-3, OS-6), DP 13 (OS-7)



Subject: Callout
Page Label: 39
Author: CDurham
Date: 4/11/2022 6:04:13 PM
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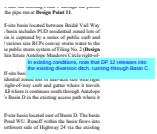
Does OS-7 combine with D and OS-8 at DP 4 or travel through site down to DP 6? Clarify and update table.



Subject: Text Box
Page Label: 9
Author: CDurham
Date: 4/11/2022 6:18:08 PM
Status:
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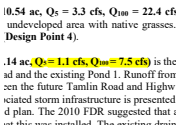
In existing conditions, note that DP 12 releases into the existing diversion ditch, running through Basin C.



Subject: Highlight
Page Label: 10
Author: CDurham
Date: 4/11/2022 6:18:35 PM
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Color:
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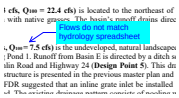
Q5 = 1.1 cfs, Q100 = 7.5 cfs



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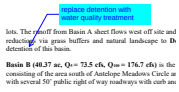
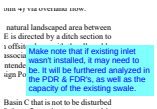
Flows do not match hydrology spreadsheet



Subject: Callout
Page Label: 13
Author: CDurham
Date: 4/11/2022 6:23:46 PM
Status:
Color:
Layer:
Space:

replace detention with water quality treatment



Subject: Text Box
Page Label: 13
Author: CDurham
Date: 4/11/2022 6:24:48 PM
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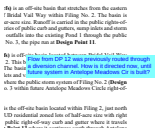
Make note that if existing inlet wasn't installed, it may need to be. It will be furthered analyzed in the PDR & FDR's, as well as the capacity of the existing swale.



Subject: Text Box
Page Label: 12
Author: CDurham
Date: 4/11/2022 6:27:28 PM
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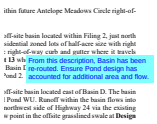
Flow from DP 12 was previously routed through a diversion channel. How is it directed now, until future system in Antelope Meadows Cir is built?



Subject: Text Box
Page Label: 12
Author: CDurham
Date: 4/11/2022 6:28:44 PM
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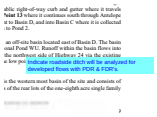
Color:
Layer:
Space:

From this description, Basin has been re-routed. Ensure Pond design has accounted for additional area and flow.



Subject: Text Box
Page Label: 12
Author: CDurham
Date: 4/11/2022 6:29:39 PM
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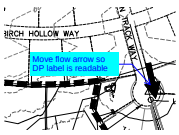
Indicate roadside ditch will be analyzed for developed flows with PDR & FDR's.



Subject: Callout
Page Label: 72
Author: CDurham
Date: 4/11/2022 6:31:46 PM
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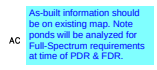
Color:
Layer:
Space:

Move flow arrow so DP label is readable



Subject: Text Box
Page Label: 72
Author: CDurham
Date: 4/11/2022 6:32:53 PM
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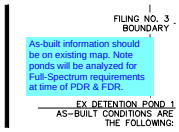
As-built information should be on existing map. Note ponds will be analyzed for Full-Spectrum requirements at time of PDR & FDR.



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Author: CDurham
Date: 4/11/2022 6:32:58 PM
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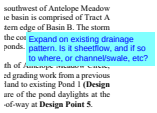
As-built information should be on existing map. Note ponds will be analyzed for Full-Spectrum requirements at time of PDR & FDR.



Subject: Text Box
Page Label: 9
Author: CDurham
Date: 4/11/2022 9:10:47 AM
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Color:
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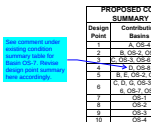
Expand on existing drainage pattern. Is it sheetflow, and if so to where, or channel/swale, etc?



Subject: Callout
Page Label: 45
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Layer:
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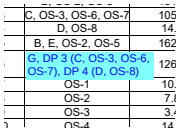
See comment under existing condition summary table for Basin OS-7. Revise design point summary here accordingly.



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Author: CDurham
Date: 4/12/2022 9:23:34 AM
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G, DP 3 (C, OS-3, OS-6, OS-7), DP 4 (D, OS-8)

Subject: Text Box
Page Label: 45
Author: CDurham
Date: 4/12/2022 9:23:52 AM
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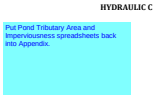
Layer:
Space:

Missing Basin F



Subject: Text Box
Page Label: 47
Author: CDurham
Date: 4/12/2022 9:24:16 AM
Status:
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Layer:
Space:

Put Pond Tributary Area and Imperviousness spreadsheets back into Appendix.