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El Paso County

Grandview Metro District Project

1041 Submission

August 6th, 2021

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HR Green Project No: 201662.05

Prepared For:

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Application – 1041 Permit

Completed Application form in the format attached and approved by the Planning and Community Development Director.

a) See attached 1041 Permit Application as Exhibit B.

Additional Submissions, as Requested by Director

The Director may require submission of any plan, study, survey or other information, in addition to the information required by this Section at the applicant's expense, as in the Director's judgement is necessary to enable it to review and act upon the application. Completed Application form in the format attached and approved by the Planning and Community Development Director,

a) See the table of contents for a full list of information provided in this permit submittal. Exhibit C contains a map depicting the proposed infrastructure to be permitting under this 1041 application.

Certification of Deed Research of Mineral Owners

Any application which requires compliance with § 24-65.5-101, et seq., C.R.S., (Notification to Mineral Owners of Surface Development) shall not be considered to have been submitted as complete until the applicant has provided a certification signed by the applicant confirming that the applicant or its agent has examined the records of the El Paso County Clerk and Recorder for the existence of any mineral estate owners or lessees that own less than full fee title in the property which is the subject of the application, and stating whether or not any such mineral estate owners or lessees exist. In addition, for purposes of the County convening its initial public hearing on any application involving property which mineral estate owners or lessees owning less than full fee title in the property have been certified by the applicant to exist, the application shall not be considered to have been submitted as complete until the applicant has provided an additional signed certification confirming that the applicant has, at least 30 days prior to the initial public hearing, transmitted to the County and to the affected mineral estate owners and lessees the notices required by C.R.S. §24-65.5-101, et seq.

As of January 8, 2019, Mike Bramlett, on behalf of JR Engineering researched the records of the El Paso County Clerk and Record and established that there were no mineral estate owners on the property known as Grandview Reserve. For official certification, see Exhibit H. For further information about soil type in the area, please reference Exhibit U.

Information Describing the Applicant

a) *The names and addresses, including email address and fax number, organization form, and business of the applicant and, if different, the owner of the Project.*

Melody Homes, Inc.
9555 S. Kingston Ct.,
Englewood, Colorado 80112
303-503-4903
WMCarlisle@drhorton.com

Paul Howard
Grandview Reserve Metropolitan District
1271 Kelly Johnson Blvd, Suite 100
Colorado Springs, CO 80920
719-499-8416
Paulinfinity1@msn.com

b) *The names, address and qualifications, including those areas of expertise and experience with projects directly related or similar to that proposed in the application package, of individuals who are or will be responsible for construction and operating the Project.*

Information regarding the HR Green team that compiled this application can be found in section 4. e) below and a full resume for each of these individuals is also provided in Exhibit EE.

c) *Written authorization of the application package by the Project owner, if different than the applicant.*

The District is the applicant and has authorized the application package in Exhibit B. Will serve letters by Woodmen Hills Metropolitan District (WHMD) and Cherokee Metropolitan District (MSD) are located in Appendix CC.

Melody Homes is now a partial landowner and has also authorized this application.

d) *Documentation of the applicant's financial and technical capability to develop and operate the Project, including a description of the applicant's experience developing and operating similar projects.*

The property owner has engaged HR Green, Inc. to design and manage associated sub-consultants of the proposed development. HR Green is one of the nation's longest operating engineering firms with experience in a wide variety of projects. While HR Green is newer to the Colorado market, current employees within the organization have worked in Colorado for numerous years and have designed and managed numerous similar size and larger projects within Colorado and nationwide. Most recently HR Green has been the lead engineering

consultant for the Aurora Highlands project covering 3,100+ acres of land is planned to have 23,000 homes.

Grandview Reserve Metropolitan District (GRMD) is authorized to issue up to $295,000,000 in bonds. At full build out, GRMD projects to generate approximately $2,427,000 in revenue from a 10-mill levy dedicated for O&M. Refer to the Grandview Reserve Metro District Service Plan located in Exhibit J for more details. According to the Draft Agreement with WHMD, WHMD will be responsible to operate the wastewater system. Discussions are ongoing regarding the operation of the water system.

e) *Written qualification of report preparers.*

This report was prepared by the following:

Gregory Panza, PE, PMP, Senior Project Manager

With nearly 25 years of experience, Greg manages and master plans land development and municipal water projects. He offers experience in both the engineering and construction realms. His project management, construction management, and general contracting experience, total nearly 15 years of expertise. Greg brings a broad knowledge of the civil field, including drainage, construction inspection, surveying, and stormwater management analysis. His project experience ranges from hydrologic & hydraulic analysis, utility and drainage studies consistent with FEMA, Corps and local requirements, utility coordination, heavy civil utility construction, mass grading, and roadway design projects.

Professional Engineer, CO, 37081, 2002

Mark Volle, PE, Lead Engineer

Mark has over 14 years of experience encompassing all aspects of water and wastewater projects. He has extensive permitting experience for projects similar to the proposed project including wastewater lift stations and force mains, large diameter transmission lines, water storage tanks and ground water treatment plants. On those projects, he has performed or managed a team on all aspects including: planning, permitting, design and construction administration.

Professional Engineer, CO, 48654, 2014

Trevor Igel, EIT, Staff Engineer

Trevor has a variety of hands-on experience ranging from the physical analysis of hydraulic phenomena, to stream, wetland and general ecosystem restoration. His

experience also includes computational hydraulic and hydrologic analysis, drainage design, grading, erosion control, surveying and construction inspection. Trevor is proficient in AutoCAD, Civil 3D, GIS, 1 and 2 Dimensional HEC-RAS analysis and SWMM modeling. His experience in modeling will ensure the water development plans are accurate for the Grandview Metro District project application.

Sarah Fernandez, MA English, Design Technician

Sarah is an analytical and detail-oriented individual with acute knowledge of drafting technologies. She supports the design leaders to ensure that exhibits are accurate. Having completed a Master's of English, her background in both communication and design is an asset in preparing the 1041 permit.

Information Describing the Project

a) *Vicinity map showing the proposed site and the surrounding area.*

Vicinity Map include in Exhibit A.

b) *Executive summary of the proposal indicating the scope and need for the Project.*

Proposed Water System:

The proposed project consists of the water infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The water infrastructure applicable to the 1041 includes source water wells, water treatment facilities, water storage tanks and the associated piping. Please reference Exhibit BB for all information regarding Grandview Reserve's water demands. The wells will be Denver Basin wells typically with 2 wells (one Arapahoe and one Laramie Fox Hills) per well site. Exhibit C contains a map of the potential proposed well sites within GRMD. The total number of well sites to be developed will be dependent on well production and the rate of development.

A total of up to 4 water treatment facilities are planned for the project. All water treatment facilities will utilize pressure sand filtration and iron and manganese precipitation to treat raw water from the wells. A flow diagram of the treatment provided is in Appendix II. The capacity of each water treatment facility will be determined by the filings that it will serve. The first water treatment facility will be sized to treat approximately 0.5 MGD with room to expand to 1.0 MGD. The total treatment capacity needed for full buildout of GRMD is approximately 3.0 MGD. Exhibit C shows the proposed locations of the water treatment facilities.

Once treated at the water treatment facilities, water will be stored in elevated or ground-level tanks. Multiple tanks constructed of steel or concrete will serve the project area. Currently, up to 4 different sites are identified in Exhibit C. The tanks will be sized to store

identify max size & if above or below ground: repeat comment

THESE COMMENTS APPLY TO CHAPTER 4 RESPONSES ALSO

approximately 24 hours of average daily flow and the fire flow requirement. The first tank is anticipated to be approximately 400,000 gallons. The size and number of future tanks will be determined as development progresses. Total storage capacity for the development at buildout is anticipated to be 1.5-3.0 million gallons. The total storage required will be determined by the building with the largest fire flow requirement.
The raw and potable water facilities will be connected by water lines ranging from 4”-18” diameter as depicted in Exhibit C.

Proposed Wastewater System:
The proposed project consists of the wastewater infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The wastewater infrastructure applicable to the 1041 includes one or more lift stations and associated force main(s). Treatment will be provided by an existing treatment facility.

GRMD is proposed to have approximately 3340 single family equivalents (SFE) at buildout. Please reference Exhibit BB for all information regarding Grandview Reserve’s wastewater demands.

This report evaluates three alternatives for conveyance and treatment:

A. Woodmen Hills Metropolitan District (WHMD)
B. Meridian Ranch Metropolitan District (MSMD)
C. Cherokee Metropolitan District (CMD)

identify the expansion per the IGA so its included in the request-

The preferred alternative is Woodmen Hills Metropolitan District.

For all three alternatives, it is anticipated that parallel force mains will be installed as shown in Exhibit C. An 8” – 12” diameter force main will be used to convey flows during the early stages of development. This will ensure that flushing velocities of 3.5 ft/s can be achieved with minimal water added. A second force main will be 12”-16” to convey the remainder of the wastewater flows for full build-out. The gravity lines are anticipated to be 15”-21” in diameter and the exact size will be determined once a design profile is developed, and the minimum slope is known. The force mains and gravity interceptors shall be PVC or HDPE and will vary in length depending on the alternative chosen. The typical lift station will consist of:

- Wet Well/Dry Well Configuration
- Flooded-suction Pumps with redundancy for the largest pump
- Emergency storage
- Electrical Equipment
- Back-up Generator
- Odor Control

number of maximum lift stations and "accessory" uses

notify adj neighbors to alternative B and C lift stations please. and identify sluge or lagoons if propsoed.

Alternative A

Wastewater infrastructure will convey flows from GRMD and other surrounding parcels to the Woodmen Hills Metropolitan District (WHMD) Water Reclamation Facility (WRF) for treatment. This alignment will require one lift station that will be located at the corner of Curtis Rd. and Judge Orr Rd. The sanitary sewer alignment is approximately 5.8 miles and is depicted in Exhibit C. The service area of the lift station is defined in Exhibit II. WHMD will determine the exact capacity of the proposed lift station and force main. It is anticipated that the lift station and force main will have a 0.8 – 1.5 MGD average daily flow capacity. The WHMD WRF currently has capacity for 900 SFE from GRMD. WHMD plans to expand the WRF capacity to allow them to accept full build out flows from GRMD. The WHMD WRF expansion is not included in this 1041. No pretreatment or equalization storage is required for this alternative. The will-serve letter from WHMD is included in Exhibit CC.

Alternative B

Wastewater infrastructure will convey flows from GRMD to the MSMD Falcon Lift Station, where MSMD will facilitate conveyance to and treatment at the CMD WRF. Currently, MSMD has an inter-governmental agreement (IGA) with CMD and owns nearly half the capacity of the plant. This alternative requires one lift station located along Highway 24 at the southeast border of the project site. The proposed lift station would have a capacity of 0.5-0.75 MGD since it would only serve GRMD and not be intended as a regional facility.

The force main alignment will be from GRMD to the intersection of Highway 24 and Judge Orr Rd and will be approximately 4.3 miles. There are two potential routes for the gravity interceptors to flow:

B1) Judge Orr Rd. to Fort Smith Rd to MSMD 12” gravity main.
B2) Highway 24 to a MSMD 12” gravity main.

Both gravity mains will need to be paralleled in the future to handle full build-out flows from GRMD. The size of the future parallel mains are anticipated to be 12-18” and will be determined by MSMD and GRMD as built-out progresses.

The sanitary sewer alignment alternatives can be found in Exhibit C. Equalization storage will be included at this lift station and no pretreatment is required for this option.

Alternative C

Wastewater infrastructure will convey flows from GRMD to the Cherokee Metropolitan District (CMD) Water Reclamation Facility (WRF) for treatment as depicted in Exhibit C.

This alternative will require two lift stations. The north lift station will be located at the intersection of Curtis Rd. and Judge Orr Rd and will include equalization storage. The south lift station will be located north of the intersection of Davis Rd. and Curtis Rd. The second lift station will include pre-treatment as required by CMD to include a bar screen and grit

to verify no sludge or open lagoons are proposed here correct- as they are not requested?

including ancillary facilities , and

removal equipment. Both lift stations will include odor control. The lift stations and force mains would have a capacity of 0.8 – 1.5 MGD and could provide service to GRMD and potentially to the areas identified in Exhibit II.

The conveyance infrastructure described above will be approximately 10 miles and will deliver the wastewater to the connection point as defined in the CMD IGA. That connection point is on CMD's existing force main running parallel to Hwy 94, approximately at Curtis Road.

c) *Plans and specification of the Project in sufficient detail to evaluate the application against the applicable Review Criteria.*

Preliminary analysis has been performed on major infrastructure for the development and is included in the overall report. See the Table of Contents for a full list of all documents included in this submittal. Site development plans meeting Chapter 6 of the LDC will be required and they will address aesthetic and noise issues in future submittals.

d) *Descriptions of alternatives to the Project considered by the applicant. If the Director determines that the nature or extent of the proposal involves the potential for significant damage and warrants examination of other specific, less damaging alternatives, the Director may require the applicant to evaluate and present information on such additional alternatives as part of the application.*

The following alternatives were considered for water and wastewater service for the proposed development:

1. Annexation into City of Colorado Springs – not feasible given the requirement that properties to be annexed into the City must be within 3 miles of the existing city limit.
2. Wastewater treatment provided by WHMD – DR Horton has a draft agreement with WHMD for wastewater treatment and have continued to pursue this option as a viable alternative. The draft agreement is included in Exhibit AA.
3. Wastewater treatment provided by CMD – The District has obtained an IGA with CMD for wastewater treatment and have continued to pursue this option as a viable alternative.
4. Wastewater conveyance provided by MSMD – The District has had discussions with MSMD regarding purchasing capacity in MSMD's lift station, force main, and the CMD WRF.
5. GRMD has had discussions with MSMD and WHMD regarding serving water but has not been able to reach an agreement at this point. Discussions regarding water service or interconnections may be revisited in the future.

e) *Schedules for designing, permitting, constructing, and operating the Project, including the estimated life of the Project.*

The proposed water and wastewater infrastructure will be permitted, designed and constructed in phases as development progresses.

Phase 1 Water: Phase 1 water infrastructure will support Grandview Reserve Filing 1 (approximately 577 SFE). Permitting and design has begun and is expected to continue through the first quarter of 2024. Well drilling is expected to begin in the second quarter of 2023. All other construction is anticipated to begin in second quarter of 2024 and continue through the first quarter of 2025. Construction is anticipated to last 6 - 14 months. Subsequent phases will be constructed as necessary based on the build-out of the development.

All 1041 wastewater infrastructure is anticipated to be constructed in a single phase. Permitting has begun and is anticipated to continue through the fourth quarter of 2023. Design is anticipated to start in the second quarter of 2023 and run through the first quarter of 2024. Construction is anticipated to begin immediately after completion of design and may span from 6 - 18 months.

The useful life span of the proposed infrastructure is approximately 50 years.

f) *The need for the Project, including a discussion of alternatives to the Project that were considered and rejected; existing/proposed facilities the perform the same or related function; and population projections or growth trends that form the basis of demand projections justifying the Project.*

The need for the Project is primarily due to the growing demand and shortage of housing in the Colorado Springs region and this area of El Paso County specifically. There is a great need for a variety of housing choices that are more affordable to the general population. Population growth and trends in the Colorado Springs are pushing expansion to the east and northeast primarily. This property is just east of Meridian Ranch which has grown significantly and nearing the final phases of that community. While exact population projections are not known, there is significant population growth east of Colorado Springs limits in areas near Grandview Reserve. Other alternatives were explored but the mix of housing products and densities that were selected and approved on the Sketch Plan aim to meet the housing needs and associated services such as Institutional (school and church), parks and open space, and amenity center and miles of trails.

The proposed development includes lots smaller than 2.5 acres so onsite wastewater treatment systems (septic systems) are not allowed. Therefore, a centralized wastewater system is required. The District considered construction of its own wastewater treatment facility (WWTF) but chose to pursue capacity in an existing WWTF to save cost and comply with the EPC Water Master Plan and Regional 208 Water Quality Management Plan regarding proliferation of individual systems. Additionally, the lot sizes in the proposed development are too small for individual residential wells so a central water system is

required. As discussed in Section D, the District explored options to be served by an existing water system but none in the area had the capacity or desire to serve the development in GRMD. Infrastructure developments in connection with Grandview Metro District are essential to support the growing population in the area. The development of Water and Wastewater infrastructure will streamline water distribution efforts and mitigate the need for private well and septic among the growing number of independent property owners. Road developments will provide greater ease of transportation and diminish traffic congestion in the area. The development of an elementary school in the area will provide competitive educational options for families in the area.

g) *Description of relevant conservation techniques to be used in the construction and operation of the Project.*

During construction, BMPs will be required to reduce sediment discharge from the site. The specific BMPs to be utilized will be included in the drainage and erosion control plan to be submitted with the Site Development Plans for the infrastructure components.

Several techniques and technologies will be utilized for conservation during operation of the project. All pump motors will be run by variable frequency drives which allow for operation at the pump/motor best efficiency point whenever possible which will reduce power demand. Dual force mains will be installed. One of the force mains will allow a flushing velocity of 3.5 ft/s to be achieved with minimal potable water use. This will lead to responsible water use. Finally, a SCADA system will be constructed with the infrastructure improvements to allow remote monitoring and control of some aspects of the system which will reduce the number of trips the operators must make to the site. This will reduce fuel consumption.

Relevant conservation techniques were examined such as creation site and road layouts that were efficient and worked well with the existing topography. Regarding landscape for the community this project will use primarily Colorado native plant material and other Xeriscape plans to minimize high maintenance landscapes. This community will preserve most of the on-site drainages and adjacent open space buffer area, allowing good potential to improve native vegetation by creating a habitat restoration and management plan for the drainages/open space corridors. Increasing native vegetation in the disturbed shortgrass prairie areas by seeding with native species. Implementing a stormwater management plan and preparing a natural channel stabilization plan for all drainages, which will provide long-term natural landscapes for wildlife and residents to enjoy for generations. These areas will either be maintained by the Sub-Districts or an HOA (Homeowners Association) or combination thereof.

h) *Description of demands that this Project expects to meet and basis for projections of that demand.*

There is significant demand and need for housing in this area of El Paso County. This project intends to meet that need by proposing a range of housing choices in Filing 1 (and future phases). The Sketch Plan (Exhibit I) includes approximately 3,260 homes at varying densities, which will provide the opportunity for a range of housing product at a variety of price points. This will provide housing for varying demands and lifestyle options, which will ensure that the proposed housing is both attractive to and attainable by a variety of purchasers, including first-time buyers, families, and empty-nesters. The proposed open space, parks, and trail system will create an active community that will be beneficial to the health and wellbeing of County residents, both within and outside Grandview Reserve subdivision. The proposed community park will be the central focal point of the neighborhood and will provide a venue for recreational activities, social events, and community entertainment. This will help to provide a strong and connected community, which will have a positive social impact on this part of the County.

i) *List of adjacent property owners and their mailing addresses*

Adjacent Property Owner Map include in Exhibit D. Complete list of surrounding property owners' contact information is also included in list form in Exhibit D.

Property Rights, Other Permits, and Approvals

a) *Description of property rights that are necessary for or that will be affected by the Project, including easements and property rights proposed to be acquired through negotiation or condemnation.*

The property in GRMD is currently owned by the developer. Additional off-site easements may be necessary depending on the sanitary sewer alignment chosen. Exhibits Z show the offsite wastewater alignment and the portions which require easements. Negotiations to acquire those easements are paused until an alternative is selected. Exhibit G contains ownership information of the project site within which all water improvements will be constructed.

b) *A list of all other federal, state, and local permits and approvals that will be required for the Project, together with any proposal for coordinating these approvals with the County permitting process. Copies of any permits or approvals related to the Project that have been granted.*

Additional permits required for the project will include:

i) Federal – Conditional Letter of Map Revision, Letter of Map Revision, USACE Wetlands Determination Letters.
ii) State – CDPHE Stormwater Discharge Permit, CDOT Permit, CDPHE Dewatering Permit, CDPHE Site Location Application and CDPHE BDR. See Exhibit DD for a summary of discussions that have been held with CDPHE.
iii) County – Site Development Plan permits, storm water permitting

iv) City/Local – The project is outside city limits however falls within the Pikes Peak Regional Building Department's (PPRBD) limits. PPRBD general building permits and a Floodplain Development Permit will be required.
v) EPC Construction Activity Permit
vi) EPC Right-of-Way Permit
vii) Haul Route Agreement if required

c) *Copies of relevant official federal and state consultation correspondence prepared for the Project; a description of all mitigation required by federal, state and local authorities; and copies of any draft or final environmental assessments or impact statements required for the Project.*

The Amended Water Rights Determinations from the Colorado Ground Water Commission are included in Exhibit T. See Exhibit P for more information on correspondence received from the USACE. See Exhibit R for information regarding correspondence with the State Historic Preservation Office.

The well permit applications for LFH-1 and A-1 are anticipated to be submitted to the State Engineer's Office in February 2023.

The following documents will be submitted to CDPHE for review and approval:

i. Site Location Application for lift station(s) – Anticipated submittal date: June 2023
ii. Construction documents and Basis of Design Report (BDR) for lift station(s) and force main(s) – Anticipated submittal date: February 2024
iii. BDR and Construction Documents for the water system including water treatment facility, source water (wells) and storage tank – Anticipated submittal date: November 2023

To date, no state permit or approvals have been received. Copies of all CDPHE approvals shall be provided to El Paso County as they are received.

Land Use

a) *Provide a map at a scale relevant to the Project and acceptable to the Department describing existing land uses and existing zoning of the proposed Project area and the Project service area, including peripheral lands which may be impacted. The land use map shall include but need not necessarily be limited to the following categories: residential, commercial, industrial, extractive, transportation, communication and utility, institutional, open space, outdoor recreation, agricultural, forest land and water bodies. Show all special districts (school, fire, water, sanitation, etc.) within the Project area.*

Exhibit GG contains a map depicting zoning in the project area. Exhibits FF and E contain maps of neighboring special districts in the vicinity. Exhibit W contains maps of the land use in the project area. The service area for the water infrastructure is the Grandview

Development. The wastewater service area depends on the alternative selected. The various service areas are shown in Exhibit MM.

The overall development plan consists of a mix of urban residential densities, institutional (i.e., school and church) and commercial land uses as depicted in the Sketch Plan included in Exhibit I. This community will contain ample open space, trails, and parks including a community park.

Residential Land Use:

i) Majority of the proposed uses are residential for this community. The maximum number of residential units proposed Sketch Plan is based upon the proposed density of 4.24 units/acre totaling 3,260 units. The proposed residential development will range in density from Low Density (up to 2 dwelling units per acre) adjacent to part of the north boundary, with gradual transitions in density up to High Density (up to 12 dwelling units per acre) surrounding the commercial uses along Highway 24.

Institutional:

ii) Two sites are planned for institutional uses. One site on the east half of the project is tentatively planned for an elementary school; the location and size of which has been discussed with the Peyton School District. The applicant had two meetings with the Peyton School District representatives to determine which site would be beneficial and the size that would be acceptable for an elementary school and the request was made to have a park adjacent to the school for a shared use purpose. These requests were accommodated and shown on the Sketch Plan accordingly. The area show on the plan for the elementary school is 10.9 acres shown as Parcel “V”. The other site in the northwest corner is tentatively planned for a church denoted as parcel A that is 6.1 acres.

b) *All immediately affected public land boundaries should be indicated on the map. Potential impacts of the proposed development upon public lands will be visually illustrated on the map as well as described in the text.*

Exhibit W includes a map of the public lands near to the project area. No public lands, sans those rights-of-way planned to be used for linear infrastructure (gravity sewer and force mains) will be impacted by this development.

c) *Specify whether and how the proposed Project conforms to the El Paso County Master Plan.*

Grandview falls within the “Area of Change” for new development and is planned for suburban and urban growth. Furthermore, the Master Plan states:

“These areas will be significantly transformed as new development takes place on lands currently largely designated as undeveloped or agricultural areas. Undeveloped portions of

the County that are adjacent to a built-out area will be developed to match the character of that adjacent development or to a different supporting or otherwise complementary one such as an employment hub or business park adjacent to an urban neighborhood."

As Grandview is adjacent to the last phases of Meridian Ranch, the project is a natural extension of development from west to east.

More specifically Grandview falls within the Suburban Residential Placetype which is described as:

"Predominantly residential areas with mostly single-family detached housing. This placetype can also include limited single-family attached and multifamily housing, provided such development is not the dominant development type and is supportive of and compatible with the overall single-family character of the area. This placetype often deviates from the traditional grid pattern of streets and contains a more curvilinear pattern."

Grandview Reserve meets the description and intent of the Suburban Residential placetype. The Master Plan states there are Primary and Supporting Uses in this placetype as follows:

Primary
• Single-Family Detached Residential with lots sizes smaller than 2.5 acres per lot, up to 5 units per acre
Supporting
- *Single-family Attached and Multifamily Residential*
- *Parks/Open Space*
- *Commercial Retail and Commercial Service*
- *Institutional*

Grandview will encompass all of these uses with the primary use being single family as described above.

2021 El Paso County Master Plan - Priority Development Areas

The Master Plan states:

"This framework identifies specific locations throughout the County that should be prioritized first for new residential development to help accommodate growth".

Filing 1 of Grandview Reserve falls within the "Suburban Residential" and "Urban Residential" areas including the "Priority Development Areas". Therefore, this proposal meets the intent of the 2021 Master Plan.

2021 El Paso County Master Plan - Highway 24 Area

The Master Plan describes the “Highway 24” area as already growing and that the area along the Highway 24 corridor “should not be set aside for Large-Lot Residential alone”. The Master Plan further states:

“Falcon, and the surrounding area, is already growing, with the majority of homes being developed in the last two decades. The amount of vacant land along Highway 24 should not be set aside for Large-Lot Residential alone. Just as with the proposed Large-Lot Residential in this part of the County, proximity to Highway 24 and availability of central services is another benefit to expanding suburban development. The corridor provides important access south to Colorado Springs”.

• To sustain Falcon’s growth momentum, the County should continue to prioritize Suburban Residential in this area. Doing so would match the community’s existing character and utilize available land to accommodate a sizable portion of the County’s expected population growth without negatively impacting adjacent areas.

Therefore, Grandview Reserve and specifically Filing 1 meets the general intent of this Master plan core idea as it proposes Suburban Residential uses and densities.

2021 El Paso County Master Plan - Housing Mix

Regarding housing mixes the County Master Plan states:

“Housing variety provides multiple options to support residents regardless of income, house-hold size, and age. Providing an equitable mix of housing can ensure the viability of El Paso County as a home for all.”

This statement aligns well with the Grandview Reserve project as per the approved Sketch Plan with a project of this size, a large variety of housing types are proposed. Filing 1 (the first phase of Grandview Reserve) proposes 50’ and 60’ wide lots and future phases include duplex (paired units), townhomes and various other residential uses.

2021 El Paso County Master Plan - Affordability

The Master plan states:

Like many growing communities across the United States, housing affordability is an issue in El Paso County. With significant estimated growth over the next three decades, the County will undoubtedly have to continue addressing this issue. Since this Master Plan addresses unincorporated areas, the recommendations regarding affordability do as well.

The County Master plan further describes the need for attainable and more affordable homes which typically translates to smaller lots and homes instead of large estate lots. Grandview Reserve and specifically Filing 1 aligns with this goal of proposing smaller lots

that are in a more affordable range rather than large estates lots that promote urban sprawl and high prices of homes un-affordable to most residents.

2013 El Paso County Parks Master Plan

One of the significant goals of the Parks Master Plan is to:

Provide a coordinated and connected system of parks, trails, and open space that is equitably distributed based on population and serves the needs of county residents.

The proposed development in Grandview will provide a demand for more parks, trails and open spaces. The proposed water and wastewater system will allow for irrigated parks with bathroom facilities should that be desired in the area. None of the proposed infrastructure will negatively impact existing parks facilities. A condition of the license agreement to use the Rock Island Trail for the gravity alignment along Hwy 24 is that the trail be restore to similar or better condition than it is currently. Grandview will work closely with the Parks Department to ensure that there are no negative impacts from the sewer line.

1996 El Paso County Mineral Extraction Master Plan

The Mineral Extraction Master Plan states that the primary material mined in El Paso County is aggregate. It states that coal mining is not considered economically feasible at this time. It also states that refractory clay mining is limited to the area around Calhan. Since the clay mining is not near the proposed project area, the review of the Mineral Extraction Master Plan was focused on aggregate mining.

The project area is primarily in soils classified as Upland Deposits. The master plan describes this as “sand, gravel with silt and clay; remnants of older streams deposited on topographic highs or bench like features.” The only active mine near the project area listed in the Master Plan is the Solberg Pit (State Permit Number M-81-044). It is located along Curtis Road so would only be near the project if CMD was selected as the wastewater treatment alternative. The proposed sewer alignment will be within the ROW of Curtis Road or withing the prescriptive easement. As such, it will not impact the Solberg Pit.

After reviewing the Mineral Extraction Master Plan and evaluating the impacts of the proposed project, it is apparent that the proposed project will not have a negative impact on mineral extraction and complies with the general intent of the Master Plan.

2016 El Paso County Major Transportation Corridors Plan

The Major Transportation Corridors Plan states that growth in the County will lead to a need for new roads and improvements to existing roads. The following roads in the project area are identified for improvements:

1. Proposed Bicycle Routes: Curtis Road, Judge Orr Road and Stapleton Drive
2. Rural County Road Upgrades: Curtis Road and Falcon Hwy
3. County Road Capacity Improvements: Judge Orr Road and Stapleton Drive

All 3 wastewater alternatives include linear infrastructure either crossing or paralleling those roads. The gravity sewer and force mains will be designed to be installed outside of the pavement cross section to reduce the impact to the roads. Crossing of paved roads are anticipated to be bored to reduce pavement damage and minimize impact to traffic. For those reasons, the infrastructure in the proposed project will have minimal negative impact on the roads identified in the Major Transportation Corridors Plan and is in general conformance with the Plan.

2018 El Paso County Water Master Plan

The Water Master Plan places an emphasis on protecting water quality, promoting responsible use of water resources and encouraging re-use. The proposed project is located in Planning Region 3 as identified in the Water Master Plan. The Water Master Plan projects growth in Region 3 and Grandview is an example of that projected growth. This project complies with the Water Master Plan in the following ways:

1. Protects water quality by utilizing existing, advanced wastewater treatment facilities. Both WHMD and CMD treat their wastewater to a very high level and both plants are modern, having been built or significantly upgraded in the last 4 years. Both plants discharge highly treated effluent which helps to maintain clean source water.
2. Grandview intends to encourage responsible use of water by implementing tiered water rates, similar to other Metropolitan Districts in the area. Tiered rates have proven to be effective in reducing water use and therefore help to conserve water.
3. While the current project does not include re-use, discussions have been help with both CMD and WHMD to ensure that re-use will be a possibility in the future. Both CMD and WHMD have language in their agreements that allow for re-use by Grandview. Once re-use is a possibility (either by CMD having their Replacement Plan approved by the State or by WHMD achieving a higher level of treatment), Grandview will consider how best to implement water re-use.

As such, the proposed project generally conforms to the goals of the Water Master Plan.

b) *Specify whether and how the proposed Project conforms to applicable regional and state planning policies.*

The Pikes Peak Area Council of Governments (PPACG) Regional Water Quality Plan is the regional planning policy most applicable to this project. The project is located in the Upper Black Squirrel Watershed which is a subbasin of the Chico Creek Watershed. The following are some excerpts from the Water Quality Plan accompanied by brief descriptions of how the project aligns with the Water Quality Plan:

i) "Groundwater quality could be impacted from an increased reliance on onsite wastewater systems instead of centralized wastewater treatment." The proposed project includes a centralized wastewater system which benefits groundwater quality.
ii) "Stormwater detention, retention ponds or other BMPs should be utilized to minimize flooding, maximize infiltration and minimize water quality impacts from impervious surface contaminants." The proposed development shall include detention ponds and other BMPs designed to minimize water quality impacts.
iii) "Recommend regional cooperation…to avoid the proliferation of individual wastewater treatment facilities". The proposed project may utilize the WHMD WRF or CMD WRF to provide wastewater treatment depending on the alternative selected by the applicant.

c) *Specify whether and how the proposed Project conforms to applicable federal land management policies.*

No federal lands will be impacted by this project, the development of Grandview Metro District is limited to privately owned land. Regardless, the development process, resale, and maintenance of Grandview Metro District will follow the regulations set forth by the Federal Land Policy. The surface drainage channel design will follow FEMA guidelines for floodplain delineation and design.

d) *If relevant to the Project design, describe the agricultural productivity capability of the land in the Project area, using Soils Conservation Service soils classification data.*

The land to be used for Grandview Metro District was previously used for agricultural purposes and has the capability of being agriculturally productive. Approximately 55% of the proposed development includes Group A soils and the other 45% are classified as Group B soils. Exhibit S contains the SCS soil classification map for the area.

e) *Describe the probability that the Project may be significantly affected by earthquakes, floods, fires, snow, slides, avalanches, rockslides or landslides and any measures that will be taken to reduce the impact of such events upon the Project.*

The probability that the land will be affected by earthquakes, slides, avalanches, rockslides or landslides is extremely low. The location of the site development is far away from sloping land formations where rockslides, landslides, and avalanches may pose a threat. Seismic activity is largely absent in northeast Colorado. No measures will be taken to reduce the impacts of these events beyond ensuring that the common standards are met. For impacts due to floods, fires and snow, the project will be designed to local, state and federal

regulations governing such impacts such as surface drainage design, fire protection required for each particular building type and structural design of buildings for snow loads.

f) *Specify if excess service capabilities created by the proposed Project will prove likely to generate sprawl or strip development.*

The project falls within El Paso County's master plan, described in additional detail above. The project will likely not generate any additional sprawl or strip development. The project is proposed in answer to the growing population but does not intend to generate any additional spread. The few job opportunities generated by the development (school personnel, utility personnel, etc.) may be filled by current community residents. Sprawl would not necessarily increase in response to the capacity developed for the purpose of Grandview Reserve Metropolitan District.

The water system will be sized to serve only GRMD and is not projected to have any excess capacity.

If either the CMD or WHMD wastewater solution is selected, the wastewater infrastructure will be sized and located to potentially serve other properties in the region. However, currently all of the capacity in CMD's plant is under contract. Additionally, both CMD and WHMD's facilities are regional facilities, so a potential for central wastewater service in this area exists regardless of whether or not the infrastructure in this 1041 application is constructed. Therefore, the increased risk of additional urban development in this area is not significantly increased by the proposed project.

g) *Specify whether the demand for the Project is associated with development within or contiguous to existing service areas.*

The demand for the project exists and as demand increases the development will progress. It is not expected that the entire development will occur over a short period of time however each phase/filing will go through final planning and engineering efforts as demand is forecast. The residential population of the area is estimated to increase by approximately 8,125 as a result of the development. The project is associated with development contiguous to the existing service areas (MSMD and 4WRMD).

Surface and Subsurface Drainage Analysis

a) The applicant shall supply a surface and subsurface drainage analysis.

A Master Development Drainage Study has been done for the project and is included in Exhibit L of the appendix. In general, the site has 4 major drainage channels running through the site which will be used in conjunction with detention facilities to control storm surface drainage. Sub surface drainage will include storm sewer systems to convey flow captured with the streets and will ultimately discharge to the aforementioned ponds and

ultimately to the drainage channels. The Final Drainage Reports will be provided with the site development plans(s) and subdivisions.

Financial Feasibility of the Project

a) *Relevant bond issue, loan and other financing approvals or certifications (ex: approved bond issues; bond counsel opinion).*

The District anticipates issuing bonds to pay for the capital water and wastewater improvements in this 1041 submittal. The initial bond issuance contemplated in the Service Plan is for approximately $65,025,000. Subsequent bond issues are anticipated.

The water infrastructure proposed in this 1041 application is anticipated to cost $60M-$70M. Approximately $10-$15M of that will be needed for Phase 1. The wastewater infrastructure is projected to cost $6M-$26M depending on the alternative selected. Additional costs for existing infrastructure expansion could range from $5M-$15M. All wastewater costs are anticipated to be incurred in Phase 1.

The projected mill levy for the District is 60 mills for residential and 45 mills for commercial development. Of those, 10 mills from both residential and commercial will be used for O&M expenses. At buildout, annual O&M revenue from those 10 mills are anticipated to be $2,427,321. Refer to the Grandview Reserve Metro District Service Plan, Exhibit J for more details.

b) *Business plan that generally describes the financial feasibility of the Project.*

The property within GRMD is divided into 4 parcels as follows:

Schedule Number	Owner
4200000471	Cross Fellowship Church
4200000473	4 Site Investments LLC
4200000464	4 Site Investments LLC
4200000465	4 Site Investments LLC

Melody Homes Inc is under contract to purchase a portion of parcel number 4200000473.

Cost estimates for the proposed public improvements were generated by Developer representatives, with the assistance of HR Green, Inc., who all have experience in the completion of similar improvements.

It should be noted, though, that such costs estimates are preliminary in nature and the ultimate costs may increase or decrease depending on numerous factors, many of which are out of the Developer's control. In particular, these initial cost estimates only include the

public improvement portion of costs and the total project improvement costs may be significantly higher.

Anticipated development of approximately 3,260 single-family residential units and 20,000 square feet of commercial development. The rate of absorption provided in the Service Plan (Exhibit J) is a projection based on information from the developer and is used for estimating the financial plan. There is no way to accurately predict absorption due to variables such as the economic factors, housing demand, land-use approval timing, building supply chains, and labor availability. In view of these factors, the bond underwriter projects the potential ability of the Districts to discharge the proposed debt per the statutory requirement. If absorption is delayed or accelerated, the bond issuance parameters will reflect those changes at the time of issuance.

The estimated initial assessed value at time of complete build-out, estimated to be in 2036, is $105,013,186. The District is anticipated to complete an estimated $285,000,000 of on and off-site public improvements including, but not limited to on and off-site streets, roadway, water and sanitary, stormwater and drainage, landscaping, and park and recreation improvements. The water and wastewater infrastructure included in this application is expected to account for approximately $85,000,000 - $105,000,000 of the total public improvement cost. GRMD is anticipated to fund the construction costs for all public improvements included in this permit application.

Local Infrastructure and Service Impacts

a) *An impact analysis that addresses the manner in which the applicant will comply with the relevant Permit Application Review Criteria. The impact analysis shall include the following information: description of existing capacity of and demand for local government services including but not limited to roads, schools, water and wastewater treatment, water supply, emergency services, transportation, infrastructure, and other services necessary to accommodate the Project within El Paso County.*

   i) Roads: Rex Road will be extended for greater ease in transportation. US Highway 24 is planned to be widened to four lanes through Falcon. PPRTA-funded improvements are anticipated in the future at the intersection of Eastonville Road and Stapleton Drive. A plan of proposed roadways within the development is included in the Sketch Plan in Exhibit I. For more information about roads and traffic studies, please review Exhibit X.
   ii) Schools: Peyton School District will serve the property and a potential elementary school site is provided on the Sketch Plan in Exhibit I. The school district will be impacted by the development of this elementary school. The school is not likely to adversely affect the school district or its preexisting entities.
   iii) Water and Wastewater Treatment and Water Supply: Wastewater treatment will be provided by an existing WRF. Both the CMD and WHMD WRFs would need to be expanded to provide treatment for the full build-out of the project. The proposed water

supply is based on adjudicated water rights. Based on the water determinations included, the water supply will not have an impact on adjacent properties or water rights.

iv) Emergency services: Falcon Fire Protection District and Peyton Fire Protection District will provide fire protection since the property spans the boundaries between districts. Fire Protection letters from both fire protection districts are provided with this application in Exhibit K.

v) Transportation: School bus routes will be impacted by the new housing development and the development of a new elementary school. Traffic will be impacted by increased population in the area. For Traffic Impact Studies refer to Exhibit X.

vi) Infrastructure: The development will consist of housing, roads, parks, trails, and an elementary school. Further commercial development may result from the increase in population in the area. For more information about road and water developments, see sections i and iii above.

vii) Other services: The proposed community park will be the central focal point of the neighborhood and will provide a venue for recreational activities, social events, and community entertainment. This will help to provide a strong and connected community, which will have a positive social impact on this part of the County. Mountain View Electric Association Inc. (MVEA) will provide electric service to the property. A Will Serve letter is provided with this application. Utility services for El Paso County may be impacted by the development. Pikes Peak Library District may be slightly impacted by a small increase in patrons due to the regional population growth, however this impact should be offset by the correlational rise in financial support by that population.

Recreational Opportunities

a) *Description of the impacts and net effect of the Project on present and potential recreational opportunities.*

An expansive system of parks, open space, and trails is planned throughout the community. Many of the major open space corridors follow the four major existing drainage-ways. The proposed trails within this community will connect to the existing Rock Island Trail along the eastern boundary to the rest of this community. The trails will also provide connection to the El Paso County Falcon Regional Park northwest of this project. Over 16% of the site is proposed in open space. A large, 6.3-acre community park is the central focal point of the community, adjacent to the proposed institutional parcel that is tentatively planned for an elementary school. The park and school will be linked to the entire community by the trail system and sidewalks. There are also numerous smaller neighborhood parks (0.25 acres – 1 acre) throughout the community all linked by the expansive trail system that approximately equals 5 acres. The locations and sizes of the parks shown on the Sketch Plan are approximate only and subject to change as more detailed plans are created in the future. This approximate acreage for the pocket parks does not include opens space and detention ponds. Commercial uses are sited along Highway 24 at the main entrance to the community. It is unknown at this time the type uses; however, the intent is mixed, low to medium density commercial uses (not industrial) that will serve this community (within walking distance) and

users traveling in vehicles along Highway 24. Please reference Exhibit N for comments from Parks and Wildlife and Exhibit I for more information about the development of recreational areas.

Areas of Paleontological, Historic or Archeological Importance

a) *Description of the impacts and net effect of the Project on sites of paleontological, historic or archeological interest.*

According to the Historic Survey conducted by the Office of Archeology and Historic Preservation, the only point of historical importance involved in the development of the property is the Rock Island Regional Trail that runs parallel to Highway 24 between Falcon and Peyton and is part of the America the Beautiful Trail. It was constructed on the former Chicago and Rock Island Railroad Line that ran between Falcon and Peyton and thus has cultural and historical significance. While there will likely be no major long-term disruption to the trail as a result of the development, it may be temporarily impacted by access ways and staging areas during the construction phase. Please see Exhibit R for more information on points of historical importance.

Nuisance

a) Descriptions of noise, glare, dust, fumes, vibration, and odor levels anticipated to be caused by the Project.

Noise:

The results of the noise prediction were compared to the noise abatement criteria contained in Exhibit 1 of the Colorado Department of Transportation Noise Analysis and Abatement Guidelines dated January 15, 2015. The proposed residential areas would be considered Category “B” land uses. The threshold for exterior noise level for Category B is 66 decibels Leq(h). The results of the noise prediction show that in the year 2040, receivers 1, 2, and 3 located on the east boundary of Parcel K would have predicted noise levels which would exceed this threshold.

If a six-and-a-half-foot high noise barrier were constructed at the location shown, these noise receiver locations are predicted to be below the threshold. This noise barrier could be a wall, a berm, or a combination of the two. If a wall is constructed, it should be made of rigid material with a density of at least 4 pounds per square foot and should have no gaps. Receivers 4 through 9 located on the east boundary of Parcels L, M, and N have predicted noise levels that would not exceed 66 decibels Leq(h) and therefore noise mitigation would not be required adjacent to these parcels. Please see Exhibit Q for more information on Noise Reports.

Glare:

The plans for Grandview Reserve Metropolitan District water and wastewater infrastructure do not include any structures of significant size and glazing to impact glare.

Dust:

While dust may be a factor during construction phases, measures should be taken to control dust and particulate spread. Construction crews should follow Erosion Control Plans provided in final design sets. Landscaping, seeding mulching, and sodding efforts should be sufficient to mitigate any long-term effects of dust in the area.

Fumes:

Facilities developed in connection with Grandview Metro District will comply to standard practices to mitigate any diffusion of fumes.

Vibration:

Use of construction equipment that results in significant vibration will be strategically managed to diminish any negative impacts of vibration for nearby residents during construction. Long-term, no facilities developed in connection with Grandview Metro District will contribute to any increase in vibration in the area.

Odor:

Wastewater facilities developed in connection with Grandview Metro District will comply to standard practices of odor control to prevent the diffusion of odor vapors. The lift station(s) will have either liquid or gas phase odor control.

Air Quality

a) *Description of the impacts and net effect that the Project would have on air quality during both construction and operation, and under both average and worst case conditions, considering particulate matter and aerosols, oxides, hydrocarbons, oxidants, and other chemicals, temperature effects and atmospheric interactions.*

Air quality may be impacted due to construction causing an increase of dust and particulate. During construction the contractor will be required to obtain an Air Pollutant Emission Notice (APEN) Permit from CDPHE by filling out Form APCD-223 for land development activities disturbing more than 25 acres. Additionally, should the contractor have any generators on site they may need additional APEN permits as well.

Long term, the proposed water and wastewater infrastructure will have a negligible impact on air quality. Electric motors shall be used for all facilities except for backup generators which shall be diesel. The backup generators will rarely be run and therefore will have a negligible effect on air quality. Odor control at the lift station(s) will be either liquid or gas phase. The only chemicals anticipated to be stored for this project sodium hypochlorite for disinfection and bioxide for odor control. They will be stored in appropriate containers and properly vented to avoid impacts to air quality.

Visual Quality

a) *Description of the impacts and net effect that the Project would have on visual quality, considering viewsheds, scenic vistas, unique landscapes or land formations within view of the Project area.*

The development is not within a viewshed nor is it currently a scenic vista. The site is currently gently sloping range land with minor drainage channels within the property. An ill-defined and undulating hill, which likely an eroded remnant bluff, is present in the north-central portion of the site. The development will generally use the natural topography for development with grading to be completed to convey storm water and provide scenic vistas to the front range when possible. The development will improve the visual aesthetics of the natural drainage ways with natural stream design and landscape plantings.

The following water and wastewater facilities will have above grade buildings that will be constructed to match the character of the surrounding development. They will be single-story and have siding and roofing material which matches the nearby homes:

1. Water treatment facilities
2. Well houses
3. Lift stations

The water storage tanks shall be above grade. They will be painted tan to prevent them standing out as much as possible. Water storage tanks are anticipated not to exceed 40' above grade unless an elevated storage tank is selected. The height of the elevated storage tanks will be discussed with EPC for their approval as each specific tank is designed.

Surface Water Quality

a) *Map and/or description of all surface waters relevant to the Project, including description of provisions of the applicable regional water quality management plan, and NPDES Phase II Permit and necessary El Paso County Erosion and Stormwater Quality Control Permit ("ESQCP"), Section 404 Federal Clean Water Act Permit that applies to the Project and assessment of whether the Project would comply with those provisions.*

The property contains 4 natural drainage channels which are ephemeral streams. The four channels are referred to as follows moving from west to east: The Main Stem, Main Stem Tributary Number 2, East Fork tributary, and the East Fork. All four drainage channels are tributary to Black Squirrel Creek and lie within the Gieck Ranch Drainage Basin. All channels within this watershed are part of the Arkansas River water basin.

Currently there is not an adopted Drainage Basin Planning Study for the site however a Master Development Drainage Plan has been developed for the project which this development will follow recommendations and general design guidance. As part of the development, full spectrum detention facilities will be installed to provide water quality for the development. The facilities will be designed using El Paso County criteria and provide stormwater quality by slowing the release of stormwater captured by the ponds and allowing solids to settle out. Additionally, when possible, the revised drainage channels, which were not jurisdictional wetlands, will be used to convey stormwater via a natural channel. Currently, the Main Stem and Main Stem tributary of the Gieck Ranch Drainage Basin will be

regraded and stabilized to accommodate the new flows. The Conditional Letter of Map Revision has been sent to FEMA. Wetlands will not be negatively impacted by the development. Please consult Exhibit O for more information about wetland impacts. Stormwater must be treated before entering the natural channels. The natural channel will provide a pervious means to transport stormwater and provide some water quality benefits as well.

On site practices for the homes, schools, churches, and other buildings should use means such that impervious areas drain across pervious area to allow for infiltration during the minor events. This would include discharge of the gutters onto landscape areas vs. directly connecting to storm sewer and using natural ditches and swales where it is logical and makes sense to convey stormwater in lieu of storm sewer piping.

b) *Existing data monitoring sources.*

No existing monitoring is currently occurring related to the water quality of these streams nor is Black Squirrel Creek listed by CDPHE as impaired waters.

c) *Descriptions of the immediate and long-term impact and net effects that the Project would have on the quantity and quality of surface water under both average and worst-case conditions.*

Overall runoff from the site will by and large match the predevelopment peak flows. The volume of water will increase however as the drainage channels are designed; continuous simulation models will be done to see the effects of prolonged runoff rates. Increases in runoff volume can impact natural drainage channels that typically would not have a base flow however geomorphic assessments and design have been done to reduce the possibilities for erosion within the channel.

In a worst-case scenario should the detention ponds fail or a storm event exceeding the maximum design of the detention basins and storm sewer occur, drainage channels within the area would likely fare better than a natural channel as improvements to the channels will occur to limit head cutting within the channel thalweg along with providing additional free board in the channels for storms exceeding their designed intent.

Groundwater Quality

b) *Map and/or description of all groundwater, including any and all aquifers relevant to the Project. At a minimum, the description should include:*

Refer to Exhibit V for more information about groundwater. Seasonal water levels in each portion of the aquifer affected by the Project.

i) Since the Denver Basin water for this project is non-tributary, the static water level in those aquifers is anticipated to drop over time. The alluvial groundwater levels at the development site are anticipated to drop during construction due to expected dewatering efforts and well pumping.

Seasonal alluvial groundwater levels in this area fluctuate based on precipitation in the region. Groundwater is anticipated at levels starting anywhere from 8 to 17 feet deep, based on the Subsurface Soil Investigation performed by CTL Thompson., dated December 23, 2020 and enclosed in Appendix U and an earlier Subsurface Soil Investigation was performed by Entech Engineering, dated January 15, 2019 and also enclosed in Appendix U shows groundwater levels starting anywhere from 4.5 to 19 feet deep.

After completion of the project, and after removal of temporary dewatering equipment, groundwater levels adjacent to the development are anticipated to return to typical seasonal levels.

Artesian pressure in said aquifers.

ii) There are no known artesian wells or artesian confined aquifers at the proposed location.

Groundwater flow directions and levels.

iii) Groundwater generally flows from the northwest to the southeast in the project area. Groundwater has been encountered approximately 5 feet below existing grade in early summer. The soils report, included as Exhibit S, contains additional information on groundwater conditions. Exhibit O also includes information about existing soil conditions in Section 3.

Existing aquifer recharge rates and methodology used to calculate recharge to the aquifer from any recharge sources.

iv) Existing aquifer recharge rates have not been determined for this project, nor have methodologies been used to calculate recharge rates from any sources.

For aquifers to be used as part of a water storage system, methodology and results of tests used to determine the ability of the aquifer to impound groundwater and aquifer storage capacity.

v) No aquifers are planned to be used for water storage for this project.

Seepage losses expected at any subsurface dam and at stream-aquifer interfaces and methodology used to calculate seepage losses in the affected streams, including description and location of measuring devices.

vi) There are no subsurface dams or stream-aquifer interfaces that the project is anticipated to affect.

Existing groundwater quality and classification

vii) The groundwater in the area can be classified as EPA Class II – Ground water currently and potentially a source for drinking water.

Location of all water wells potentially affected by the Project and their uses.

viii) There are currently two wells in use at the 4WRMD filter plant site, and the distance between the proposed lift station and the wells is over 2,000 feet (horizontally).

This distance is in conformance with the Office of the State Engineer, State Board of Examiners of Water Well Construction and Pump Installation Contractors, Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring & Observation Hole/Well Construction - 2 CCR 402-2, Effective Date January 1, 2005, Section 12.2.2, which states:

10.2.2 Wells shall not be located closer than one hundred (100) feet horizontally to the nearest existing source of contaminants or fifty (50) feet from a septic tank, sewer line or other vessel containing contaminants. A request for variance must be submitted and written approval from the Board must be obtained prior to the construction of a well that cannot meet this spacing requirement.

This distance also exceeds the values listed in Table 7-1, Chapter 8 of the El Paso County Board of Health On-Site Wastewater Treatment System Regulations. This table lists a minimum horizontal distance of 50 feet between a sewage vault and a well.

Description of the impacts and net effect of the Project on groundwater.

ix) Temporary dewatering is likely to lower groundwater levels immediately adjacent to the lift station during construction. After completion of the project, and after removal of temporary dewatering equipment, groundwater levels adjacent to the lift station are anticipated to return to typical seasonal levels. It is anticipated that there will be little to no net effect of this project on groundwater.

Water Quantity

a) *Map and/or description of existing stream flows and reservoir levels relevant to the Project.*

As mentioned within the surface water quality portion of this project, a Master Development Drainage Plan has been developed for the project which goes into detail related to storm water quality and quantity. No channels within the site have constant base flow at this time nor do reservoirs exist within the property boundaries. A small farm stock pond does currently exist in the western portion of the site however this pond does not provide any meaningful water storage or benefits to the existing land and will be removed as part of the development project.

Stream flow amounts are discussed in greater detail in the MDDP in Exhibit L.

b) *Map and/or description of existing minimum stream flows held by the Colorado Water Conservation Board.*

No existing minimum stream flows are held by the Colorado Water Conservation Board.

c) *Descriptions of the impacts and net effect that the Project would have on water quantity.*

The project will use water from Determinations 510-BD and 511-BD. GRMD currently owns 140,000 acre-ft of Arapahoe water under 511-BD and 131,250 acre-ft of LFH water under 510-BD. Both determinations allow for municipal use by GRMD. The Determinations are included in Exhibit T. Both water rights are non-tributary and allow the District to use them to extinction. The quantities of water included in the determinations are determined by the State Engineer's office so that GRMD's use of that water will not negatively impact other water rights. Based on the 300-year rule, the proposed water supply will last for 300 years before being exhausted if it is on the only supply. GRMD is continuing to explore options for re-use which will reduce their dependency on the Denver Basin water supplies and extend their useful life. More details regarding possible re-use plans are included in Section d below.

d) *Statement of methods for efficient utilization of water, including recycling and reuse.*

This project will deliver wastewater to either Cherokee Metropolitan District or Woodmen Hills Metropolitan District Wastewater Treatment Facility.

Cherokee is currently processing a replacement plan with the State that will allow CMD to utilize an alluvial aquifer recharge system downstream of the treatment facility that pumps water north for reuse. The CMD WRF is in the same basin (Upper Black Squirrel) as GRMD so they will be eligible to participate in replacement plan water once approved.

Woodmen currently does not implement reuse. The Draft Agreement (Exhibit AA) with WHMD allows for GRMD to re-use treated effluent. Currently, the WHMD WRF does not

provide a high enough level of treatment for the effluent to be re-used without additional treatment.

Grandview will continue to evaluate opportunities for re-use.

Floodplains, Wetlands and Riparian Areas; Terrestrial and Aquatic Animals, Plant Life and Habitat

a) Floodplains:

The property contains portions of floodplain as shown in the FEMA Flood Insurance Rate Maps 08041C0556G and 08041C0552G effective December 7, 2018. Exhibit M provides current FEMA FIRM maps of the area involved in the development of Grandview Metro District. Currently, the Main Stem and Main Stem tributary of the Gieck Ranch Drainage Basin will be regraded and stabilized to accommodate the new flows. The Conditional Letter of Map Revision has been sent to FEMA. The Letter of Map Revision will be sent to FEMA once construction is complete.

b) Wildlife:

The impact to wildlife is parallel to that for vegetation. Species that occur in wetland and riparian habitat are expected to benefit from the habitat restoration and management plan for the drainages and Open Space. Implementation of the stormwater management plan will assist in protecting water quality in the drainages to ameliorate development impacts on aquatic wildlife species. Many shortgrass prairie specialist species avoid areas with buildings, overhead power lines, and trees; thus, the project is expected to have the most significant negative impact on these species; however, effects may be ameliorated by improving native vegetation in the disturbed shortgrass prairie areas (refer to Vegetation section above). Reference Exhibit N for correspondence with CPW and Sections 3.7 and 4 of Exhibit O for additional information about wildlife and the impacts of wetland habitat. Additional measures to reduce impacts to wildlife include:

i) Limiting the use of herbicides, pesticides, and fertilizers.
ii) Minimizing the installation of fencing; and when fencing is needed, use wildlife friendly fences or include specific wildlife crossings along fence lines.
iii) Designing road crossing over the drainages to enable wildlife underpass and allow use of the drainages as movement corridors to reduce collisions with vehicles.
iv) Managing pets to avoid conflicts with wildlife.

Soils, Geologic Conditions and Natural Hazards

a) *Map and/or description of soils, geologic conditions, and natural hazards including but not limited to soil types, drainage areas, slopes, avalanche areas, debris fans, mud flows, rockslide areas, faults and fissures, seismic history, and wildfire hazard areas, all as relevant to the Project area.*

The Soils and Geology Report prepared by Entech on January 15, 2019 identifies geologic conditions that occur on the property. This Entech report was for the overall property. Site

specific reports will be developed and submitted with each site development plan as they become available. The site was found to be suitable for development. Refer to Exhibit U for additional information.

b) *Descriptions of the risks to the Project from natural hazards.*

Refer to Exhibit P for risk due to natural hazards.

c) *Descriptions of the impacts and net effect of the Project on soil and geologic conditions in the area.*

The project is not anticipated to have adverse impacts on soil and geologic conditions.

Hazardous Materials

a) Description of all solid waste, hazardous waste, petroleum products, hazardous, toxic, and explosive substances to be used, stored, transported, disturbed or produced in connection with the Project, including the type and amount of such substances, their location, and the practices and procedures to be implemented to avoid accidental release and exposure.

Exhibit P includes a map of hazardous materials storage locations. Diesel and Sodium Hypochlorite will be utilized in the water treatment plants and the location of these materials is specified in the map. Diesel will be stored at the lift station(s) for the emergency generators. All hazardous materials will be stored in double-walled tanks or have secondary containment. Operations staff shall develop site specific material safety plans before the facilities are put into operation. Some materials may be involved in the construction process, but construction crews will handle any hazardous materials according to regulations. Solid waste generated from residential and light commercial use will occur however this will be handled by normal waste management contractors and facilities.

b) Location of storage areas designated for equipment, fuel, lubricants, and chemical and waste storage with an explanation of spill containment plans and structures.

As part of CDPHE's permitting process for construction water quality, contractor's working on the site will be required to submit for approval materials management plans should storage of equipment, fuel, lubricants and chemical waste occur as part of the construction. Ultimate means and methods of this will be done by the contractor.

Monitoring and Mitigation Plan

a) *Description of all mitigation that is proposed to avoid, minimize or compensate for adverse impacts of the Project and to maximize positive impacts of the Project.*

As part of the development process for Grandview Reserve, land planning efforts, including landscape design of the site will be done to enhance the beauty of the site. An expansive system of parks, open space, and trails is planned throughout the community. Many of the major open space corridors follow the four major existing drainage-ways. The proposed trails within this community will connect to the existing Rock Island Trail along the eastern boundary to the rest of this community. The trails will also provide connection to the El Paso County Falcon Regional Park northwest of this project. Over 16% of the site is proposed in open space. A large, 6.3-acre community park is the central focal point of the community, adjacent to the proposed institutional parcel that is tentatively planned for an elementary school. The park and school will be linked to the entire community by the trail system and sidewalks. There are also numerous smaller neighborhood parks (0.25 acres – 1 acre) throughout the community all linked by the expansive trail system that approximately equals 5 acres. The locations and sizes of the parks shown on the Sketch Plan are approximate only and subject to change as more detailed plans are created in the future.

A LOMR will be completed for the impacted drainageways designated as Zone X as required by FEMA. There are four drainageways on the property. Portions of the drainageways will be reconfigured in a manner to stabilize the drainageway in order to lessen the impacts of the surrounding uses. Stabilizing the drainageways will ultimately lesson the maintenance typical required with agricultural use or development. Less maintenance will decrease financial obligations over the life of the waterway.

b) *Describe how and when mitigation will be implemented and financed.*

These improvements to mitigate possible adverse impacts will be paid for initially by the developer and will be managed via homeowner's associations within the single and multi-family development areas and via the commercial property owners within the commercial development areas. Ongoing maintenance of parks, community parks and landscaped areas will be funded from HOA fees and district fees paid as part of property taxes. Furthermore, the district will collect revenue to manage and own the open space areas as well as CCR enforcement.

c) *Describe impacts that are unavoidable that cannot be mitigated.*

As all impacts to the site cannot be avoided it should be noted that increased quantity of water leaving the site is to be expected. This may lead to increased vegetation along the lower drainage ways which could reduce the conveyance capabilities of the water.

Additionally, because surface water will have fewer means to infiltrate into the ground water system it is expected that the groundwater level within the area may reduce. Lastly because the development will provide homes for a large amount of people, traffic to and within the area will increase which may affect the existing air quality.

d) *Description of methodology used to measure impacts of the Project and effectiveness of proposed mitigation measures.*

Proven methods for waterway stabilization in the form of natural waterways is implemented in this project.

e) *Description, location and intervals of proposed monitoring to ensure that mitigation will be effective.*

GRMD will perform regular maintenance checks. The maintenance check interval will be determined on a case by case basis for each mitigation as it is implemented.

Additional Information

To be provided should the director require additional information.

Documents Related to 3.201 [Source Water]

1..... Description of Efficient Water Use

2.....Map and Description of Water Projects and Providers

3.....Description of Water to Be Used by the Project

4.....Water Rights

Documents Related to 3.201 [Source Water]

1. Description of Efficient Water Use:

a) Description of efficient water use, recycling and reuse technology the Project intends to use. Such description shall include estimated stream transit losses of water, reservoir evaporation losses, and power and energy requirements of the Project and alternatives to the Project.

The following alternatives were considered for water and wastewater service for the proposed development:

1. Annexation into City of Colorado Springs – not feasible given the requirement that properties to be annexed into the City must be within 3 miles of the existing city limit.
2. Wastewater treatment provided by WHMD – DR Horton has a draft agreement with WHMD for wastewater treatment and have continued to pursue this option as a viable alternative. The draft agreement is included in Exhibit AA.
3. Wastewater treatment provided by CMD – The District has obtained an IGA with CMD for wastewater treatment and have continued to pursue this option as a viable alternative.
4. Wastewater conveyance provided by MSMD – The District has had discussions with MSMD regarding purchasing capacity in MSMD's lift station, force main, and the CMD WRF.
5. GRMD has had discussions with MSMD and WHMD regarding serving water but has not been able to reach an agreement at this point. Discussions regarding water service or interconnections may be revisited in the future.

The Arapahoe and Laramie Fox Hills water rights for this project are non-tributary and therefore 98% may be used to extinction with 2% reserved for post pumping depletions. Wastewater treatment will be provided by Cherokee Metropolitan District (CMD) or WHMD as described in Section 2.303 page 7. CMD currently has a replacement plan filed with the State. Once approved, treated effluent from the CMD wastewater treatment plant can be removed from the Upper Black Squirrel Groundwater Basin making the water available for use. The IGA between CMD and GRMD allows for GRMD to use replacement plan water. WHMD does not currently re-use water, however the draft agreement between DR Horton and WHMD allows for potential re-use in the future.

The project does not include any open-air storage or conveyance so transit water loss and evaporative losses will not occur.

The power requirements for the water system are anticipated to be as follows:

1. Water treatment facilities – Approximately 50 HP per treatment facility.

2. Booster pump stations – Approximately 75-150 HP. This is dependent on actual fire flow requirements which will be determined once maximum building square footage is known.
3. Well Sites – Approximately 150 HP per LFH well and 50 HP per Arapahoe well.
4. Tank sites – Power requirements are for mixing, approximately 10 HP per tank.

Exhibit C shows the proposed locations of the water infrastructure.

2. Map and Description of Water Projects and Providers:

a) *Map and description of other municipal and industrial water projects and providers in the vicinity of the Project, including their capacity and existing service levels, location of intake and discharge points, service fees and rates, debt structure and service plan boundaries and reasons for and against hooking on to those facilities.*

Potential future interconnections may be made with neighboring districts to foster conjunctive use and better accommodate water supply emergencies. Possible water connections to other districts could be in the form of full interconnectivity (water flowing both directions, all the time) or in the form of an emergency connection (normally closed, only opened to flow one way during an emergency). Exhibit FF shows significant adjacent water and wastewater infrastructure that was publicly available.

As with neighboring districts, Grandview will likely implement tiered water rates to help reduce water usage. In addition, multiple stages of water restrictions can be implemented during drought years and when infrastructure repairs are required (i.e., well pumps need to be replaced in the middle of the summer). Exhibit C provides more information about proposed Water infrastructure plans. Exhibit A provides a Vicinity Map and Exhibit E provides a Surrounding Metro District Map to give a greater understanding of the project in relation to the surrounding infrastructure.

3. Description of Water to Be Used by the Project:

a) *Description of the water to be used by the Project and to the extent identified by the Director in consultation with the applicant, alternatives, including: the source, amount, the quality of such water; the applicant's right to use the water, including adjudicated decrees or determinations and any substitute water supply plans, and applications for decrees or determinations; proposed points of diversion and changes in the points of diversion; the existing uses of the water; adequate proof that adequate water resources have been or can and will be committed to and retained for the Project, and that applicant can and will supply the Project with water of adequate quality, quantity, and dependability; and approval by the respective Designated Ground Water Management District if applicable. If an augmentation or replacement plan for the Project has been decreed or determined or an application for such plan has been filed in the court or with the Ground Water Commission, the applicant must submit a copy of that plan or application.*

The project will use water from Determinations 510-BD and 511-BD. GRMD currently owns 140,000 acre-ft of Arapahoe water under 511-BD and 131,250 acre-ft of LFH water under 510-BD. Both determinations allow for municipal use by GRMD. The Water Resource Report (Exhibit BB) contains additional information and details regarding water supply. The Determinations are included in Exhibit T.

4. Loss of Agricultural Productivity:

a) *Information on any agricultural water rights in the region converted to provide water for the Project, now or in the future.*

No agricultural water rights were converted to provide water for the Project. Grandview Reserve Metropolitan District is a new water district and utilization will be 100% for residential, commercial, and institutional use. The water rights to be used for the project have not previously been used for agricultural purposes.

b) *Information on the amount of irrigated agricultural lands taken out of production, and a description of revegetation plans.*

The project area does not contain any land that was previously irrigated for agriculture. Previous agricultural uses include grazing of non-irrigated pasture land. As such, no irrigated agricultural lands will be taken out of production for this project.

c) *Economic consequences of any loss of irrigated agriculture, including loss of tax base, in the region.*

There is no loss of irrigated agriculture due to this project since the proposed project area has not been used for irrigated agriculture.

d) *Information as to loss of wildlife habitat, loss of topsoil, or noxious weed invasion, as a result of the transfer of water rights and subsequent dry-up of lands.*

The proposed project will not utilize alluvial water and therefore the project will not contribute to the “dry-up of lands”. The water to support the project will come from the Laramie Fox Hills and the Arapahoe aquifers which are both classified as non-tributary. Because they are non-tributary, any reduction in water levels in those aquifers will have no effect on the ground conditions.

e) *Information on impacts to agricultural head gates and water delivery systems.*

No agricultural head gates and water delivery systems existing in the project area and therefore the project will have no impact on these systems.

Documents Related to 4.201 [Major New Domestic Water/Wastewater]

1. Preliminary Review by CDPHE and CDNR
2. Water System Scope of Proposal
3. Demonstration of Need
4. Water Source
5. Loss of Agricultural Productivity
6. Financial Impact Analysis

Documents Related to 4.201 [Major New Domestic Water/Wastewater]

1. Preliminary Review by CDPHE and CDNR:

a) *Preliminary review and comment on the proposal by the appropriate agency of the Colorado Department of Natural Resources and the Colorado Department of Public Health and Environment within sixty (60) days of the date of submittal of the proposal for review*.

The well permit applications were issued in June of 2023 and are included as Exhibit JJ.

The following documents will be submitted to CDPHE for review and approval:

i. Site Location Application for lift station(s) – Anticipated submittal date: June 2023
ii. Construction documents and Basis of Design Report (BDR) for lift station(s) and force main(s) – Anticipated submittal date: February 2024
iii. BDR and Construction Documents for the water system including water treatment facility, source water (wells) and storage tank – Anticipated submittal date: November 2023

Copies of all CDPHE approvals shall be provided to El Paso County as they are received.

2. Water System Scope of Proposal:

a) *Scope of Proposal:*

Provide detailed plans of the proposal, including proposed system capacity and service area plans mapped at a scale acceptable to the Department.

Proposed Water System:

The proposed project consists of the water infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The water infrastructure applicable to the 1041 includes source water wells, water treatment facilities, water storage tanks and the associated piping. Please reference Exhibit BB for all information regarding Grandview Reserve's water demands. The wells will be Denver Basin wells typically with 2 wells (one Arapahoe and one Laramie Fox Hills) per well site. Exhibit C contains a map of the potential proposed well sites within GRMD. The total number of well sites to be developed will be dependent on well production and the rate of development.

A total of up to 4 water treatment facilities are planned for the project. All water treatment facilities will utilize pressure sand filtration and iron and manganese precipitation to treat raw water from the wells. A flow diagram of the treatment provided is in Appendix II. The capacity of each water treatment facility will be determined by the filings that it will serve. The first water treatment facility will be sized to treat approximately 0.5 MGD with room to

expand to 1.0 MGD. The total treatment capacity needed for full buildout of GRMD is approximately 3.0 MGD. Exhibit C shows the proposed locations of the water treatment facilities.

Once treated at the water treatment facilities, water will be stored in elevated or ground-level tanks. Multiple tanks constructed of steel or concrete will serve the project area. Currently, up to 4 different sites are identified in Exhibit C. The tanks will be sized to store approximately 24 hours of average daily flow and the fire flow requirement. The first tank is anticipated to be approximately 400,000 gallons. The size and number of future tanks will be determined as development progresses. Total storage capacity for the development at buildout is anticipated to be 1.5-3.0 million gallons. The total storage required will be determined by the building with the largest fire flow requirement.
The raw and potable water facilities will be connected by water lines ranging from 4”-18” diameter as depicted in Exhibit C.

Proposed Wastewater System:
The proposed project consists of the wastewater infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The wastewater infrastructure applicable to the 1041 includes one or more lift stations and associated force main(s). Treatment will be provided by an existing treatment facility.

GRMD is proposed to have approximately 3340 single family equivalents (SFE) at buildout. Please reference Exhibit BB for all information regarding Grandview Reserve’s wastewater demands.

This report evaluates three alternatives for conveyance and treatment:

A. Woodmen Hills Metropolitan District (WHMD)
B. Meridian Ranch Metropolitan District (MSMD)
C. Cherokee Metropolitan District (CMD)

The preferred alternative is Woodmen Hills Metropolitan District.

For all three alternatives, it is anticipated that parallel force mains will be installed as shown in Exhibit C. An 8” – 12” diameter force main will be used to convey flows during the early stages of development. This will ensure that flushing velocities of 3.5 ft/s can be achieved with minimal water added. A second force main will be 12”-16” to convey the remainder of the wastewater flows for full build-out. The gravity lines are anticipated to be 15”-21” in diameter and the exact size will be determined once a design profile is developed, and the minimum slope is known. The force mains and gravity interceptors shall be PVC or HDPE and will vary in length depending on the alternative chosen. The typical lift station will consist of:

- Wet Well/Dry Well Configuration
- Flooded-suction Pumps with redundancy for the largest pump
- Emergency storage
- Electrical Equipment
- Back-up Generator
- Odor Control

Alternative A

Wastewater infrastructure will convey flows from GRMD and other surrounding parcels to the Woodmen Hills Metropolitan District (WHMD) Water Reclamation Facility (WRF) for treatment. This alignment will require one lift station that will be located at the corner of Curtis Rd. and Judge Orr Rd. The sanitary sewer alignment is approximately 5.8 miles and is depicted in Exhibit C. The service area of the lift station is defined in Exhibit II. WHMD will determine the exact capacity of the proposed lift station and force main. It is anticipated that the lift station and force main will have a 0.8 – 1.5 MGD average daily flow capacity. The WHMD WRF currently has capacity for 900 SFE from GRMD. WHMD plans to expand the WRF capacity to allow them to accept full build out flows from GRMD. The WHMD WRF expansion is not included in this 1041. No pretreatment or equalization storage is required for this alternative. The will-serve letter from WHMD is included in Exhibit CC.

Alternative B

Wastewater infrastructure will convey flows from GRMD to the MSMD Falcon Lift Station, where MSMD will facilitate conveyance to and treatment at the CMD WRF. Currently, MSMD has an inter-governmental agreement (IGA) with CMD and owns nearly half the capacity of the plant. This alternative requires one lift station located along Highway 24 at the southeast border of the project site. The proposed lift station would have a capacity of 0.5-0.75 MGD since it would only serve GRMD and not be intended as a regional facility.

The force main alignment will be from GRMD to the intersection of Highway 24 and Judge Orr Rd and will be approximately 4.3 miles. There are two potential routes for the gravity interceptors to flow:

B1) Judge Orr Rd. to Fort Smith Rd to MSMD 12” gravity main.
B2) Highway 24 to a MSMD 12” gravity main.

Both gravity mains will need to be paralleled in the future to handle full build-out flows from GRMD. The size of the future parallel mains are anticipated to be 12-18” and will be determined by MSMD and GRMD as built-out progresses.

The sanitary sewer alignment alternatives can be found in Exhibit C. Equalization storage will be included at this lift station and no pretreatment is required for this option.

Alternative C

Wastewater infrastructure will convey flows from GRMD to the Cherokee Metropolitan District (CMD) Water Reclamation Facility (WRF) for treatment as depicted in Exhibit C.

This alternative will require two lift stations. The north lift station will be located at the intersection of Curtis Rd. and Judge Orr Rd and will include equalization storage. The south lift station will be located north of the intersection of Davis Rd. and Curtis Rd. The second lift station will include pre-treatment as required by CMD to include a bar screen and grit removal equipment. Both lift stations will include odor control. The lift stations and force mains would have a capacity of 0.8 – 1.5 MGD and could provide service to GRMD and potentially to the areas identified in Exhibit II.

The conveyance infrastructure described above will be approximately 10 miles and will deliver the wastewater to the connection point as defined in the CMD IGA. That connection point is on CMD's existing force main running parallel to Hwy 94, approximately at Curtis Road.

b. *Provide a description of all existing or approved proposed domestic water or sewage treatment systems within the Project area.*

There are no existing or approved proposed water or wastewater treatment systems within the project area. Nearby water treatment facilities are owned by Meridian Service Metropolitan District, Woodmen Hills Metropolitan District and Four Way Ranch Metropolitan District. Nearby wastewater treatment facilities are Woodmen Hills Metropolitan District Water Reclamation Facility and Cherokee Metropolitan District Water Reclamation Facility.

c. *Describe the design capacity of each domestic water or sewage treatment system facility proposed and the distribution or collection network proposed in the Project area.*

The projected maximum daily water demand for full buildout is approximately 3.0 MGD. Up to four water treatment facilities are proposed with a combined capacity matching the projected maximum daily demand. The treatment facilities will have pressure sand filtration and a preliminary process flow diagram is provided in Exhibit Y. As development progresses, the design capacities of each water treatment facility may be adjusted as necessary. The potable water distribution system will be designed to handle fire flows which shall vary throughout the development based on the square footage of buildings proposed.

The projected average daily wastewater flows from GRMD at full buildout is approximately 0.6 MGD. Depending on the alternative chosen, there are different IGA requirements for each. See section 2.a. for a discussion of the requirements.

d. *Describe the excess capacity of each treatment system and distribution or collection network in the affected community or Project area.*

The water treatment and distribution system is not intended to have excess capacity above the 3.0 MGD anticipated to serve full buildout of GRMD. The lift station(s) will be designed to serve full buildout from GRMD and the service area in Exhibit A. (Approximately 1.5 MGD Average Daily Flow). The wastewater conveyance system will be master-planned to allow for future expansion for possible future connections.

e. *Provide an inventory of total commitments already made for current water or sewage services.*

Cherokee Metro District committed to providing 0.5MGD of capacity to Grandview Reserve. The IGA between CMD and GRMD is included as Exhibit AA.

WHMD has committed to providing 900 SFEs (0.15 MGD) of treatment capacity in the existing plant and treatment for full build-out once the WRF expansion is complete.

GRMD has not committed to provided water or wastewater service to any projects except water service to the Grandview Reserve Development.

f. *Describe the operational efficiency of each existing system in the Project area, including the age, state of repair and level of treatment.*

4WRMD has an existing water treatment facility constructed approximately in 2008 and rated for approximately 0.19 MGD. The system includes pressure sand filtration and disinfection. The system is in good condition but was not planned for expansion and the proposed project does not include water service for 4WRMD.

There are two regional water reclamation facilities in the general area of the proposed project. Wastewater treatment for Grandview will be provided by one of them. Their treatment facilities can be described as follows:

1. The WHMD WRF is currently permitted for 1.3 MGD. Current flows to the plant are approximately 0.8-0.9 MGD. A recent upgrade was completed in 2019 which replaced the entire process and equipment with the exceptions of the headworks and disinfection facilities. The WRF is currently meeting its discharge permit and is in good repair. An expansion will be required for WHMD to provide treatment to more than 900 SFE.
2. The CMD WRF was constructed in approximately 2010 and have a permitted rating of 4.8 MGD. CMD is completing a plant upgrade including the addition of a reverse osmosis process to meet the TDS limit in their discharge permit. Current flows to the plant are approximately 2.0 MGD. The WRF is in a good state of repair. An expansion may be required for CMD to provide treatment for more than 0.5 MGD.

g. *Describe the existing water utilization, including the historic yield from rights and use by category such as agricultural, municipal and industrial supply obligations to other systems.*

Grandview Reserve Metro District is a new water district and utilization will be 100% for residential, commercial, and institutional use. The water rights to be used for the project have not previously been used for agricultural purposes.

3. Demonstration of Need:

a) *Provide population trends for the Project area, including present population, population growth and growth rates, documenting the sources used.*

This project is located adjacent to new residential growth in the Falcon area. The recently adopted El Paso County Master Plan has marked this area as suburban land use which would include single family housing, multifamily housing, commercial, parks and open space and institutional. The Falcon/Peyton Small Area Master Plan marks this area as proposed Urban Density Development. Refer to census.gov for more information about current population trends in the area. Refer to Exhibit J – District Service Plan for population projections.

b) *Specify the predominant types of developments to be served by the proposed new water and/or sewage systems or extensions thereof.*

Suburban Residential: this will consist primarily of Single-family detached dwellings, but supports single family attached, multifamily, commercial retail, commercial service, parks and open space and institutional uses.

c) *Specify at what percentage of the design capacity the current system is now operating:*

i. *Water treatment system.*

This is a new system designed for the Grandview Reserve Metro District.

ii. *Wastewater treatment system.*

Alternative A:
The WHMD WRF has capacity of 900 SFE for Grandview. The WRF is rated for 1.3 MGD and is currently loaded at approximately 0.8-0.9 MGD. The draft agreement between WHMD and DR Horton requires WHMD to expand their WRF. The expansion is planned to increase the plant rating to approximately 2.5 MGD. This expansion will provide treatment capacity for full build out of Grandview.

Alternative B and C:
The CMD WRF is currently operating at approximately 2.0 MGD and has a permitted rating of 4.8 MGD. The existing CMD force main along Hwy 94 conveys approximately 90-95% of the WRF loading. That force main is sized to convey up to the permitted rating of the WRF.

The 0.5 MGD capacity that GRMD has purchased via the IGA is within the 4.8 MGD rating of the WRF. No expansions to the WRF or CMD force main are required for the first 0.5 MGD. As development progresses, GRMD will negotiate for CMD to acquire additional capacity which may require an expansion of CMD infrastructure.

d) *Specify whether present facilities can be upgraded to accommodate adequately the ten-year projected increase needed in treatment and/or hydraulic capacity*.

There are no water systems in the area that are feasible to tie into to provide water to the project due aquifer rights and current allocations at the current time. Grandview will continue to explore connections to adjacent water systems if future conditions allow.

There are no adjacent wastewater gravity tie-in locations to service the project.

Alternative A:
WHMD has committed to provide treatment for 900 SFE in the current WRF. Based on current projections, that will provide treatment for the first 4-7 years of development. An expansion will be necessary to provide treatment for the first 10 years of development. That expansion is required by the draft agreement between WHMD and DR Horton.

Alternative B and C:
Lift Stations will be required to deliver wastewater effluent to the CMD WRF which is currently operating at 2.0 MGD out of the permitted 4.8 MGD capacity (~42%). As such, the CMD WRF will not need to be expanded to provide service for the projected ten-year wastewater loading from this project. An expansion may be necessary to provide treatment for full build out.

4. Water Source:

a) *Description of the water to be used by the Project and, to the extent identified by the Director in consultation with the applicant, alternatives, including: the source, amount, the quality of such water; the applicant's right to use the water, including adjudicated decrees or determinations and any substitute water supply plans, and applications for decrees or determinations; proposed points of diversion and changes in the points of diversion; the existing uses of the water; adequate proof that adequate water resources have been or can and will be committed to and retained for the Project, and that applicant can and will supply the Project with water of adequate quality, quantity, and dependability; and approval by the respective Designated Ground Water Management District if applicable. If an augmentation or replacement plan for the Project has been decreed or determined or an application for such plan has been filed in the court or with the Ground Water Commission, the applicant must submit a copy of that plan or application.*

The project will use water from Determinations 510-BD and 511-BD. GRMD currently owns 140,000 acre-ft of Arapahoe water under 511-BD and 131,250 acre-ft of LFH water under 510-BD. Both determinations allow for municipal use by GRMD. The Determinations are included in

Exhibit T. Both water rights are non-tributary and allow the District to use them to extinction. Well permit applications for the first two wells (LFH-1 and A-1) are anticipated to be submitted in February 2023.

5. Loss of Agricultural Productivity:

Loss of Agricultural Productivity: Grandview Reserve Metropolitan District is a new water district and utilization will be 100% for residential, commercial, and institutional use. The water rights to be used for the project Have not previously been used for agriculture.

a) *Information on any agricultural water rights in the region converted to provide water for the Project, now or in the future.*

No agricultural water rights were converted to provide water for the Project.

b) *Information on the amount of irrigated agricultural lands taken out of production, and a description of revegetation plans.*

No agricultural water rights were converted to provide water for the Project.

c) *Economic consequences of any loss of irrigated agriculture, including loss of tax base, in the region.*

N/A

d) *Information as to loss of wildlife habitat, loss of topsoil, or noxious weed invasion, as a result of the transfer of water rights and subsequent dry-up of lands.*

No water rights were transferred for this project. All water rights were part of the overall 4 Way Ranch property.

e) *Information on impacts to agricultural head gates and water delivery systems.*

N/A

6. Financial Impact Analysis:

a) *The financial impact analysis of site selection and construction of major new water and sewage treatment facilities and/or major extension of existing domestic water and sewage treatment systems shall include but need not be limited to the following items:*

A review and summary of an existing engineering and/or financial feasibility studies, assessed taxable property valuations and all other matters of financial aid and resources in determining the feasibility of the proposed new facility including:

i) Service area and/or boundaries.

The proposed water infrastructure shall serve all of Grandview Metropolitan District (Districts 1-4) and the proposed wastewater infrastructure shall serve all of GRMD (Districts 1-4) and the areas shown in Exhibit MM For more information, refer to the Grandview Reserve Metro District Service Plan, Exhibit J.

ii) Applicable methods of transmitting, storing, treating and delivering water and collecting, transmitting, treating and discharging sewage, including effluent and/or sludge disposal.

Water Treatment: Water treatment will be in the form of a single or multiple treatment facilities utilizing pressure-sand filtration. Ideally, a single centralized facility is easier for operation and maintenance. However, construction of a single facility capable of meeting buildout demands is not always economical in early stages. Therefore, two or more facilities may be constructed as building progresses. Pressure-sand treatment systems are utilized by many other metropolitan districts in the Falcon area. They are typically used to treat secondary contaminant levels in source water (iron and manganese), primarily for aesthetics (taste and odor).

Storage Facility: Water storage will have to be sized for the largest demand in the development to meet International Fire Code standards. That fire-flow volume will be added to the Maximum Daily Demand to establish the required water storage volume.

Distribution/Transmission: Distribution lines will likely be PVC, adequately sized to convey fire-flows throughout the subdivision. They will be constructed by GRMD. No other districts are planned to provide water or infrastructure for GRMD water system. The project and subsequent filings will be looped to provide redundancy and reliability of the system.

Collection System: There are currently three alternatives being evaluated for GRMD's wastewater conveyance and treatment: Woodmen Hills Metropolitan District (WHMD), Meridian Service Metropolitan District (MSMD), and Cherokee Metropolitan District (CMD). The WHMD and MSMD alternatives will require 1 lift station and the CMD alternative will require two lift stations.

GRMD is proposed to have approximately 3340 single family equivalents (SFE) at buildout. All development will be served by the wastewater infrastructure in the proposed project.

Wastewater Treatment: Treatment will be provided at either the WHMD or the CMD WRF. The WHMD WRF will need to be expanded to provide treatment for more than 900 SFEs in Grandview. CMD has committed to providing treatment for 0.5 MGD and may need to expand their facility to provide treatment for full build out.

iii) *Estimated construction costs and period of construction of each new or extension facility component.*

It is anticipated that permitting and construction of the new water and wastewater facilities will take 18-24 months.

The Water System treatment and delivery infrastructure is anticipated to be approximately $60M-$70M for the full build out. The water system is proposed to be phased and the first phase (0.5 MGD water treatment facility, 2 wells and 400,000 gallon water storage tank) is projected to cost approximately $10M-$15M. The proposed project consists of the water infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The water infrastructure includes source water wells, water treatment facilities, water storage tanks and the associated piping.

The wells will be Denver Basin wells typically with 2 wells (one Arapahoe and one Laramie Fox Hills) per well site. Exhibit C contains a map of the potential proposed well sites within GRMD. The total number of well sites to be developed will be dependent on well production and the rate of development.

A total of up to 4 water treatment facilities are planned for the project. The capacity of each water treatment facility will be determined by the filings that it will serve. The total treatment capacity needed for full buildout of GRMD is approximately 3.0 MGD. Exhibit C shows the proposed locations of the water treatment facilities.

Once treated at the water treatment facilities, water will be stored in tanks. Multiple tanks will be constructed to serve the project, at up to 4 different sites identified in Exhibit C The raw and potable water facilities will be connected by water lines ranging from 4”-16” diameter as depicted in Exhibit C.

There are currently three alternatives being evaluated for GRMD’s wastewater conveyance and treatment: Woodmen Hills Metropolitan District (WHMD), Meridian Service Metropolitan District (MSMD), and Cherokee Metropolitan District (CMD). Unlike the water system costs which can be phased, the wastewater system costs will be incurred during the first phase of development. The projected costs are as follows:
Alternative A – WHMD: The proposed infrastructure required includes gravity conveyance to the lift station, the lift station and force main to the WHMD WRF. Costs for that infrastructure are estimated to be $8-12 million. Grandview would be responsible for a portion of the cost to expand the WRF. Their current projected cost share is $12.4 million.
Alternative B – MSMD: The proposed infrastructure for this alternative includes gravity lines to the lift station, lift station and force main. The projected cost for this

infrastructure is estimated at $6-10 million. It is not yet defined if MSMD would need to expand their infrastructure and if Grandview would pay for a portion of the expansion costs.
Alternative C – MSMD: The proposed infrastructure for this alternative includes gravity conveyance, two lift stations and force mains. The total projected cost for this is estimated to be $22-26 million. If expansion of the WRF is necessary to provide treatment for full build out, Grandview would be responsible for their proportionate share of that expansion cost.

iv) *Assessed valuation of the property to be included within the service area boundaries.*

The current assessed value of the property within the GRMD service area is $8,610 according to the EPC Assessors GIS site. The projected assessed value of the property at full build out is $105,013,186. Full build out is projected to be completed by 2036. See the GRMD Service Plan in Exhibit J for more details.

v) *Revenues and operating expenses of the proposed new or extension facility, including but not limited to historical and estimated property taxation, service charges and rates, assessments, connection and tap fees, standby charges and all other anticipated revenues of the proposed new facility.*

The projected mill levy for the District is 60 mills for residential and 45 mills for commercial development. Of those, 10 mills from both residential and commercial will be used for O&M expenses. At buildout, annual O&M revenue from those 10 mills are anticipated to be $2,427,321. Refer to the Grandview Reserve Metro District Service Plan, Exhibit J for more details.

vi) *Amount and security of the proposed debt and method and estimated cost of debt service.*

The District anticipates issuing bonds to pay for the capital water and wastewater improvements in this 1041 submittal. The initial bond issuance contemplated in the Service Plan is for approximately $65,025,000. Subsequent bond issues are anticipated. Refer to the Grandview Reserve Metro District Service Plan, Exhibit J for more details.

vii) *Provide the detail of any substantial contract or agreement for revenues or for services to be paid, furnished, or used by or with any person, association, corporation, or governmental body.*

The only substantial contract that has been executed related to the proposed project is the IGA between GRMD and CMD. Under the IGA, CMD committed to provide 0.5 MGD treatment capacity to GRMD. In addition, CMD committed to providing conveyance from the connection point (approximately Hwy 94 and Curtis Road) to the WRF. CMD also

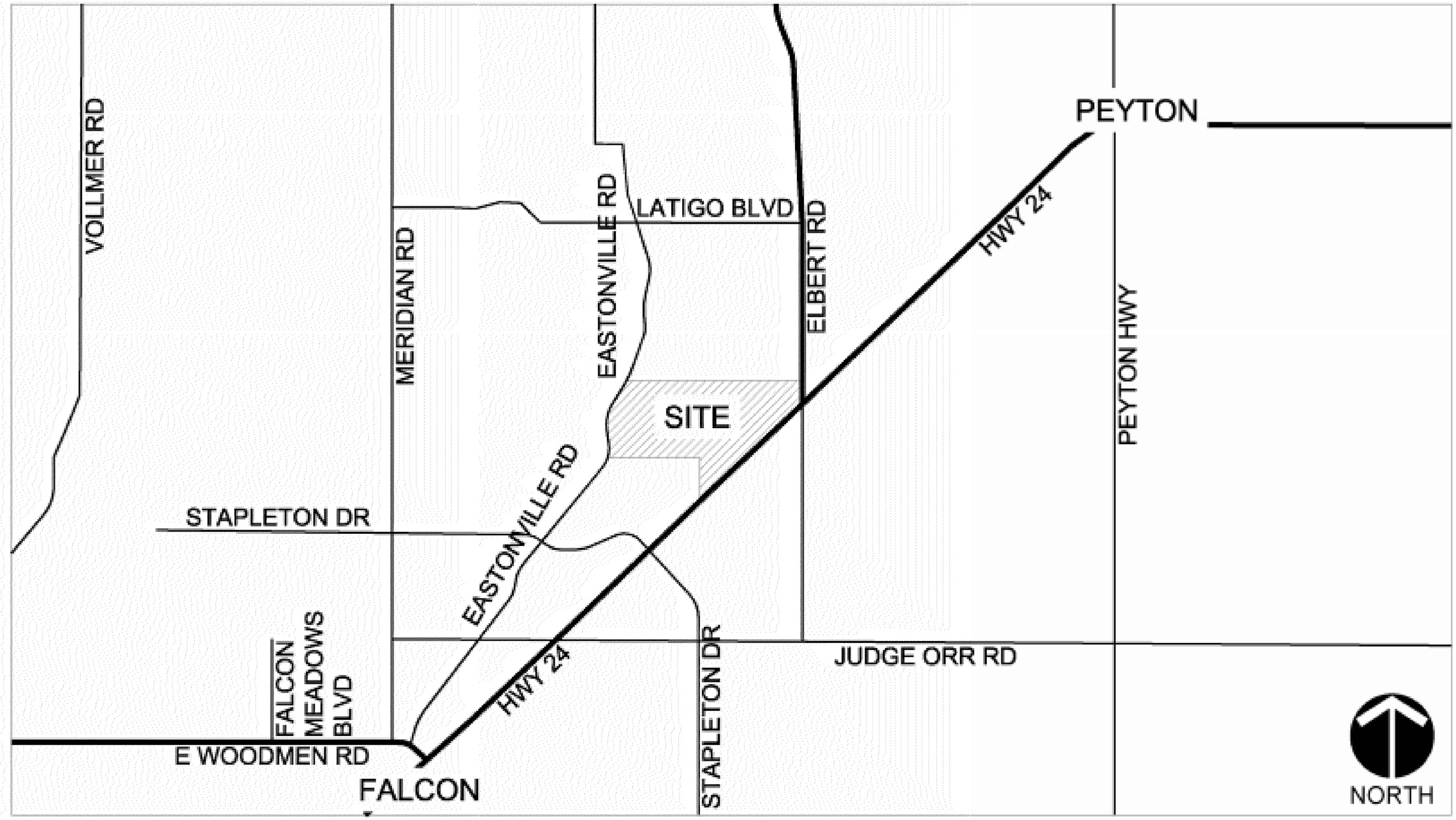
committed to making replacement water available to GRMD at the Tamlin Tank in the event that the CMD Replacement Plan is approved. Under the IGA, GRMD is responsible for constructing the infrastructure to convey the wastewater to the connection point. GRMD will own and operate the conveyance infrastructure. The IGA is attached as Exhibit AA.

DR Horton is currently negotiating an agreement with WHMD for wastewater treatment. The draft agreement requires WHMD to provide treatment for 900 SFE in the existing WRF and treatment for full build out once the plant is expanded. WHMD also agreed to make return flows available to Grandview. Grandview is responsible for paying their proportionate share of the plant expansion costs and for constructing the infrastructure to convey their wastewater to the WHMD WRF. Upon completion of construction and acceptance by WHMD, the conveyance infrastructure shall be owned and operated by WHMD.

EXHIBIT A: VICINITY/LOCATION MAP

VICINITY MAP

SCALE = N.T.S



Job No.:	201662.05
Prepared By:	SJF
Date:	11/18/2019

VICINITY MAP

FIG.XX

EXHIBIT B: 1041 PERMIT APPLICATION

APPLICATION FOR A PERMIT
TO CONDUCT A DESIGNATED ACTIVITY OF STATE INTEREST
OR TO ENGAGE IN DEVELOPMENT
IN A DESIGNATED AREA OF STATE INTEREST

To: Permit Authority, El Paso County. Colorado

Re: Grandview Reserve Metropolitan District Water Wells, Water Treatment Plant, Water Storage Tank, Lift Stations and Force Mains, a matter of state interest.

From: Grandview Reserve Metropolitan District
1271 Kelly Johnson, Suite 100, Colorado Springs, CO 80920

719-499-8416

Date Submitted: 2/17/2023

Date Received: _____

1. Matter of State Interest.

The applicant requests that a permit be issued for each of the items checked below:

A permit to conduct one or more of the following areas of state interest:

(x) Efficient utilization of municipal and industrial water projects
(x) Site selection and construction of major new domestic water and sewage treatment systems and/or major extension of existing domestic water and sewage treatment systems
( ) Site selection and construction of major facilities of a public utility
( ) Development in areas containing or having a significant impact upon floodplain natural hazard areas
( ) Site selection and expansion of airports
( ) Site selection of arterial highways and interchanges and collector highways
( ) Site selection of rapid or mass transit facilities

2. Proposed Activity or Development.

General description of the specific activity or development proposed (attach additional sheets if necessary):

Proposed Water System:

The proposed project consists of the water infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The water infrastructure applicable to the 1041 includes source water wells, water treatment facilities, water storage tanks and the associated piping. Please reference Exhibit BB for all information regarding Grandview Reserve's water demands. The wells will be Denver Basin wells typically with 2 wells (one Arapahoe and one Laramie Fox Hills) per well site. Exhibit C contains a map of the potential proposed well sites within GRMD. The total number of well sites to be developed will be dependent on well production and the rate of development.

A total of up to 4 water treatment facilities are planned for the project. All water treatment

facilities will utilize pressure sand filtration and iron and manganese precipitation to treat raw water from the wells. A flow diagram of the treatment provided is in Appendix II. The capacity of each water treatment facility will be determined by the filings that it will serve. The first water treatment facility will be sized to treat approximately 0.5 MGD with room to expand to 1.0 MGD. The total treatment capacity needed for full buildout of GRMD is approximately 3.0 MGD. Exhibit C shows the proposed locations of the water treatment facilities.

Once treated at the water treatment facilities, water will be stored in elevated or ground-level tanks. Multiple tanks constructed of steel or concrete will serve the project area. Currently, up to 4 different sites are identified in Exhibit C. The tanks will be sized to store approximately 24 hours of average daily flow and the fire flow requirement. The first tank is anticipated to be approximately 400,000 gallons. The size and number of future tanks will be determined as development progresses. Total storage capacity for the development at buildout is anticipated to be 1.5-3.0 million gallons. The total storage required will be determined by the building with the largest fire flow requirement.

The raw and potable water facilities will be connected by water lines ranging from 4"-18" diameter as depicted in Exhibit C.

Proposed Wastewater System:

The proposed project consists of the wastewater infrastructure necessary to support development within the Grandview Reserve Metropolitan District (GRMD). The wastewater infrastructure applicable to the 1041 includes one or more lift stations and associated force main(s). Treatment will be provided by an existing treatment facility.

GRMD is proposed to have approximately 3340 single family equivalents (SFE) at buildout. Please reference Exhibit BB for all information regarding Grandview Reserve's wastewater demands.

This report evaluates three alternatives for conveyance and treatment:

A. Woodmen Hills Metropolitan District (WHMD)
B. Meridian Ranch Metropolitan District (MSMD)
C. Cherokee Metropolitan District (CMD)

expansion to WMHD per IGA include in request

For all three alternatives, it is anticipated that parallel force mains will be installed as shown in Exhibit GG. An 8" – 12" diameter force main will be used to convey flows during the early stages of development. This will ensure that flushing velocities of 3.5 ft/s can be achieved with minimal water added. A second force main will be 12"-16" to convey the remainder of the wastewater flows for full build-out. The gravity lines are anticipated to be 15"-21" in diameter and the exact size will be determined once a design profile is developed, and the minimum slope is known. The force mains and gravity interceptors shall be PVC or HDPE and will vary in length depending on the alternative chosen. The typical lift station will consist of:

- **Wet Well/Dry Well Configuration**
- **Flooded-suction Pumps with redundancy for the largest pump**
- **Emergency storage**
- **Electrical Equipment**
- **Back-up Generator**
- **Odor Control**

no open lagoons or sludge in alternative B and C correct?

Alternative A

Wastewater infrastructure will convey flows from GRMD and other surrounding parcels to the Woodmen Hills Metropolitan District (WHMD) Water Reclamation Facility (WRF) for treatment. This alignment will require one lift station that will be located at the corner of Curtis Rd. and Judge Orr Rd. The sanitary sewer alignment is depicted in Exhibit C and the service area of the lift station is defined in Exhibit JJ. WHMD will determine the exact capacity of the proposed lift station and force main. It is anticipated that the lift station and force main will have a 0.8 – 1.5 MGD average daily flow capacity. The WHMD WRF currently has capacity for 900 SFE from GRMD. WHMD plans to expand the WRF capacity to allow them to accept full build out flows from GRMD. The WHMD WRF expansion is not included in this 1041. No pretreatment or equalization storage is required for this alternative. The will-serve letter from WHMD is included in Exhibit CC.

Alternative B

Wastewater infrastructure will convey flows from GRMD to the MSMD Falcon Lift Station, where MSMD will facilitate conveyance to and treatment at the CMD WRF. Currently, MSMD has an inter-governmental agreement (IGA) with CMD and owns nearly half the capacity of the plant. This alternative requires one lift station located along Highway 24 at the southeast border of the project site. The proposed lift station would have a capacity of 0.5-0.75 MGD since it would only serve GRMD and not be intended as a regional facility.

The force main alignment will be from GRMD to the intersection of Highway 24 and Judge Orr Rd. There are two potential routes for the gravity interceptors to flow:

B1) Judge Orr Rd. to Fort Smith Rd to MSMD 12" gravity main.

B2) Highway 24 to a MSMD 12" gravity main.

Both gravity mains will need to be paralleled in the future to handle full build-out flows from GRMD. The size of the future parallel mains are anticipated to be 12-18" and will be determined by MSMD and GRMD as built-out progresses.

The sanitary sewer alignment alternatives can be found in Exhibit C. Equalization storage will be included at this lift station and no pretreatment is required for this option.

Alternative C

Wastewater infrastructure will convey flows from GRMD to the Cherokee Metropolitan District (CMD) Water Reclamation Facility (WRF) for treatment as depicted in Exhibit C.

This alternative will require two lift stations. The north lift station will be located at the intersection of Curtis Rd. and Judge Orr Rd and will include equalization storage. The south lift station will be located north of the intersection of Davis Rd. and Curtis Rd. The second lift station will include pre-treatment as required by CMD to include a bar screen and grit removal equipment. Both lift stations will include odor control. The lift stations and force mains would have a capacity of 0.8 – 1.5 MGD and could provide service to GRMD and potentially to the areas identified in Exhibit JJ.

The conveyance infrastructure described above will deliver the wastewater to the connection point as defined in the CMD IGA. That connection point is on CMD's existing force main running parallel to Hwy 94, approximately at Curtis Road.

3. Location of Development.

A general, non-legal description and the popular name, if any, of the tract of land upon which the activity or development is to be conducted:

Proposed development is Grandview Reserve, located between Eastonville Rd and Highway 24, east of Falcon, CO. The proposed water system to be located on-site. The proposed wastewater infrastructure to extend from GRMD down Curtis Road to Hwy 94.

4. Legal Description.

The legal description, including the acreage, of the tract of land upon which the development or the activity is to be conducted, by metes and bounds or by government survey description: (attach additional sheets if necessary):

Sections 21, 22, 27, and 28, all in Township 12 South, Range 64 West of the 6th Principal Meridian. Refer to the attached legal description in Exhibit F.

In addition, please add the parcel Nos for all 3 lift station alternatives; keep the legal provided

5. Owners and Interests.

Set out below the names of those persons holding recorded legal, equitable, contractual and option interests and any other person known to the applicant having an interest in the property described in paragraph 4, above, as well as the nature and extent of those interests for each person, provided that such recorded interests shall be limited to those which are recorded in the County Recorder's Office of this jurisdiction, the land office of the Bureau of Land Management for this State, the Office of the State Board of Land Commissioners of the Department of Natural Resources, or the Secretary of State's Office of this State. (Attach additional sheets if necessary):

Paul Howard, 4 Site Investments, LLC

Bill Carlisle, Melody Homes

Grandview Reserve Metropolitan District

Cherokee Metropolitan District

4-Way Ranch Metropolitan District

6. Submission Requirements.

Submission requirements described in the regulations, which have been adopted by this jurisdiction for each of the activities or areas checked in paragraph 1 above, are attached to this application. Those attachments are identified, by letter or number, and described by title below:

Documents Related to 2.303 [Submission Requirements]

Documents Related to 3.201 [Source Water]

Documents Related to 4.201 [Major New Domestic Water/Wastewater]

Refer to the attached Table of Contents for a full summary of Documents and Exhibits

7. Additional Information.

The attached analyses show that each of the design and performance standards set forth in the regulations for each of the activities or areas checked in paragraph 1 above, will be met. The Table of Contents contains a full list of all documents and analyses included in this submittal.

8. Duration of Permit.

The applicant requests a permit for an indefinite period.

9. Application Fee.

An application fee of $3837.00, accompanies this application.

APPLICANT:

By Paul Howard
(Name)

Manager
(Title)

sign

EXHIBIT C: COMBINED PROPOSED INFRASTRUCTURE MAP

LEGEND

METRO DISTRICT BOUNDARY

PROPOSED GRAVITY LINE

PROPOSED DUAL FORCE MAINS

FM FM FM

missing legend items
red, blue and green lines

OFFSITE SANITARY IMPROVEMENT DESCRIPTIONS:

ALTERNATIVES FOR CONVEYANCE AND TREATMENT:

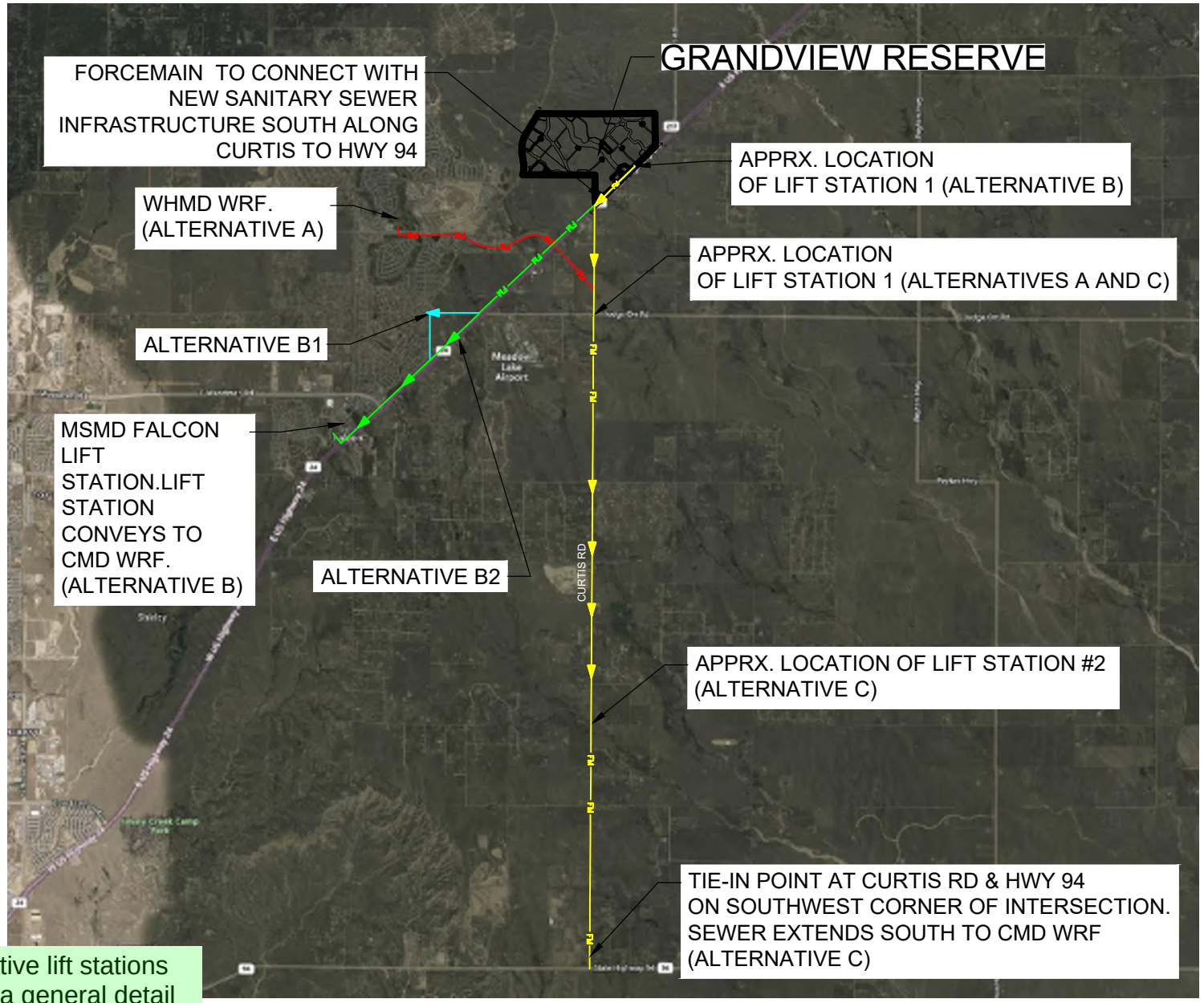
RED: WOODMEN HILLS METROPOLITAN DISTRICT

GREEN: MERIDIAN RANCH METROPOLITAN DISTRICT

YELLOW: CHEROKEE METROPOLITAN DISTRICT

NOTE: FOR ALL THREE ALTERNATIVES, IT IS ANTICIPATED TO HAVE:

- DUAL FORCE MAINS 8"-16"
- GRAVITY LINES 15"-21"



Add the expansion map for alternative lift stations behind this map for detail; provide a general detail for each liftstation alternative (IF B and C are the same design note on that detail); The detail for Alternative A is in the IGA - copy it behind this sheet with the other alternatives. To show what is proposed and to identify adj properties of impacts

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GRANDVIEW RESERVE
METROPOLITAN DISTRICT
OFFSITE SANITARY SEWER

SHEET
1
SCALE:1" = 10000'
DATE: 9/26/2022

HR GREEN Xrefs: 01-DV-CONCEPT; xgt-1-AV01

LEGEND

METRO DISTRICT BOUNDARY

PROPOSED 18" SANITARY SEWER MAIN

PROPOSED DUAL FORCE MAINS

FM FM FM

green line symbol

PROPOSED WATERMAIN

W

PROPOSED POTABLE WATER

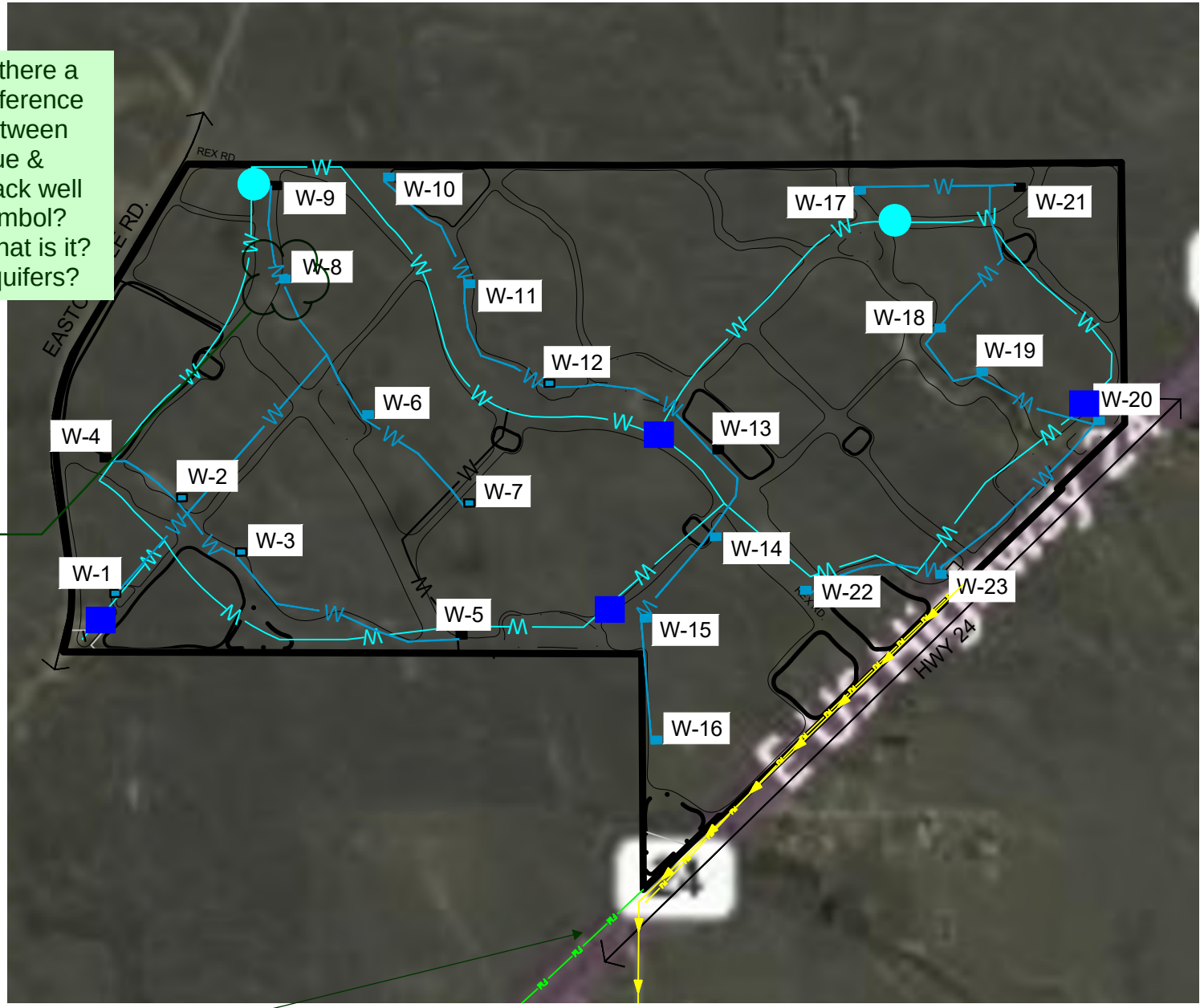
PROPOSED WELL SITE

W-XX some are blue

PROPOSED WATER TREATMENT LOCATION

PROPOSED WATER TANK SITE

Is there a difference between blue & black well symbol? What is it? Aquifers?



WATER MAIN IMPROVEMENTS:

RAW AND POTABLE WATER LINES TO BE 4"-18" DIAMETER AND PVC. ALL LINES WILL BE ROUTES WITHIN THE INTERNAL ROADWAYS TO PROVIDE POINT OF SERVICE CONNECTION TO ALL PLATTED LOTS. ALL WATER TREATMENT SITES CAN BE WATER TANK SITES.

Repeat Comment: Please identify the max size of EACH tank and state max height; are they buried or above ground (use labels); identify which lines are which size.

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GRANDVIEW RESERVE METROPOLITAN DISTRICT

OVERALL 1041 INFRASTRUCTURE

water infrastructure

SHEET 2

SCALE: 1" = 1250'

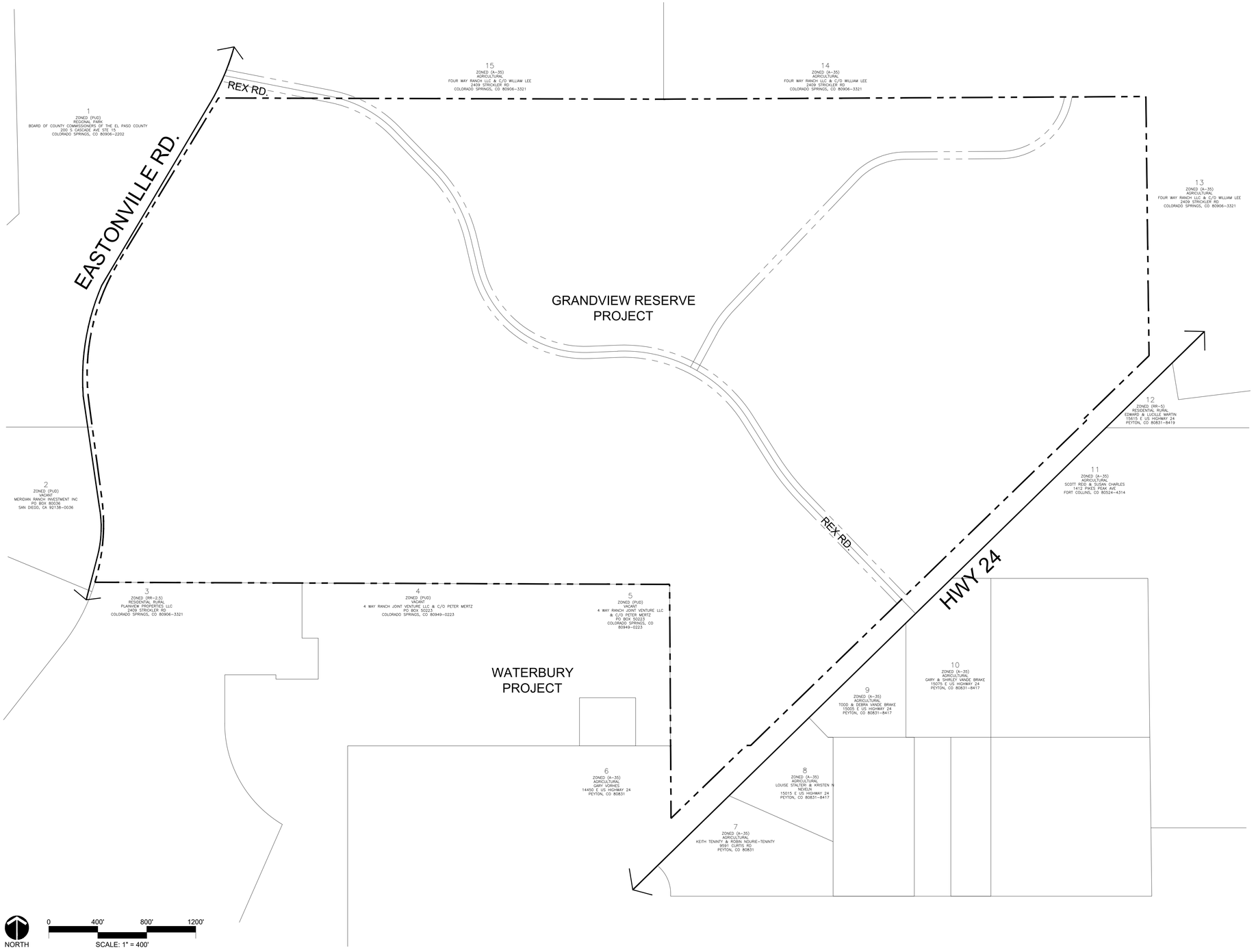
DATE: 04/01/2020

HR GREEN Xrefs: 01-DV-CONCEPT; xgt-1-AV01

EXHIBIT D: ADJACENT PROPERTY OWNERS MAP

GRANDVIEW ADJACENT PROPERTIES

TOWNHIP T12S, RANGE R64W, 38.9847°N 104.5520°W
EAST OF EASTONVILLE RD., WEST OF HWY 24, NORTH OF STAPLETON RD.
EL PASO COUNTY, COLORADO



ADJACENT PROPERTY OWNERS

1. ZONED (PUD)
   REGIONAL PARK
   BOARD OF COUNTY COMMISSIONERS OF THE EL PASO COUNTY
   200 S CASCADE AVE STE 15
   COLORADO SPRINGS, CO 80906-2202

2. ZONED (PUD)
   VACANT
   MERIDIAN RANCH INVESTMENT INC
   PO BOX 80036
   SAN DIEGO, CA 92138-0036

3. ZONED (RR-2.5)
   RESIDENTIAL RURAL
   PLAINVIEW PROPERTIES LLC
   2409 STRICKLER RD
   COLORADO SPRINGS, CO 80906-3321

4. ZONED (PUD)
   VACANT
   4 WAY RANCH JOINT VENTURE LLC & C/O PETER MERTZ
   PO BOX 50223
   COLORADO SPRINGS, CO 80949-0223

5. ZONED (PUD)
   VACANT
   4 WAY RANCH JOINT VENTURE LLC & C/O PETER MERTZ
   PO BOX 50223
   COLORADO SPRINGS, CO 80949-0223

6. ZONED (A-35)
   AGRICULTURAL
   GARY VORHES
   14450 E US HIGHWAY 24
   PEYTON, CO 80831

7. ZONED (A-35)
   AGRICULTURAL
   KEITH TENINTY & ROBIN NOURIE-TENINTY
   9591 CURTIS RD
   PEYTON, CO 80831

8. ZONED (A-35)
   AGRICULTURAL
   LOUISE STALTERI & KRISTEN N NEVELN
   15015 E US HIGHWAY 24
   PEYTON, CO 80831-8417

9. ZONED (A-35)
   AGRICULTURAL
   TODD & DEBRA VANDE BRAKE
   15005 E US HIGHWAY 24
   PEYTON, CO 80831-8417

10. ZONED (A-35)
    AGRICULTURAL
    GARY & SHIRLEY VANDE BRAKE
    15075 E US HIGHWAY 24
    PEYTON, CO 80831-8417

11. ZONED (A-35)
    AGRICULTURAL
    SCOTT REID & SUSAN CHARLES
    1412 PIKES PEAK AVE
    FORT COLLINS, CO 80524-4314

12. ZONED (RR-5)
    RESIDENTIAL RURAL
    EDWARD & LUCILLE MARTIN
    15615 E US HIGHWAY 24
    PEYTON, CO 80831-8419

13. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

14. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

15. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

the list includes the alternative lift station sites ? and pipe lines? please add label to the following sheet-

SKP-20-001

HR GREEN Xrefs: 01-DV-DSGN: xgr-1-ARCH DH01: 01-VICINITY MAP: 01-XL-CONCEPT: 01-DV-SURF

DRAWN BY: JAG	JOB DATE: 7/15/2021	BAR IS ONE INCH ON OFFICIAL DRAWINGS.	
APPROVED: PLS	JOB NUMBER: 191897	0 1"	
CAD DATE: 8/12/2021		IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD FILE: J:\2020\201662.05\Design\Permits\1041\ADJACENT PROPERTY OWNERS MAP			

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com
HRGreen

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

GRANDVIEW RESERVE SKETCH PLAN
ADJACENT PROPERTY OWNERS MAP

SHEET AP1

01

Does the list includes the alternative lift station sites ? and pipe lines? Add label to categorize which group is associated with lines verses liftstations

Parcel No.	Owner Name	Location
4200000014	JMJK HOLDINGS LLC	13333 ELBERT RD
4200000034	BABCOCK LISLE, BABCOCK MARY LOU, BABCOCK DURRAN, BABCOCK KIMBERLIE	16741 E HIGHWAY 24
4200000047	BROWN MABEL L, BROWN FRED L JR	9555 N CURTIS RD
4200000148	VORHES GARY	E HIGHWAY 24
4200000190	JMJK HOLDINGS LLC	13908 ELBERT RD
4200000191	JMJK HOLDINGS LLC	MURPHY RD
4200000192	JMJK HOLDINGS LLC	LATIGO BLVD
4200000209	GIECK ROBERT D TRUST, GIECK REVOCABLE TRUST	JUDGE ORR RD
4200000255	PEYTON SCHOOL DISTRICT NO 23-JT	13990 BRADSHAW RD
4200000256	GLENNON JAMES F, GLENNON ROSE	16846 MURPHY RD
4200000257	GLENNON ROSE M	14350 BRADSHAW RD
4200000258	CUCHARES JAMES M, CUCHARES SHAWNE M	14250 BRADSHAW RD
4200000259	ROLENC DAVID D, ROLENC NICOLLE	14150 BRADSHAW RD
4200000263	WOOLSEY JOHN M, BAGLEY JULIE A, BAGLEY WADE M	14755 E HIGHWAY 24
4200000265	EL PASO COUNTY	E HIGHWAY 24
4200000266	ALECCI ANTHONY J	14050 BRADSHAW RD
4200000267	ALECCI ANTHONY J	BRADSHAW RD
4200000271	REUTER KIM R, REUTER HOLLY M	11375 MCKISSICK RD
4200000283	ORELLANA OSCAR ELISE DEL CID	11706 ELBERT RD
4200000284	THERESA D MEISMAN REVOCABLE TRUST	11566 ELBERT RD
4200000285	WORKMAN SCOTT C, WORKMAN WANDA G	10427 ELBERT RD
4200000303	MOUNTAIN VIEW ELECTRIC ASSOC INC	14305 LATIGO BLVD
4200000304	JMJK HOLDINGS LLC	12902 EASTONVILLE RD
4200000326	4 WAY RANCH JOINT VENTURE LLC, C/O PETER MARTZ	EASTONVILLE RD
4200000328	4 SITE INVESTMENTS LLC	E HIGHWAY 24
4200000345	FALCON LATIGO LLC	EASTONVILLE RD
4200000348	FALCON LATIGO LLC	EASTONVILLE RD
4200000349	4 WAY RANCH JOINT VENTURE LLC, C/O PETER MARTZ	E HIGHWAY 24
4200000352	FALCON LATIGO LLC	EASTONVILLE RD
4200000366	4 WAY RANCH JOINT VENTURE LLC, C/O PETER MARTZ	STAPLETON DR
4200000368	4 WAY RANCH JOINT VENTURE LLC, C/O PETER MARTY	STAPLETON DR
4200000380	JMJK HOLDINGS LLC	12501 ELBERT RD
4200000381	DEPARTMENT OF TRANSPORTATION, STATE OF COLORADO, REGION 2 BUSINESS OFFICE	ELBERT RD
4200000397	PLAINVIEW PROPERTIES LLC	EASTONVILLE RD
4200000398	935 DEVELOPMENT INC	STAPLETON DR
4200000399	KO1515 LLC	STAPLETON DR
4200000400	BOARD OF COUNTY COMMISSIONERS OF, EL PASO COUNTY	EASTONVILLE RD
4200000405	PETE LIEN & SONS INC	JUDGE ORR RD
4200000406	DAVIS JANE LIVING TRUST, DAVIS JANE TRUSTEE	JUDGE ORR RD
4200000417	4 WAY RANCH JOINT VENTURE LLC, C/O PETER MARTZ	EASTONVILLE RD
4200000444	THERESA D MEISMAN REVOCABLE TRUST	15-12-64 RD
4200000445	MEISMAN RONALD	15-12-64 RD
4200000446	THERESA D MEISMAN REVOCABLE TRUST	LATIGO BLVD
4200000447	MEISMAN KELLY RAY	ELBERT RD
4200000455	ORTEGA JOHN M, ORTEGA JENNIE L	ELBERT RD
4200000456	BYNES SEAN, BYNES VALENCIA	ELBERT RD
4200000457	HOLLAMBY RYAN J, HOLLAMBY ASHLEY M	ELBERT RD
4200000458	ORTEGA JOSEPH	ELBERT RD
4200000461	JMJK HOLDINGS LLC	EASTONVILLE RD
4200000463	4 SITE INVESTMENTS LLC	EASTONVILLE RD
4200000464	4 SITE INVESTMENTS LLC	EASTONVILLE RD
4200000465	4 SITE INVESTMENTS LLC	EASTONVILLE RD
4200000466	4 SITE INVESTMENTS LLC	EASTONVILLE RD
4200000467	4 SITE INVESTMENTS LLC	EASTONVILLE RD
4204000001	JMJK HOLDINGS LLC	EASTONVILLE RD
4204000002	WOLFER LIVING TRUST	14291 MURPHY RD
4204000004	DIEDRICH VIANN A	14055 MURPHY RD

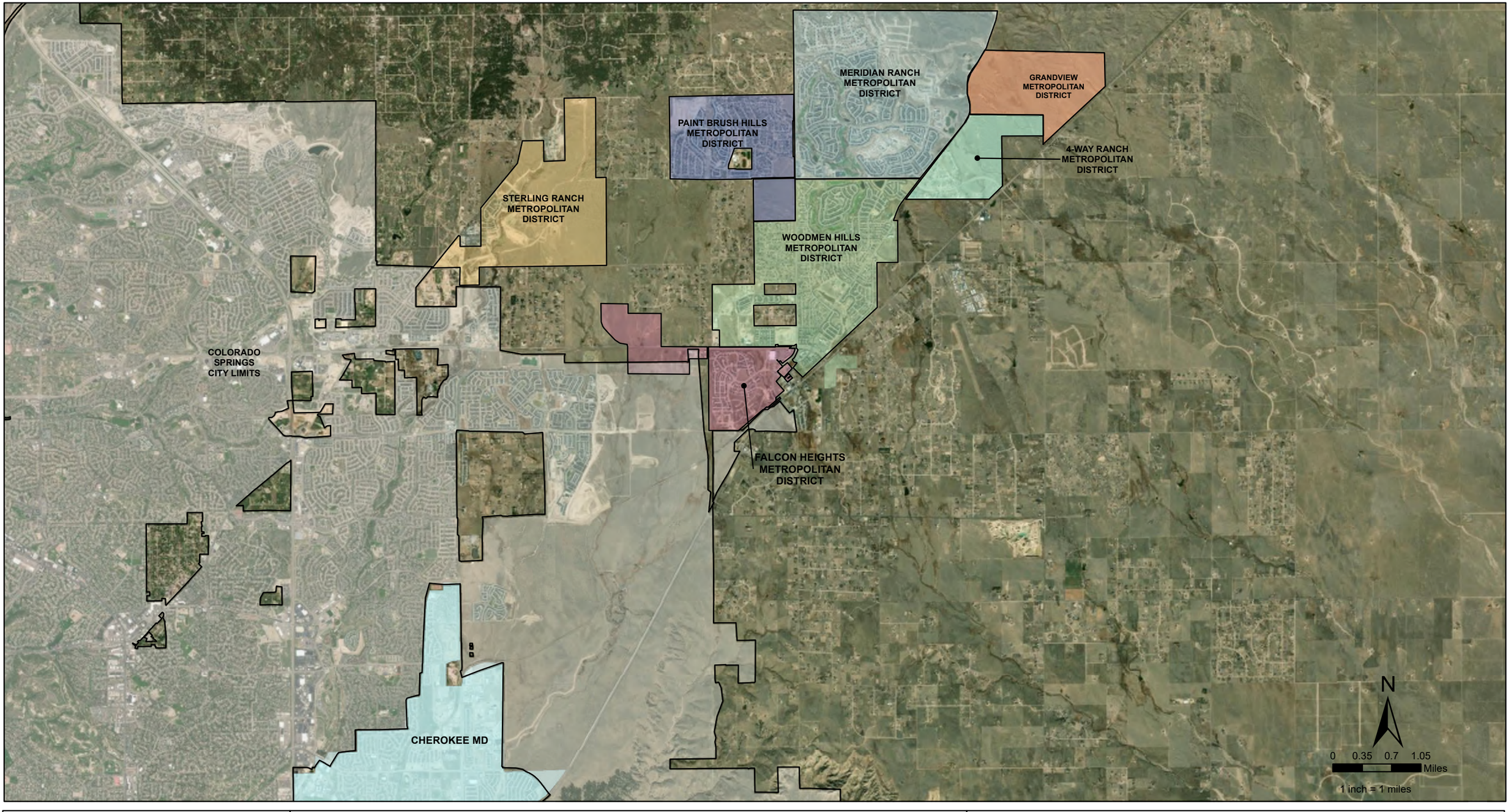
4204000009	GREGG ZACHARY E, GREGG TRISHIA J	13779 EASTONVILLE RD
4204000013	MOATS SHERMAN, MOATS AMY	14259 EASTONVILLE RD
4204000014	MALONE KATHLEEN M	14231 EASTONVILLE RD
4204000015	DTS FAMILY TRUST	13955 MURPHY RD
4204000016	VAN SANDT LIVING TRUST, VAN SANDT JK TRUSTEE, VAN SANDT DIANA L TRUSTEE	13925 MURPHY RD
4204000017	WEGNER HEIKO	13989 MURPHY RD
4204000020	GATES JACQUELINE L	14093 MURPHY RD
4204001001	HOMBERG ROBERT D, HOMBERG LINDA M	14175 EASTONVILLE RD
4204001003	BENSBERG W CASS, BENSBERG MARLENE R, BENSBERG CHRISTOPHER C	14053 EASTONVILLE RD
4204001004	LYNN JOHN CHRISTOPHER, LYNN JILLIAN DANIELLE	14005 EASTONVILLE RD
4204001005	SIMPSON NATHAN, SIMPSON STEFANIE	14125 EASTONVILLE RD
4204001006	BENSBERG W CASS & MARLENE R, FAMILY TRUST	14105 EASTONVILLE RD
4208000017	EL PASO COUNTY	LATIGO BLVD
4209001002	KERCHEVAL DAVID W	EASTONVILLE RD
4209001007	NERING KATHLEEN M	13385 BENT SPUR TRL
4209001008	MARTIN KIMBERLY K	13345 EASTONVILLE RD
4209001009	KERCHEVAL DAVID W, KERCHEVAL KEA T	13365 EASTONVILLE RD
4209001010	GULLEDGE JOSHUA, GULLEDGE SUMMER L	13405 EASTONVILLE RD
4209001011	DODSON RONALD G	13425 EASTONVILLE RD
4209001012	DORAN LANCE W, WRIGHT JENNIFER M	13445 EASTONVILLE RD
4209001013	STRICKLAND ALLEN G, STRICKLAND JANET R	13345 BENT SPUR TRL
4209001014	WESTON ROBERT J, PASCUAL TAMMY S	13365 BENT SPUR TRL
4209001016	MEISNER DEREK H, MEISNER KRISTINA R	13325 BENT SPUR TRL
4209001017	APOSTOLOV MARIO T	13305 BENT SPUR TRL
4209001018	CHESKAWICH JAMES MICHAEL	13310 BENT SPUR TRL
4209001019	CAIN FRANCES E, CAIN DONALD D	13320 BENT SPUR TRL
4213000002	DUNN JAMES P, DUNN REBECCA L	16803 E HIGHWAY 24
4213000004	TAMLIN ROBERT	11501 MCKISSICK RD
4213000005	TICHENOR JOSEPH M, TICHENOR JOAN J	16910 HIGHWAY 24
4213000006	CREED TERRENCE	16855 E HIGHWAY 24
4213001001	GALLION SHERRY L, GALLION ROLLO L	12610 BRADSHAW RD
4213001002	SHAW GREGORY F, SHAW JUDY E	12520 BRADSHAW RD
4213001006	MCPHERSON EDWIN W, MCPHERSON SALLY S	12320 BRADSHAW RD
4213001008	MORGAN KYLE BENJAMIN, MORGAN SARAH LYNNE	12220 TRACY LN
4213001009	CYNCAR JOHN A, KOPPLIN KURT C	12090 TRACY LN
4213001010	MURPHY EDWARD C, MURPHY LINDSEY M	12050 TRACY LN
4213001011	MARTZ TODD G, MARTZ L JENNIFER	12105 PRESTON PL
4213001012	JACOBS DARYL, JACOBS CHERI	12225 PRESTON PL
4213001013	HERNANDEZ JESUS J	12315 PRESTON PL
4213001025	TILLQUIST MARION D, TILLQUIST MECY D	12430 BRADSHAW RD
4213001026	DAILY TIMOTHY L, DAILY NANCY A	12250 TRACY LN
4213001027	ELLIOTT CHARLES W, ELLIOTT PATRICIA	12110 PRESTON PL
4213001028	NEWCOMB JANICE M, KNUPP MICHELLE E, SKABOWSKI MICHAEL S JR, MOORE HARLEY D	12220 PRESTON PL
4213001029	LOPEZ MADELYN L, LOPEZ JUSTIN V	12310 PRESTON PL
4213001030	MARTINEZ ANTONIO ANDRES	12330 PRESTON PL
4213001031	SCOTT THOMAS J	11980 TRACY LN
4213001032	FOLLOWELL ELMER L JR	11950 TRACY LN
4213001033	HERNANDEZ CESAR ANTONIO SIERRA, SIERRA NORMA YADIRA CONTRERAS	11920 TRACY LN
4213001034	DAMRON JAMES FARRELL SR, DAMRON TERESA CHRISTINE	12480 BRADSHAW RD
4213001035	PHELAN GREGORY L, PHELAN CONNIE L	12460 BRADSHAW RD
4213002001	ECKHARDT SCOTT ALLEN	12198 BRADSHAW RD
4213002002	MCINROY TODD	12205 TRACY LN
4213002004	BABCOCK LLOYD D, BABCOCK WILLABETH V	12125 TRACY LN
4213002006	HEWITT WILLIAM R, HEWITT KAREN S	12065 TRACY LN
4213002007	DEPUTY BRENT J	12035 TRACY LN
4213002008	ROMERO MIGUEL, ROSALES CYNTHIA ZAVALA	11985 TRACY LN
4213002009	CONNELLY JAMES B, CONNELLY CECELIA ANN	11955 TRACY LN

4213002010	SCHAFER PAULA C	11915 TRACY LN
4213002011	LOHMEIER BRIAN M LIVING TRUST, LOHMEIER BRIAN M TRUSTEE	11865 TRACY LN
4213002012	BREWER JONATHAN W, BREWER DEBRA E	11785 TRACY LN
4213002013	THACKER WILLIAM W	11715 TRACY LN
4213002017	LOPEZ JUSTIN V	11610 TRACY LN
4213002018	KOVAL SUSAN M	11680 TRACY LN
4213002019	HATAMI SHAHRIAR, KHOZAYER AMINEH	11710 TRACY LN
4213002020	WEINZIERL ALEXANDER CHASE, WILLIAMS BRITTANY EILEEN	11730 TRACY LN
4213002021	SEGER JOAN, SEGER ELIZABETH	11750 TRACY LN
4213002022	WHITED EDEN	11770 TRACY LN
4213002023	CURTIS GARY F, CURTIS JOY A	11790 TRACY LN
4213002024	ORNESS TERRY L, ORNESS JULIE	17355 MCKENZE LN
4213002030	BARNETT DAVID F, BARNETT CAROL A	17525 BLUE LAKE LN
4213002031	HUNSAKER JOSHUA	17465 BLUE LAKE LN
4213002032	FREEMAN MELVIN R JR, FREEMAN COY D	17405 BLUE LAKE LN
4216001012	FALCON TRAILS LLC	SILVER CONCHO TRL
4222001002	MARTIN LUCILLE A	15505 E HIGHWAY 24
4222001003	MARTIN LUCILLE A	15615 E HIGHWAY 24
4223000005	WEBER LIVING TRUST	10725 ELBERT RD
4223000006	NIEHUS JENNIFER L	10721 ELBERT RD
4223000007	MATTHEWS DIONN C, MATTHEWS GARY E	10525 ELBERT RD
4223000008	BURGUIN EVELYN M	ELBERT RD
4223000009	CHRISTIAN JOSHUA D	15819 SPENCER RD
4223000011	MARTIN WILLIAM ASA, MARTIN VICKY LYNN	16150 SPENCER RD
4223001001	WOOD JAMES A, WOOD VESNA	16271 MCCONNELL CT
4223001002	PHILLIPS RONALD WILLIAM, PHILLIPS SHERRY LYNN	16241 MCCONNELL CT
4223001003	BERRY DAVID RAY, BERRY VICKI SUE	16211 MCCONNELL CT
4223001004	TURNER DONALD R, TURNER NANCY L	16210 MCCONNELL CT
4223001005	HARP BRIAN K, HARP TAWNIA L	16240 MCCONNELL CT
4223001006	SOCO INVESTMENT PROPERTIES LLC	16270 MCCONNELL CT
4223001007	COLE JESSICA L, COLE CASEY A	16490 PRAIRIE VISTA LN
4223001008	STANCIL ADAM TAYLOR	16520 PRAIRIE VISTA LN
4223001009	CHAFFEE BRIAN M, CHAFFEE APRIL L	16550 PRAIRIE VISTA LN
4223001010	BRADFORD BYRON, BRADFORD WIMON	16580 PRAIRIE VISTA LN
4223001011	MEISMAN KELLY RAY	16610 PRAIRIE VISTA LN
4223001012	ROUSE ADRIAN	16640 PRAIRIE VISTA LN
4223001015	SHANNON DALLAS B, SHANNON KRYSTAL G	16735 SCOTT RD
4223001016	FREEMAN GREGORY D, FREEMAN LORI D	11424 MCKISSICK RD
4223001017	LASHLEY DARRYL, LASHLEY EVET S	11354 MCKISSICK RD
4223001018	ALLENDER JOHN R, ALLENDER KATHLEEN E	11284 MCKISSICK RD
4223001019	ANTONOW RANDALL M	16790 PRAIRIE VISTA LN
4223001020	GRAY PATRICK E, GRAY BETH A	16760 PRAIRIE VISTA LN
4223001021	GRAY LAWRENCE D, GRAY GINA	16730 PRAIRIE VISTA LN
4223001022	CHINCHILLA JIMMY BRADY GUZMAN	16670 PRAIRIE VISTA LN
4223001023	SOLID & SMART INVESTMENTS LLC	16705 SCOTT RD
4223001024	WOOD JAMES A, WOOD VESNA	16274 MCCARA CT
4223001025	LEE BRIAN DAVID	16094 MCCARA CT
4223001026	PONCE DE LEON CESAR E	16034 MCCARA CT
4223001027	VILLANUEVA-GUTIERREZ KARLA A, VILLANUEVA-GUTIERREZ JAIME	15974 MCCARA CT
4223001028	HOEFLICH RALPH, CALVIN MICHELLE	15915 MCCARA CT
4223001029	TURNER CHARLES E	15975 MCCARA CT
4223001030	BUTLER RICHARD L, BAILEY BRIDGET K	16035 MCCARA CT
4223001031	WELSHANS KENNETH, WELSHANS JACQUELINE	16095 MCCARA CT
4223001032	HOFFMAN DAVID R	16155 MCCARA CT
4223001033	BURNSIDE STEPHEN J, BURNSIDE CAROL L	16215 MCCARA CT
4223001034	STEWART GORDON K, STEWART DEBBY-LYNN	16275 MCCARA CT
4223001035	MAKSYN RONALD M, MAKSYN TERESA K	16340 PRAIRIE VISTA LN
4223002001	GOERING DUANE A	16731 PRAIRIE VISTA LN
4223002002	HADDOCK CHRISTOPHER B	16761 PRAIRIE VISTA LN

4223002008	COOPER GREGORY S, COOPER TERESA A	16641 PRAIRIE VISTA LN
4223002009	BESSANT CHARLES W, WOLBACH DEBORAH K	16551 PRAIRIE VISTA LN
4223002010	MCDONALD GARY R, MCDONALD CINDY	16491 PRAIRIE VISTA LN
4223002011	FFR10 LLC	16281 PRAIRIE VISTA LN
4223002013	WERNER FAMILY TRUST	16581 PRAIRIE VISTA LN
4227000001	VANDE BRAKE TODD E, VANDE DEBRA A	15005 E HIGHWAY 24
4227000004	ACEVEDO EDUARDO SAMUEL MENDEZ, VILLANUEVA SAMUEL MENDEZ	15345 E HIGHWAY 24
4227000005	DE LA TORRE-ESPINOZA VICTOR MANUE, DE LA TORRE-ALAMILLA MARIA	15325 E HIGHWAY 24
4227000006	HUNTINGTON VALERIE J, MARTIN MATTHEW	15115 E HIGHWAY 24
4227000007	BEAR ENTERPRISES LTD	15065 E HIGHWAY 24
4227000008	WILLIAMS DELORES A	15035 E HIGHWAY 24
4227000009	NEVELN KRISTEN N	15015 E HIGHWAY 24
4227000010	NOURIE-TENINTY H ROBIN, TENINTY KEITH	14855 E HIGHWAY 24
4227000011	THORNTON JAMES E II, THORNTON MARILYN L	9611 N CURTIS RD
4227000012	REYNOLDS BENJAMIN T	9595 N CURTIS RD
4227000013	ADAMS KATHY, CRUPI PATRICIA ANN	9585 N CURTIS RD
4227000014	TENINTY KEITH, NOURIE-TENINTY H ROBIN	9591 N CURTIS RD
4227000015	MORGAN JULIA B LIVING TRUST	27-12-64
4227000016	REID SCOTT D, CHARLES SUSAN K	E HIGHWAY 24
4227000020	VANDE BRAKE TODD	15075 E HIGHWAY 24
4229301001	ALMENDAREZ HAMLETT GUILLERMO	13667 EVENING SKY DR
4229301033	KONITZ ROBERT M, KONITZ NANCY A	9595 SUMMER SKY LN
4229301034	LANDRENEAU BRANDON, CALDERON STEPHANIE	9583 SUMMER SKY LN
4229301035	FELDER TYRONE	9571 SUMMER SKY LN
4229301036	TALLAM GLADYS J	9559 SUMMER SKY LN
4229301037	HOUSARI JOHN R, HOUSARI ALYSHA M	9547 SUMMER SKY LN
4229301038	GRAHAM JONATHAN K, GRAHAM CHRISTINE D	9535 SUMMER SKY LN
4229301039	HARTMAN SCOTT, HARTMAN CRYSTAL	9523 SUMMER SKY LN
4229301040	SAHHAR FAMILY LIVING TRUST	9510 SUMMER SKY LN
4229301041	STEADMAN WALTER F, STEADMAN DEBORAH KAY	9522 SUMMER SKY LN
4229301042	MELGR EMILY	9534 SUMMER SKY LN
4229301043	RAY MICHAEL A, RAY DIANE	9546 SUMMER SKY LN
4229301044	WILLIAMS JANICE	9558 SUMMER SKY LN
4229301045	O'CONNOR DAVID, O'CONNOR CHARI	9570 SUMMER SKY LN
4229301046	STULL WESLEY D, STULL DARLENE C	9582 SUMMER SKY LN
4229301047	GALVEZ YOANDY, GALVEZ CHARISSE	12875 MORNING BREEZE WAY
4229301048	MORIARTY RYAN PATRICK, MORIARTY PATRICIA MARIE	12869 MORNING BREEZE WAY
4229301049	OTUONYE SOLOMON, OTUONYE BOSSAN	12863 MORNING BREEZE WAY
4229301050	TORTELLA JOSEPH, TORTELLA ERICA	12857 MORNING BREEZE WAY
4229301051	BRENNAN ERIN, STEVENS KELLY	12851 MORNING BREEZE WAY
4229301052	MASON DONALD III	12845 MORNING BREEZE WAY
4229301053	HEIER NICHOLAS, HEIER CRYSTAL	12839 MORNING BREEZE WAY
4229301054	KRAYER MICHAEL, KRAYER CHRISTINA	12833 MORNING BREEZE WAY
4229301055	SANTORO JEREMY, SANTORO CINDI	12827 MORNING BREEZE WAY
4229301056	AMBROSE ERIC A, AMBROSE JANAE MARIE	12821 MORNING BREEZE WAY
4229301057	BANNING KEVIN	12815 MORNING BREEZE WAY
4229301058	AQUINO ANTHONY G	12809 MORNING BREEZE WAY
4229301059	VAZQUEZ ERNESTO ARTURO GINEBRA	12803 MORNING BREEZE WAY
4229301060	RACCA ANTHONY R, RACCA HEATHER M	12797 MORNING BREEZE WAY
4229301061	TYNAN HEESUN, TYNAN PAUL CHRISTOPHER	12791 MORNING BREEZE WAY
4229301062	KING ANDREE D II, KING PATRICIA M	12785 MORNING BREEZE WAY
4229301063	RUSH CHAUNDRA A, WILLIAMS GEORGE JR	12779 MORNING BREEZE WAY
4229301064	STORMS CLAUDIA D, STORMS STEVEN	12773 MORNING BREEZE WAY
4229301065	SEAL ALLEN, SEAL KARA	12767 MORNING BREEZE WAY
4229301066	SMITH SAMANTHA B, MUNTEAN-DEAFENBAUGH DAVID ANDREW	12761 MORNING BREEZE WAY
4229301067	KUESTER NATHAN RYAN, KUESTER LISA JEANALLE	12755 MORNING BREEZE WAY
4229301068	FORAKER JENNIFER L, FORAKER DEREK E	12749 MORNING BREEZE WAY
4229301069	WAKAMATSU IZUMI	12743 MORNING BREEZE WAY
4229301070	ORTIVEZ CRYSTAL	12737 MORNING BREEZE WAY

4229301071	HPA II BORROWER 2021-1 LLC	12731 MORNING BREEZE WAY
4229301072	CABRERA JEREMY, HESSELBERG SARAH	12725 MORNING BREEZE WAY
4229301073	ADAMS KEITH M, ADAMS DANIELLA D	12719 MORNING BREEZE WAY
4229301074	BELLOMY SARA LINETTE, BELLOMY BRANDON LEE	12713 MORNING BREEZE WAY
4229301075	LEAKS ANTHONY, LEAKS KIMBERLY	12707 MORNING BREEZE WAY
4229301076	ALLEN EVERTON EMILE	12704 SCENIC WALK DR
4229301077	ERPELDING KRISTOPHER JOHN, KORINEK LAURI L	12708 SCENIC WALK DR
4229301078	KANKAMFO GYEBI, KANKAMFO DIANA ANOWA	12712 SCENIC WALK DR
4229301079	RAMOS THOMAS R	12716 SCENIC WALK DR
4229301080	HIGGINS JOSHUA EUGENE, HIGGINS KELLY	12720 SCENIC WALK DR
4229301081	SHARP WILLIAM WOODSON II, SHARP TAMIE LIN	12724 SCENIC WALK DR
4229301082	MERIDIAN SERVICE METRO DISTRICT	STAPLETON DR
4229308009	BROWN DYLAN	9751 ARBOR WALK LN
4229308010	REBILAS RANDALL, REBILAS DEENA	9743 ARBOR WALK LN
4229310001	PEAVEY MARK WESLEY, PEAVEY TINA TAYLOR	9736 ARBOR WALK LN
4229310002	HEDRICK SHANE D, HEDRICK ALEXANDRIA	9728 ARBOR WALK LN
4229310004	MINOR KEVIN V, MINOR JENNIFER D	9712 ARBOR WALK LN
4229310005	HALLUMS CHRISTOPHER S, HALLUMS RACHELLE J	9704 ARBOR WALK LN
4200000249	PHILS BOYS FALCON LLC	13630 JUDGE ORR RD

EXHIBIT E: SURROUNDING METROPOLITAN DISTRICT MAP



Grandview Metropolitan District

Surrounding Metropolitan Districts Map

El Paso County
Colorado

Data Source:
Coordinate System: NAD 1983 StatePlane Colorado Central FIPS 0502 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US

HRGreen

EXHIBIT F: LEGAL DESCRIPTION

on-site

EXHIBIT F2
Parcel numbers of offsite lift station
Alternative or add to this sheet

EXHIBIT A

GRANDVIEW RESERVE METROPOLITAN DISTRICT No. 2

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, A PORTION OF THE SOUTHWEST QUARTER OF SECTION 22, A PORTION OF THE WEST HALF OF SECTION 27 AND A PORTION OF THE NORTH NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED " PLS 30087", AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED " PLS 30087", BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO THE POINT OF BEGINNING; THENCE N89°41'03"E, ON THE NORTH LINE OF THE SOUTH HALF OF SECTION 22, A DISTANCE OF 400.43 FEET; THENCE S54°38'19"E, A DISTANCE OF 322.18 FEET; THENCE S15°28'17"E, A DISTANCE OF 239.41 FEET; THENCE S07°54'45"W, A DISTANCE OF 89.22 FEET; THENCE S48°50'01"E, A DISTANCE OF 156.62 FEET; THENCE N83°02'29"E, A DISTANCE OF 324.17 FEET; THENCE S71°00'05"E, A DISTANCE OF 309.15 FEET; THENCE S42°42'14"W, A DISTANCE OF 361.76 FEET; THENCE S49°48'45"E, A DISTANCE OF 1,122.17 FEET; THENCE S46°23'57"W, A DISTANCE OF 1,414.53 FEET; THENCE S25°17'59"E, A DISTANCE OF 103.66 FEET; THENCE S09°17'58"E, A DISTANCE OF 136.80 FEET; THENCE S42°25'16"E, A DISTANCE OF 685.79 FEET; THENCE S41°12'32"W, A DISTANCE OF 99.97 FEET; THENCE S00°00'00"E, A DISTANCE OF 282.37 FEET; THENCE S43°38'54"W, A DISTANCE OF 640.39 FEET; THENCE S51°46'34"E, A DISTANCE OF 548.80 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNT IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID RIGHT-OF-WAY THE FOLLOWING THREE (3) COURSES:

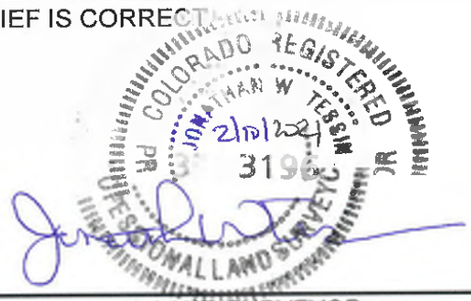
1. S45°55'49"W, A DISTANCE OF 1,078.91 FEET;
2. S89°39'01"W A DISTANCE OF 36.17 FEET;
3. S45°55'49'W, A DISTANCE OF 855.35 FEET TO A POINT ON THE EASTERLY LI NE OF THE SOUTHEAST QUARTER OF SECTION 28;

THENCE N00°21'45"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 591.16 FEET TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER; THENCE N00°21'38"W ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W ON SAID SOUTH LINE, A DISTANCE OF 1,415.10 FEET; THENCE N00°20'56"E, A DISTANCE OF 131.71 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N09°07'27"E, HAVING A DELTA OF 32°48'22", A RADIUS OF 330.82 FEET, A DISTANCE OF 189.42 FEET TO A POINT ON CURVE; THENCE N27°48'24"W, A DISTANCE OF 255.75 FEET; THENCE N46°29 19"E, A DISTANCE OF 590.52 FEET; THENCE N14°36'33"W, A DISTANCE OF 372.33 FEET; THENCE N43°11'44"E, A DISTANCE OF 557.57 FEET; THENCE N14°30'21"E, A DISTANCE OF 374.20 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N13°50'22"E, HAVING A DELTA OF 62°58'51", A RADIUS OF 839.00 FEET, A DISTANCE OF 922.25 FEET TO A POINT OF TANGENT; THENCE N13°10'46"W, A DISTANCE OF 235.68 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING DELTA OF 31°01'27", A RADIUS OF 1,261.00 FEET, A DISTANCE OF 682.80 FEET TO A POINT OF TANGENT; THENCE N44°12'14"W, A DISTANCE OF 446.79 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 21°22'37", A RADIUS OF 1,061.00 FEET, A DISTANCE OF 395.86 FEET TO THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21; THENCE S89°50'58" ON SAID NORTH LINE, A DISTANCE OF 2,471.06 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 12,695,360 FEET, OR 291.445 ACRES MORE OR LESS

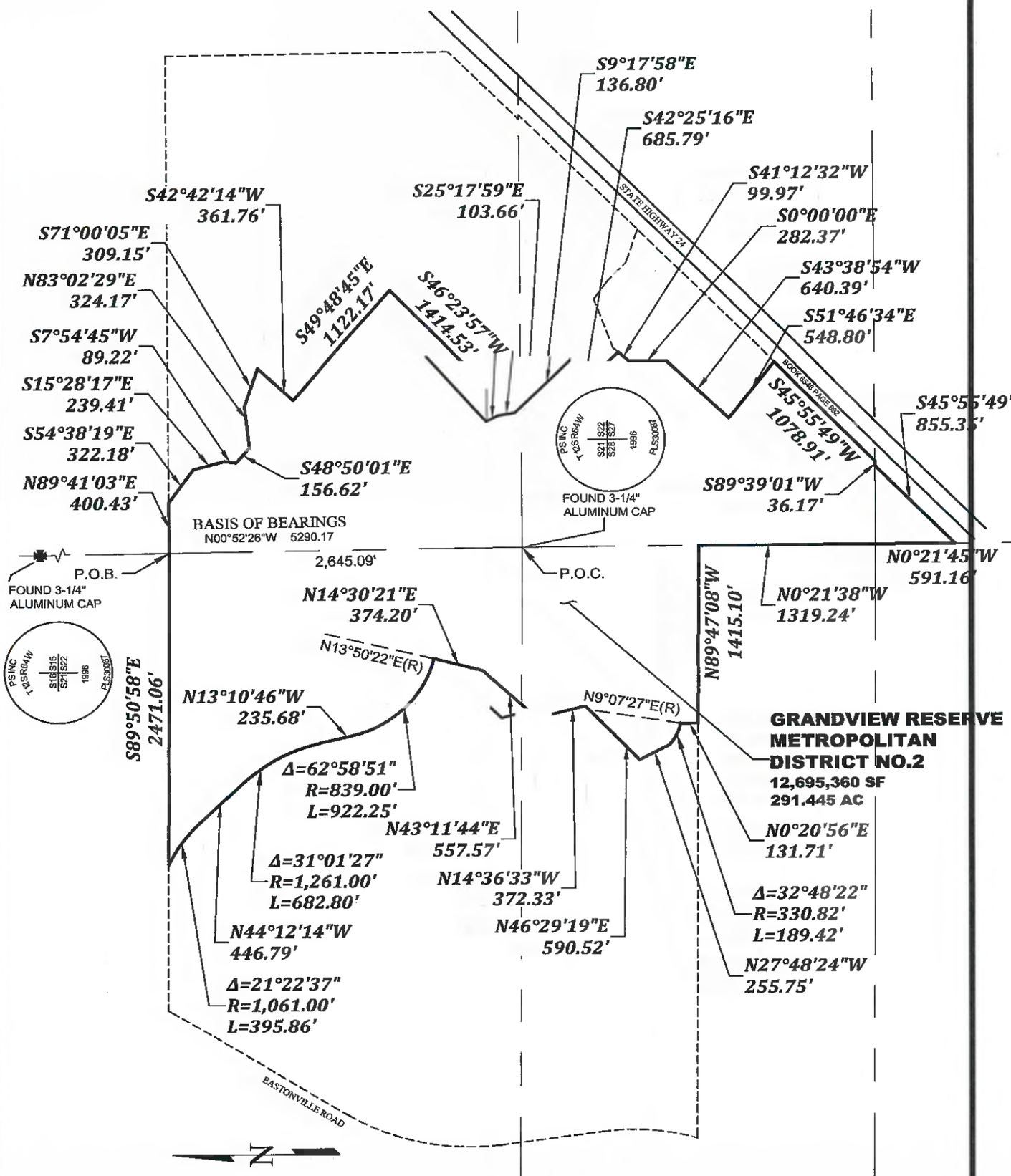
LEGAL DESCRIPTION STATEMENT

I, JONATHAN W. TESSIN, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY STATE THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED UNDER MY RESPONSIBLE CHARGE AND ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF IS CORRECT.



JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.

EXHIBIT B



LEGEND:

P.O.B	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCING

COLORADO REGISTERED
JOSEPH W TESSIN
33196
PROFESSIONAL LAND SURVEYOR

THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.

EDWARD-JAMES SURVEYING, INC
926 Elkton Dr.
Colorado Springs, CO 80907
(719) 576-1216
4732 Eagleridge Circle
Pueblo, CO 81008
(719) 545-6240

01-29-21
DISTRICT NO. 2

JOB NO. 1672-02
SHEET 3 OF 3

EXHIBIT G: TITLE COMMITMENT

INVOICE

Land Title Guarantee Company
5975 Greenwood Plaza Blvd Suite 125
Greenwood Village, CO 80111
719-634-4821

WELD COUNTY PROJECT
PETER MARTZ
PO BOX 50223
COLORADO SPRINGS, CO 80949

Reference

Your Reference Number:	TBD Commitment - 55099141
Our Order Number:	CSP-38464
Our Customer Number:	55955.2
Invoice Requested by:	PETER MARTZ
Invoice (Process) Date:	August 19, 2021
Transaction Invoiced By:	Web Services
Email Address:	system@ltgc.com

Invoice Number: CSP-38464 Date: August 19, 2021

Order Number: 55099141

Property Address: GRANDVIEW RESERVE FILING NO. 1 COLORADO SPRINGS

Parties: A Purchaser To Be Determined

Invoice Charges

Service:	TBD Commitment	$271.00
Ref:	55099141	
Addr:	GRANDVIEW RESERVE FILING NO. 1	
Party:	4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY	
		$271.00
Total Amount Invoiced:		$0.00
Less Payment(s):		$271.00
Balance Due:		

Due and Payable upon receipt

Please make check payable to Land Title Guarantee Company and send to the address at the top of Page 1.
Please reference **Invoice Number CSP-38464** on your Payment

Land Title Guarantee Company
Customer Distribution

PREVENT FRAUD - Please remember to call a member of our closing team when initiating a wire transfer or providing wiring instructions.

Order Number: **SC55099141** Date: **08/19/2021**

Property Address: **GRANDVIEW RESERVE FILING NO. 1, COLORADO SPRINGS, CO**

PLEASE CONTACT YOUR CLOSER OR CLOSER'S ASSISTANT FOR WIRE TRANSFER INSTRUCTIONS

For Closing Assistance

For Title Assistance
Robert Hayes
102 S TEJON #760
COLORADO SPRINGS, CO 80903
(303) 850-4136 (Work)
(719) 634-3190 (Work Fax)
rohayes@ltgc.com

Seller/Owner
4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY
Attention: PETER MARTZ
PO BOX 50223
COLORADO SPRINGS, CO 80949
(719) 491-3150 (Cell)
(719) 447-8773 (Work)
pmartzlrg@comcast.net
Delivered via: Electronic Mail

LAND TITLE GUARANTEE COMPANY
Attention: BRANDON STRAUB
102 S TEJON #760
COLORADO SPRINGS, CO 80903
(719) 659-6991 (Cell)
(719) 634-4821 (Work)
(719) 634-3190 (Work Fax)
bstraub@ltgc.com
Delivered via: Electronic Mail

Seller/Owner
4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY
Attention: PAUL HOWARD
1271 KELLY JOHNSON BOULEVARD
SUITE 100
COLORADO SPRINGS, CO 80920
(719) 499-8416 (Cell)
(719) 499-8419 (Work)
paulinfinity1@msn.com
Delivered via: Electronic Mail

HR GREEN
Attention: PHIL STUEPFERT
(630) 220-7936 (Cell)
(720) 602-4941 (Work)
pstuepfert@hrgreen.com
Delivered via: Electronic Mail

Seller/Owner
4 SITE INVESTMENTS, LLC, A COLORADO LIMITED
LIABILITY COMPANY
Attention: SAMUEL HOWARD
1271 KELLY JOHNSON BOULEVARD
SUITE 100
COLORADO SPRINGS, CO 80918
(719) 375-9123 (Work)
howardsamuel3@gmail.com
Delivered via: Electronic Mail

Land Title Guarantee Company
Estimate of Title Fees

Order Number: **SC55099141** Date: **08/19/2021**

Property Address: **GRANDVIEW RESERVE FILING NO. 1, COLORADO SPRINGS, CO**

Parties: **A PURCHASER TO BE DETERMINED**

4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY

Visit Land Title's Website at **www.ltgc.com** for directions to any of our offices.

Estimate of Title insurance Fees	
"TBD" Commitment	$271.00
	Total $271.00
If Land Title Guarantee Company will be closing this transaction, the fees listed above will be collected at closing.	
Thank you for your order!	

Note: The documents linked in this commitment should be reviewed carefully. These documents, such as covenants conditions and restrictions, may affect the title, ownership and use of the property. You may wish to engage legal assistance in order to fully understand and be aware of the implications of the effect of these documents on your property.

Chain of Title Documents:

El Paso county recorded 08/08/2018 under reception no. 218091620

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule A

Order Number: SC55099141

Property Address:

GRANDVIEW RESERVE FILING NO. 1, COLORADO SPRINGS, CO

1. **Effective Date:**

   08/13/2021 at 5:00 P.M.

2. **Policy to be Issued and Proposed Insured:**

   "TBD" Commitment $0.00
   Proposed Insured:
   A PURCHASER TO BE DETERMINED

3. **The estate or interest in the land described or referred to in this Commitment and covered herein is:**

   A FEE SIMPLE

4. **Title to the estate or interest covered herein is at the effective date hereof vested in:**

   4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY

5. **The Land referred to in this Commitment is described as follows:**

   ****
   NOTE: THE FOLLOWING LEGAL DESCRIPTION IS PRELIMINARY AND IS SUBJECT TO CHANGE UPON COMPLIANCE WITH THE REQUIREMENTS UNDER SCHEDULE B-1, HEREIN.
   ****

   A PARCEL TO BE PLATTED AS GRANDVIEW RESERVE FILING NO. 1:

   A TRACT OF LAND BEING A PORTION OF SECTION 21, AND A PORTION OF THE NORTH HALF OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:
   BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHERLY END BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHERLY END BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

   COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W ON THE EAST LINE OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21; THENCE N89°50'58"W, ON SAID NORTHERLY LINE, A DISTANCE OF 2,934.88 FEET TO THE POINT OF BEGINNING; THENCE S11°05'24"W, A DISTANCE OF 24.40 FEET; THENCE S78°54'36"E, A DISTANCE OF 185.19 FEET; THENCE S26°50'16"W, A DISTANCE OF 203.39 FEET TO A POINT OF CURVE, THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 32°15'55", A RADIUS OF 250.00 FEET, A DISTANCE OF 140.78 FEET TO A POINT OF TANGENT; THENCE S05°25'39"E, A DISTANCE OF 185.30 FEET TO A POINT OF CURVE, THENCE ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 11°17'04", A RADIUS OF 1,140.00 FEET, A DISTANCE OF 224.52 FEET TO A POINT OF TANGENT; THENCE S05°51'25"W, A DISTANCE OF 481.83 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING DELTA OF 55°09'30", A RADIUS

OF 550.00 FEET, A DISTANCE OF 529.48 FEET TO A POINT OF TANGENT; THENCE S49°18'05"E, A DISTANCE OF 342.14 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 29°29'59", A RADIUS OF 1,050.00 FEET, A DISTANCE OF 540.61 FEET TO A POINT OF TANGENT; THENCE S19°48'06"E, A DISTANCE OF 438.38 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 08°00'18", A RADIUS OF 1,950.00 FEET, A DISTANCE OF 272.44 FEET TO A POINT OF TANGENT; THENCE S27°48'24"E, A DISTANCE OF 779.86 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 61°56'07", A RADIUS OF 190.00 FEET, A DISTANCE OF 205.39 FEET TO A POINT OF TANGENT; THENCE S89°44'32"E, A DISTANCE OF 289.03 FEET; THENCE S00°12'52"W, A DISTANCE OF 111.41 FEET TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W, ON SAID SOUTH LINE, A DISTANCE OF A DISTANCE OF 2,630.21 FEET; THENCE N00°12'52"E, A DISTANCE OF 25.00 FEET; THENCE N89°47'08"W, A DISTANCE OF 679.35 FEET; THENCE N44°47'01"W, A DISTANCE OF 42.37 FEET; THENCE N41°52'38"E, A DISTANCE OF 21.11 FEET; THENCE N41°03'22"E, A DISTANCE OF 139.03 FEET; THENCE S89°58'12"W, A DISTANCE OF 288.62 FEET TO A POINT ON CURVE, SAID POINT BEING ON THE EASTERLY RIGHT-OF-WAY LINE OF EXISTING EASTONVILLE ROAD (60.00 FOOT WIDE); THENCE ON SAID EASTERLY RIGHT-OF-WAY AS DEFINED BY CERTIFIED BOUNDARY SURVEY, AS RECORDED JULY 18, 2001 UNDER DEPOSIT NO. (RECEPTION NO.) **201900096**, THE FOLLOWING SEVEN (7) COURSES:

1. ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS N79°27'48"W, HAVING A DELTA OF 18°12'30", A RADIUS OF 1,630.00 FEET; A DISTANCE OF 518.00 FEET TO A POINT OF TANGENT;
2. N07°40'18"W, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;
3. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 39°01'10", A RADIUS OF 1,770.00 FEET, A DISTANCE OF 1,205.40 FEET TO A POINT OF TANGENT;
4. N31°20'52"E, A DISTANCE OF 1,517.37 FEET TO A POINT OF CURVE;
5. ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 2°07'03", A RADIUS OF 1,330.00 FEET, A DISTANCE OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;
6. THENCE CONTINUING ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 09°53'50", A RADIUS OF 1,330.00 FEET, A DISTANCE OF 229.74 FEET TO A POINT OF TANGENT;
7. N19°19'59"E, A DISTANCE OF 81.04 FEET;

THENCE S74°09'13"E, A DISTANCE OF 47.53 FEET; THENCE S27°01'36"E, A DISTANCE OF 35.92 FEET; THENCE S71°02'24"E, A DISTANCE OF 160.69 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 07°52'12", A RADIUS OF 1,150.00 FEET, A DISTANCE OF 157.96 FEET TO A POINT OF TANGENT; THENCE S78°54'36"E, A DISTANCE OF 237.75 FEET; THENCE S11°05'24"W, A DISTANCE OF 105.60 FEET TO THE POINT OF BEGINNING.

PREPARED BY:
JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.
AUGUST 11, 2021

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule A

Order Number: SC55099141

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule B, Part I

(Requirements)

Order Number: SC55099141

All of the following Requirements must be met:

This proposed Insured must notify the Company in writing of the name of any party not referred to in this Commitment who will obtain an interest in the Land or who will make a loan on the Land. The Company may then make additional Requirements or Exceptions.

Pay the agreed amount for the estate or interest to be insured.

Pay the premiums, fees, and charges for the Policy to the Company.

Documents satisfactory to the Company that convey the Title or create the Mortgage to be insured, or both, must be properly authorized, executed, delivered, and recorded in the Public Records.

1. PARTIAL RELEASE OF DEED OF TRUST DATED AUGUST 07, 2019 FROM 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY TO THE PUBLIC TRUSTEE OF EL PASO COUNTY FOR THE USE OF PFG FUND II, LLC TO SECURE THE SUM OF $2,400,000.00 RECORDED AUGUST 08, 2019, UNDER RECEPTION NO. **219092123**.

   MODIFICATION RECORDED DECEMBER 18, 2020 UNDER RECEPTION NO. **220208112**.

   NOTE: TRI-PARTY AGREEMENT IN CONNECTION WITH SAID DEED OF TRUST RECORDED APRIL 7, 2021 UNDER RECEPTION NO. **221069463**.

2. PARTIAL RELEASE OF DEED OF TRUST FROM 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY TO THE PUBLIC TRUSTEE OF EL PASO COUNTY FOR THE USE OF PFG FUND II, LLC TO SECURE THE SUM OF $1,515,000.00 RECORDED DECEMBER 18, 2020, UNDER RECEPTION NO. **220208111**.

   NOTE: TRI-PARTY AGREEMENT IN CONNECTION WITH SAID DEED OF TRUST RECORDED APRIL 7, 2021 UNDER RECEPTION NO. **221069463**.

3. PARTIAL RELEASE OF DEED OF TRUST DATED APRIL 07, 2021 FROM 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY TO THE PUBLIC TRUSTEE OF EL PASO COUNTY FOR THE USE OF A PURCHASER TO BE DETERMINED TO SECURE THE SUM OF $250,000.00 RECORDED APRIL 07, 2021, UNDER RECEPTION NO. **221069464**.

   NOTE: TRI-PARTY AGREEMENT IN CONNECTION WITH SAID DEED OF TRUST RECORDED APRIL 7, 2021 UNDER RECEPTION NO. **221069463**.

4. RECORD DULY EXECUTED AND ACKNOWLEDGED PLAT OF GRANDVIEW RESERVE, FILING NO. 1.

   NOTE: A COPY OF SAID PLAT MUST BE SUBMITTED TO LAND TITLE GUARANTEE COMPANY PRIOR TO RECORDATION. UPON RECEIPT AND REVIEW FURTHER REQUIREMENTS AND/OR EXCEPTIONS MAY BE NECESSARY.

5. SPECIAL WARRANTY DEED FROM 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY TO A PURCHASER TO BE DETERMINED CONVEYING SUBJECT PROPERTY.

   NOTE: THE OPERATING AGREEMENT FOR 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY DISCLOSES PAUL J. HOWARD AND PETER MARTZ AS THE MANAGERS THAT MUST EXECUTE LEGAL INSTRUMENTS ON BEHALF OF SAID ENTITY.

   NOTE: THE STATEMENT OF AUTHORITY FOR 4 SITE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY RECORDED APRIL 07, 2021 AS RECEPTION NO. **221069462** DISCLOSES PAUL J. HOWARD AND PETER MARTZ AS THE MANAGERS AUTHORIZED TO EXECUTE LEGAL INSTRUMENTS ON BEHALF OF SAID ENTITY.

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule B, Part I

(Requirements)

Order Number: SC55099141

All of the following Requirements must be met:

NOTE: ALL PARTIES WILL BE REQUIRED TO SIGN A FINAL AFFIDAVIT AND AGREEMENT AT CLOSING.

NOTE: ITEM 5 OF THE STANDARD EXCEPTIONS WILL BE DELETED IF LAND TITLE GUARANTEE COMPANY CONDUCTS THE CLOSING OF THE CONTEMPLATED TRANSACTION(S) AND RECORDS THE DOCUMENTS IN CONNECTION THEREWITH.

NOTE: UPON PROOF OF PAYMENT OF 2020 TAXES, ITEM 7 UNDER SCHEDULE B-2 WILL BE DELETED AND ITEM 6 WILL BE AMENDED TO READ:

TAXES AND ASSESSMENTS FOR THE YEAR 2021, AND SUBSEQUENT YEARS, NOT YET DUE OR PAYABLE.

NOTE: ADDITIONAL REQUIREMENTS OR EXCEPTIONS MAY BE NECESSARY WHEN THE BUYERS NAMES ARE ADDED TO THIS COMMITMENT. COVERAGES AND/OR CHARGES REFLECTED HEREIN, IF ANY, ARE SUBJECT TO CHANGE UPON RECEIPT OF THE CONTRACT TO BUY AND SELL REAL ESTATE AND ANY AMENDMENTS THERETO.

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule B, Part II

(Exceptions)

Order Number: SC55099141

This commitment does not republish any covenants, condition, restriction, or limitation contained in any document referred to in this commitment to the extent that the specific covenant, conditions, restriction, or limitation violates state or federal law based on race, color, religion, sex, sexual orientation, gender identity, handicap, familial status, or national origin.

1. **Any facts, rights, interests, or claims thereof, not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.**
2. **Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.**
3. **Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.**
4. **Any lien, or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the Public Records.**
5. **Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the public records or attaching subsequent to the effective date hereof but prior to the date of the proposed insured acquires of record for value the estate or interest or mortgage thereon covered by this Commitment.**
6. **(a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.**
7. **(a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water.**
8. EXISTING LEASES AND TENANCIES.

   NOTE: TO BE DELETED UPON CONFIRMATION OF NO EXISTING LEASES OR TENANCIES IN SELLER'S FINAL AFFIDAVIT.
9. ANY INTEREST WHICH MAY HAVE BEEN ACQUIRED BY THE PUBLIC IN AND TO THE SUBJECT PROPERTY BY REASON OF RESOLUTION OF BOARD OF COUNTY COMMISSIONERS DATED AND RECORDED OCTOBER 3, 1887, IN ROAD BOOK A AT PAGE **78** WHICH PROVIDED FOR PUBLIC ROADS 60 FEET IN WIDTH BEING 30 FEET ON EITHER SIDE OF SECTION LINES ON THE PUBLIC DOMAIN.
10. RIGHT OF WAY EASEMENT AS GRANTED TO THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY IN INSTRUMENT RECORDED NOVEMBER 18, 1963, IN BOOK 1986 AT PAGE **795**.
11. RIGHT OF WAY EASEMENT AS GRANTED TO COLORADO INTERSTATE GAS COMPANY IN INSTRUMENT RECORDED NOVEMBER 19, 1971, IN BOOK 2450 AT PAGE **586**.
12. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS, OBLIGATIONS AND EASEMENTS OF RULE AND ORDER RECORDED APRIL 24, 1997 AT RECEPTION NO. **97046029**.
    NOTE: THIS EXCEPTION WILL BE AMENDED UPON RECORDATION OF AGREEMENT.

ALTA COMMITMENT

Old Republic National Title Insurance Company

Schedule B, Part II

(Exceptions)

Order Number: SC55099141

13. WATER RIGHTS, CLAIMS OR TITLE TO WATER, INCLUDING BUT NOT LIMITED TO COLORADO GROUND WATER COMMISSION FINDINGS AND ORDER RECORDED SEPTEMBER 10, 2004 UNDER RECEPTION NO. **204153948**.
14. TERMS, CONDITIONS AND PROVISIONS OF WATER EASEMENT AGREEMENT RECORDED NOVEMBER 06, 2007 AT RECEPTION NO. **207143740**. CONSENT TO GRANT OF EASEMENT RECORDED NOVEMBER 6, 2007 UNDER RECEPTION NO. **207143741**.
15. RIGHT OF WAY EASEMENT AS GRANTED TO MOUNTAIN VIEW ELECTRIC ASSOCIATION, INC., A COLORADO CORPORATION IN INSTRUMENT RECORDED APRIL 13, 2010, UNDER RECEPTION NO. **210034079** AND AMENDMENT TO THE GRANT OF RIGHT-OF-WAY RECORDED MAY 18, 2010 UNDER RECEPTION NO. **210046560**.
16. ANY AND ALL WATER RIGHTS CONVEYED BY SPECIAL WARRANTY DEED RECORDED AUGUST 8, 2018, UNDER RECEPTION NO. **218091621**.
17. ANY AND ALL WATER RIGHTS CONVEYED BY QUIT CLAIM DEED RECORDED AUGUST 8, 2019 UNDER RECEPTION NO. **219092121**.
18. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DECLARATION OF PFG FUND II, LLC CONCERNING CERTAIN WATER RIGHTS PLEDGED AS COLLATERAL BY 4 SITE INVESTMENTS, LLC, FOR THE BENEFIT OF PFG FUND II, LLC RECORDED AUGUST 08, 2019 UNDER RECEPTION NO. **219092171**.
19. WATER LEASE IN FAVOR OF SPRING CREEK, LLC, A COLORADO LIMITED LIABILITY COMPANY AS EVIDENCED IN SECOND AMENDED WATER RIGHTS LEASE RECORDED SEPTEMBER 22, 2020 UNDER RECEPTION NO. **220147708**.
20. THE EFFECT OF RESOLUTION NO. 20-342, RECORDED SEPTEMBER 23, 2020, UNDER RECEPTION NO. **220148200**.
21. EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF GRANDVIEW RESERVE FILING NO. 1 RECORDED _____ UNDER RECEPTION NO. _____. (TO BE RECORDED)

LAND TITLE GUARANTEE COMPANY
DISCLOSURE STATEMENTS

Note: Pursuant to CRS 10-11-122, notice is hereby given that:

(A) The Subject real property may be located in a special taxing district.

(B) A certificate of taxes due listing each taxing jurisdiction will be obtained from the county treasurer of the county in which the real property is located or that county treasurer's authorized agent unless the proposed insured provides written instructions to the contrary. (for an Owner's Policy of Title Insurance pertaining to a sale of residential real property).

(C) The information regarding special districts and the boundaries of such districts may be obtained from the Board of County Commissioners, the County Clerk and Recorder, or the County Assessor.

Note: Effective September 1, 1997, CRS 30-10-406 requires that all documents received for recording or filing in the clerk and recorder's office shall contain a top margin of at least one inch and a left, right and bottom margin of at least one half of an inch. The clerk and recorder may refuse to record or file any document that does not conform, except that, the requirement for the top margin shall not apply to documents using forms on which space is provided for recording or filing information at the top margin of the document.

Note: Colorado Division of Insurance Regulations 8-1-2 requires that "Every title entity shall be responsible for all matters which appear of record prior to the time of recording whenever the title entity conducts the closing and is responsible for recording or filing of legal documents resulting from the transaction which was closed". Provided that Land Title Guarantee Company conducts the closing of the insured transaction and is responsible for recording the legal documents from the transaction, exception number 5 will not appear on the Owner's Title Policy and the Lenders Policy when issued.

Note: Affirmative mechanic's lien protection for the Owner may be available (typically by deletion of Exception no. 4 of Schedule B, Section 2 of the Commitment from the Owner's Policy to be issued) upon compliance with the following conditions:

(A) The land described in Schedule A of this commitment must be a single family residence which includes a condominium or townhouse unit.

(B) No labor or materials have been furnished by mechanics or material-men for purposes of construction on the land described in Schedule A of this Commitment within the past 6 months.

(C) The Company must receive an appropriate affidavit indemnifying the Company against un-filed mechanic's and material-men's liens.

(D) The Company must receive payment of the appropriate premium.

(E) If there has been construction, improvements or major repairs undertaken on the property to be purchased within six months prior to the Date of Commitment, the requirements to obtain coverage for unrecorded liens will include: disclosure of certain construction information; financial information as to the seller, the builder and or the contractor; payment of the appropriate premium fully executed Indemnity Agreements satisfactory to the company, and, any additional requirements as may be necessary after an examination of the aforesaid information by the Company.

No coverage will be given under any circumstances for labor or material for which the insured has contracted for or agreed to pay.

Note: Pursuant to CRS 10-11-123, notice is hereby given:

This notice applies to owner's policy commitments disclosing that a mineral estate has been severed from the surface estate, in Schedule B-2.

(A) That there is recorded evidence that a mineral estate has been severed, leased, or otherwise conveyed from the surface estate and that there is substantial likelihood that a third party holds some or all interest in oil, gas, other minerals, or geothermal energy in the property; and

(B) That such mineral estate may include the right to enter and use the property without the surface owner's permission.

Note: Pursuant to CRS 10-1-128(6)(a), It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policyholder or claimant for the purpose of defrauding or attempting to defraud the policyholder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

Note: Pursuant to Colorado Division of Insurance Regulations 8-1-3, notice is hereby given of the availability of a closing protection letter for the lender, purchaser, lessee or seller in connection with this transaction.

Note: Pursuant to CRS 10-1-11(4)(a)(1), Colorado notaries may remotely notarize real estate deeds and other documents using real-time audio-video communication technology. You may choose not to use remote notarization for any document.

JOINT NOTICE OF PRIVACY POLICY OF LAND TITLE GUARANTEE COMPANY, LAND TITLE GUARANTEE COMPANY OF SUMMIT COUNTY LAND TITLE INSURANCE CORPORATION AND OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

This Statement is provided to you as a customer of Land Title Guarantee Company as agent for Land Title Insurance Corporation and Old Republic National Title Insurance Company.

We want you to know that we recognize and respect your privacy expectations and the requirements of federal and state privacy laws. Information security is one of our highest priorities. We recognize that maintaining your trust and confidence is the bedrock of our business. We maintain and regularly review internal and external safeguards against unauthorized access to your non-public personal information ("Personal Information").

In the course of our business, we may collect Personal Information about you from:

- applications or other forms we receive from you, including communications sent through TMX, our web-based transaction management system;
- your transactions with, or from the services being performed by us, our affiliates, or others;
- a consumer reporting agency, if such information is provided to us in connection with your transaction;

  and
- The public records maintained by governmental entities that we obtain either directly from those entities, or from our affiliates and non-affiliates.

Our policies regarding the protection of the confidentiality and security of your Personal Information are as follows:

- We restrict access to all Personal Information about you to those employees who need to know that information in order to provide products and services to you.
- We may share your Personal Information with affiliated contractors or service providers who provide services in the course of our business, but only to the extent necessary for these providers to perform their services and to provide these services to you as may be required by your transaction.
- We maintain physical, electronic and procedural safeguards that comply with federal standards to protect your Personal Information from unauthorized access or intrusion.
- Employees who violate our strict policies and procedures regarding privacy are subject to disciplinary action.
- We regularly assess security standards and procedures to protect against unauthorized access to Personal Information.

WE DO NOT DISCLOSE ANY PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT STATED ABOVE OR PERMITTED BY LAW.

Consistent with applicable privacy laws, there are some situations in which Personal Information may be disclosed. We may disclose your Personal Information when you direct or give us permission; when we are required by law to do so, for example, if we are served a subpoena; or when we suspect fraudulent or criminal activities. We also may disclose your Personal Information when otherwise permitted by applicable privacy laws such as, for example, when disclosure is needed to enforce our rights arising out of any agreement, transaction or relationship with you.

Our policy regarding dispute resolution is as follows: Any controversy or claim arising out of or relating to our privacy policy, or the breach thereof, shall be settled by arbitration in accordance with the rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

Commitment For Title Insurance

Issued by Old Republic National Title Insurance Company

NOTICE

IMPORTANT—READ CAREFULLY: THIS COMMITMENT IS AN OFFER TO ISSUE ONE OR MORE TITLE INSURANCE POLICIES. ALL CLAIMS OR REMEDIES SOUGHT AGAINST THE COMPANY INVOLVING THE CONTENT OF THIS COMMITMENT OR THE POLICY MUST BE BASED SOLELY IN CONTRACT.

THIS COMMITMENT IS NOT AN ABSTRACT OF TITLE, REPORT OF THE CONDITION OF TITLE, LEGAL OPINION, OPINION OF TITLE, OR OTHER REPRESENTATION OF THE STATUS OF TITLE. THE PROCEDURES USED BY THE COMPANY TO DETERMINE INSURABILITY OF THE TITLE, INCLUDING ANY SEARCH AND EXAMINATION, ARE PROPRIETARY TO THE COMPANY, WERE PERFORMED SOLELY FOR THE BENEFIT OF THE COMPANY, AND CREATE NO EXTRACONTRACTUAL LIABILITY TO ANY PERSON, INCLUDING A PROPOSED INSURED.

THE COMPANY'S OBLIGATION UNDER THIS COMMITMENT IS TO ISSUE A POLICY TO A PROPOSED INSURED IDENTIFIED IN SCHEDULE A IN ACCORDANCE WITH THE TERMS AND PROVISIONS OF THIS COMMITMENT. THE COMPANY HAS NO LIABILITY OR OBLIGATION INVOLVING THE CONTENT OF THIS COMMITMENT TO ANY OTHER PERSON. .

COMMITMENT TO ISSUE POLICY

Subject to the Notice; Schedule B, Part I—Requirements; Schedule B, Part II—Exceptions; and the Commitment Conditions, Old Republic National Title Insurance Company, a Minnesota corporation (the "Company"), commits to issue the Policy according to the terms and provisions of this Commitment. This Commitment is effective as of the Commitment Date shown in Schedule A for each Policy described in Schedule A, only when the Company has entered in Schedule A both the specified dollar amount as the Proposed Policy Amount and the name of the Proposed Insured. If all of the Schedule B, Part I—Requirements have not been met within 6 months after the Commitment Date, this Commitment terminates and the Company's liability and obligation end.

COMMITMENT CONDITIONS

1. DEFINITIONS
   (a) "Knowledge" or "Known": Actual or imputed knowledge, but not constructive notice imparted by the Public Records.
   (b) "Land": The land described in Schedule A and affixed improvements that by law constitute real property. The term "Land" does not include any property beyond the lines of the area described in Schedule A, nor any right, title, interest, estate, or easement in abutting streets, roads, avenues, alleys, lanes, ways, or waterways, but this does not modify or limit the extent that a right of access to and from the Land is to be insured by the Policy.
   (c) "Mortgage": A mortgage, deed of trust, or other security instrument, including one evidenced by electronic means authorized by law.
   (d) "Policy": Each contract of title insurance, in a form adopted by the American Land Title Association, issued or to be issued by the Company pursuant to this Commitment.
   (e) "Proposed Insured": Each person identified in Schedule A as the Proposed Insured of each Policy to be issued pursuant to this Commitment.
   (f) "Proposed Policy Amount": Each dollar amount specified in Schedule A as the Proposed Policy Amount of each Policy to be issued pursuant to this Commitment.
   (g) "Public Records": Records established under state statutes at the Commitment Date for the purpose of imparting constructive notice of matters relating to real property to purchasers for value and without Knowledge.
   (h) "Title": The estate or interest described in Schedule A.

2. If all of the Schedule B, Part I—Requirements have not been met within the time period specified in the Commitment to Issue Policy, Commitment terminates and the Company's liability and obligation end.

3. The Company's liability and obligation is limited by and this Commitment is not valid without:
   (a) the Notice;
   (b) the Commitment to Issue Policy;
   (c) the Commitment Conditions;
   (d) Schedule A;
   (e) Schedule B, Part I—Requirements; and
   (f) Schedule B, Part II—Exceptions; and
   (g) a counter-signature by the Company or its issuing agent that may be in electronic form.

4. **COMPANY'S RIGHT TO AMEND**

   The Company may amend this Commitment at any time. If the Company amends this Commitment to add a defect, lien, encumbrance, adverse claim, or other matter recorded in the Public Records prior to the Commitment Date, any liability of the Company is limited by Commitment Condition 5. The Company shall not be liable for any other amendment to this Commitment.

5. **LIMITATIONS OF LIABILITY**
   (a) The Company's liability under Commitment Condition 4 is limited to the Proposed Insured's actual expense incurred in the interval between the Company's delivery to the Proposed Insured of the Commitment and the delivery of the amended Commitment, resulting from the Proposed Insured's good faith reliance to:
      i. comply with the Schedule B, Part I—Requirements;
      ii. eliminate, with the Company's written consent, any Schedule B, Part II—Exceptions; or
      iii. acquire the Title or create the Mortgage covered by this Commitment.
   (b) The Company shall not be liable under Commitment Condition 5(a) if the Proposed Insured requested the amendment or had Knowledge of the matter and did not notify the Company about it in writing.
   (c) The Company will only have liability under Commitment Condition 4 if the Proposed Insured would not have incurred the expense had the Commitment included the added matter when the Commitment was first delivered to the Proposed Insured.
   (d) The Company's liability shall not exceed the lesser of the Proposed Insured's actual expense incurred in good faith and described in Commitment Conditions 5(a)(i) through 5(a)(iii) or the Proposed Policy Amount.
   (e) The Company shall not be liable for the content of the Transaction Identification Data, if any.

(f) In no event shall the Company be obligated to issue the Policy referred to in this Commitment unless all of the Schedule B, Part I—Requirements have been met to the satisfaction of the Company.
(g) In any event, the Company's liability is limited by the terms and provisions of the Policy.

6. **LIABILITY OF THE COMPANY MUST BE BASED ON THIS COMMITMENT**
   (a) Only a Proposed Insured identified in Schedule A, and no other person, may make a claim under this Commitment.
   (b) Any claim must be based in contract and must be restricted solely to the terms and provisions of this Commitment.
   (c) Until the Policy is issued, this Commitment, as last revised, is the exclusive and entire agreement between the parties with respect to the subject matter of this Commitment and supersedes all prior commitment negotiations, representations, and proposals of any kind, whether written or oral, express or implied, relating to the subject matter of this Commitment.
   (d) The deletion or modification of any Schedule B, Part II—Exception does not constitute an agreement or obligation to provide coverage beyond the terms and provisions of this Commitment or the Policy.
   (e) Any amendment or endorsement to this Commitment must be in writing and authenticated by a person authorized by the Company.
   (f) When the Policy is issued, all liability and obligation under this Commitment will end and the Company's only liability will be under the Policy.

7. **IF THIS COMMITMENT HAS BEEN ISSUED BY AN ISSUING AGENT**

   The issuing agent is the Company's agent only for the limited purpose of issuing title insurance commitments and policies. The issuing agent is not the Company's agent for the purpose of providing closing or settlement services.
8. **PRO-FORMA POLICY**

   The Company may provide, at the request of a Proposed Insured, a pro-forma policy illustrating the coverage that the Company may provide. A pro-forma policy neither reflects the status of Title at the time that the pro-forma policy is delivered to a Proposed Insured, nor is it a commitment to insure.
9. **ARBITRATION**

   The Policy contains an arbitration clause. All arbitrable matters when the Proposed Policy Amount is $2,000,000 or less shall be arbitrated at the option of either the Company or the Proposed Insured as the exclusive remedy of the parties. A Proposed Insured may review a copy of the arbitration rules at http://www.alta.org/arbitration.

IN WITNESS WHEREOF, Land Title Insurance Corporation has caused its corporate name and seal to be affixed by its duly authorized officers on the date shown in Schedule A to be valid when countersigned by a validating officer or other authorized signatory.

Issued by:
Land Title Guarantee Company
3033 East First Avenue Suite 600
Denver, Colorado 80206
303-321-1880

Craig B. Rants, Senior Vice President

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
A Stock Company
400 Second Avenue South, Minneapolis, Minnesota 55401
(612) 371-1111

By _____ President
Attest _____ Secretary

This page is only a part of a 2016 ALTA® Commitment for Title Insurance issued by Land Title Insurance Corporation. This Commitment is not valid without the Notice; the Commitment to Issue Policy; the Commitment Conditions; Schedule A; Schedule B, Part I—Requirements; and Schedule B, Part II—Exceptions; and a counter-signature by the Company or its issuing agent that may be in electronic form.

EXHIBIT H: NOTICE TO MINERAL ESTATE OWNERS

CERTIFICATION:

I Mike Bramlett on behalf of JR Engineering researched the records of the El Paso County Clerk and Recorder and established that there was/~~was not~~ a mineral estate owner(s) on the real property known as Grandview Reserve. An initial public hearing on Grandview Reserve Preliminary Plan which is the subject of the hearing, is schedules for to be determined, ~~2000~~ 2019.

~~Pursuant to §24-65.5-103(4), C.R.S., I certify that a Notice of an initial public hearing was mailed to the mineral estate owner(s) (if established above) and a copy was mailed to the El Paso County Planning Department on _____, 200____.~~

Dated this 8 day of January, 20~~0~~19.

STATE OF COLORADO)
) s.s.
COUNTY OF EL PASO)

The foregoing certification was acknowledged before me this 8 day of January, 20~~0~~19, by Mike Bramlett.

Witness my hand and official seal.

My Commission Expires: 09-01-2020

LADONNA NELSON
Notary Public
State of Colorado
Notary ID # 20164033617
My Commission Expires 09-01-2020

LaDonna Nelson
Notary Public

EXHIBIT I: GRANDVIEW RESERVE SKETCH PLAN

GRANDVIEW RESERVE SKETCH PLAN

TOWNHIP T12S, RANGE R64W, 38.9847°N 104.5520°W
EAST OF EASTONVILLE RD., WEST OF HWY 24, NORTH OF STAPLETON RD.
EL PASO COUNTY, COLORADO

LEGAL DESCRIPTION

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, A PORTION OF THE SOUTH HALF OF SECTION 22, A PORTION OF THE NORTH HALF OF SECTION 28, AND A PORTION OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS:
THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED "PS INC PLS 30087 1996", AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED "PS INC PLS 30087 1996", BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO;
THENCE N00°52'26"W ON THE EAST LINE OF SAID SECTION 21, A DISTANCE OF 2645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21, SAID POINT BEING THE POINT OF BEGINNING; THENCE N89°41'03"E ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 22, A DISTANCE OF 3938.19 FEET; THENCE S00°41'58"E ON THE EAST LINE OF THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 22, A DISTANCE OF 2,117.66 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THAT WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID NORTHWESTERLY RIGHT-OF-WAY LINE THE FOLLOWING FIVE (5) COURSES:

1. S45°55'49"W, A DISTANCE OF 758.36 FEET TO A POINT ON THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 22;
2. N89°38'06"E ON SAID SOUTH LINE, A DISTANCE OF 36.18 FEET;
3. S45°55'49"W, A DISTANCE OF 3818.92 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 27;
4. S89°39'01"W ON SAID NORTH LINE, A DISTANCE OF 36.17 FEET;
5. S45°55'49"W, A DISTANCE OF 855.35 FEET TO A POINT ON THE EASTERLY LINE OF SAID SECTION 28;

THENCE N00°21'45"W ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 591.16 TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER; THENCE N00°21'38"W ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W ON SAID SOUTH LINE, A DISTANCE OF 4,692.55 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF EXISTING EASTONVILLE ROAD (60.00 FOOT WIDE); THENCE ON SAID EASTERLY RIGHT-OF-WAY AS DEFINED BY CERTIFIED BOUNDARY SURVEY, AS RECORDED UNDER DEPOSIT NO. 201900096, THE FOLLOWING FIVE (5) COURSES:

1. ON THE ARC OF A CURVE TO THE LEFT; WHOSE CENTER BEARS N73°08'46"W, HAVING A DELTA OF 24°31'32", A RADIUS OF 1,630.00 FEET; A DISTANCE OF 697.72 FEET TO A POINT OF TANGENT;
2. N07°40'18"W, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;
3. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 39°01'10", A RADIUS OF 1,770.00 FEET, A DISTANCE OF 1,205.40 FEET TO A POINT OF TANGENT;
4. N31°20'52"E, A DISTANCE OF 1,517.37 FEET TO A POINT OF CURVE;
5. ON THE ARC OF A CURVE OT THE LEFT, HAVING A DELTA OF 2°07'03", A RADIUS OF 1,330.00 FEET, A DISTANCE OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;

THENCE S89°50'58"E ON SAID NORTH LINE, A DISTANCE OF 3,635.53 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 768.2334 ACRES MORE OR LESS.

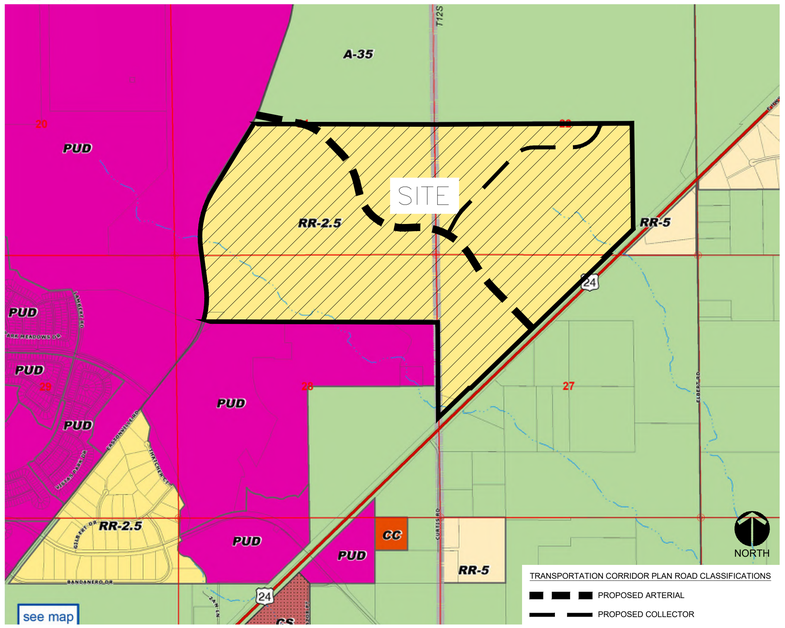
NOTES

GENERAL NOTES

1. A TOTAL OF 3260 DWELLING UNITS ARE ALLOWED WITHIN THE GRANDVIEW RESERVE PROJECT.
2. CLUSTERING OF UNITS WITHIN RESIDENTIAL DISTRICTS IS PERMITTED, BUT NOT REQUIRED, SO LONG AS THE OVERALL DENSITY LIMIT IS NOT EXCEEDED. THE USE OF CLUSTERING IS ENCOURAGED TO PROMOTE COMMON OPEN SPACE, PROTECT NATURAL FEATURES, AND PROVIDE CREATIVE AND FLEXIBLE DESIGN ALTERNATIVES.
3. A DENSITY TRANSFER MAY BE PERMITTED ON GRANDVIEW RESERVE FOR ALL RESIDENTIAL DISTRICTS. THIS TRANSFER WOULD BE PROPOSED AT THE TIME OF REZONING AND/OR PRELIMINARY PLAN (WHERE APPROPRIATE) AND WOULD NEED TO BE REVIEWED BY STAFF TO ENSURE THAT THE OVERALL DEVELOPMENT CONCEPT IS ADHERED TO. A DENSITY TRANSFER NOT TO EXCEED TWENTY PERCENT (20%) OF THE MAXIMUM UNITS FOR EACH PARCEL IS PERMITTED. THE TRANSFERRED DENSITY SHALL MEET ALL MINIMUM REQUIREMENTS OF THE RECEIVING AREA SUCH AS LOT SIZE, SETBACKS, ETC. IN NO CASE SHALL THE OVERALL DENSITY CAP EXCEED THE TOTAL UNITS APPROVED FOR THE PROJECT.
4. SPECIFIC DEVELOPMENT STANDARDS SUCH AS SETBACKS, LOT COVERAGE, BUILDING HEIGHTS AND LAND USES SHALL BE ADDRESSED WITH A SUBSEQUENT ZONING OF THE PROPERTY AT A LATER DATE. THESE STANDARDS WILL EITHER FOLLOW SPECIFIC PROPOSED PUD DEVELOPMENT PLANS OR PER COUNTY ZONING STANDARDS IF FOLLOWING "STRAIGHT ZONING" OF THE COUNT.
5. COMMERCIAL USES SHALL BE ALLOWED TO DEVELOP INDEPENDENT OF THE PHASING PLAN AS MARKET FACTORS ALLOW.
6. ALL COMMON LANDSCAPE, OPEN SPACE, PARKS, TRACTS AND DRAINAGE FACILITIES WITHIN THIS DEVELOPMENT SHALL BE OWNED AND MAINTAINED BY THE DISTRICT.
7. ALL DETENTION PONDS AND CROSS LOT DRAINAGE DITCHES WILL BE LOCATED WITHIN DRAINAGE EASEMENTS PROVIDING ACCESS FOR MAINTENANCE TO THE GRANDVIEW RESERVE METROPOLITAN DISTRICT NO.1.
8. THERE SHALL BE NO DIRECT LOT ACCESS TO STATE HIGHWAY 24, EASTONVILLE ROAD OR REX ROAD.
9. NOISE STUDY WILL BE SUBMITTED WITH SUBSEQUENT SUBMITTAL WHERE APPROPRIATE TO MITIGATE IMPACTS FROM EASTONVILLE, RE ROAD AND HWY 24 TO THE PROJECT AREA.
10. PARK IMPROVEMENTS PROVIDED BY THE DEVELOPER MAY BE APPLIED TO PARK LAND DEDICATION AND/OR FEES WITH REVIEW AND APPROVAL BY EL PASO COUNTY PARKS. ANY PARK IMPROVEMENTS WILL BE COORDINATED AT A LATER DATE WITH EL PASO COUNTY PARKS VIA PARK LAND AGREEMENTS.
11. POTENTIAL SCHOOL SITE IS PROVIDED AS SHOWN ON THE PLAN AS INSTITUTIONAL.
12. SCHOOL SITE (10.7 AC) IS SHOWN WITH THE INTENT OF GETTING FULL CREDIT IN LIEU OF FEES. IF THE SCHOOL SITE IS NOT ACCEPTED FEES IN LIEU OF LAND WILL BE PROVIDED.
13. ALL ELECTRIC SERVICE SHALL BE PROVIDED BY MOUNTAIN VIEW ELECTRIC ASSOCIATION. BLACK HILLS ENERGY AND NATURAL GAS EASEMENTS WILL BE PROVIDED AS REQUIRED.
14. SITE LIGHTING, IF REQUIRED, WILL MEET THE REQUIREMENTS SET FORTH IN SECTION 6.2.3 OF EL PASO COUNTY LAND DEVELOPMENT CODE.
15. THE DEVELOPER SHALL COMPLY WITH FEDERAL AND STATE LAWS, REGULATIONS, ORDINANCES, REVIEW AND PERMIT REQUIREMENTS, AN OTHER AGENCY REQUIREMENTS, IF ANY, OF APPLICABLE AGENCIES INCLUDING, BUT NOT LIMITED TO, THE COLORADO PARKS AND WILDLIFE, COLORADO DEPARTMENT OF TRANSPORTATION, U.S. ARMY CORPS OF ENGINEERS, AND THE U.S. FISH AND WILDLIFE SERVICE REGARDING THE ENDANGERED SPECIES ACT, PARTICULARLY AS IT RELATES TO ANY LISTED SPECIES.
16. THE FOLLOWING DISTRICTS WILL SERVE THE PROPERTY
    GRANDVIEW RESERVE METROPOLITAN DISTRICT NOS. 1-5 INCLUDING WATER SERVICE.
    WASTEWATER SERVICES - WOODMEN HILLS METROPOLITAN DISTRICT
    SCHOOLS-PEYTON SCHOOL DISTRICT
    FIRE EMERGENCY - PEYTON FIRE PROTECTION DISTRICT
    EMERGENCY SERVICES - FALCON FIRE PROTECTION DISTRICT
    EL PASO COUNTY CONSERVATION DISTRICT
    PIKES PEAK LIBRARY DISTRICT
17. THE MAILBOX KIOSK WILL BE DETERMINED WITH EACH FINAL PLAT AND IN COORDINATION WITH THE U.S. POSTAL SERVICE.
18. PERIMETER BUFFERS ALONG EXISTING ADJACENT ZONING OF A-35 SHALL BE 20 FEET WHERE NOTED ON PLAN AND ALL OTHER BUFFERS TO ADJACENT ZONING SHALL BE 15 FEET WHERE NOTED ON PLAN.

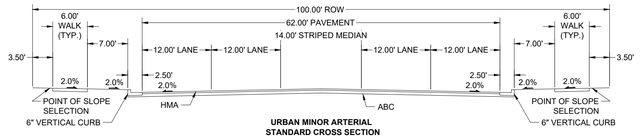
ZONING MAP

SCALE = N.T.S



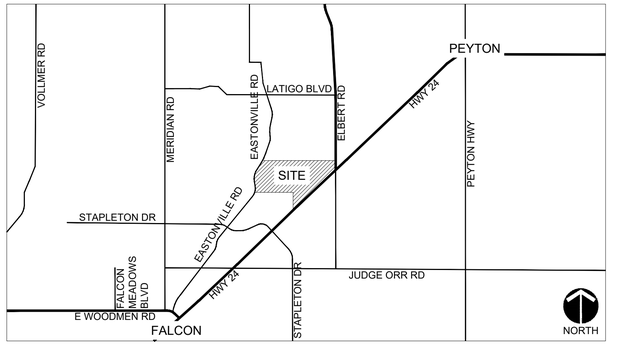
REX ROAD DETAIL

SCALE = N.T.S



VICINITY MAP

SCALE = N.T.S



FLOODPLAIN NOTES:

1. PORTIONS OF THIS PROPERTY ARE LOCATED WITHIN A DESIGNATED FEMA FLOODPLAIN AS DETERMINED BY THE FEMA NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE MAP NUMBERS '08041C0556G' AND '08041C0552G' WITH AN EFFECTIVE DATE DECEMBER 7, 2018.2.THE EXISTING FLOODPLAIN BOUNDARIES MAY BE REVISED AND/OR THE BASE FLOOD ELEVATION (BFE) MAY BE MODIFIED. COORDINATION WITH FEMA WILL BE COMPLETED TO ESTABLISH REVISED FLOOD PLAIN LIMITS AND BFE, IF THE SUBMITTAL AND REVIEW OF A FLOODPLAIN REVISION OCCURS INDEPENDENTLY OF THIS SKETCH PLAN AND SHALL BE APPROVED PRIOR TO THE PLATTING OF ANY LOTS CURRENTLY LOCATED WITHIN FLOODPLAIN BOUNDARIES
2. NO STRUCTURES OR SOLID FENCES ARE PERMITTED WITHIN THE DESIGNATED FLOODPLAIN AREA.

PUBLIC STREETS

1. REX ROAD AS ILLUSTRATED ON THE DRAWINGS WILL BE A PUBLIC STREET TO DESIGNED AND CONSTRUCTED TO EL PASO COUNTY STANDARDS, DEDICATED TO EL PASO COUNTY FOR AND UPON ACCEPTANCE BY EL PASO COUNTY, AND SHALL BE MAINTAINED BY EL PASO COUNTY DEPARTMENT OF TRANSPORTATION. ALIGNMENT IS SUBJECT TO CDOT APPROVAL; IF CDOT DENIES REX ROAD ALIGNMENT AS SHOWN INTERSECTING HWY 24, AN AMENDMENT MAY BE REQUIRED PURSUANT TO THE PCD DIRECTORS DETERMINATION.
2. STREETS WILL MEET THE STANDARDS OF EL PASO COUNTY ENGINEERING CRITERIA MANUAL. A DEVIATION REQUEST AND/OR PUD MODIFICATION MUST BE APPROVED FOR ANY DESIGN THAT DOES NOT CONFORM WITH THESE STANDARDS.
3. SIDEWALKS OR WALKWAYS WILL BE PROVIDED ALONG ALL STREETS AND INTERIOR TO DEVELOPMENT PARCELS, LINKING SCHOOLS, PARKS AND TRAIL SYSTEMS.
4. PUBLIC STREETS WITHIN THIS DEVELOPMENT SHALL PROVIDE FOR LEVELS OF VEHICULAR CIRCULATION REQUIRED BY THE TRAFFIC STUDY AND SHALL BE PAVED.
5. UNTIL APPROVED BY THE COUNTY ENGINEER ALL ACCESS POINTS SHOWN ON THIS PLAN ARE CONCEPTUAL AND NON-BINDING UPON THE COUNTY APPROVAL OF THIS SKETCH PLAN AMENDMENT SHALL NOT BE INTERPRETED TO INCLUDE APPROVAL OF ANY ACCESS TO ANY PUBLIC ROADS. THE COUNTY ENGINEER SHALL APPROVE ALL ACCESSES IN ACCORDANCE WITH THE REQUIREMENTS AND PROCEDURES OF THE ENGINEERING CRITERIA MANUAL AT THE TIME OF PUD DEVELOPMENT PLAN AND/OR SUBDIVISION SUBMITTAL AND REVIEW.

PRIVATE STREETS

4. A WAIVER OF THE EPC LAND DEVELOPMENT CODE WILL BE REQUESTED TO PERMIT PRIVATE ROADWAYS WITHIN THIS DEVELOPMENT AT THE TIME OF SUBSEQUENT APPLICATIONS.
5. ANY FUTURE PRIVATE STREETS, IF PROPOSED, WILL BE PRIVATELY OWNED AND MAINTAINED BY THE GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 1 OR HOA (HOMEOWNERS ASSOCIATION).

PHASING PLAN:

1. THE GRANDVIEW RESERVE PROJECT WILL BE DEVELOPED IN MULTIPLE PHASES AND PLATTED IN MULTIPLE FILINGS, WHICH HAVE YET TO BE DETERMINED. THE SEQUENCE OF CONSTRUCTION AND DEVELOPMENT IS NOT DEPENDENT UPON UTILITIES OR INFRASTRUCTURE.

GEOLOGIC HAZARDS DISCLOSURE STATEMENT:

1. AREAS OF PROPOSED SUBDIVISION HAVE BEEN FOUND TO BE IMPACTED BY GEOLOGICAL CONDITIONS, INCLUDING SEASONAL AND POTENTIALLY SEASONAL SHALLOW GROUND WATER, ARTIFICIAL FILL, LOOSE AND EXPANSIVE SOILS AND SLOPE STABILITY. THESE CONDITIONS CAN BE MITIGATED BY AVOIDANCE, RE-GRADING, PROPER ENGINEERING DESIGN, AND CONSTRUCTION TECHNIQUES. A MAP OF THE HAZARD AREAS AND PROPOSED MITIGATION MEASURES CAN BE FOUND IN THE GEOLOGICAL HAZARD STUDY AND WASTEWATER STUDY PREPARED BY ENTECH ENGINEERING INC., DATED JANUARY 15, 2019. FURTHER STUDIES OF THESE CONDITIONS SHALL BE PROVIDED WITH EITHER PRELIMINARY OR FINAL PLANS.

SITE DATA

EXISTING LAND USE:	AGRICULTURAL
EXISTING ZONING:	RR-2.5
SITE ACREAGE:	768.2 AC
MAXIMUM NUMBER OF UNITS:	3,260
MAXIMUM GROSS DENSITY:	4.24 DU/AC

TOTAL AREAS (SEE LAND USE CHART ON SHEET 2)

RESIDENTIAL:	587.1 AC
LOW DENSITY	134.1 AC
MEDIUM DENSITY	272.5 AC
MED. - HIGH DENSITY	65.6 AC
HIGH DENSITY	114.9 AC
PARK/OPEN SPACE:	127.1 AC
OPEN SPACE	117.2 AC
PERIMETER BUFFER	9.9 AC
INSTITUTIONS:	17.0 AC
POTENTIAL SCHOOL	10.9 AC
POTENTIAL CHURCH	6.1 AC
R.O.W.	20.6 AC
PUBLIC - REX ROAD	15.1 AC
COLLECTOR	5.5 AC
NEIGHBORHOOD COMMERCIAL:	16.4 AC

SHEET INDEX

OWNER/DEVELOPER:
4 SITE INVESTMENTS, LLC
1272 KELLY JOHNSON BLVD., SUITE 100
COLORADO SPRINGS, CO 80920

PLANNER/LANDSCAPE ARCHITECT:
HRGREEN DEVELOPMENT, LLC
5619 DTC PARKWAY SUITE 1150
GREENWOOD VILLAGE, CO 80111

CIVIL ENGINEER:
HRGREEN DEVELOPMENT, LLC
5619 DTC PARKWAY SUITE 1150
GREENWOOD VILLAGE, CO 80111

SKP-20-001

DRAWN BY:	JAG	JOB DATE:	8/26/2020
APPROVED:	PLS	JOB NUMBER:	191897
CAD DATE:	8/26/2020		
CAD FILE:	J:\2019\191897\CAD\Dwgs\L\01-SKETCH PLAN		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 — 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com
HRGreen

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

GRANDVIEW RESERVE SKETCH PLAN
COVER SHEET

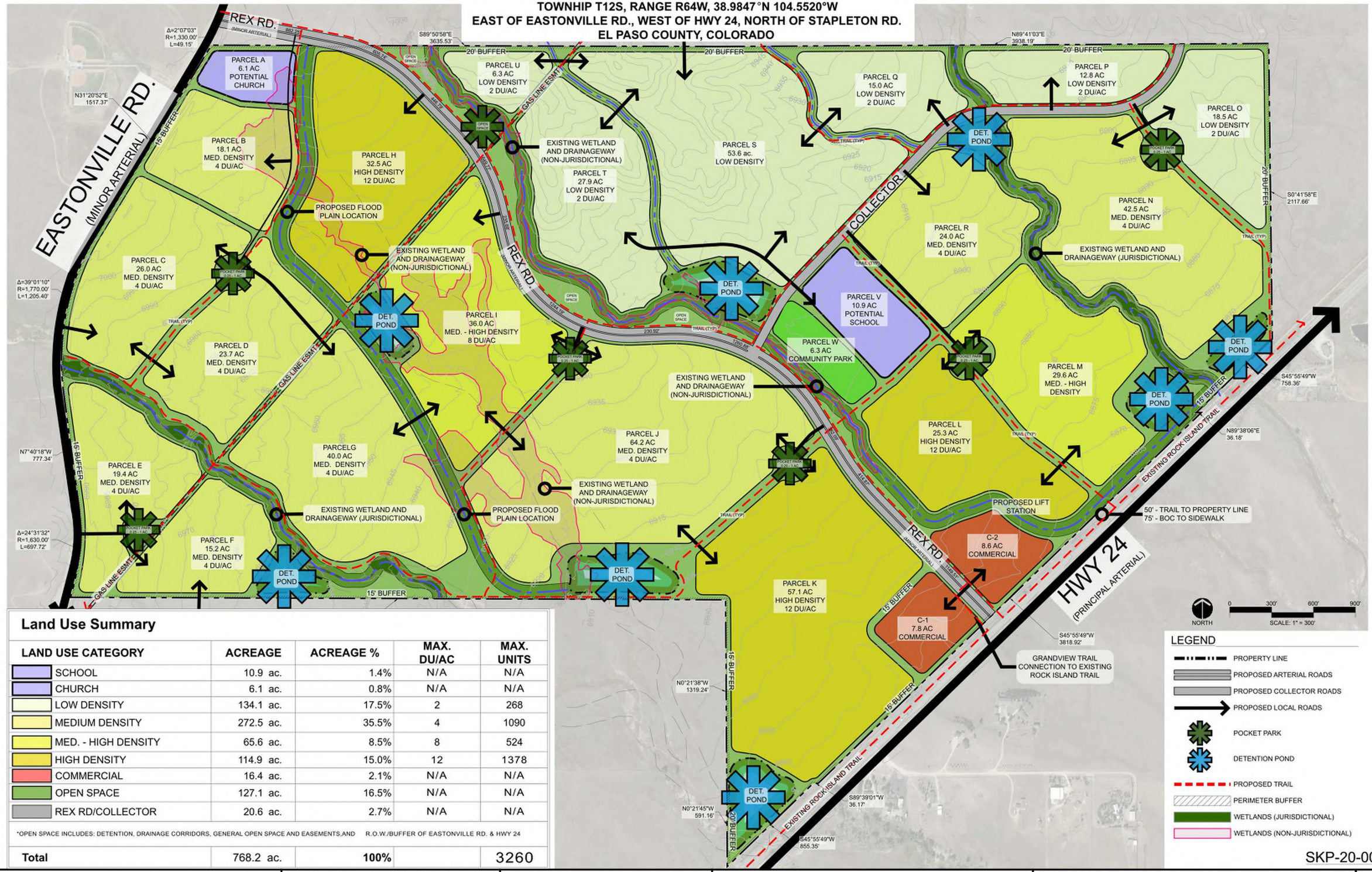
SHEET SP1.1

1

HR GREEN Xrefs: 01-DV-DSGN; xg1-ARCH DWG1; 01-VICINITY MAP; 01-XL-CONCEPT; 01-DV-SURF

GRANDVIEW RESERVE SKETCH PLAN

TOWNHIP T12S, RANGE R64W, 38.9847°N 104.5520°W
EAST OF EASTONVILLE RD., WEST OF HWY 24, NORTH OF STAPLETON RD.
EL PASO COUNTY, COLORADO



Land Use Summary

LAND USE CATEGORY	ACREAGE	ACREAGE %	MAX. DU/AC	MAX. UNITS
SCHOOL	10.9 ac.	1.4%	N/A	N/A
CHURCH	6.1 ac.	0.8%	N/A	N/A
LOW DENSITY	134.1 ac.	17.5%	2	268
MEDIUM DENSITY	272.5 ac.	35.5%	4	1090
MED. - HIGH DENSITY	65.6 ac.	8.5%	8	524
HIGH DENSITY	114.9 ac.	15.0%	12	1378
COMMERCIAL	16.4 ac.	2.1%	N/A	N/A
OPEN SPACE	127.1 ac.	16.5%	N/A	N/A
REX RD/COLLECTOR	20.6 ac.	2.7%	N/A	N/A
*OPEN SPACE INCLUDES: DETENTION, DRAINAGE CORRIDORS, GENERAL OPEN SPACE AND EASEMENTS,AND R.O.W./BUFFER OF EASTONVILLE RD. & HWY 24				
Total	768.2 ac.	**100%**		3260

LEGEND

- PROPERTY LINE
- PROPOSED ARTERIAL ROADS
- PROPOSED COLLECTOR ROADS
- PROPOSED LOCAL ROADS
- POCKET PARK
- DETENTION POND
- PROPOSED TRAIL
- PERIMETER BUFFER
- WETLANDS (JURISDICTIONAL)
- WETLANDS (NON-JURISDICTIONAL)

SKP-20-001

DRAWN BY: JAG | JOB DATE: 8/26/2020
APPROVED: PLS | JOB NUMBER: 191897
CAD DATE: ----
CAD FILE: J:\2019\191897\CAD\Dwgs\L\01-SKETCH PLAN

BAR IS ONE INCH ON OFFICIAL DRAWINGS. IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

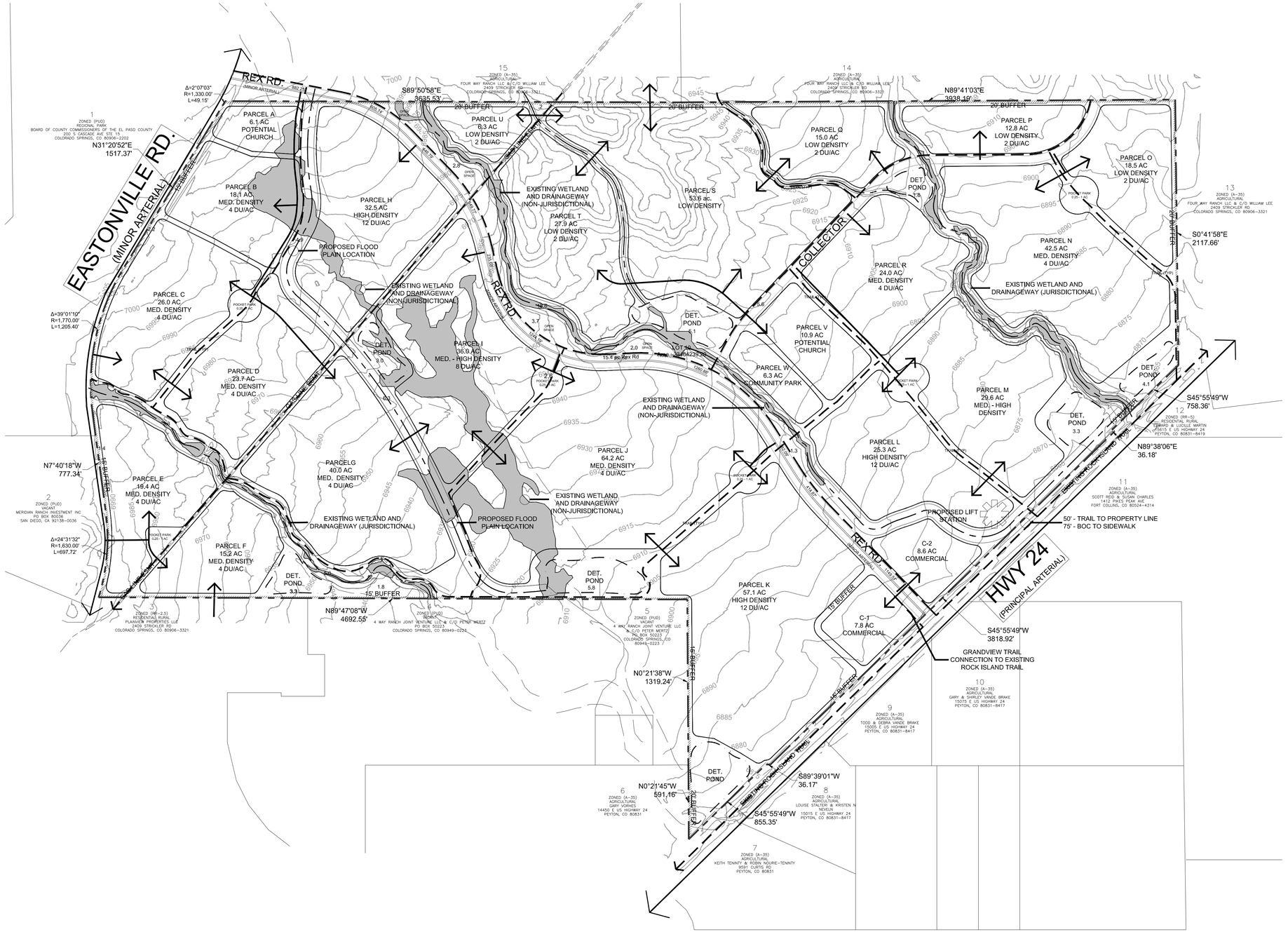
GRANDVIEW RESERVE SKETCH PLAN
SKETCH PLAN

SHEET SP1.2 | 2

HR GREEN Xrefs: 01-DV-0360N; xg# I-ARCH DH01; 01-VICINITY MAP- 01-XL-CONCEPT; 01-DV-SURF

GRANDVIEW RESERVE SKETCH PLAN

TOWNHIP T12S, RANGE R64W, 38.9847°N 104.5520°W
EAST OF EASTONVILLE RD., WEST OF HWY 24, NORTH OF STAPLETON RD.
EL PASO COUNTY, COLORADO



NORTH

0 400' 800' 1200'

SCALE: 1" = 400'

ADJACENT PROPERTY OWNERS

1. ZONED (PUD)
   REGIONAL PARK
   BOARD OF COUNTY COMMISSIONERS OF THE EL PASO COUNTY
   200 S CASCADE AVE STE 15
   COLORADO SPRINGS, CO 80906-2202

2. ZONED (PUD)
   VACANT
   MERIDIAN RANCH INVESTMENT INC
   PO BOX 80036
   SAN DIEGO, CA 92138-0036

3. ZONED (RR-2.5)
   RESIDENTIAL RURAL
   PLAINVIEW PROPERTIES LLC
   2409 STRICKLER RD
   COLORADO SPRINGS, CO 80906-3321

4. ZONED (PUD)
   VACANT
   4 WAY RANCH JOINT VENTURE LLC & C/O PETER MERTZ
   PO BOX 50223
   COLORADO SPRINGS, CO 80949-0223

5. ZONED (PUD)
   VACANT
   4 WAY RANCH JOINT VENTURE LLC & C/O PETER MERTZ
   PO BOX 50223
   COLORADO SPRINGS, CO 80949-0223

6. ZONED (A-35)
   AGRICULTURAL
   GARY VORHES
   14450 E US HIGHWAY 24
   PEYTON, CO 80831

7. ZONED (A-35)
   AGRICULTURAL
   KEITH TENINTY & ROBIN NOURIE-TENINTY
   9591 CURTIS RD
   PEYTON, CO 80831

8. ZONED (A-35)
   AGRICULTURAL
   LOUISE STALTERI & KRISTEN N NEVELN
   15015 E US HIGHWAY 24
   PEYTON, CO 80831-8417

9. ZONED (A-35)
   AGRICULTURAL
   TODD & DEBRA VANDE BRAKE
   15005 E US HIGHWAY 24
   PEYTON, CO 80831-8417

10. ZONED (A-35)
    AGRICULTURAL
    SCOTT REID & SUSAN CHARLES
    1412 PIKES PEAK AVE
    FORT COLLINS, CO 80524-4314

11. ZONED (A-35)
    AGRICULTURAL
    GARY & SHIRLEY VANDE BRAKE
    15075 E US HIGHWAY 24
    PEYTON, CO 80831-8417

12. ZONED (RR-5)
    RESIDENTIAL RURAL
    EDWARD & LUCILLE MARTIN
    15615 E US HIGHWAY 24
    PEYTON, CO 80831-8419

13. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

14. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

15. ZONED (A-35)
    AGRICULTURAL
    FOUR WAY RANCH LLC & C/O WILLIAM LEE
    2409 STRICKLER RD
    COLORADO SPRINGS, CO 80906-3321

SKP-20-001

DRAWN BY: JAG	JOB DATE: 7/10/2020	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
APPROVED: PLS	JOB NUMBER: 191897		
CAD DATE: 7/10/2020			
CAD FILE: J:\2019\191897\CAD\Dwgs\L\01-L-SHEETS			

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com

HRGreen

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

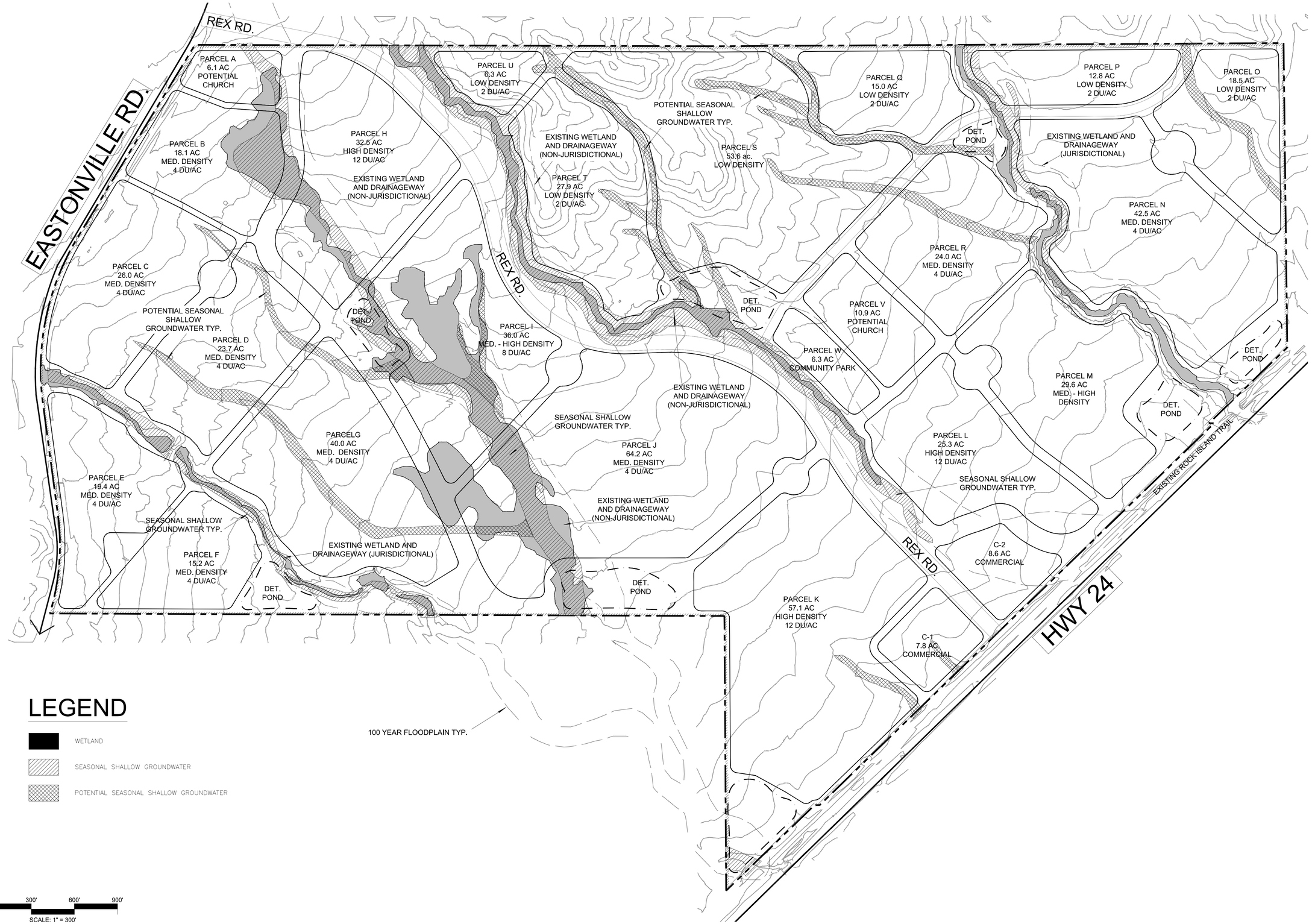
GRANDVIEW RESERVE SKETCH PLAN

ADJACENT PROPERTY OWNERS MAP

SHEET SP1.3

3

HR GREEN Xrefs: 01-DV-DSGN; xgl-1-ARCH DH01; 01-V/CINITY MAP; 01-XL-CONCEPT; 01-DV-SURF



LEGEND

- WETLAND
- SEASONAL SHALLOW GROUNDWATER
- POTENTIAL SEASONAL SHALLOW GROUNDWATER

NORTH

0 300' 600' 900'

SCALE: 1" = 300'

DRAWN BY:	JAG	JOB DATE:	7/8/2020
APPROVED:	PLS	JOB NUMBER:	191897
CAD DATE:	7/8/2020		
CAD FILE:	J:\2019\191897.01\CAD\Dwgs\Exhibits\01-Geotec Exhibit		

BAR IS ONE INCH ON OFFICIAL DRAWINGS.
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

GRANDVIEW RESERVE SKETCH PLAN
PHYSICAL FEATURES MAP

SHEET
SP1.4

4

HR GREEN Xrefs: xgl-1-ARCH D\H01.01-XL-CONCEPT; 01-DV-SURF

EXHIBIT J: GRANDVIEW RESERVE DISTRICT SERVICE PLAN

BOCC

Chuck Broerman
09/29/2021 02:57:42 PM
Doc $0.00 102
Rec $0.00 Pages
El Paso County, CO
221182388

RESOLUTION NO. 21- 365

BOARD OF COUNTY COMMISSIONERS
COUNTY OF EL PASO, STATE OF COLORADO

RESOLUTION TO APPROVE THE SERVICE PLAN FOR GRANDVIEW RESERVE METROPOLITAN DISTRICT NOS. 1-4 (ID-21-001)

WHEREAS, 4 Site Investments, LLC, Linda Johnson-Conne, Trace Lee, Debbie Elliot and Peter Martz, did file an application with the Planning and Community Development Department of El Paso County, pursuant to Section 32-1-204 (2), C.R.S., for the review of a draft service plan for Grandview Reserve Metropolitan District Nos. 1-4; and

WHEREAS, a public hearing was held by the El Paso County Planning Commission on September 2, 2021, upon which date the Planning Commission did by formal resolution recommend approval of the subject Service Plan with conditions and a notation(s); and

WHEREAS, on September 14, 2021, the Board ordered a public hearing to be held on the Service Plan; and

WHEREAS, notice of the hearing before the Board was duly published in *The El Paso County Advertiser and News* on September 8, 2021 as required by law; and

WHEREAS, notice of the hearing before the Board was duly mailed by first class mail, to interested persons, defined as: The owners of record of all property within the proposed Title 32 district as such owners of record are listed in the proposed service plan; and the governing body of any municipality or special district which has levied an ad valorem tax within the next preceding tax year, and which has boundaries within a radius of three (3) miles of the proposed district's boundaries; and

WHEREAS, pursuant to the provisions of Title 32, Article 1, C.R.S., as amended, the Board held a public hearing on the Service Plan for the District on September 28, 2021; and

WHEREAS, based on the evidence, testimony, exhibits, consideration of the master plan for the unincorporated area of the County, study of the proposed service plan for Grandview Reserve Metropolitan District Nos. 1-4, presentation and comments of the El Paso County Planning and Community Development Department and other County representatives, comments of public officials and agencies, and comments from all interested persons, and comments by the El

Paso County Planning Commission during the hearing, this Board finds as follows:

1. That the application for the draft service plan for the Special District was properly submitted for consideration by the Planning Commission and Board of County Commissioners.

2. That proper publication and public notice were provided as required by law for the hearings before the Planning Commission and the Board of County Commissioners of El Paso County.

3. That the hearings before the Planning Commission and the Board of County Commissioners of El Paso County were extensive and complete, that all pertinent facts, matters and issues were submitted and that all interested persons were heard at those hearings.

4. That all exhibits were received into evidence.

5. There is sufficient existing and projected need for organized service in the area to be served by the proposed Special District.

6. Existing service in the area to be served by the proposed Special District is inadequate for present and projected needs.

7. The proposed Special District is capable of providing economical and sufficient service to the area within the proposed boundaries.

8. The area to be included in the proposed Special District has or will have the financial ability to discharge the proposed indebtedness on a reasonable basis.

9. Adequate service is not or will not be available to the area through the County, other existing municipal or quasi-municipal corporations, including existing special districts, within a reasonable time and on a comparable basis.

10. The facility and service standards of the proposed Special District are compatible with the facility and service standards of each county within which the proposed Special District is to be located and each municipality which is an interested party.

11. The proposal is in substantial compliance with a Master Plan adopted pursuant to C.R.S. §30-28-106.

12. The proposal is in compliance with any duly adopted county, regional or state long-range water quality management plan for the area.

13. The creation of the proposed Special District will be in the best interests of the area proposed to be served.

NOW, THEREFORE, BE IT RESOLVED the El Paso County Board of County Commissioners, Colorado, hereby determines that the requirements of Sections 32-1-207, C.R.S., relating to the modification of a service plan for the Cloverleaf Metropolitan District have been fulfilled in a timely manner;

BE IT FURTHER RESOLVED the Board hereby approves the Service Plan submitted for the Cloverleaf Metropolitan District, for property more particularly described in Exhibit A, which is attached hereto and incorporated by reference;

AND BE IT FURTHER RESOLVED that the following Conditions shall be placed upon this approval:

CONDITIONS OF APPROVAL

1. As stated in the proposed service plan, the maximum combined residential mill levy shall not exceed 65 mills for any residential property within the Grandview Reserve Metropolitan District Nos. 1-4, with no more than 50 mills devoted to residential debt service, no more than 10 mills devoted to operations and maintenance, no more than 5 mills devoted to a special purpose unless the Districts receive Board of County Commissioner approval to increase the maximum mill levy.

2. As stated in the proposed service plan, the maximum combined commercial mill levy shall not exceed 45 mills for any commercial property within the Grandview Reserve Metropolitan District Nos. 1-4, with no more than 35 mills devoted to commercial debt service, no more than 10 mills devoted to operations and maintenance unless the Districts receive Board of County Commissioner approval to increase the maximum mill levy.

3. As stated in the attached service plan, the maximum authorized debt for the Grandview Reserve Metropolitan District Nos. 1-4 shall be limited to $295 million until and unless the Districts receive Board of County Commissioner approval to increase the maximum authorized debt.

4. Approval of the service plan for the Grandview Reserve Metropolitan District Nos. 1-4 includes the ability of the Districts to use eminent domain powers for the acquisition of property to be owned, controlled, or maintained by the Districts or another public or non-profit entity and is for the material use or benefit of the general public. The Districts may not use the power of eminent domain without prior approval by the Board of County Commissioners at a publicly noticed hearing after a showing that the use of eminent domain is necessary in order for the Districts to continue to provide service(s) within the Districts' boundaries and that there are no other alternatives that would not result in the need for the use of eminent domain powers.

5. The Grandview Reserve Metropolitan District Nos. 1-4 shall provide a disclosure form to future purchasers of property in a manner consistent with the approved Special District Annual Report form. The developer(s) shall provide written notation on each subsequent final plat associated with the development of the annually filed public notice. County staff is authorized to administratively approve updates to the disclosure form to reflect current contact information and calculations.

6. The Grandview Reserve Metropolitan District Nos. 1-4 is expressly prohibited from creating separate sub-districts except upon prior notice to the Board of County Commissioners, and subject to the Board of County Commissioners right to declare such creation to be a material modification of the service plan, pursuant to C.R.S. § 32-1-1101(1)(f)(I).

7. As stated in the attached service plan, the Grandview Reserve Metropolitan District Nos. 1-4 shall not have the authority to apply for or utilize any Conservation Trust ("Lottery") funds without the express prior consent of the Board of County Commissioners. The Districts shall have the authority to apply for and receive any other grant funds, including, but not limited to, Great Outdoors Colorado (GOCO) discretionary grants.

8. Approval of this application shall not constitute relinquishment or undermining of the County's authority to require the developer to complete subdivision improvements as required by the Land

Development Code and Engineering Criteria Manual and to require subdivision improvement agreements or development agreements and collateral of the developer to guarantee the construction of improvements.

9. Any future proposed development of the subject parcels will require approval of a map amendment (rezone), preliminary plan, and final plat(s), and such final plat(s) must be recorded prior to undertaking land disturbing activities, excluding pre-subdivsion site grading without installation of wet utilities as a separate, stand-alone request.

10. The Grandview Reserve Metropolitan District Nos. 1-4 shall not be authorized to issue debt until and unless the underlying map amendment (rezoning) for the proposed Grandview Reserve development is approved by the Board of County Commissioners.

11. A material change to the land use assumptions identified in the service plan, and associated attachments, or any future material modification to the service plan shall require an amendment(s) to the service plan.

12. The Grandview Reserve Metropolitan District Nos. 1-4 shall not adopt or enact an ordinance, resolution, rule or other regulation that prohibits or restricts an authorized permittee from carrying a concealed handgun in a building or specific area under the direct control or management of the District as provided in C.R.S. § 18-12-214.

NOTATIONS

1. Approval of this service plan shall in no way be construed to infer a requirement or obligation of the Board of County Commissioners to approve any future land use requests within the boundaries of the Districts.

2. Any expansions, extensions, or construction of new facilities by the Grandview Reserve Metropolitan District Nos. 1-4 will require prior review by the Planning and Community Development Department to determine if such actions are subject to the requirements of Appendix B of the Land Development Code, Guidelines and

Regulations for Areas and Activities of State Interest (a.ka. "1041 Regulations).

AND BE IT FURTHER RESOLVED, the record and recommendations of the El Paso County Planning Commission be adopted, except as modified herein.

AND BE IT FURTHER RESOLVED that a certified copy of this Resolution shall be filed in the records of the County and submitted to the petitioners for the purpose of filing in the District Court of El Paso County.

AND BE IT FURTHER RESOLVED that all resolutions or parts thereof, in conflict with the provisions hereof, are hereby repealed.

DONE THIS 28th day of September, 2021, at Colorado Springs, Colorado.

BOARD OF COUNTY COMMISSIONERS
EL PASO COUNTY, COLORADO

ATTEST:

By: _____

By: _____
Chair

EXHIBIT A

GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 1

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, AND A PORTION OF THE NORTH HALF OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N89°47'04"W ON THE SOUTH LINE OF SAID SECTION 21, A DISTANCE OF 1,253.14 FEET TO THE POINT OF BEGINNING; THENCE S43°11'44"W, A DISTANCE OF 155.45 FEET; THENCE S14°36'33"E, A DISTANCE OF 372.33 FEET; THENCE S46°29'19"W, A DISTANCE OF 590.52 FEET; THENCE S27°48'24"E, A DISTANCE OF 255.75 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS N41°55'50"E, HAVING A DELTA OF 32°48'22", A RADIUS OF 330.82 FEET, A DISTANCE OF 189.42 FEET TO A POINT ON CURVE; THENCE S00°20'56"W, A DISTANCE OF 131.71 FEET TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W, ON SAID SOUTH LINE, A DISTANCE OF 2,342.61 FEET; THENCE N00°12'52"E, A DISTANCE OF 25.00 FEET; THENCE N89°47'08"W, A DISTANCE OF 679.35 FEET, THENCE N°44°47"W, A DISTANCE OF 42.37

FEET; THENCE N41°52'38"E, A DISTANCE OF 21.11 FEET; THENCE N41°03'22"E, A DISTANCE OF 139.03 FEET; THENCE S89°58'12"W, A DISTANCE OF 288.62 FEET TO A POINT ON CURVE, SAID POINT BEING ON THE EASTERLY RIGHT-OF-WAY LINE OF EXISTING EASTONVILLE ROAD (60.00 FOOT WIDE); THENCE ON SAID EASTERLY RIGHT-OF-WAY AS DEFINED BY CERTIFIED BOUNDARY SURVEY, AS RECORDED UNDER DEPOSIT NO. 201900096, THE FOLLOWING FIVE (5) COURSES:

1. ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS N79°27'48"W, HAVING A DELTA OF 18°12'30", A RADIUS OF 1,630.00 FEET; A DISTANCE OF 518.00 FEET TO A POINT OF TANGENT;

2. N07°40'18"W, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;

3. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 39°01'10", A RADIUS OF 1,770.00 FEET, A DISTANCE OF 1,205.40 FEET TO A POINT OF TANGENT.

4. N31°20'52"E, A DISTANCE OF 1,517.37 FEET TO A POINT OF CURVE;

5. ON THE ARC OF A CURVE TO THE LEFT HAVING A DELTA OF 2°07'03", A RADIUS OF 1,330.00 FEET, A DISTANCE OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;

THENCE S89°50'58"E ON SAID NOTH LINE, A DISTANCE OF 1,164.47 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS S24°25'09"W, HAVING A DELTA OF 21°22'37" A RADIUS OF 1,061.00 FEET, A DISTANCE OF 395.86 FEET TO A POINT OF TANGENT; THENCE S44°12'14"E, A DISTANCE OF 446.79 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 31°01'27", A RADIUS OF 1,261.00 FEET, A DISTANCE OF 682.80 FEET TO A POINT OF TANGENT; THENCE S13°10'46"E, A DISTANCE OF 235.68 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 62°58'51", A RADIUS OF 839.00 FEET, A DISTANCE OF 922.25 FEET TO A POINT ON CURVE; THENCE S14°30'21"W, A DISTANCE OF 374.20 FEET, THENCE S43°11'44"W, A DISTANCE OF 402.13 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 11,746,693 SQ. FEET OR 269.667 ACRES MORE OR LESS.

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, AND A PORTION OF THE SOUTHWEST QUARTER OF SECTION 22, A PORTION OF THE WEST HALF OF SECTION 27 AND A PORTION OF THE NORTH NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH,

RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED "PLS 30087," AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED "PLS 30087", BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO THE POINT OF BEGINNING, THENCE N89°41'03"E ON THE NORTH LINE OF THE SOUTH HALF OF SECTION 22, A DISTANCE OF 400.43 FEET, THENCE S54°38'19"E, A DISTANCE OF 322.18 FEET, THENCE S15°28'17"E, A DISTANCE OF 239.41 FEET, THENCE S07°54'45"W, A DISTANCE OF 89.22 FEET; THENCE S48°50'01"E, A DISTANCE OF 156.62 FEET; THENCE N83°02'29"E, A DISTANCE OF 324.17 FEET; THENCE S71°00'05"E, A DISTANCE OF 309.15 FEET; THENCE S42°42'14"W, A DISTANCE OF 361.76 FEET, THENCE S49°48'45"E, A DISTANCE OF 1,122.17 FEET; THENCE S46°23'57"W, A DISTANCE OF 1,414.53 FEET; THENCE S25°17'59"E, A DISTANCE OF 103.66 FEET; THENCE S09°17'58"E, A DISTANCE OF 136.80 FEET; THENCE S42°25'16"E, A DISTANCE OF 685.79 FEET; THENCE S41°12'32"W, A DISTANCE OF 99.97 FEET; THENCE S00°00'00"E, A DISTANCE OF 282.37 FEET, THENCE S43°38'54"W, A DISTANCE OF 640.39 FEET; THENCE S51°46'34"E, A DISTANCE OF 548.80 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO, THENCE ON SAID RIGHT-OF-WAY THE FOLLOWING THREE (3) COURSES:

1. S45°55'49"W, A DISTANCE OF 1,078.91 FEET;
2. S89°39'01"W, A DISTANCE OF 36.17 FEET;

3. S45°55'49W, A DISTANCE OF 855.35 FEET TO A POINT ON THE EASTERLY LINE OF THE SOUTHEAST QUARTER OF SECTION 28;

THENCE N00°21'45"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 591.16 FEET TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER, THENCE N00°21'38"W ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28, THENCE N89°47'08"W ON SAID SOUTH LINE, A DISTANCE OF 1.415.10 FEET; THENCE N00°20'56"E, A DISTANCE OF 131.71 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N09°07'27"E, HAVING A DELTA OF 32°48'22", A RADIUS OF 330.82 FEET, A DISTANCE OF 189.42 FEET TO A POINT ON CURVE; THENCE N27°48'24"W, A DISTANCE OF 255.75 FEET; THENCE N 46°29'19"E, A DISTANCE OF 590.52 FEET; THENCE N14°36'33"W, A DISTANCE OF 372.33 FEET; THENCE N43°11'44" E, A DISTANCE OF 557.57 FEET; THENCE N14°30'21"E, A DISTANCE OF 374.20 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N13°50'22"E, HAVING A DELTA OF 62°58'51", A RADIUS OF 839.00 FEET, A DISTANCE OF 922.25 FEET TO A POINT OF TANGENT; THENCE N13°10'46"W, A DISTANCE OF 235.68 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING DELTA OF 31°01'27", A RADIUS OF 1,261.00 FEET, A DISTANCE OF 682.80 FEET TO A POINT OF TANGENT; THENCE N44°12'14W, A DISTANCE OF 446.79 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 21°22'37", A RADIUS OF 1,061.00 FEET, A DISTANCE OF 395.86 FEET TO THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21; THENCE S89°50'58" ON SAID NORTH LINE, A DISTANCE OF 2,471.06 FEET TO THE POINT OF BEGINNNG.

CONTAINING A CALCULATED AREA OF 12,695,360 FEET, OR 291.445 ACRES MORE OR LESS.

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 22, AND A PORTION OF THE NORTH HALF OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH,

RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST

CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W ON THE EAST LINE OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21; THENCE N89°41'03"E ON THE NORTH LINE OF THE SOUTH HALF OF SECTION 22, A DISTANCE OF 400.43 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING N89°41'03"E ON SAID NORTH LINE, A DISTANCE OF 3,537.77 FEET, THENCE S00°41'58"E ON THE EAST LINE OF THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 22, A DISTANCE OF 2,117.66 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LIE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO, THENCE ON SAID RIGHT-OF-WAY THE FOLLOWING THREE (3) COURSES:

1. S45°55'49"W, A DISTANCE OF 758.36 FEET;
2. N89°38'06"E, A DISTANCE OF 36.18 FEET;
3. S45°55'49W, A DISTANCE OF 1,275.69 FEET;

THENCE N71°34'44"W, A DISTANCE OF 280.24 FEET; THENCE N46°34'17" W, A DISTANCE OF 189.58 FEET; THENCE N54°29'04"W, A DISTANCE OF 186.95 FEET; THENCE S69°20'27"W, A DISTANCE OF 410.44 FEET; THENCE S41°12'32" W, A DISTANCE OF 54.02 FEET; THENCE N42°25'16"W, A DISTANCE OF 685.79 FEET; THENCE N09°17'58"W, A DISTANCE 136.80 FEET; THENCE N25°17'59"W, A DISTANCE OF 103.66 FEET; THENCE N46°23'57"E, A DISTANCE OF 1,414.53 FEET; THENCE N49°48'45"W, A DISTANCE OF 1,122.17 FEET; THENCE N42°42'14", A DISTANCE OF 361.76 FEET; THENCE N71°00"05W, A DISTANCE OF 309.15 FEET; THENCE S83 °02'29"W, A DISTANCE OF 324.17 FEET; THENCE N48°50'01"W, A DISTANCE OF 156.62 FEET; THENCE N07°54'45"E, A DISTANCE OF 89.22 FEET; THENCE N15°28'17"W, A DISTANCE OF 239.41 FEET; THENCE N54°38'19"W, A DISTANCE OF 322.18 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 8,073,011 SQ. FEET, OR 185.331 ACRES MORE OR LESS

A TRACT OF LAND BEING A PORTION OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH,

RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N89°38'06"E, ON THE NORTH LINE OF SAID SECTION 27, A DISTANCE OF 3,378.84 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, REORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID NORTHWESTERLY RIGHT-OF-WAY LINE THE FOLLOWING TWO (2) COURSES:

1. N89°38'06"E, A DISTANCE OF 36.18 FEET;
2. S45°55'49W, A DISTANCE OF 1,275.69 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING S45°55'49"W, ON SAID NORTHERLY RIGHT-OF-WAY LINE; A DISTANCE OF 1,464.32 FEET; THENCE N51°46'34"W, A DISTANCE OF 548.80 FEET; THENCE N43°38'54"E, A DISTANCE OF 640.39 FEET; THENCE N00°00'00"E, A DISTANCE OF 282.37 FEET; THENCE N41°12'32"E, A DISTANCE OF 153.99 FEET; THENCE N69°20'27"E, A DISTANCE OF 410.44 FEET; THENCE S54°29'04E, A DISTANCE OF 186.95 FEET; THENCE S46°34'17"E, A DISTANCE OF 189.58 FEET; THENCE S71°34'44" E, A DISTANCE OF 280.24 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 889,127 SQ. FEET OR 20.412 ACRES MORE OR LESS.

GRANDVIEW RESERVE
METROPOLITAN DISTRICT NOS. 1 - 4

EL PASO COUNTY, COLORADO

Date: July 20, 2021

SERVICE PLAN

FOR

GRANDVIEW RESERVE

METROPOLITAN DISTRICT NOS. 1 - 4

Prepared by:

SPENCER FANE LLP
Attention: Russell W. Dykstra
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Denver, CO 80203-4554
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DRAFT: July 20, 2021

Applicant

Developer:

4 Site Investments, LLC
Attention: Paul Howard, Manager
1271 Kelly Johnson Boulevard, Suite 100
Colorado Springs, CO 80920

Proposed Initial Directors:

Kim Herman
Paul Howard
Samuel Howard

—
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Consultants:

- Engineers – JDS-Hydro Consultants, Inc. and HR Green, Inc.
- Underwriter – D.A. Davidson- Brooke Hutchens

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I. EXECUTIVE SUMMARY

The following is a summary of general information regarding the proposed Districts provided for the convenience of the reviewers of this Service Plan. Please note that the following information is subject in all respects to the more complete descriptions contained elsewhere in this Service Plan.

Proposed Districts:	Grandview Reserve Metropolitan District Nos. 1 - 4
Property Owner:	4 Site Investments, LLC (Schedule Numbers 4200000396 and 4200000328)
Developer:	4 Site Investments, LLC
Description of Development:	The boundaries of the proposed Districts consist of approximately 767 acres of land located northwest of Highway 24, east of Eastonville Road, south of Latigo Boulevard, and north of Stapleton Road in El Paso County. Approximately 581 acres within the proposed Districts' boundaries are anticipated to consist of approximately 555 single family homes with an average value of $385,000, approximately 749 single family homes with an average value of $375,000, approximately 846 single family homes with an average value of $340,000, approximately 1,110 single family attached homes with an average value of $295,000, approximately 17 acres are anticipated to consist of commercial development, and approximately 146 acres are anticipated to be utilized for open space, a church site, and a school site (see Pages 4 and 5 of the financial plan provided as part of Exhibit D). The number of anticipated homes and the amount of commercial square footage remain estimates and may be altered depending on the final outcome of the development approval process. At this stage, it is anticipated that all developed residential lots will be subject to the same mill levies based upon the overall services to be provided to the development as a whole and all developed commercial properties will be subject to the same mill levies based upon the overall services to be provided to the development.
Proposed Improvements to be Financed:	Proposed completion of an estimated $285,000,000 of on and off-site public improvements including, but not limited to, on and off-site streets, roadway, water and sanitary sewer, stormwater and drainage, landscaping, and park and recreation improvements. The foregoing cost estimates are preliminary in nature and the ultimate costs may increase or decrease depending on numerous factors, many of which are out of the Developer's control. In particular, these initial cost estimates

	only include the public improvement portion of costs and the total project improvement costs (including items such as dry utilities, etc.) will be significantly higher and will materially increase the overall development costs.
Proposed Ongoing Services:	The Developer and the proposed Districts intend to work with existing overlapping service providers to obtain the necessary consents and/or approvals for the provision of necessary services to the Districts including, but not limited to, water, streets, drainage, and parks and recreation. Because the overall development remains in its infancy, the specific services and potential overlapping service providers have yet to be determined. Based on current information, it is anticipated that the Districts will ultimately utilize other service providers to provide wastewater and fire protection services once the necessary improvements are constructed. More information can be provided once determined and known. Additionally, the proposed Districts shall have the power and authority to provide other services as authorized under the Special District Act including, but not limited to, mosquito control, television relay and translation, covenant enforcement and design review, and security services.
Infrastructure Capital Costs:	Approximately $285,000,000
Maximum Debt Authorization:	$295,000,000 (combined for all Districts)
Proposed Maximum Debt Mill Levy:	50 Mills – for each residential district 35 Mills – for each commercial district
Proposed Maximum O & M Mill Levy:	10 Mills for each district
Proposed Special Purpose Mill Levy:	5 mills for covenant enforcement and design review – for each residential district
Proposed Maximum Mill Levies:	Residential districts: 65 Mills inclusive of debt (50 mills for residential districts), operations and maintenance (10 mills), and covenant enforcement and design review (5 mills) for each District. Commercial districts: 45 inclusive of debt (35 mills for commercial districts) and operations and maintenance (10 mills) for each District
Proposed Fees:	None anticipated at this time.

II. DEFINITIONS

The following terms are specifically defined for use in this Service Plan. For specific definitions of terms not listed below please also refer to the El Paso County Special District Policies, the El Paso County Land Development Code and Colorado Revised Statutes, as may be applicable.

Additional Inclusion Areas: means the property described in Section J of Article III.

Annual Report and Disclosure Statement: means the statement of the same name required to be filed annually with the Board of County Commissioners pursuant to Resolution 06-472 as may be amended.

Board(s): means the board of directors of any District, or in the plural, the boards of directors of all the Districts.

Board of County Commissioners: means the Board of County Commissioners of El Paso County.

Commercial District: means District No. 4, containing property classified for assessment as nonresidential.

Control District: means District No. 1, which is intended to include property owned by the organizers of the Districts, and whose Board of Directors is intended to be occupied by representatives of the organizers of the Districts, in order to direct the activities of the Districts to achieve an overall development plan for Public Improvements. References to "District No. 1" shall be deemed to refer to the Control District.

County: means El Paso County, Colorado

Debt: means bonds or other obligations for the payment of which the Districts have promised to impose an *ad valorem* property tax mill levy without such promise being subject to annual appropriation.

Developer Funding Agreement: An agreement of any kind executed between a special district and a Developer as this term is specifically defined below, including but not limited to advance funding agreements, reimbursement agreements or loans to the special district from a Developer, where such an agreement creates an obligation of any kind which may require the special district to re-pay the Developer. The term "Developer" means any person or entity (including but not limited to corporations, venture partners, proprietorships, estates and trusts) that owns or has a contract to purchase undeveloped taxable real property greater than or equal to ten percent (10%) of all real property located within the boundaries of the special district. The term "Developer Funding Agreement" shall not extend to any such obligation listed above if such obligation has been converted to Debt issued by the special district to evidence the obligation to repay such Developer Funding Agreement, including the purchase of such Debt by a Developer.

District No. 1: means the Grandview Reserve Metropolitan District No. 1 (also known as the Control District) as described in this Service Plan.

District No. 2: means the Grandview Reserve Metropolitan District No. 2.

District No. 3: means the Grandview Reserve Metropolitan District No. 3.

District No. 4: means the Grandview Reserve Metropolitan District No. 4.

External Financial Advisor: means a consultant that: (i) advises Colorado governmental entities on matters relating to the issuance of securities by Colorado governmental entities, including matters such as the pricing, sales and marketing of such securities and the procuring of bond ratings, credit enhancement and insurance in respect of such securities; (ii) shall be an underwriter, investment banker, or individual listed as a public finance advisor in the Bond Buyer's Municipal Market Place; and (iii) is not an officer or employee of the District for which External Advisor Services are being rendered; and (iv) has not been otherwise engaged to provide services in connection with the transaction related to the applicable Debt.

Financing Districts: means District Nos. 2 - 4, which are expected to include residential and/or commercial development that will produce the required revenue to fund the Public Improvements and any operations and maintenance costs.

Initial District Boundaries: means the initial boundaries of the Districts as described in **Exhibit A** and as legally described in the legal description found at **Exhibit A**.

Legislative Adjustment: means if, on or after January 1, 2021, there are changes in the method of calculating assessed valuation or any constitutionally mandated tax credit, cut, or abatement, the Maximum Debt Service Mill Levy, Maximum Operational Mill Levy, or the Maximum Special Purpose Mill Levy limitation may be increased or decreased to reflect such changes, such increases or decreases to be determined by the Board in good faith (such determination to be binding and final) so that to the extent possible, the actual tax revenues generated by the mill levy, as adjusted for changes occurring after January 1, 2021, are neither diminished nor enhanced as a result of such changes.

Local Public Improvements: means facilities and other improvements which are or will be dedicated to the County or another governmental or quasi-governmental entity for substantially public use, but which do not qualify under the definition of Regional Public Improvements. Examples would include local streets and appurtenant facilities, water and sewer lines which serve individual properties and drainage facilities that do not qualify as reimbursable under adopted drainage basin planning studies.

Material Modification: has the meaning described in Section 32-1-207, C.R.S., as it may be amended from time to time, which, among other things, outlines what constitutes a material modification and the procedure for making a modification to a service plan.

Maximum Combined Mill Levy: The maximum combined ad valorem mill levy the applicable District may certify against any property within said District for any purposes.

Maximum Debt Authorization: means the maximum principal amount of Debt that the Districts combined may have outstanding at any time, which under this Service Plan is $295,000,000.

Maximum Debt Service Mill Levy: The maximum ad valorem mill levy the applicable District may certify against any property within said District for the purpose of servicing any Debt incurred by or on behalf of said District.

Maximum Operational Mill Levy: The maximum ad valorem mill levy the applicable District may certify against any property within said District for the purposes providing revenues for ongoing operation, maintenance, administration or any other allowable services and activities other than the servicing of Debt. This Maximum Operational Mill Levy is exclusive of any Maximum Special Mill Levy which might be separately authorized.

Maximum Special Purpose Mill Levy: means the maximum ad valorem mill levy which is allowed in addition to the allowable Maximum Debt Service Mill Levy and Maximum Operation Mill Levy to be used for covenant enforcement and design review (if provided by the District) by the Residential Districts.

Planning and Community Development Department: The department of the County formally charged with administering the development regulations of the County.

Public Improvements: Those improvements constituting Regional Public Improvements and Local Public Improvements collectively including, but not limited to, on and off-site improvements such as on and off-site streets, roadway, bridges, water and sanitary sewer, stormwater and drainage, landscaping, and park and recreation improvements.

Regional Public Improvements: Facilities and other improvements which are or will be dedicated to the County, State, or another governmental or quasi-governmental entity for substantially public use, and which serve the needs of the region.

Residential Districts: District Nos. 1-3, inclusive, containing property classified for assessment as residential.

Revenue Obligations: means bonds or other obligations not subject to annual appropriation that are payable from a pledge of revenues other than *ad valorem* property taxes.

Service Plan: means this Service Plan for the Districts.

Special District Act: means Section 32-1-101, et seq., of the Colorado Revised Statutes, as amended from time to time.

State: means the State of Colorado.

Underlying Land Use Approvals: means Board of County Commissioners approval of the applicable land use plans that form the basis for the need for the Districts and its proposed financing plan and/or services. Such approvals may be in the form of one or a combination of Sketch Plans, Generalized Planned Unit Development (PUD) Development Plans, site-specific PUD plans, or subdivision plans.

III. INTRODUCTION

A. Overall Purpose and Intent.

The Districts will be created pursuant to the Special District Act, and are being created with a Control District/Financing District structure under El Paso County policies. The Districts are independent units of local government, separate and distinct from the County, and, except as may otherwise be provided for by State or local law or this Service Plan, their activities are subject to review by the County only insofar as they may deviate in a material matter from the requirements of the Service Plan. It is intended that the Districts, in their discretion, will provide a part or all of various Public Improvements, as defined herein, necessary and appropriate for the development of a project within the unincorporated County to be known as "Grandview Reserve" (the "Project"). The Public Improvements will be constructed for the use and benefit of all anticipated inhabitants, property owners and taxpayers of the Districts. Offsite Public Improvements will also benefit regional users. The primary purpose of the Districts will be to finance the construction of these Public Improvements. Additional major purposes may include covenant enforcement, design review, and park and recreation purposes.

District No. 1 is proposed to be the Control District, and is expected to coordinate the financing and construction of all Public Improvements. District Nos. 2 - 4 are proposed to be the Financing Districts, and are expected to include residential and/or commercial development that (in coordination with District No. 1) will produce the required revenue to fund the Public Improvements and any operations and maintenance costs.

B. Need For The Districts.

There is a need for creation of the Districts. A multiple district structure has been chosen to account for the project to be developed in multiple phases. The phasing of development will allow for more efficient financing for the overall project. As further explanation, the Districts will serve a large project with significant infrastructure and phasing will require multiple districts to accommodate any delay in development and for a coordinated approach to infrastructure financing. The multiple district structure also allows bonding to be done in the most efficient manner by segregating the bonds to completed portions of the development instead of being forced to issue bonds early in the project.

There are currently no other governmental entities, including the County, located in the immediate vicinity of the Districts that consider it desirable, feasible or practical to undertake the planning, design, acquisition, construction, installation, relocation, redevelopment, and financing of

the Public Improvements needed for the Project. It is acknowledged that the Districts are located in the vicinity of 4-Way Ranch Metropolitan District No. 2 ("4-Way Ranch") and Woodmen Hills Metropolitan District ("Woodmen Hills"). It is not feasible, however, for the property to be included into either 4-Way Ranch or Woodmen Hills and receive the support it needs for development. First, Woodmen Hills is unable to finance and provide necessary water and sanitation system infrastructure internal to the development. Second, the Board of Directors of 4-Way Ranch determined that it is unable to provide or finance the necessary infrastructure for the development and therefore approved the exclusion of the property within the Project. Moreover, the Board of Directors of 4-Way Ranch have submitted a letter to the Board of County Commissioners expressing its support of the formation of the Districts and further explaining the inability of 4-Way Ranch to provide the service, improvements, and funding required for the Grandview Reserve development. Based on the foregoing, formation of the Districts is necessary in order for the Public Improvements required for the Project to be provided in the most economic manner possible.

C. County Objectives In Forming The Districts.

The County recognizes the Districts as independent quasi-municipal entities which are duly authorized for the purposes and functions identified in the Service Plan. Future County involvement in the affairs of the Districts will generally be limited to functions as required by the Colorado Revised Statutes, reporting and disclosure functions, determinations as to compliance with the limits as set forth in this Service Plan or any conditions attached to its approval, as well as additional activities or relationships as may be stipulated in any intergovernmental agreements which may be entered into between the Districts and the County in the future.

In approving this Service Plan, the objectives of the County include an intent to allow the applicant reasonable access to public tax-exempt financing for reasonable costs associated with the generally identified Public Improvements and to allow the applicant the ability to prudently obligate future property owners for a reasonable share of the repayment costs of the Public Improvements which will benefit the properties within the Districts.

It is the additional objective of the County to allow for the Districts to provide for the identified ongoing services which either cannot or will not be provided by the County and/or other districts.

D. Multiple District Structure.

1. Multiple District Structure. This Service Plan sets forth the general parameters for the working relationship between District No. 1 (as the Control District) and the Financing Districts. This structure is intended to provide for the fair and equitable allocation of the costs of the Public Improvements and related services within the various development areas of the Project. In addition, the multiple district structure will support the phased development of the Project, as well as the designation of the residential and commercial development among the Districts.

District No. 1 is expected to be responsible for managing the construction, acquisition, installation and operation of the Public Improvements. The Financing Districts (District Nos. 2 through 4) are expected to be responsible for providing the funding and tax base needed to support

the plan for financing the Public Improvements and for operation, maintenance and administrative costs. It is anticipated that the District Nos. 2 & 3 (Residential Districts) will consist primarily of residential units and the commercial uses will be located in District No. 4 (Commercial District). The allocation of responsibility for all such functions among the Districts may occur in any combination based upon the best interests of the property owners and residents within the Project.

Each District will be authorized to provide improvements and services, including but not limited to acquisition of completed improvements, to the property within and without their respective legal boundaries, as they may be amended from time to time. Debt may be issued by either District No. 1 and/or the Financing Districts as appropriate to deliver the improvements and services to the property within the Project.

Due to the interrelationship between the Districts, various agreements are expected to be executed by one or more of the Districts clarifying the respective responsibilities and the nature of the functions and services to be provided by each District. The agreements will be designed to help assure the orderly development of essential services and facilities resulting in a community that is an aesthetic and economic asset to the County.

2. Benefits of Multiple District Structure. The use of a multiple district structure as described in this Service Plan serves the best interests of the County, the applicant and the future taxpayers within the Districts. The benefits of using the multiple district structure include: (a) coordinated administration of construction and operation of public improvements and delivery of those improvements in a timely manner; and (b) assurance that improvements required by the County are constructed in a timely and cost effective manner.

a. Coordinated Services. As presently planned, development of the Project will proceed in phases, which will require the extension of public services and facilities. The multiple district structure will assure that the construction and operation of each phase of Public Improvements, including Public Improvements such as parks, channels, and drainage, will be administered consistent with a long-term construction and operations program. Use of District No. 1 to direct financing, construction, acquisition and installation of improvements and for management of operation and maintenance needs will facilitate a well-planned financing effort through all phases of construction, which will assist in the coordinated extension of services.

b. Debt Allocation. Allocation of the responsibility for paying debt for capital improvements will be managed through development of a unified financing plan for these improvements and through development of an integrated operating plan for long-term operations and maintenance for those improvements that are not dedicated to and accepted by the County or other governmental entity, but retained by the Districts as appropriate. Use of District No. 1 to manage these functions will help assure that no area within the Project becomes obligated for more than its share of the costs of capital improvements and operations. Neither high nor low-density areas will bear a disproportionate burden of debt and operating costs. Additionally, equity is also promoted due to the fact that there must be a rational relationship between the land that is subject to a District's mill levy and the improvements or services being funded.

3. Transition to Single District Structure. Once the Districts have achieved full

development, including completion of (i) the necessary on and off-site public improvements; (ii) the contemplated residential and commercial development components; and (iii) repayment of all outstanding debt, the Districts may thereafter take the appropriate steps to transition to a single district structure.

E. Specific Purposes - Facilities and Services.

Each of the Districts are authorized to provide the following facilities and services and those further described in the Special District Act, both within and without the boundaries of the Districts as may be necessary:

1. Water. The Districts shall have the power and authority to finance, design, construct, acquire, install, maintain, and provide for potable water and irrigation water facilities and systems, including, but not limited to, water rights, water supply, treatment, storage, transmission, and distribution systems for domestic, irrigation, fire control, and other public purposes, together with all necessary and proper reservoirs, treatment facilities, wells, equipment, and appurtenances incident thereto, which may include, but shall not be limited to, transmission lines, pipes, distribution mains and laterals, storage facilities, and ditches, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto. The Districts shall have the power and authority to contract with other private or governmental entities to provide any or all of the services the Districts are authorized or empowered to provide. To the extent necessary, the Districts shall dedicate any necessary improvements to one or more governmental entities that provide service ("Provider Jurisdiction") in accordance with the Provider Jurisdiction rules and regulations.

It is anticipated that District No. 1 will provide water services to the property within the Districts' boundaries. The initial planning of the land plan for the property within the Districts' boundaries references the County's Master Plan goals and implementation strategies to incorporate efficiency and conservation. The sketch plan submitted to the County increases density and maximizes open space surrounding the natural tributary areas, thus decreasing irrigation consumption and discouraging individual wells. The landform grading is focused on limiting excavation within shallow ground water levels to deter ground water surfacing and associated groundwater re-introductions. Swales will be utilized within the individual planning areas to promote groundwater recharge. Future local wells, mostly in the Arapahoe and Laramie Fox-Hills formations, will provide water for the property located within the District. It is anticipated that off-site wells will likely be needed (from neighboring lands owned by the Developer) for full build-out. In addition, potential future interconnections may be made with neighboring districts and service providers. Finally, the Districts will implement strategies to reduce water usage, including tiered water rates, multiple stages of water restrictions, and end-user sustainability practices.

2. Sanitation. The Districts shall have the power and authority to finance, design, construct, acquire, install, maintain, assess tap or other facility fees, and provide for sanitary sewers and to transport wastewater to an appropriate wastewater treatment facility, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto. To the extent necessary, the Districts shall dedicate any necessary improvements to one or more governmental entities that provide service ("Provider Jurisdiction") in accordance with the Provider Jurisdiction rules and regulations. It is anticipated that that the Districts will construct or

cause to be constructed the sanitary sewer infrastructure needed for the Project and will dedicate such infrastructure to Cherokee Metropolitan District for operation and maintenance. The Districts may enter into an intergovernmental agreement with Cherokee Metropolitan District to govern this relationship. In the unlikely event the Districts are not able to reach an agreement with Cherokee Metropolitan District, the Districts may renew discussions with Woodmen Hills Metropolitan District for sewer treatment services.

3. Street Improvements, Transportation and Safety Protection. The Districts shall have the power and authority to finance, design, construct, acquire, install, maintain, and provide for arterial and collector streets and roadway improvements including, but not limited to, bridges, curbs, gutters, culverts, storm sewers and drainage facilities, retaining walls and appurtenances, sidewalks, paving, lighting, grading, landscaping, streetscaping, placement of underground utilities, snow removal, tunnels, and other street improvements, and architectural enhancements to any or all of the above, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto. It is anticipated that most of the foregoing street improvements, except underground utilities, will be dedicated by the Districts to the County upon completion and, following acceptance by the County, the County will own, operation and maintain such street improvements.

4. Drainage. The Districts shall have the power and authority to finance, design, construct, acquire, install, maintain, and provide for flood and surface drainage improvements, including, but not limited to, culverts, dams, retaining walls, access way inlets, detention and retention ponds, paving, roadside swales, curbs and gutters, disposal works and facilities, water quality facilities, and all necessary and proper equipment, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto. To the extent necessary, the Districts shall dedicate any necessary improvements to one or more governmental entities that provide service ("Provider Jurisdiction") in accordance with the Provider Jurisdiction rules and regulations. It is anticipated that the Districts will maintain drainageways, detention and water quality facilities, unless and until the County develops a stormwater maintenance district, division, or other entity.

5. Parks and Recreation. The Districts shall have the power and authority to finance, design, construct, acquire, install, maintain, and provide for public park and public recreation centers and other recreation facilities, services, or programs including, but not limited to, grading, soil preparation, landscaping, sprinkler systems, fencing, pavilions, playgrounds, playing fields, open space, bike trails, pedestrian trails, pedestrian bridges, picnic areas, common area landscaping, streetscaping, storage buildings and facilities, weed control, paving, decorative paving, outdoor functional and decorative lighting, community events, and other services, programs and facilities, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto. To the extent necessary, the Districts shall dedicate any necessary improvements to one or more governmental entities that provide service ("Provider Jurisdiction") in accordance with the Provider Jurisdiction rules and regulations. It is anticipated that the Districts will own, operate, and maintain the park and recreation improvements and facilities.

The Districts shall not have the authority to apply for or utilize any Conservation Trust ("Lottery") funds without the express prior consent of the Board of County

Commissioners. The Districts shall have the authority to apply for and receive any other grant funds, including, but not limited to, Great Outdoors Colorado (GOCO) discretionary grants. Such approval, although required, is not considered to be a material modification which would require the need to revise this Service Plan.

6. Mosquito Control. The Districts shall have the power and authority to finance, design, construct, acquire, install, operate, maintain, and provide for systems and methods for the eradication and control of mosquitoes, including but not limited to elimination or treatment of breeding grounds and purchase, lease, contracting or other use of equipment or supplies for mosquito control.

7. Fire Protection. The Districts shall not be authorized to plan for, design, acquire, construct, install, relocate, redevelop, finance, operate or maintain fire protection facilities or services, unless such facilities and services are provided pursuant to an intergovernmental agreement with the applicable Fire District. The authority to plan for, design, acquire, construct, install, relocate, redevelop or finance fire hydrants and related improvements installed as part of the water system shall not be limited by this provision. It is anticipated that the Districts will cooperate with the applicable Fire District in regard to placement and construction of a fire station.

8. Television Relay and Translation. The Districts shall have the power and authority to finance, design, construct, install, acquire, operate, and maintain television relay and translator facilities, with all necessary and incidental and appurtenant facilities, land and easements, together with extensions and improvements thereto.

9. Covenant Enforcement and Design Review. The Districts shall have the power and authority to provide covenant enforcement and design review services subject to the limitations set forth in C.R.S. § 32-1-1004(8), as it may be amended from time to time, which addresses covenant enforcement and design review services as additional powers of a metropolitan district under certain circumstances. If utilized, the covenant enforcement and design review powers will be coordinated through District No. 1 on behalf of all of the Districts pursuant to an Inter-District Intergovernmental Agreement to be executed by the Districts.

10. Security Services. The Districts shall have the power and authority to provide security services within the boundaries of the Districts, subject to the limitations set forth in C.R.S. § 32-1-1004(7), as it may be amended from time to time, which addresses security services as an additional power of a metropolitan district under certain circumstances. In no way is this power and authority intended to limit or supplant the responsibility and authority of local law enforcement (i.e., the El Paso County Sheriff's Department) within the boundaries of the Districts.

11. Solid Waste Disposal. The Districts have no plans to provide solid waste disposal services.

12. General. Because the overall development remains in its infancy, the specific services and potential overlapping service providers have yet to be determined. Based on current information, it is anticipated that the Districts will ultimately utilize other service providers to provide wastewater and fire protection services once the necessary improvements have been constructed.

More information can be provided once determined and known. Further, to the extent any of the above referenced facilities, improvements and services are dedicated and accepted by the County, the County shall own, operate and maintain such accepted facilities and related improvements. The Districts shall be authorized to own, operate and maintain any facilities, improvements and appurtenances not otherwise dedicated to and accepted by any Provider Jurisdiction, subject to any applicable County rules and regulations.

F. Other Powers.

1. Amendments. The Districts shall have the power to amend this Service Plan as needed, subject to appropriate statutory procedures as set forth in Section 32-1-207, C.R.S., as it may be amended from time to time, which, among other things, outlines what constitutes a material modification and the procedure for making a modification in a service plan.

2. Authority to Modify Implementation of Financing Plan and Public Infrastructure. Without amending this Service Plan, the Districts may defer, forego, reschedule or restructure the financing and construction of certain improvements and facilities, to better accommodate the pace of growth, resources availability, and potential inclusions of property within the Districts.

G. Other Statutory Powers.

The Districts may exercise such powers as are expressly or impliedly granted by Colorado law, if not otherwise limited by the Service Plan or its conditions of approval. The Districts shall not exercise the statutory authority granted in C.R.S. § 18-12-214 by enacting an ordinance, resolution, rule, or other regulation restricting or prohibiting the carrying of a concealed handgun in a building or specific area within its jurisdiction or under its direct control by a person holding a permit to do so.

H. Eminent Domain.

The Districts may exercise the power of eminent domain only as necessary to further the clear public purposes of the Districts. Currently, the Districts do not expect to use the power of eminent domain.

The power of eminent domain shall be limited to the acquisition of property that the applicable District intends to own, control or maintain by the applicable District or other governmental entity and is for the material use or benefit of the general public. The term "material use or benefit for the general public" shall not include the acquisition of property for the furtherance of an economic development plan, nor shall it include as a purpose an intent to convey such property or to make such property available to a private entity for economic development purposes. The phrase "furtherance of an economic development plan" does not include condemnation of property to facilitate public infrastructure that is necessary for the development of the Project.

I. Intergovernmental Agreements (IGAs).

The Districts are authorized to enter into IGAs to the extent permissible by law. As of the date of approval of this Service Plan, and as noted below, the Districts intend to enter into an intergovernmental agreement which shall govern the relationships by and among the Districts with respect to the financing, construction and operation of the Public Improvements contemplated herein. The Districts will establish a mechanism whereby any one or more of the Districts may separately or cooperatively fund, construct, install and operate the improvements. As noted earlier, the multiple district structure fits within an intended multiple phase development plan. The phasing of development will allow for more efficient financing for the overall project.

J. Description Of Proposed Boundaries And Service Area.

1. Initial District Boundaries. A vicinity map showing the general location of the area that may be served by the Districts is included as part of **Exhibit A**. A map of the initially included properties is included as part of **Exhibit A**, with legal descriptions of each of the Districts' boundaries also found as part of **Exhibit A**.

2. Additional Inclusion Areas/Boundary Adjustments. The Districts shall be authorized to include territory in accordance with applicable provisions of the Special District Act. Further, in order to accommodate the needs of Project phasing and other contingencies, the boundaries of the Districts may be adjusted via the inclusion or exclusion within the combined area of the Initial District Boundaries in accordance with the applicable provisions of the Special District Act. Notwithstanding the foregoing, the Districts are prohibited from including additional property within the Districts' boundaries if the property is within the corporate limits of the City of Colorado Springs without express prior consent of the City of Colorado Springs.

3. Extraterritorial Service Areas. The Districts do not anticipate providing services to areas outside of the Initial District Boundaries and Additional Inclusion Areas.

4. Analysis Of Alternatives. It is anticipated that the Districts, collectively, will undertake the financing and construction of the improvements contemplated herein. Specifically, the Districts shall enter into an intergovernmental agreement which shall govern the relationships between and among the Districts with respect to the financing, construction and operation of the improvements contemplated herein. The multiple district structure will support the phased development of the Project, as well as the fact that although the Financing Districts will consist primarily of residential units, the limited commercial development will be located in one or more of the Financing Districts. The Districts will establish a mechanism whereby any one or more of the Districts may separately or cooperatively fund, construct, install and operate the improvements. As stated above, neither the County nor any other public entity, including 4-Way Ranch Metropolitan District and Woodmen Hills Metropolitan District, is available or willing to provide the Public Improvements required.

5. Material Modifications/Service Plan Amendment. Material modifications of this Service Plan shall, at a minimum, trigger the need for prior approval of the Board of County Commissioners at an advertised public hearing and may require a need for a complete re-submittal of

an amended Service Plan along with a hearing before the County's planning commission. For the purpose of this Service Plan the following changes shall be considered material modifications:

a. Any change in the basic services provided by the Districts, including the addition of any types of services not authorized by this Service Plan.

b. Any other matter which is now, or may in the future, be described as a material modification by the Special District Act.

c. Imposition of a mill levy in excess of any of the Maximum Mill Levies as authorized in this approved Service Plan.

d. Issuance of Debt in excess of the Maximum Debt Authorization authorized in this Service Plan.

e. Creation of any sub-districts as contemplated in the Special District Act.

f. Inclusion into any District of any property over five (5) miles from the combined area of the Initial District Boundaries.

g. Issuance of any Debt with a maturity period of greater than thirty (30) years from the date of issuance of such Debt.

IV. DEVELOPMENT ANALYSIS

A. Existing Developed Conditions.

At the present time there are no public improvements within the boundaries of the proposed Districts and there is no population.

B. Total Development At Project Buildout.

At complete Project build-out, development within the Districts is planned to consist of approximately 555 single family homes with an average value of $385,000, approximately 749 single family homes with an average value of $375,000, approximately 846 single family homes with an average value of $340,000, approximately 1,110 single family attached homes with an average value of $295,000, and approximately 20,000 square feet of commercial development (see Pages 4 and 5 of the financial plan information provided as part of Exhibit D). The total estimated population of the Districts upon completion of the residential development is 8,125 people (3,250 residential units x 2.5 persons per residential unit). The rate of absorption is a projection based on information from the Developer and is used for estimating the financial plan. There is no way to accurately predict absorption due to variables such as the economic factors, housing demand, land-use approval timing, building supply chains, and labor availability. In view of these factors, the bond underwriter projects the potential ability of the Districts to discharge the proposed debt per the statutory requirement. If absorption is delayed or accelerated, the bond issuance parameters will reflect those changes at the

time of issuance.

C. Development Phasing And Absorption.

Absorption of the project is projected to take approximately fourteen (14) years, estimated to begin in 2022 (year) and end in 2036 (year) and is further described in the Development Summary Table found at **Exhibit B**. Maps depicting the Public Improvements are attached as part of **Exhibit B**.

D. Status of Underlying Land Use Approvals.

Sketch Plan approval was obtained from the EPC BOCC and recorded on September 23, 2020. The land use conforms to the Falcon/Peyton Small Area Master Plan for "Urban Density." The County's Master Plan categorizes the future land use placetype as "Suburban Residential." This categorization provides a collection of land uses that include mainly single-family detached homes, but also includes single-family attached, multifamily, commercial retail, commercial service, parks and open space and institutional uses, all of which are anticipated within the Project.

V. INFRASTRUCTURE SUMMARY

Attached as **Exhibit C** is a summary of the estimated costs of Public Improvements which are anticipated to be required within these Districts. A general description of the categories of Public Improvements is included in Section III.D. of this Service Plan. The total costs of the Public Improvements is estimated to be approximately $285,000,000 in year 2021 dollars. It should be noted, though, the foregoing costs estimates are preliminary in nature and the ultimate costs may increase or decrease depending on numerous factors, many of which are out of the Developer's control. In particular, these initial cost estimates only include the public improvement portion of costs and the total project improvement costs (including items such as dry utilities, etc.) will be significantly higher and will materially increase the overall costs. The financial model attached to **Exhibit D** estimates that the Districts will finance up to approximately $94,605,000 (approximately 36% of the total costs of the Public Improvements), but the amount ultimately financed by the Districts will be subject to the Maximum Authorized Debt limit.

All Public Improvements will be designed and constructed in accordance with the standards of the governmental entity to which such Public Improvements will be dedicated (including, with respect to storm sewer and drainage facilities, the applicable NPDES standards), and otherwise in accordance with applicable El Paso County standards. The composition of specific Public Improvements will be determined in connection with applicable future land use and development approvals required by El Paso County rules and regulations.

VI. FINANCIAL PLAN SUMMARY.

A. Financial Plan Assumptions and Debt Capacity Model.

Attached at **Exhibit D** is a summary of development assumptions, projected assessed valuation, description of revenue sources (including applicable mill levies and fees) and expenses for

both operations and debt service, and an overall debt capacity model associated with projected future development of the Project. The model demonstrates that the Districts are capable of providing sufficient and economic service within the Project and that the Districts have or will have the financial ability to discharge the Districts' Debt on a reasonable basis. The financial model attached as **Exhibit D** is an example of the manner in which the Districts may finance the Public Improvements. The specific structure for financing the Public Improvements shall be determined in the discretion of the Boards of Directors of the Districts, subject to the limitations set forth in this Service Plan.

B. Maximum Authorized Debt.

The Districts are authorized to issue Debt up to $295,000,000 in principal amount (total combined for all Districts). The debt issuance authorization is based upon the proposed completion of an estimated $285,000,000 of on and off-site public improvements including, but not limited to, on and off-site streets, roadway, water and sanitary sewer, stormwater and drainage, and park and recreation improvements. The cost estimates are preliminary in nature and the ultimate costs may increase or decrease depending on numerous factors, many of which are out of Developer's control. In particular, the initial cost estimates only include the public improvement portion of costs and the total project improvement costs (including items such as dry utilities, etc.) which may well be significantly higher and will likely materially increase the overall development costs.

C. Maximum Mill Levies.

1. Maximum Debt Service Mill Levy. The Maximum Debt Service Mill Levy shall be fifty (50) mills, subject to Legislative Adjustment, for each residential district and shall be thirty five (35) mills, subject to Legislative Adjustment, for each commercial district. All Debt issued by the Districts must be issued in compliance with the requirements of State law including, but not limited to, Section 32-1-1101, C.R.S., as it may be amended from time to time, which outlines the various financial powers of a special district.

2. Maximum Operational Mill Levy. The Maximum Operational Mill Levy Cap for each District shall be ten (10) mills, subject to Legislative Adjustment.

3. Maximum Special Purpose Mill Levy. The Maximum Special Purpose Mill Levy for each residential district is five (5) mills, subject to Legislative Adjustment. It is anticipated that the entire revenues from the Operational Mill Levy will be needed to support District No. 1 operating and maintaining certain Public Improvements, including parks, open space, storm drainage, and water and sewer facilities. Covenant enforcement is a significant administrative and oversight function that requires substantial funding, which may require the use of an additional special purpose mill levy. An alternative is to utilize fees for this purpose, however, that decision will be made by the Boards after organization.

4. Maximum Combined Mill Levy. The Maximum Combined Mill Levy shall be sixty five (65) mills, subject to Legislative Adjustment, for each residential district and shall be forty-five (45) mills, subject to Legislative Adjustment, for each commercial district.

Increases to or removal of any of the Maximum Mill Levies shall be subject to Board of County Commissioner approval without the need for a formal Service Plan Amendment (unless the Board otherwise requires).

D. Maximum Maturity Period For Debt.

The period of maturity for issuance of any Debt (but not including Developer Funding Agreements) shall be limited to no more than thirty (30) years without express, prior approval of the Board of County Commissioners. Such approval, although required, is not considered to be a Material Modification of the Service Plan which would trigger the need to amend said Service Plan. However, the Districts are specifically authorized to refund or restructure existing Debt so long as the period of maturity for the refunding or restructured Debt is no greater than 30 years from the date of the issuance thereof. The Districts must be authorized to refund or restructure existing Debt within these confines because if bonds are issued in the early part of a project as proposed, the interest rate is generally higher due to the reliance on future projected development. As that development is completed, there is less risk to the bond holders and the initial bonds are refunded and replaced with lower interest rate "permanent" bonds in order to lower the tax impact on residents. This is a common structure for new development bonds.

E. Developer Funding Agreements.

The Developer intends to enter into Developer Funding Agreements with the Districts in addition to recovery of the eligible costs associated with creation of the Districts. It is anticipated that in the formative years the Districts will have shortfalls in funding their capital costs and monthly operations and maintenance expenses. The Developer may fund these obligations for the Districts to promote the Project's development subject to the Developer being repaid from future District revenues.

Developer Funding Agreements may allow for the earning of simple interest thereon, but under no circumstances shall any such agreement permit the compounding of interest. The Developer Funding Agreements may permit an interest rate that does not exceed the prime interest rate plus two points thereon.

The maximum term for repayment of a Developer Funding Agreement shall be twenty (20) years from the date the District entering into such agreement becomes obligated to repay the Developer Funding Agreement under the associated contractual obligation. For the purpose of this provision, Developer Funding Agreements are considered repaid once the obligations are fully paid in cash or when converted to bonded indebtedness of the applicable District (including privately placed bonds). Any extension of such term is considered a Material Modification and must be approved by the Board of County Commissioners.

Required disclosure notices shall clearly identify the potential for the Districts to enter into obligations associated with Developer Funding Agreements.

F. Privately Placed Debt Limitation.

Prior to the issuance of any privately placed Debt, the District proposing such issuance shall obtain the certification of an External Financial Advisor substantially as follows: We are [I am] an External Financial Advisor within the meaning of this Service Plan.

> We [I] certify that (1) the net effective interest rate (calculated as defined in Section 32-1-103(12), C.R.S., as it may be amended from time to time, which defines "net effective interest rate" for purposes of the Special District Act) to be borne by [insert the designation of the Debt] does not exceed a reasonable current [tax-exempt] [taxable] interest rate, using criteria deemed appropriate by us [me] and based upon our [my] analysis of comparable high yield securities; and (2) the structure of [insert designation of the Debt], including maturities and early redemption provisions, is reasonable considering the financial circumstances of the District.

G. Revenue Obligations. The Districts shall also be permitted to issue Revenue Obligations in such amount as the Districts may determine. Amounts issued as Revenue Obligations are not subject to the Maximum Debt Authorization.

VII. OVERLAPPING TAXING ENTITIES, NEIGHBORING JURISDICTIONS

A. Overlapping Taxing Entities.

The directly overlapping taxing entities and their respective year 2020 mill levies are as follows:

El Paso County	.007755
El Paso County Road and Bridge	.000330
Peyton School District No. 23	.030469
Pikes Peak Library District	.003855
Falcon Fire Protection District	.014886
Upper Black Squirrel Creek Ground Water	.001056
El Paso County Conservation	.000000
Total Existing Mill Levy:	.058351

The total mill levy including the initially proposed District's mill levy is 0.123351 mills.

It is not anticipated that there will be any significant financial impacts to these entities.

B. Neighboring Jurisdictions.

The following additional taxing and/or service providing entities include territory within three (3) miles of the Initial District Boundaries (based upon information provided by the County Assessor's Office):

4-WAY RANCH METROPOLITAN DISTRICT NOS. 1 & 2
BENT GRASS METROPOLITAN DISTRICT
CENTRAL COLORADO CONSERVATION DISTRICT
EL PASO COUNTY
EL PASO COUNTY CONSERVATION DISTRICT
EL PASO COUNTY PUBLIC IMPROVEMENT DISTRICT NO. 2
EL PASO COUNTY SCHOOL DISTRICT NO. 49
FALCON FIRE PROTECTION DISTRICT
FALCON REGIONAL TRANSPORTATION METROPOLITAN DISTRICT
LATIGO CREEK METROPOLITAN DISTRICT
MERIDIAN RANCH METROPOLITAN DISTRICT
MERIDIAN RANCH METROPOLITAN DISTRICT 2018 SUBDISTRICT
MERIDIAN SERVICE METROPOLITAN DISTRICT
PAINT BRUSH HILLS METROPOLITAN DISTRICT
PAINT BRUSH HILLS METROPOLITAN DISTRICT SUBDISTRICT A
PEYTON FIRE PROTECTION DISTRICT
PEYTON SCHOOL DISTRICT NO. 23
PIKES PEAK LIBRARY DISTRICT
UPPER BLACK SQUIRREL CREEK GROUNDWATER MANAGEMENT DISTRICT
WOODMEN HILLS METROPOLITAN DISTRICT
WOODMEN ROAD METROPOLITAN DISTRICT

Anticipated relationships and impacts to these entities: As noted previously, the Developer and the Districts intend to work with any overlapping service providers to obtain the necessary consents and/or approvals for the provision of necessary services to the Districts including, but not limited to, wastewater and fire protection services.

VIII. DISSOLUTION

A. Consolidation. It is the intent of the Districts to consolidate or dissolve upon payment or defeasance of all Debt incurred, as well as when the Districts have been fully developed, all public improvements provided for in the Service Plan have been completed, or upon a court determination that adequate provision has been made for the payment of all Debt, and adequate provision for continuation or assignment and assumption of all operations and maintenance responsibilities for the District improvements and at such time as the District(s) do not need to remain in existence to discharge their financial obligations or perform their services.

B. Dissolution. Upon an independent determination of the Board of County Commissioners that the purposes for which a particular District was created have been accomplished, such District agrees to file a petition in the appropriate District Court for dissolution, pursuant to the applicable State statutes. In no event shall dissolution occur until the District has provided for the payment or discharge of all of its outstanding indebtedness and other financial obligations as required pursuant to State statutes.

C. Administrative Dissolution. The Districts shall be subject to administrative

dissolution by the Division of Local Government as set forth in Section 32-1-710, C.R.S., as it may be amended from time to time.

IX. COMPLIANCE

A. An Annual Report and Disclosure Form will be required and submitted as described in C.R.S. 32-1-207(3)(d), as it may be amended from time to time, and as further articulated by Board of County Commissioners Resolution No. 07-273, which Resolution adopted the County's model service plan.

B. Material Modifications of this Service Plan shall be subject to the provisions contained in Section 32-1-207, C.R.S., as it may be amended from time to time, and relates to approvals and notices thereof.

X. MISCELLANEOUS.

The following is additional information to further explain the functions of the Districts:

A. Special District Act.

The contemplated municipal services are under the jurisdiction of the Special District Act and not the Public Utilities Commission.

B. Disclosure to Prospective Purchasers.

After formation of the Districts, and in conjunction with final platting of any properties within a particular District, the applicable Board of Directors of the District shall prepare a notice acceptable to the Planning and Community Development Department Staff informing all purchasers of property within the District of the District's existence, purpose and debt, taxing, and other revenue-raising powers and limitations. Such notice obligation shall be deemed satisfied by recording the notice with this Service Plan and each final plat associated with the Project, or by such other means as the Planning and Community Development Department approves. Such notice shall be modified to address the potential for future Debt issuance which may be required to meet the obligations associated with loans incurred by the District. Additionally, the notice shall disclose the limited representation elements associated with the Control District/Financing District structure. In conjunction with subsequent plat recordings, Planning and Community Development Department Staff is authorized to administratively approve updates of the disclosure form to reflect current information.

C. Local Improvements.

Prior to the financing of Local Public Improvements, and if required by County policy uniformly applied, agreements shall be in place to prevent a loss of sales tax revenue from sales of construction materials that would otherwise accrue to the County.

D. Service Plan not a Contract.

The grant of authority contained in this Service Plan does not constitute the agreement or binding commitment of the Districts enforceable by third parties to undertake the activities described, or to undertake such activities exactly as described.

E. Land Use and Development Approvals.

Approval of this Service Plan does not imply approval of the development of a specific area within the Project, nor does it imply approval of the number of residential units or the total site/floor area of commercial or industrial buildings identified in this Service Plan or any of the exhibits attached thereto. All such land use and development approvals shall be processed and obtained in accordance with applicable El Paso County rules, regulations and policies.

F. Citizens Advisory Council.

The Districts shall cooperate with the County in the formation of a Citizens' Advisory Council appointed by the Board of County Commissioners consisting of five (5) property owners within the legal boundaries of the Financing Districts. Council membership shall be open to otherwise eligible electors of any of the Financing Districts. Meetings will be held at times and in locations convenient to the Council members, and such meetings and the Council's functions shall be supported by the Service Districts, subject to applicable law. If required by the Board of County Commissioners, the Chair of the Council will be appointed as a voting member of the Board of District No. 1. Formation of a Council shall not be authorized until there are at least one hundred (100) dwelling units constructed within the Financing Districts. Continuance of the Council shall be at the sole discretion of the Board of County Commissioners, and in the event of insufficient interest in CAC membership, appropriate justification presented by the Controlling District Board of Directors, or for any other reason, the Board of County Commissioners, at its sole discretion, shall have the right to eliminate a prior requirement for a CAC.

XI. CONCLUSION

It is submitted that this Service Plan for the Districts establishes that:

A. There is sufficient existing and projected need for organized service in the area to be serviced by the proposed Districts;

B. The existing service in the area to be served by the proposed Districts is inadequate for present and projected needs;

C. The proposed Districts are capable of providing economical and sufficient service to the Project;

D. The area to be included in the proposed Districts does have, and will have, the financial ability to discharge the proposed indebtedness on a reasonable basis;

E. Adequate service is not, and will not be, available to the area through the County

or other existing municipal or quasi-municipal corporations, including existing special districts, within a reasonable time and on a comparable basis;

F. The facility and service standards of the proposed Districts are compatible with the facility and service standards of the County;

G. The proposal is in substantial compliance with the County master plan.

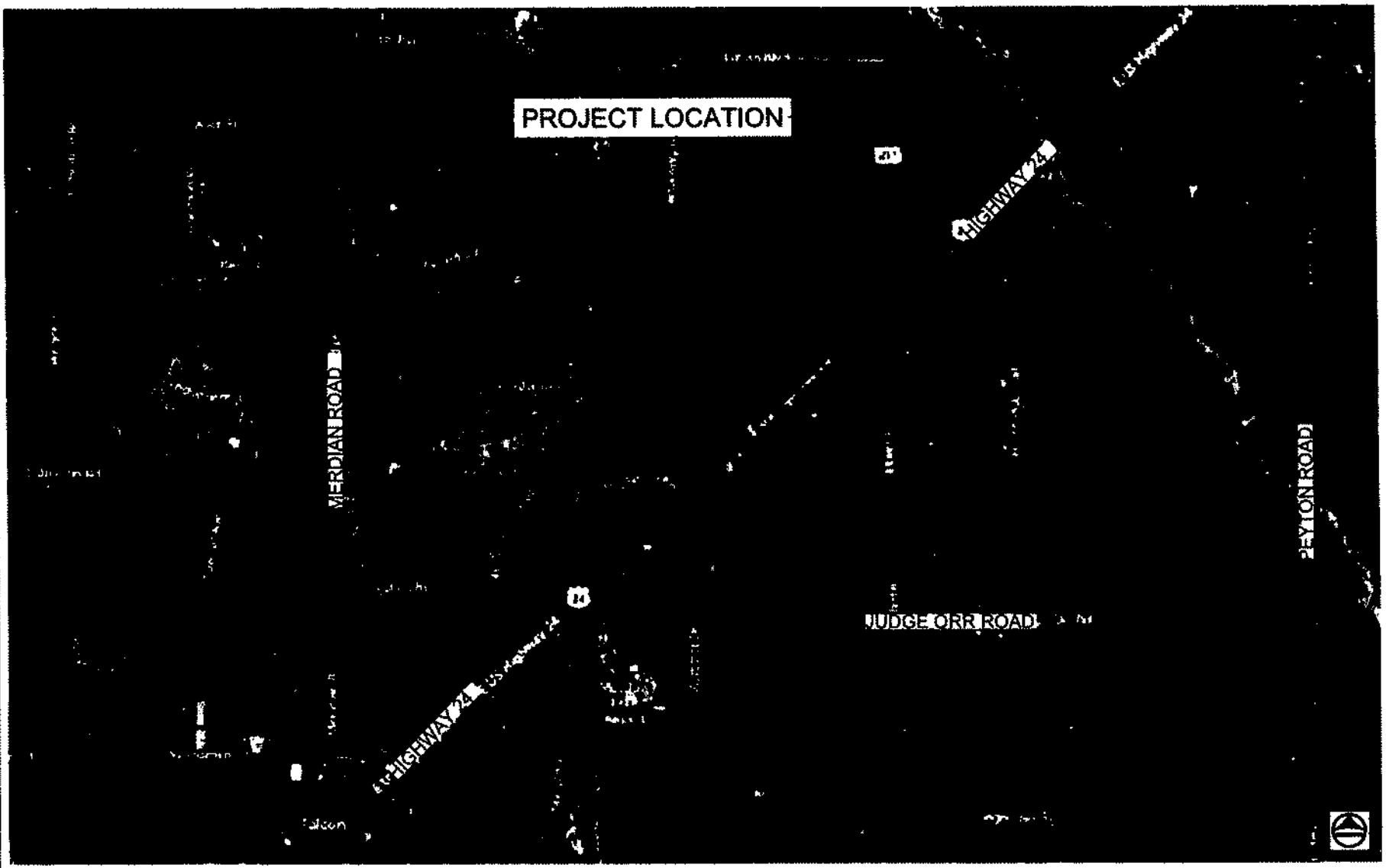
H. The creation of the proposed Districts is in the best interests of the area proposed to be served.

EXHIBIT A

MAPS AND LEGAL DESCRIPTIONS

1. Vicinity Map
2. Boundary Exhibit
3. 5-Mile Radius Map
4. Legal Descriptions

EXHIBIT A. 1 – VICINITY MAP



HRGreen HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

NEAR VICINITY MAP

SHEET 2

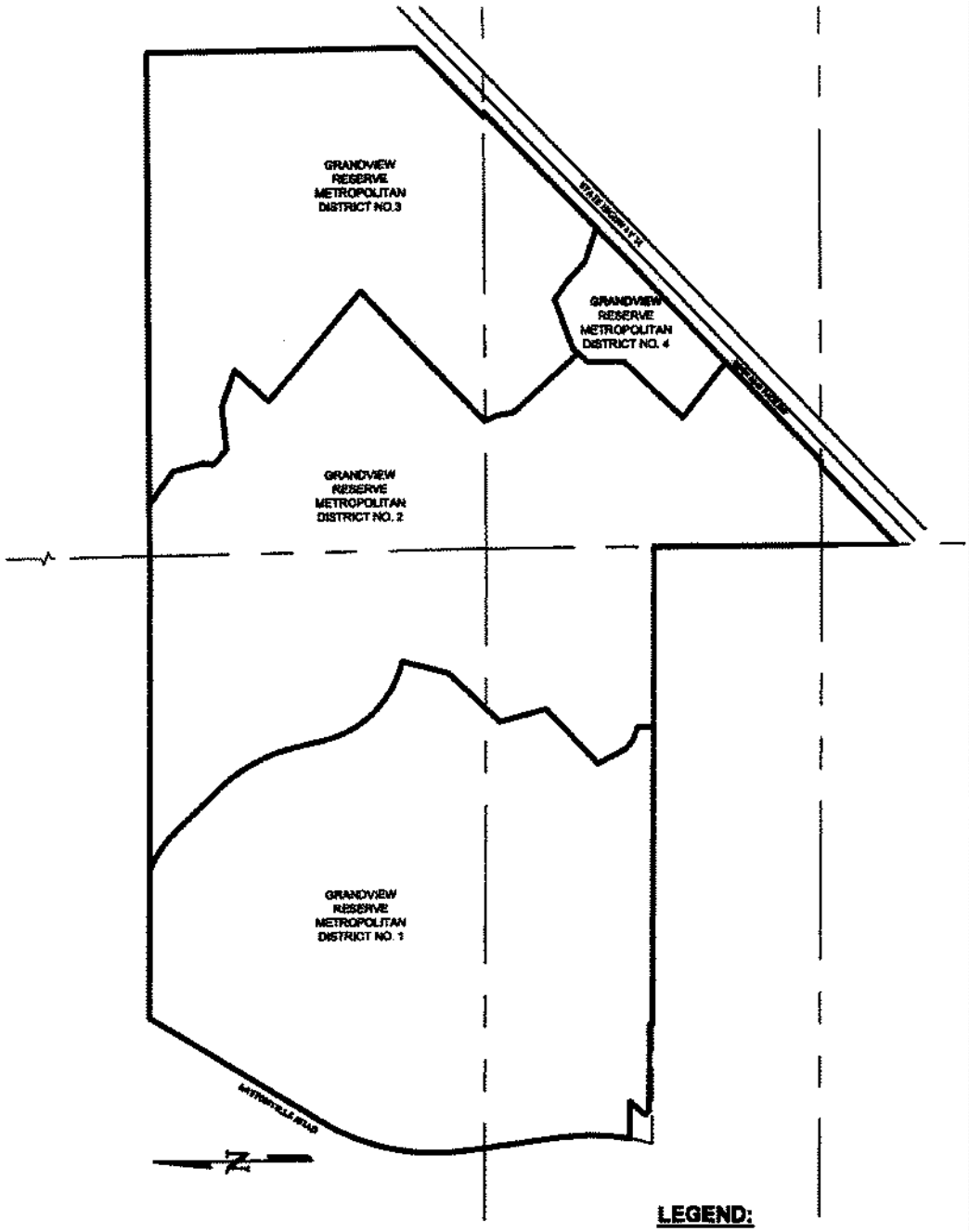
SCALE: 1" = 5000'

DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT, xgt-1-AV01

EXHIBIT A. 2 – BOUNDARY EXHIBIT

EXHIBIT A . 2



LEGEND:

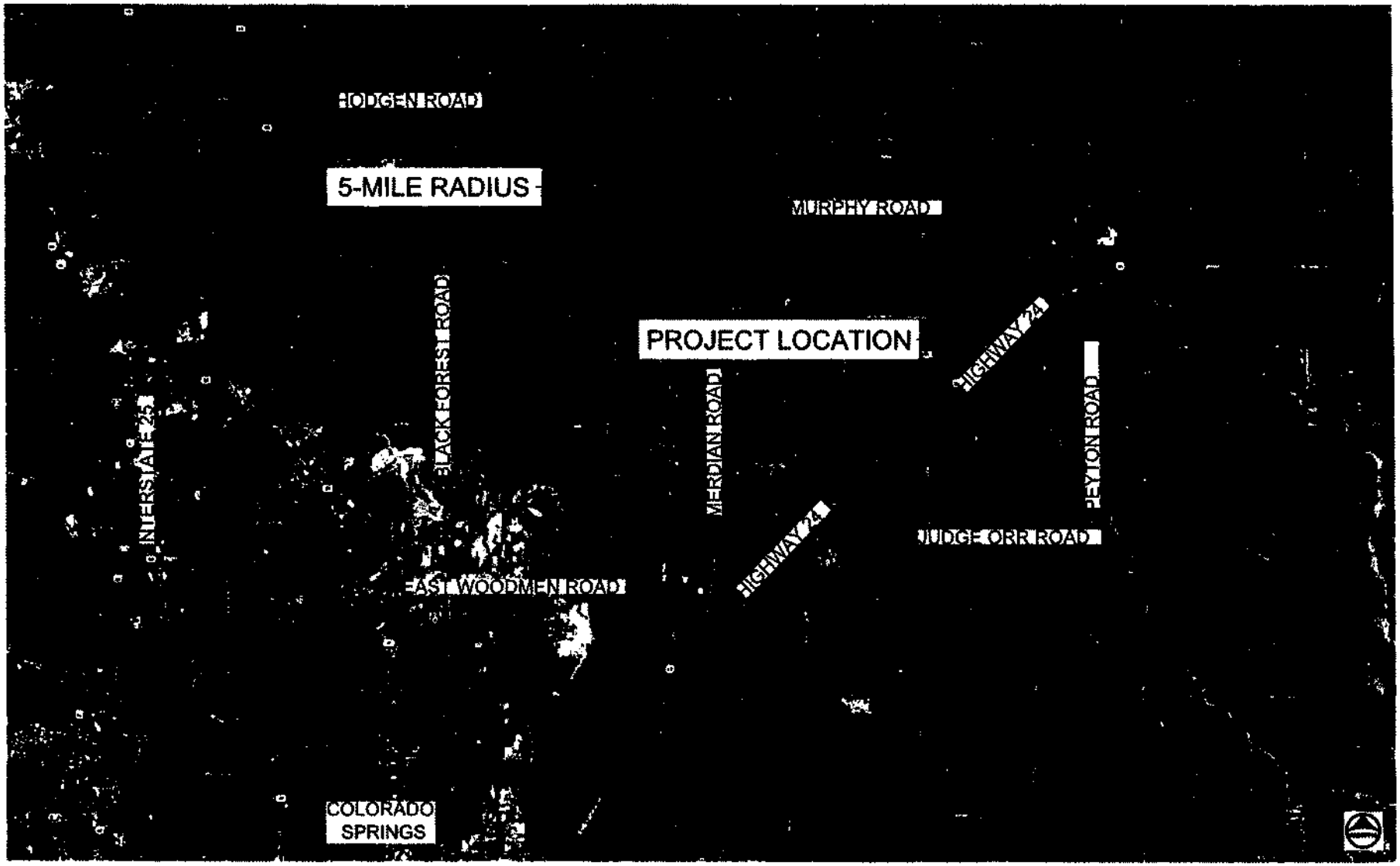
P.O.B	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCING

THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.

EDWARD-JAMES SURVEYING, INC.
926 Elkton Dr, Colorado Springs, CO 80907 (719) 576-1216
4732 Eagleridge Circle Pueblo, CO 81008 (719) 545-6240

01-29-21
DISTRICT NO. 2
JOB NO. 1672-02
SHEET 3 OF 3

EXHIBIT A. 3 – 5-MILE RADIUS MAP



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GRANDVIEW RESERVE
METROPOLITAN DISTRICT
VICINITY MAP

SHEET
1
SCALE:1" = 2.5 mi
DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT; xgt-1-AV01

EXHIBIT A. 4 – LEGAL DESCRIPTION

EXHIBIT A . 4

GRANDVIEW RESERVE METROPOLITAN DISTRICT No. 1

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, AND A PORTION OF THE NORTH HALF OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N89°47'04"W ON THE SOUTH LINE OF SAID SECTION 21, A DISTANCE OF 1,253.14 FEET TO THE POINT OF BEGINNING; THENCE S43°11'44"W, A DISTANCE OF 156.45 FEET; THENCE S14°36'33"E, A DISTANCE OF 372.33 FEET; THENCE S46°29'19"W, A DISTANCE OF 590.52 FEET; THENCE S27°48'24"E, A DISTANCE OF 255.75 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS N41°55'50"E, HAVING A DELTA OF 32°48'22", A RADIUS OF 330.82 FEET, A DISTANCE OF 189.42 FEET TO A POINT ON CURVE; THENCE S00°20'56"W, A DISTANCE OF 131.71 FEET TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W, ON SAID SOUTH LINE, A DISTANCE OF A DISTANCE OF 2,342.61 FEET; THENCE N00°12'52"E, A DISTANCE OF 25.00 FEET; THENCE N89°47'08"W, A DISTANCE OF 679.35 FEET; THENCE N44°47'01"W, A DISTANCE OF 42.37 FEET; THENCE N41°52'38"E, A DISTANCE OF 21.11 FEET; THENCE N41°03'22"E, A DISTANCE OF 139.03 FEET; THENCE S89°58'12"W, A DISTANCE OF 288.62 FEET TO A POINT ON CURVE, SAID POINT BEING ON THE EASTERLY RIGHT-OF-WAY LINE OF EXISTING EASTONVILLE ROAD (80.00 FOOT WIDE); THENCE ON SAID EASTERLY RIGHT-OF-WAY AS DEFINED BY CERTIFIED BOUNDARY SURVEY, AS RECORDED UNDER DEPOSIT NO. 201900096, THE FOLLOWING FIVE (5) COURSES:

1. ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS N79°27'48"W, HAVING A DELTA OF 18°12'30", A RADIUS OF 1,630.00 FEET; A DISTANCE OF 518.00 FEET TO A POINT OF TANGENT;
2. N07°40'18"W, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;
3. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 39°01'10", A RADIUS OF 1,770.00 FEET, A DISTANCE OF 1,205.40 FEET TO A POINT OF TANGENT;
4. N31°20'52"E, A DISTANCE OF 1,517.37 FEET TO A POINT OF CURVE;
5. ON THE ARC OF A CURVE OT THE LEFT, HAVING A DELTA OF 2°07'03", A RADIUS OF 1,330.00 FEET, A DISTANCE OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;

THENCE S89°50'58"E ON SAID NORTH LINE, A DISTANCE OF 1,164.47 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS S24°25'09"W, HAVING A DELTA OF 21°22'37", A RADIUS OF 1,061.00 FEET, A DISTANCE OF 395.86 FEET TO A POINT OF TANGENT; THENCE S44°12'14"E, A DISTANCE OF 446.79 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, HAVING

A DELTA OF 31°01'27", A RADIUS OF 1,261.00 FEET, A DISTANCE OF 682.80 FEET TO A POINT OF TANGENT; THENCE S13°10'46"E, A DISTANCE OF 235.68 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 62°58'51", A RADIUS OF 839.00 FEET, A DISTANCE OF 922.25 FEET TO A POINT ON CURVE; THENCE S14°30'21"W, A DISTANCE OF 374.20 FEET; THENCE S43°11'44"W, A DISTANCE OF 402.13 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 11,746,693 SQ. FEET OR 269.667 ACRES MORE OR LESS

LEGAL DESCRIPTION STATEMENT

I, JONATHAN W. TESSIN, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY STATE THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED UNDER MY RESPONSIBLE CHARGE AND ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF IS CORRECT.

JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.

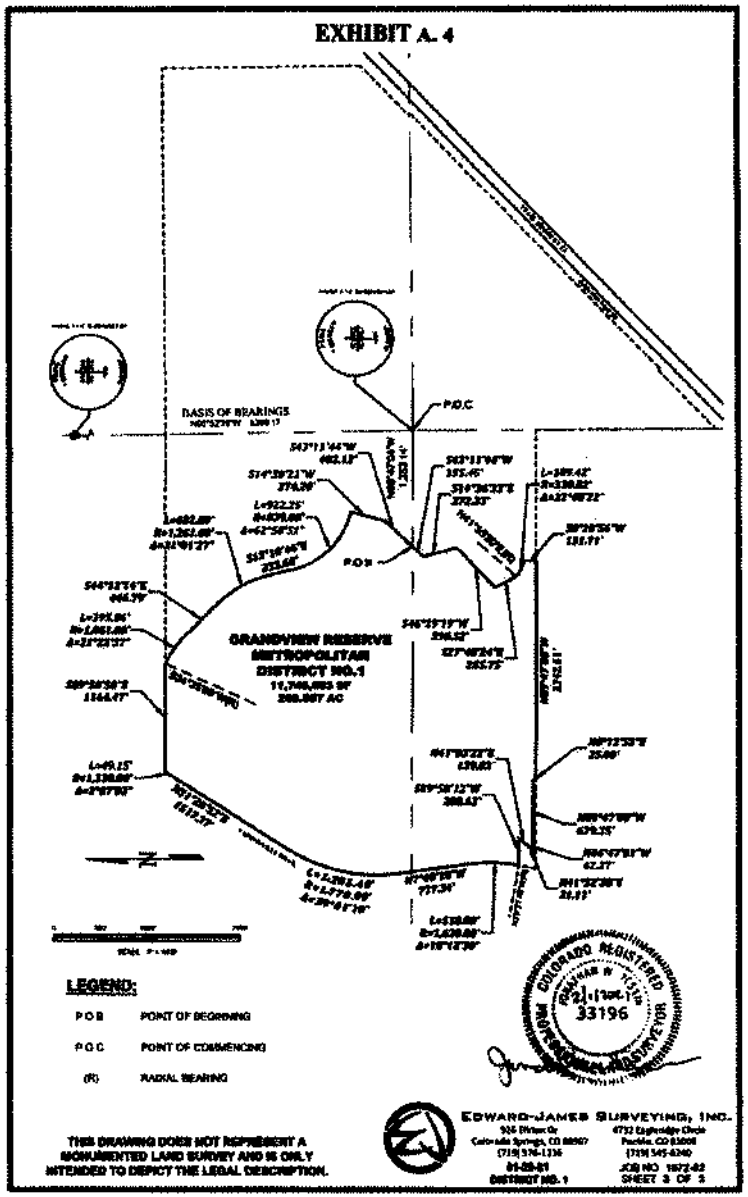


EXHIBIT A. 4
BASIS OF BEARINGS
P.O.C
P.O.B
GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 1
LEGEND:
P.O.B POINT OF BEGINNING
P.O.C POINT OF COMMENCING
(R) RADIAL BEARING
THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.
COLORADO REGISTERED
33196
EDWARD-JAMES SURVEYING, INC.
01-20-21
DISTRICT NO. 1
JOB NO. 1972-02
SHEET 3 OF 3

January 29, 2021
Job No. 1672.01
Page 1 of 3

EXHIBIT A . 4

GRANDVIEW RESERVE METROPOLITAN DISTRICT No. 2

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, A PORTION OF THE SOUTHWEST QUARTER OF SECTION 22, A PORTION OF THE WEST HALF OF SECTION 27 AND A PORTION OF THE NORTH NORTHEAST QUARTER OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED " PLS 30087", AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED " PLS 30087", BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO THE POINT OF BEGINNING; THENCE N89°41'03"E, ON THE NORTH LINE OF THE SOUTH HALF OF SECTION 22, A DISTANCE OF 400.43 FEET; THENCE S54°38'19"E, A DISTANCE OF 322.18 FEET; THENCE S15°28'17"E, A DISTANCE OF 239.41 FEET; THENCE S07°54'45"W, A DISTANCE OF 89.22 FEET; THENCE S48°50'01"E, A DISTANCE OF 156.62 FEET; THENCE N83°02'29"E, A DISTANCE OF 324.17 FEET; THENCE S71°00'05"E, A DISTANCE OF 309.15 FEET; THENCE S42°42'14"W, A DISTANCE OF 361.76 FEET; THENCE S49°48'45"E, A DISTANCE OF 1,122.17 FEET; THENCE S46°23'57"W, A DISTANCE OF 1,414.53 FEET; THENCE S25°17'59"E, A DISTANCE OF 103.66 FEET; THENCE S09°17'58"E, A DISTANCE OF 136.80 FEET; THENCE S42°25'16"E, A DISTANCE OF 685.79 FEET; THENCE S41°12'32"W, A DISTANCE OF 99.97 FEET; THENCE S00°00'00"E, A DISTANCE OF 282.37 FEET; THENCE S43°38'54"W, A DISTANCE OF 640.39 FEET; THENCE S51°46'34"E, A DISTANCE OF 548.80 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNT IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID RIGHT-OF-WAY THE FOLLOWING THREE (3) COURSES:

1. S45°55'49"W, A DISTANCE OF 1,078.91 FEET;
2. S89°39'01"W A DISTANCE OF 36.17 FEET;
3. S45°55'49"W, A DISTANCE OF 855.35 FEET TO A POINT ON THE EASTERLY LINE OF THE SOUTHEAST QUARTER OF SECTION 28;

THENCE N00°21'45"W, ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 591.16 FEET TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER; THENCE N00°21'38"W ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE N89°47'08"W ON SAID SOUTH LINE, A DISTANCE OF 1,415.10 FEET; THENCE N00°20'56"E, A DISTANCE OF 131.71 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N09°07'27"E, HAVING A DELTA OF 32°48'22", A RADIUS OF 330.82 FEET, A DISTANCE OF 189.42 FEET TO A POINT ON CURVE; THENCE N27°46'24"W, A DISTANCE OF 256.75 FEET; THENCE N46°29'19"E, A DISTANCE OF 590.52 FEET; THENCE N14°36'33"W, A DISTANCE OF 372.33 FEET; THENCE N43°11'44"E, A DISTANCE OF 557.57 FEET; THENCE N14°30'21"E, A DISTANCE OF 374.20 FEET TO A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE RIGHT, WHOSE CENTER BEARS N13°50'22"E, HAVING A DELTA OF 62°58'51", A RADIUS OF 839.00 FEET, A DISTANCE OF 922.25 FEET TO A POINT OF TANGENT; THENCE N13°10'46"W, A DISTANCE OF 235.68 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING DELTA OF 31°01'27", A RADIUS OF 1,261.00 FEET, A DISTANCE OF 682.80 FEET TO A POINT OF TANGENT; THENCE N44°12'14"W, A DISTANCE OF 446.79 FEET TO A POINT OF CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 21°22'37", A RADIUS OF 1,061.00 FEET, A DISTANCE OF 395.86 FEET TO THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21; THENCE S89°50'58" ON SAID NORTH LINE, A DISTANCE OF 2,471.06 FEET TO THE POINT OF BEGINNING.

926 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE: (719) 576-1216 FAX: (719) 576-1206

4732 EAGLEMORE CIRCLE
PUEBLO, CO. 81008
PHONE: (719) 545-6240 FAX: (719) 545-6247

http://ejsurveying.com

CONTAINING A CALCULATED AREA OF 12,695,360 FEET, OR 291.445 ACRES MORE OR LESS

LEGAL DESCRIPTION STATEMENT

I, JONATHAN W. TESSIN, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY STATE THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED UNDER MY RESPONSIBLE CHARGE AND ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF IS CORRECT.

COLORADO REGISTERED
JONATHAN W. TESSIN
21/01/21
3196
PROFESSIONAL LAND SURVEYOR

JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.

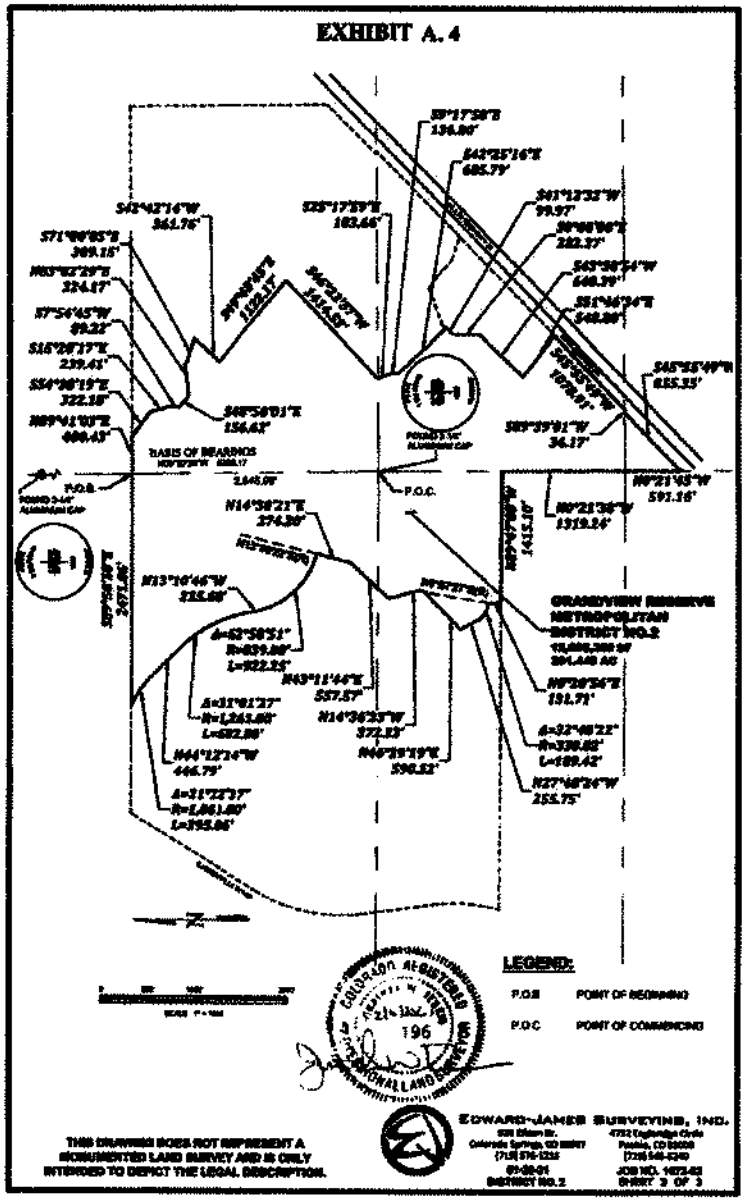


EXHIBIT A. 4
S89°17'38"E
136.80'
S42°25'16"E
685.79'
S41°12'33"W
99.97'
S43°38'24"W
648.39'
S51°46'34"E
548.88'
S45°25'49"W
655.35'
S89°39'01"W
34.17'
N0°21'45"W
591.16'
N0°21'36"W
1319.24'
S42°42'14"W
561.76'
S25°17'39"E
183.46'
S71°00'05"E
309.15'
N63°52'29"E
224.17'
S7°54'45"W
99.22'
S16°28'17"E
239.43'
S34°38'19"E
322.18'
N89°41'00"E
498.43'
S48°58'01"E
156.63'
BASIS OF BEARINGS
2,645.09'
P.O.B.
P.O.C.
N14°38'21"E
274.30'
N13°10'46"W
235.88'
S30°36'58"E
2,671.46'
2,671.31'
GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 2
Δ=62°58'51"
R=839.00'
L=922.35'
N43°11'44"E
557.57'
Δ=31°01'27"
R=1,243.00'
L=672.98'
N14°36'23"W
372.33'
N44°12'14"W
446.79'
N46°29'19"E
596.52'
Δ=31°22'37"
R=1,061.00'
L=395.86'
Δ=22°48'22"
R=338.00'
L=188.42'
N27°48'24"W
255.75'
N0°20'56"E
191.71'
LEGEND:
P.O.B POINT OF BEGINNING
P.O.C POINT OF COMMENCING
196
EDWARD-JAMES SURVEYING, INC.
THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.

January 29, 2021
Job No. 1672.01
Page 1 of 2

EXHIBIT A . 4

GRANDVIEW RESERVE METROPOLITAN DISTRICT No. 3

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 22, AND A PORTION OF THE NORTH HALF OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: **THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.**

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N00°52'26"W ON THE EAST LINE OF SAID SECTION 21, A DISTANCE OF 2,645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21; THENCE N89°41'03"E ON THE NORTH LINE OF THE SOUTH HALF OF SECTION 22, A DISTANCE OF 400.43 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING N89°41'03"E ON SAID NORTH LINE, A DISTANCE OF 3,537.77 FEET; THENCE S00°41'58"E ON THE EAST LINE OF THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 22, A DISTANCE OF 2,117.66 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNT IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID RIGHT-OF-WAY THE FOLLOWING THREE (3) COURSES:

1. **S45°55'49"W, A DISTANCE OF 758.36 FEET;**
2. **N89°38'06"E, A DISTANCE OF 36.18 FEET;**
3. **S45°55'49"W, A DISTANCE OF 1,275.69 FEET;**

THENCE N71°34'44"W, A DISTANCE OF 280.24 FEET; THENCE N46°34'17"W, A DISTANCE OF 189.58 FEET; THENCE N54°29'04"W, A DISTANCE OF 186.95 FEET; THENCE S69°20'27"W, A DISTANCE OF 410.44 FEET; THENCE S41°12'32"W, A DISTANCE OF 54.02 FEET; THENCE N42°25'18"W, A DISTANCE OF 685.79 FEET; THENCE N09°17'58"W, A DISTANCE OF 136.80 FEET; THENCE N25°17'59"W, A DISTANCE OF 103.66 FEET; THENCE N46°23'57"E, A DISTANCE OF 1,414.53 FEET; THENCE N49°48'45"W, A DISTANCE OF 1,122.17 FEET; THENCE N42°42'14"E, A DISTANCE OF 361.76 FEET; THENCE N71°00'05"W, A DISTANCE OF 309.15 FEET; THENCE S83°02'29"W, A DISTANCE OF 324.17 FEET; THENCE N48°50'01"W, A DISTANCE OF 156.62 FEET; THENCE N07°54'45"E, A DISTANCE OF 89.22 FEET; THENCE N15°28'17"W, A DISTANCE OF 239.41 FEET, THENCE N54°38'19"W, A DISTANCE OF 322.18 FEET TO THE POINT OF BEGINNING

CONTAINING A CALCULATED AREA OF 8,073,011SQ. FEET, OR 185.331 ACRES MORE OR LESS

LEGAL DESCRIPTION STATEMENT

I, JONATHAN W. TESSIN, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY STATE THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED UNDER MY RESPONSIBLE CHARGE AND ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF IS CORRECT.

JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.

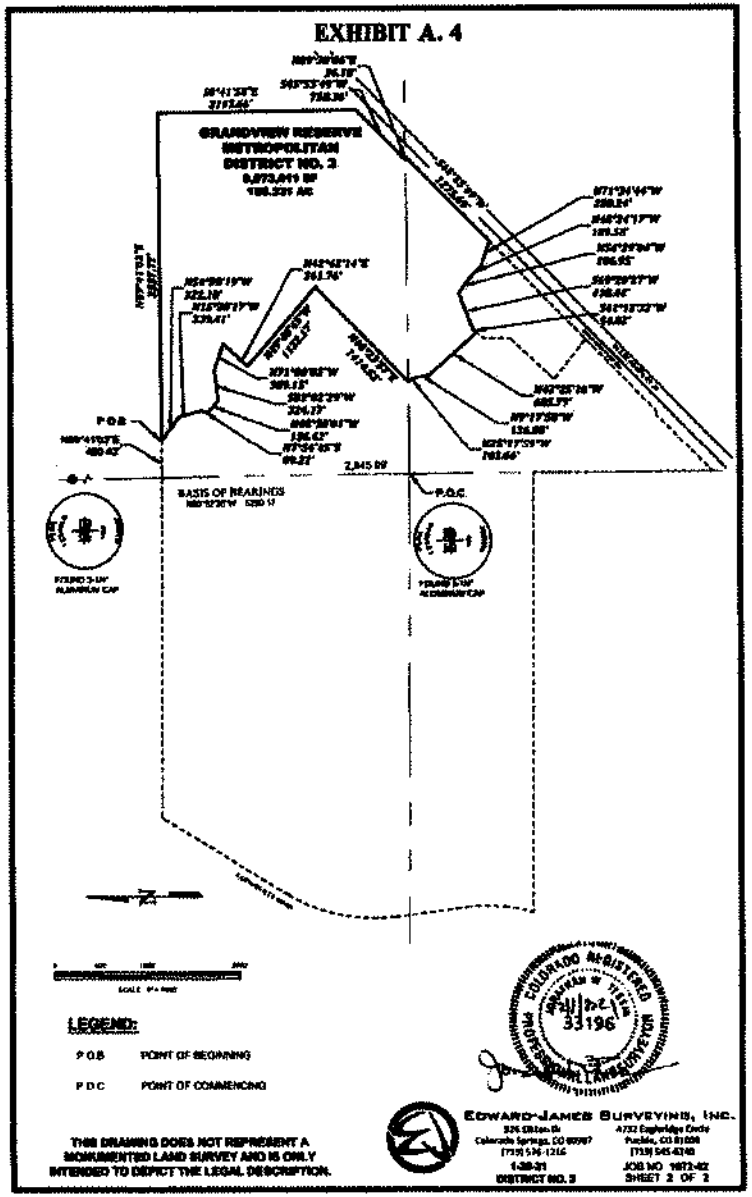


EXHIBIT A. 4
GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 3
P.O.B.
P.O.C.
BASIS OF BEARINGS
2,645.99'
LEGEND:
P.O.B. POINT OF BEGINNING
P.O.C. POINT OF COMMENCING
THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.
COLORADO REGISTERED
33196
EDWARD-JAMES SURVEYING, INC.
1-30-21
DISTRICT NO. 3
JOB NO. 1872-02
SHEET 2 OF 2

January 29, 2021
Job No. 1672.01
Page 1 of 2

EXHIBIT A. 4

LEGAL DESCRIPTION-

GRANDVIEW RESERVE METROPOLITAN DISTRICT No. 4

A TRACT OF LAND BEING A PORTION OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO; THENCE N89°38'06"E, ON THE NORTH LINE OF SAID SECTION 27, A DISTANCE OF 3,378.84 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNT IN THE WARRANTY DEED RECORDED IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID NORTHWESTERLY RIGHT-OF-WAY LINE THE FOLLOWING TWO (2) COURSES:

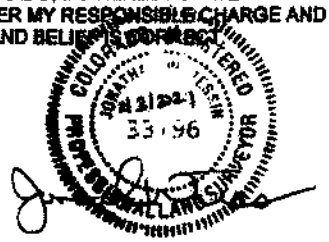
1. N89°38'06"E, A DISTANCE OF 36.18 FEET;
2. S45°55'49"W, A DISTANCE OF 1,275.69 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING S45°55'49"W, ON SAID NORTHERLY RIGHT-OF-WAY LINE, A DISTANCE OF 1,464.32 FEET; THENCE N51°46'34"W, A DISTANCE OF 548.60 FEET; THENCE N43°38'54"E, A DISTANCE OF 840.39 FEET; THENCE N00°00'00"E, A DISTANCE OF 282.37 FEET; THENCE N41°12'32"E, A DISTANCE OF 153.99 FEET; THENCE N89°20'27"E, A DISTANCE OF 410.44 FEET; THENCE S54°29'04"E, A DISTANCE OF 186.95 FEET; THENCE S46°34'17"E, A DISTANCE OF 189.58 FEET; THENCE S71°34'44"E, A DISTANCE OF 280.24 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 889,127 SQ. FEET OR 20.412 ACRES MORE OR LESS

LEGAL DESCRIPTION STATEMENT

I, JONATHAN W. TESSIN, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY STATE THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED UNDER MY RESPONSIBLE CHARGE AND ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF IS CORRECT.



JONATHAN W. TESSIN, PROFESSIONAL LAND SURVEYOR
COLORADO PLS NO. 33196
FOR AND ON BEHALF OF EDWARD-JAMES SURVEYING, INC.

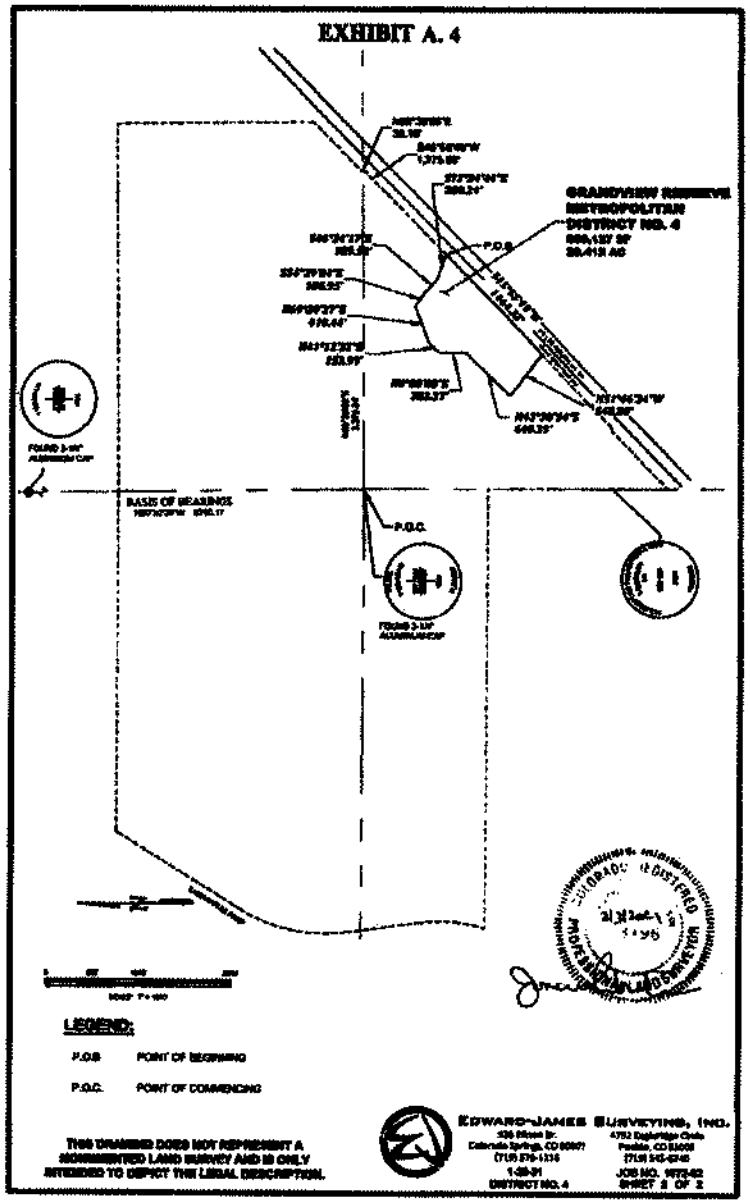


EXHIBIT A. 4
GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 4
P.O.B.
P.O.C.
BASIS OF BEARINGS
LEGEND:
P.O.B. POINT OF BEGINNING
P.O.C. POINT OF COMMENCING
THIS DRAWING DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND IS ONLY INTENDED TO DEPICT THE LEGAL DESCRIPTION.
EDWARD-JAMES SURVEYING, INC.
DISTRICT NO. 4
SHEET 2 OF 2

EXHIBIT B

DEVELOPMENT SUMMARY

Approximately 555 single family homes with an average value of $385,000, approximately 749 single family homes with an average value of $375,000, approximately 846 single family homes with an average value of $340,000, and approximately 1,110 single family attached homes with an average value of $295,000 in year 2021 dollars; and approximately 20,000 square feet of commercial property is anticipated to be developed. It is anticipated that construction will begin in 2022 and the project will be completely developed at the end of 2036. The number of anticipated homes and the amount of commercial square footage remain estimates and may be altered depending on the final outcome of the development approval process. Further, the rate of absorption is a projected based on information from the developer and is used for estimating the Financial Plan. There is no way to accurately predict absorption due to variables such as the economic factors, housing demand, land-use approval timing, building supply chains, and labor availability. In view of these factors, the bond underwriter projects the potential ability of the Districts to discharge the proposed debt per the statutory requirement. If absorption is delayed or accelerated, the bond issuance parameters will reflect those changes at the time of issuance. As noted in the Financial Plan contained in **Exhibit D**, it is currently estimated that 244 total residential units will be added each year beginning in 2022 through 2032, 223 total residential units will be added in 2033, 184 residential units will be added in 2034, 109 residential units will be added in 2035, and 50 residential units will be added in 2036; and 20,000 square feet of commercial property will be added each year in 2025 and 2026.

Regarding public improvements, overall costs of approximately $285,000,000 are currently anticipated, as outlined in **Exhibit C**. The current cost estimates include, but are not limited to, planning, permitting, and professional consulting costs in excess of $38,000,000; water, sanitary sewer, and related drainage costs in excess of $112,000,000; road, street and related improvements costs in excess of $81,000,000; and landscaping costs in excess of $24,300,000. The contemplated on and off-site public improvements include, but are not limited to, on and off-site streets, roadway, water and sanitary sewer, stormwater and drainage, landscaping, and park and recreation improvements. As noted in the Service Plan, the cost estimates remain preliminary in nature and the ultimate costs may be altered depending on numerous factors, many of which are out of Developer's control. In particular, the initial cost estimates only include the public improvement portion of costs and the total project improvement costs (including items such as dry utilities, etc.) could be significantly higher which would result in a material increase in the overall development costs. Given current demand and shortfall within the County and Colorado Springs area, the absorption rate was deemed reasonable. The infrastructure and financing plans will be adjusted accordingly if there are delays in the build-out.

LEGEND

URBAN MINOR ARTERIAL

URBAN RESIDENTIAL ROADWAY

URBAN LOCAL ROADWAY

URBAN LOCAL (LOW VOLUME)

STREET/ROADWAY IMPROVEMENTS DESCRIPTION:

URBAN MINOR ARTERIAL

THESE INTERNAL ROADWAYS WILL BE DEDICATED WITH A 100-FOOT RIGHT-OF-WAY AND INCLUDE A 62 FOOT WIDE PAVED SURFACE WITH A 14 FOOT STRIPED MEDIAN. 6 FOOT DETACHED SIDEWALKS WILL BE CONSTRUCTED WITH A 7 FOOT BUFFER. DESIGN SPEED = 40 MPH. POSTED SPEED = 35 MPH. MAX ADT = 20,000. DESIGN VEHICLE = WB-67.

URBAN RESIDENTIAL COLLECTOR ROADWAYS

THESE INTERNAL RESIDENTIAL ROADWAYS WILL BE DEDICATED WITH A 60-FOOT RIGHT-OF-WAY AND INCLUDE A 36 FOOT WIDE PAVED ROADWAY. 5 FOOT WIDE DETACHED SIDEWALKS WILL BE CONSTRUCTED WITH A 4 FOOT BUFFER.

DESIGN SPEED = 40 MPH. POSTED SPEED = 35 MPH. MAX ADT = 10,000. DESIGN VEHICLE = WB-50.

URBAN LOCAL ROADWAYS

THESE INTERNAL RESIDENTIAL ROADWAYS WILL BE DEDICATED AS 50 FOOT RIGHTS-OF-WAY AND WILL INCLUDE A 30 FOOT WIDE PAVED STREET SECTION AND 5 FOOT WIDE ATTACHED SIDEWALK. DESIGN SPEED = 25 MPH. POSTED SPEED = 25 MPH. MAX ADT = 3,000. DESIGN VEHICLE = WB-50.

URBAN LOCAL (LOW VOLUME) ROADWAYS

THESE INTERNAL RESIDENTIAL ROADWAYS WILL BE DEDICATED AS 50 FOOT RIGHTS-OF-WAY AND WILL INCLUDE A 24 FOOT WIDE PAVED STREET SECTION AND 5 FOOT WIDE ATTACHED SIDEWALK. DESIGN SPEED = 25 MPH. POSTED SPEED = 20 MPH. MAX ADT = 300. DESIGN VEHICLE = SU-30.

HRGreen

HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

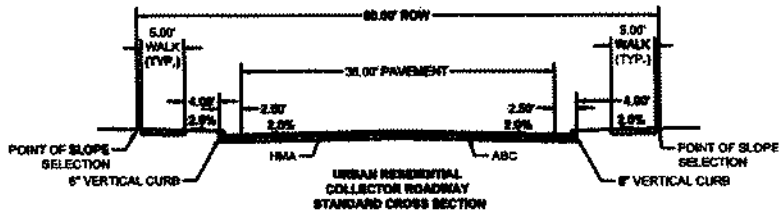
ROAD AND TRAFFIC

SHEET 3

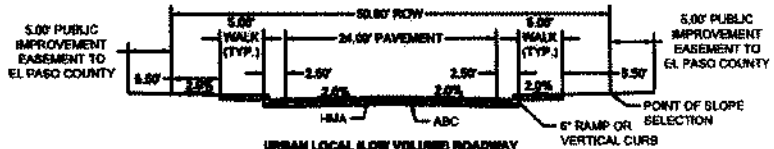
SCALE: 1" = 1500'

DATE: 04/01/2020

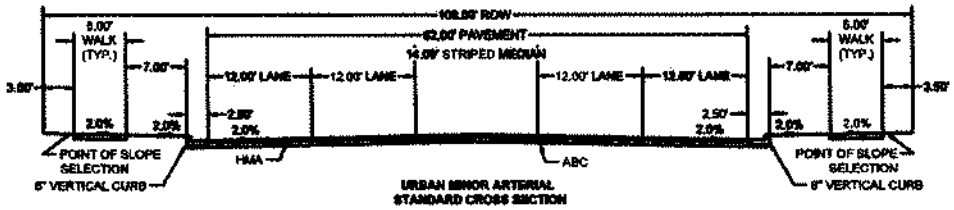
Xrefs: 01-DV-CONCEPT; xgl-1-AV01



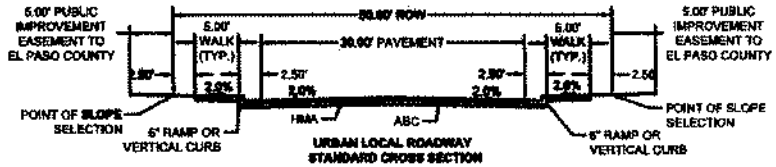
URBAN RESIDENTIAL COLLECTOR ROADWAY STANDARD CROSS SECTION



URBAN LOCAL (LOW VOLUME) ROADWAY STANDARD CROSS SECTION



URBAN MINOR ARTERIAL STANDARD CROSS SECTION



URBAN LOCAL ROADWAY STANDARD CROSS SECTION

HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

TYPICAL ROAD SECTIONS

SHEET 4

SCALE: 1" = 20'

DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT; xgt-1-AV01

STORM DRAINAGE IMPROVEMENTS DESCRIPTION:

METRO DISTRICT BOUNDARY
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
CHANNEL CENTERLINE
DETENTION POND

STORM DRAINAGE IMPROVEMENTS DESCRIPTION:

PUBLIC STORM SEWER

THE STORM SEWER SYSTEM WILL BE DESIGNED IN CONFORMANCE WITH EL PASO COUNTY STANDARDS AND SPECIFICATIONS AND WILL INCLUDE VARYING SIZES OF CONCRETE STORM SEWER, CURB INLETS, MANHOLES AND FLARED END SECTIONS PLACED AT DAYLIGHT POINTS.

REGIONAL DRAINAGE SWALE

THIS REGIONAL SWALE IS INTENDED TO INTERCEPT OFFSITE- UPSTREAM DRAINAGE FLOWS AND ROUTE THESE FLOWS THROUGH THE SITE. CROSSING CULVERTS WILL BE REQUIRED AT PLANNED ROAD CROSSINGS. DOWNSSTREAM CHANNEL ARMORING SOUTHEAST OF HWY 24 MAY BE REQUIREDDUE TO FLOWS FROM THE DEVELOPED PROPERTY.

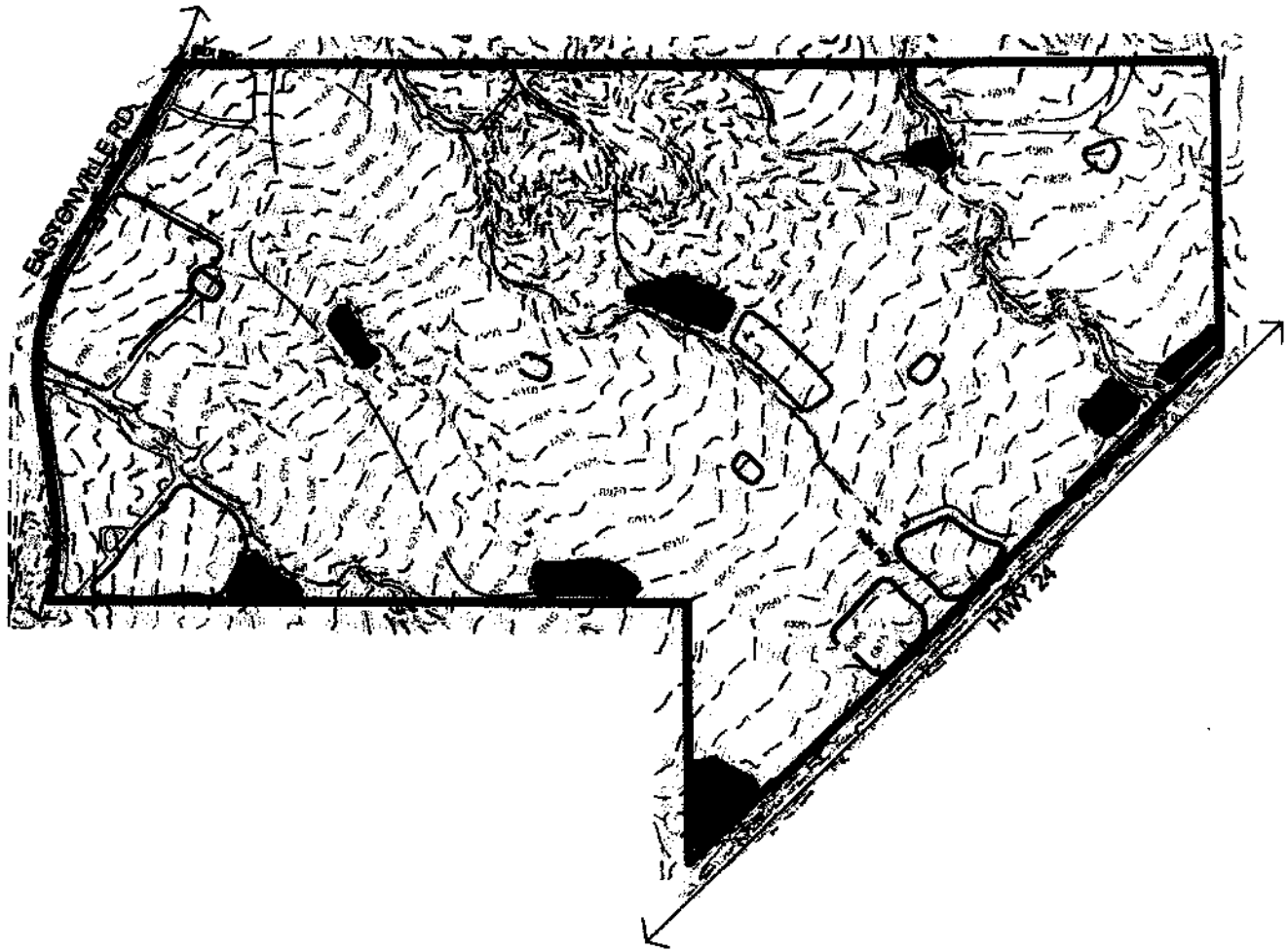
LOCAL DRAINAGE SWALES

LOCAL DRAINAGE SWALES ARE INTENDED TO INTERCEPT LOCAL ONSITE DRAINAGE AND CONVEY FLOWS TO SUB-REGIONAL DETENTION POND.

SUB-REGIONAL DETENTION POND

A SUB-REGIONAL DETENTION POND WILL BE CONSTRUCTION WITHIN THE DISTRICT BOUNDARIES TO ATTENUATE PEAK STORM DISCHARGE FLOWS DOWNSTREAM. DETENTION AND WATER QUALITY WILL BE PROVIDED IN CONFORMANCE TO EL PASO COUNTY AND MILE HIGH FLOOD CONTROL DISTRICT DESIGN STANDARDS.

87



HRGreen HRGreen.com

GRANDVIEW RESERVE
METROPOLITAN DISTRICT
STORM SYSTEM

SHEET
5
SCALE: 1" = 1250'
DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT; xpk-1-AV01

LEGEND

METRO DISTRICT BOUNDARY

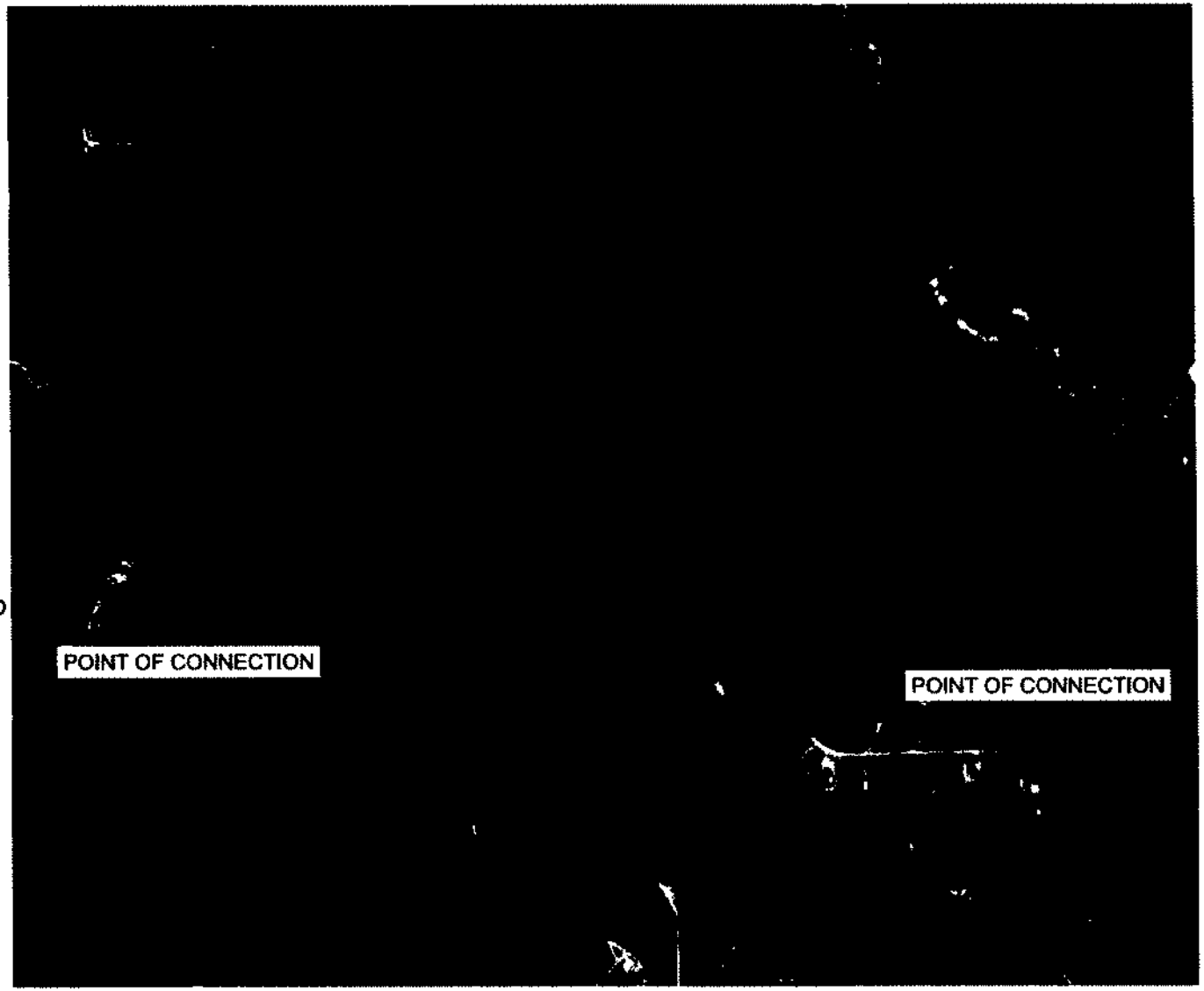
PROPOSED 12" WATER MAIN — W —

LOCALIZED WATER DISTRIBUTION

WATER TREATMENT PLANT

WATER MAIN IMPROVEMENTS DESCRIPTION:

POTABLE WATER MAIN IMPROVEMENTS WILL INCLUDE PVC WATERMAINS ROUTED WITHIN ALL INTERNAL ROADWAYS TO PROVIDE POINT OF SERVICE CONNECTION TO ALL PLATTED LOTS. WATER MAIN IMPROVEMENTS WILL INCLUDE ALL FITTINGS, FIRE HYDRANTS, GATE VALVES, BLOW-OFFS, AIR RELEASE VALVES AND TERMINAL PLUGS.



HRGreen HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

WATER MAIN

SHEET 6

SCALE: 1" = 1250'

DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT; xgt-1-AV01

LEGEND

METRO DISTRICT BOUNDARY

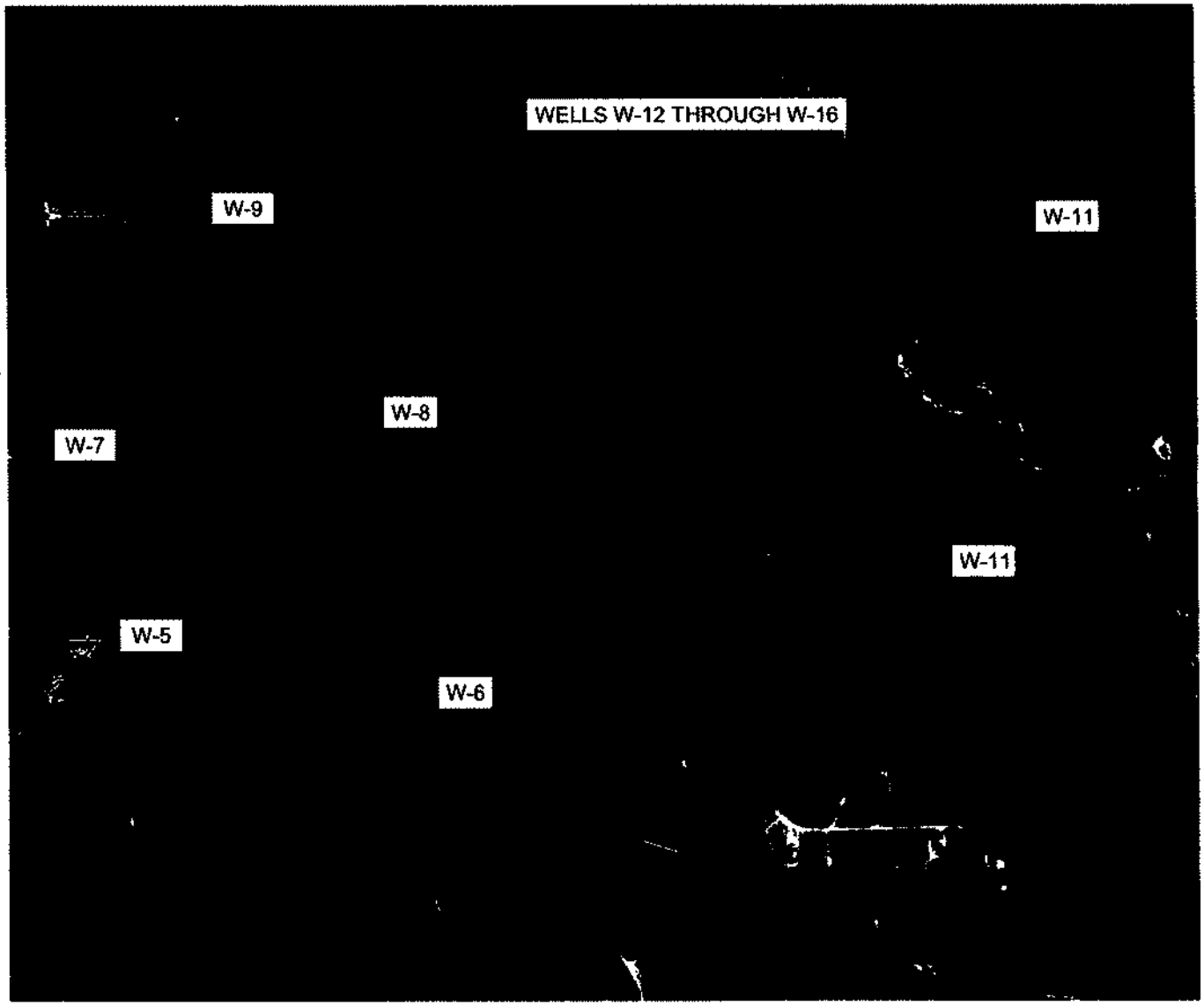
RAW WATER

WELL LOCATION

W-XX

NON-POTABLE WATER IMPROVEMENTS DESCRIPTIONS:

NON-POTABLE WATER SYSTEM WILL INCLUDE WELL WATER COLLECTION AND TRANSPORT TO A CENTRAL WATER TREATMENT FACILITY. NON-POTABLE MAIN IMPROVEMENTS WILL INCLUDE ALL FITTINGS, BLOW-OFFS, AIR RELEASE VALVES, GATE VALVES AND TERMINAL PLUGS.



HRGreen HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

NON-POTABLE WATER

SHEET 8

SCALE: 1" = 1250'

DATE: 04/01/2020

Xrefs: 01-DV-CONCEPT; xgt-1-AV01

LEGEND

METRO DISTRICT BOUNDARY

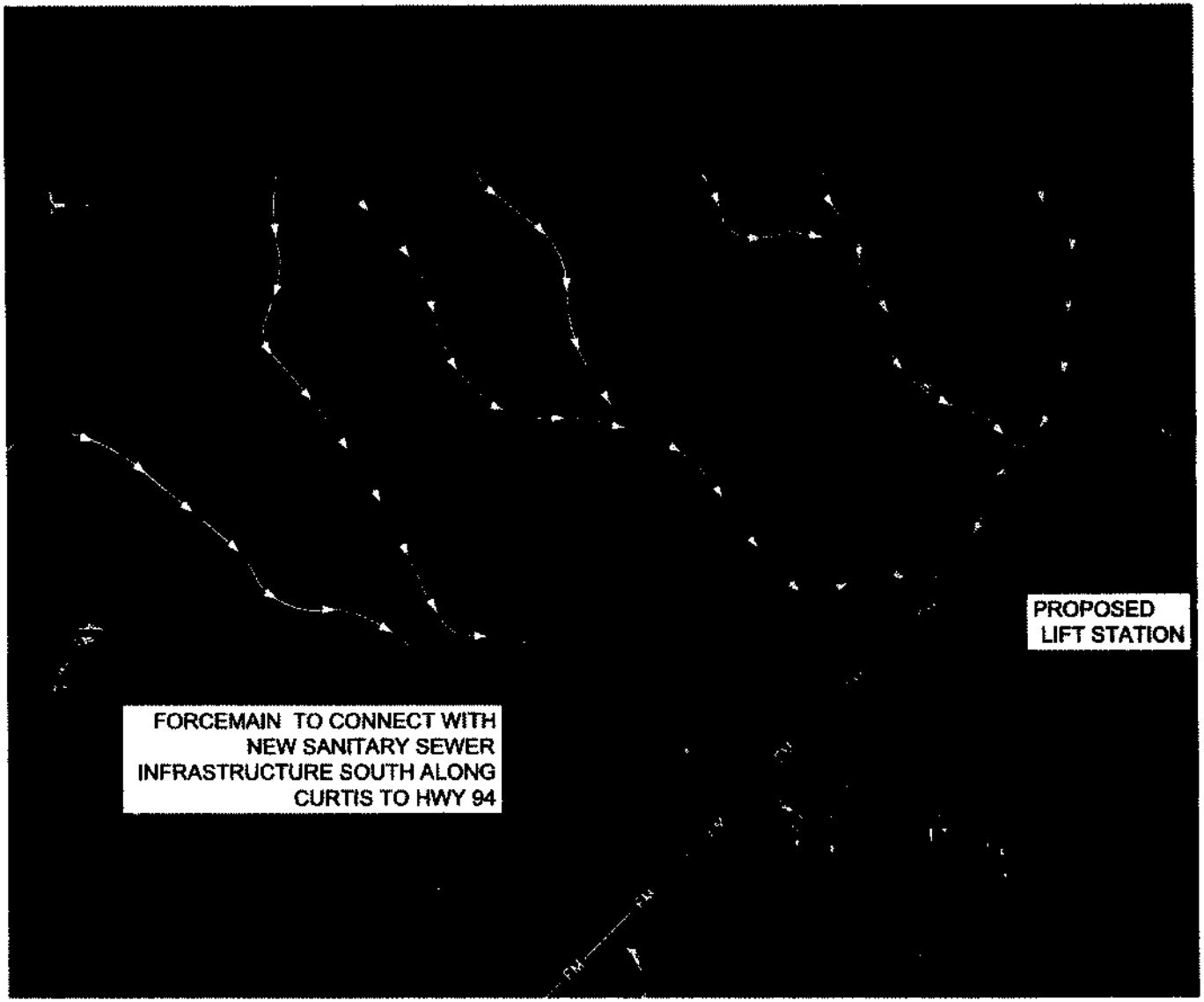
PROPOSED 18" SANITARY SEWER MAIN

PROPOSED FORCEMAIN

LOCALIZED SEWER COLLECTION

SANITARY IMPROVEMENT DESCRIPTIONS:

SANITARY SEWER PLANNED FOR THE DEVELOPMENT PARCELS WILL CONSIST OF 8-INCH PVC SEWER PIPE, 4-FEET ID MANHOLES AND SERVICE STUBS INTO FUTURE DEVELOPMENT PARCELS. SANITARY SEWER MAINS WILL BE ROUTED TO ALLOW POINT OF SERVICE CONNECTION FOR INTERNAL PLATTED PARCEL OR LOT.



HRGreen

HRGreen.com

GRANDVIEW RESERVE METROPOLITAN DISTRICT

SANITARY SEWER

SHEET 7

SCALE: 1" = 1250'

DATE: 04/01/2020

HR GREEN Xrefs: 01-DV-CONCEPT; xgl-1-AV01

EXHIBIT K: FIRE PROTECTION COMMITMENT LETTER

FALCON FIRE PROTECTION DISTRICT

Administration Office
7030 Old Meridian Road
Falcon, Colorado 80831
Business Number: 719-495-4050 Business Fax: 719-495-3112

December 15, 2021

Grandview Reserve Metro District
1271 Kelly Johnson Blvd, Suite 100
Colorado Springs, CO 80920
Attn: Samuel Howard

Re: Conditional Commitment to Provide Emergency Services
Property: Grandview Reserve Metro District

Based upon the information you have provided, a portion of the above-referenced real property is located within the jurisdiction and boundaries of the Falcon Fire Protection District ("Fire Department"). The portion within the boundaries of the Falcon Fire Protection District is that portion west of the North/South section line beginning at the intersection of Highway 24 and Curtis By this letter, the Fire Department confirms its commitment to provide fire suppression, fire prevention, emergency rescue, ambulance, hazardous materials and emergency medical services (collectively, "Emergency Services") to the property within the District boundaries, subject to the following conditions:

- ☒ All new construction, renovations or developments within the Fire Department's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the Fire Department's Board of Directors, as amended from time to time;
- ☒ All development, water and construction plans must be reviewed and approved by the Fire Department for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and,
- ☒ All development or construction projects shall meet the fire code and nationally recognized standards' pertaining to fire protection water. Please note that approved and inspected fire cisterns are permitted by the Fire Department in an attempt to help the property owner/developer meet these requirements.

Please do not hesitate to call the fire administration office or me for further information between 9:00 am and 4:00 pm, Monday through Friday.

Sincerely,
Trent Harwig

Fire Chief/Administrator

PEYTON FIRE PROTECTION DISTRICT
Administrative Offices
141 Union Boulevard, Suite 150
Lakewood, Colorado 80228-1898
Tel: 303-987-0835 800-741-3254
Fax: 303-987-2032

December 17, 2021

Grandview Reserve Metropolitan District
c/o Mr. Samuel Howard
1271 Kelly Johnson Blvd., Suite 100
Colorado Springs, CO 80920

Re: A portion Grandview Reserve Metropolitan District (the "Project") – Fire Protection "To Serve" Letter

To Whom It May Concern:

Based upon the provided information, a portion of the above-referenced Project is located within the jurisdiction and boundaries of the Peyton Fire Protection District (the "District"). On October 30, 2018, the District provided a "To Serve" Letter for that portion within the boundaries of the District, that portion east of the North/South section line beginning at the intersection of Highway 24 and Curtis Road. This letter is to reaffirm that "To Serve" Letter after reviewing the changes in the Grandview Reserve Sketch Plan Draft dated March 25, 2019, and included as Attachment "A" to this letter.

The District is able to provide fire prevention and suppression, emergency rescue, emergency medical, and emergency hazardous materials response to the portion of the Project that is within the District service area, subject to the following conditions:

- All new construction, renovations, or developments within the District's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the District's Board of Directors, as amended from time to time;
- All development, water, and construction plans must be reviewed and approved by the District for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and
- All development or construction projects shall meet the fire code and nationally recognized standards pertaining to fire protection water. Approved and inspected fire cisterns are permitted by the District in an attempt to help the property owner/developer meet these requirements.

If additional information is required, please contact our administrative office at 303-987-0835. Thank you.

Sincerely,

David Solin
District Manager

cc: Dave Rolenc, District President
Jeff Turner, Fire Chief

EXHIBIT L: GRANDVIEW MDDP

HRGreen

HRGREEN.COM

Grandview Reserve
Master Development Drainage Plan

November 2020

HR Green Project No: 191850

Prepared For:

4 SITE INVESTMENTS, LLC

Mr. Peter Martz or Paul Howard

1271 Kelly Johnson Blvd., Ste. 100

Colorado Springs, CO 80920

719-499-8416

Prepared By:

HR Green Development, LLC

Contact: Chris McFarland, PE

cmcfarland@hrgreen.com

720-602-4956

SKP-20-001

Table of Contents

List of Tables

Appendices

Engineer's Statement

This report and plan for the drainage design of the development , Grandview Reserve, was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the *El Paso County Drainage Criteria* Manual and is in conformity with the master plan of the drainage basin. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

11-3-20

Greg Panza, PE Date

State of Colorado No. 37081

For and on behalf of HR Green Development, LLC

COLORADO LICENSED
GREGORY L. PANZA
37081
11-3-20
PROFESSIONAL ENGINEER

Developer's Statement

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

4 Site Investments LLC

By: PAUL J. HOWARD

Title: MANAGER

Address: 1271 KELLY JOHNSON BLVD.

COLORADO SPRINGS, CO 80920

El Paso County:

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

APPROVED
Engineering Department

11/25/2020 1:19:15 PM
dsdnijkamp
EPC Planning & Community Development Department

Jennifer Irvine, P.E.

County Engineer/ECM Administrator

Master Development Drainage Plan – Grandview Reserve

I. General Purpose, Location and Description

a. Purpose and Scope of study

The Purpose of this Master Development Drainage Plan (MDDP) is to describe the onsite and offsite drainage patterns, existing and proposed storm infrastructure as it relates to preliminary water quality and stormwater detention, areas tributary to the site and the planned storm water management for Grandview Reserve 2 development. The items discussed in this report are preliminary in nature and final drainage calculations and design will be required as development proceeds. This reports provides a general drainage concept and guidance for future development of Grandview Reserve.

b. DBPS Investigations

The Gieck Ranch Drainage Basin Planning Study (DBPS) Preliminary Design Report prepared by Drexel, Barrell was reviewed to determine existing plans and constraints that would influence the design of Grandview Reserve. The proposed plans for Grandview Reserve are in general conformance with the DBPS.

The DBPS shows 4 reaches through Grandview Reserve. The Main Stem (MS) in the south western portion of the site, the Main Stem Tributary #2 (MST2) to the north and east of the Main Stem, the East Fork Tributary (EFT) in the middle of the site north and east of MST2, and the East Fork Upper (EF) at the north east side of the site. These drainageways have been reviewed in the following reports and further analysis will be completed of these major drainageways in future planning documents.

- Unnamed Tributary Black Squirrel Creek, Four Way Ranch Letter of Map Revisions, Kiowa Engineering, March 2004
- Haegler and Gieck Drainage Basins Letter of Map Revision, Four Way Ranch Subdivision, Kiowa, March 2004
- Unnamed Tributary Black Squirrel Creek Drainage Basin, Letter of Map Revision, Elbert Road Site, Kiowa Engineering, February 2006
- Geick Ranch Drainage Basin Planning Study (DBPS), Drexel Barrell, October 2010 (not approved)
- Meridian Ranch Master Development Drainage Plan (MDDP), Tech Contractors, January 2018

c. Agency Jurisdictions

Listed below are the jurisdictions that this project will conform to:

El Paso County

Falcon Colorado Municipal Code (where applicable)

Federal Emergency Management Agency

d. General Project Description

Grandview Reserve is located in Falcon, Colorado within El Paso County and contains approximately 765 acres within the south half of section 21 and 22 and the north half of section 27 and 28, Township 12 South, and Range 66 West of the Sixth Principal Meridian in Ela Paso County, Colorado. See below for approximate site location.

Figure 1 - Site Map

e. Data Sources

Listed Below are the technical resources reviewed in the preparation of this MDDP:

City of Colorado Springs Drainage Criteria Manual (DCM), Volumes 1 and 2

Mile High Flood District

NOAA Atlas 14

NRCS Soil Survey for El Paso County Area, Colorado

FEMA FIRM 08041C0556G and FIRM 08041C0552G (eff. 12/7/2018)

El Paso County Assessor Property Records

f. Applicable Criteria and Standards

Per the DBPS, flows from the proposed site will be limited to historic flows in an effort to maintain the stability and of the existing channels with the drainage basin. The master plan follows the Drainage Criteria Manual for El Paso County which refers to the City of Colorado Springs Drainage Criteria Manuals as amended.

II. Project Characteristics

a. Location in Drainage Basin, offsite flows, size

Grandview Reserve is located within the Gieck Ranch Drainage Basin which covers approximately 22 square miles. This drainage basin is tributary to Black Squirrel Creek and joins said creek just to the south of Elicott, CO about 18 miles to the south. Black Squirrel Creek eventually drains to the Arkansas River in Pueblo Colorado. The majority of the Gieck Ranch Drainage basin is undeveloped consisting of rural farmland. The Geick Ranch Drainage basin lies north of the Haegler Ranch drainage basin.

As part of the Fourway LOMR discussed above, the study reviewed the hydrology and hydraulics for the Main Stem Tributaries, however only a small portion of the site within Grandview was analyzed. The peak flows rates for the Main Stem for the 100 year event was 413 cfs and for the Main Stem Tributary was 280 cfs.

For the East Fork tributaries (EF and EFT), the DBPS established 100 year flow rates of 595 cfs for the East Fork (EF) and 217 cfs for the East Fork Tributary (EFT)

Generally offsite flows are conveyed through the site via the 4 tributaries. Minor offsite basins may sheet flow onto the site. These flows will be routed through the site via the tributaries.

b. Compliance with DBPS

This MDDP is in general conformance with the guidelines outlined in the Gieck Ranch DBPS. Grandview Reserve will construct multiple full spectrum detention facilities to limit the effects of development and mimic natural flow patterns.

Existing downstream infrastructure is currently the historic drainage channels and minimal downstream improvements exist. As such, the site follows the DBPS and limits offsite flow rates to at or below historic rates. Outfalls out of the site will generally be along the same historic tributaries. Although outfall rates will be at or below historic, volume of runoff will increase and therefore downstream facilities may see additional flow volume than historic. This may provide a net benefit to the downstream facilities by providing more water to assist with vegetation however it should be noted that increased volume may also lead to more erosion or channel movement.

c. Site Characteristic

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

the later soil is a Type B soil and covers the remaining 44.9% of the site. See Appendix A for the NRCS soil map.

Current ground cover is predominantly short- to mid-grass prairie grasslands and former farmland which consists of nonnative weeds and grasses. The site has very few, if any, trees and a minimal number of shrubs are found on the site.

d. Major drainage ways and structures

As mentioned previously, 4 major drainage ways exist on the site. These convey existing on and off-site flows and current on site flows through the site in a southeasterly direction. The drainageways eventually cross Highway 24 via culverts and other structures; further survey will be conducted to determine their effectiveness as the development of the site progresses.

A breached stock pond is located along the Main Stem and the effects of the existing breached dam are unknown at this time. As development occurs, this dam will be completely removed and improvements will be constructed along the channels to become high functioning low maintenance drainageway corridors.

e. Existing and proposed land uses

The existing site is open rangeland and farmland with no visible structures. The proposed development will consist of low, medium, and high density residential, along with two institutional sites, multiple pocket park sites, a large community park and a commercial area adjacent to Highway 24. The current land plan assumes approximately 3,261 dwelling units will be constructed on the site.

Land Use	MAX DU/AC
Low	2
Medium	4
Medium – High	8
High	12

III. Hydrologic Analysis

a. Major Basins and subbasins

Major Basin Description

- Previous basin study: Gieck Ranch Drainage Basin Planning Study
- Per FEMA FIRM 08041C0556G and 08041C0552G (eff. 12/7/2018), Grandview Reserve has four mapped channels within its boundaries. .
- Per aerial imaging, no major irrigation is in the vicinity that would affect Grandview Reserve.

The site has been divided into 8 major drainage basins per where each basin is tributary to a full spectrum detention pond facility. These basins and associated sub basins are described in more detail in the next section of this report.

Subbasin Description

The entire site drains in a south easterly direction and is divided into 8 major drainage basins and a total of 18 subbasins together as described below.

- Subbasin A1 is located in the southwestern corner of the site, to the south and west of MS. The basin drains towards the southeast to proposed detention pond A. Current planning documents call for medium density dwelling units and a small pocket park. The basin is 37.00 acres, with a composite impervious value of 35.22% and runoff rates for the 5 and 100 year of 30.72 cfs and 100.64 cfs respectively. The pond will discharge at predevelopment rates and into MS via the ponds outlet structure.
- Subbasin B1 is located between MS and MST2 to the east of subbasin A1. The basin drains towards the southeast and towards subbasin B2. Current planning documents call for medium density dwelling units and some parkland area. The basin is 37.00 acres, with a composite impervious value of 45.00% and runoff rates for the 5 and 100 year of 29.46 cfs and 97.08 cfs respectively.
- Subbasin B2 is located between MS and MST2 to the northeast of subbasin A1. The basin drains towards the southeast and towards Detention Pond B. Current planning documents call for medium density dwelling units. The basin is 24.89 acres, with a composite impervious value of 43.26% and runoff rates for the 5 and 100 year of 12.02 cfs and 42.26 cfs respectively.
- Subbasin B3 is located between MS and EF and to the northeast of east of basin B2. The existing MST2 tributary runs through the basin. The site drains towards the southeast and towards Detention Pond B. Current planning documents call for high, medium-high, and medium density dwelling units along with a pocket park. The basin is 118.90 acres, with a composite impervious value of 49.42% and runoff rates for the 5 and 100 year of 92.76 cfs and 295.27 cfs respectively.
- Subbasin C1 is located to the northeast of east of basin B1 and the existing MST2 tributary runs through the middle of the basin. The basin drains towards the southeast and towards Detention Pond C. Current planning documents call for an institutional parcel, medium and high density dwelling units and a pocket park. The basin is 77.83 acres, with a composite impervious value of 51.20% and runoff rates for the 5 and 100 year of 77.99 cfs and 238.03 cfs respectively.
- Subbasin D1 is located between MS and MST2 to the east of Basin B3 and adjacent to the MST2 channel. The basin drains towards the southeast and towards drainage basin D2. Current planning documents call for medium density dwelling units along with a pocket park. The basin is 24.33 acres, with a composite impervious value of 53.89% and runoff rates for the 5 and 100 year of 24.15 cfs and 70.07 cfs respectively.
- Subbasin D2 is located between MS and MST2 to the south of basins D1 and B3. The basin drains towards the southwest and towards detention pond D. Current planning documents call for high density dwelling units along with a pocket park and a commercial parcel. The basin is 77.90 acres, with a composite impervious value of 62.10% and runoff rates for the 5 and 100 year of 98.47 cfs and 252.18 cfs respectively.
- Subbasin E1 is located just east of EFT along the northern portion of the site. The basin drains towards the southeast and towards basins F3 and F4. Current planning documents call for low density dwelling units. The basin is 88.60 acres, with a composite impervious value of 19.54% and runoff rates for the 5 and 100 year of 46.88 cfs and 178.04 cfs respectively.

- Subbasin F1 is located east of basin E1 and between EFT and EF along the northern portion of the site. The basin drains towards the southeast and towards basin F3 and F4. Current planning documents call for a large community park, high density dwelling units, commercial site and an institution parcel. The basin is 33.73 acres, with a composite impervious value of 25.00% and runoff rates for the 5 and 100 year of 16.28 cfs and 58.95 cfs respectively.
- Subbasin F2 is located east of the existing drainage channel EFT. The basin drains towards the southwest and towards basin F4 and to the EFT drainage channel which runs parallel to the north east with Highway 24. Current planning documents call for high density dwelling units and commercial space. The basin is 67.64 acres, with a composite impervious value of 51.39% and runoff rates for the 5 and 100 year of 60.11 cfs and 170.90 cfs respectively.
- Subbasin F3 is located west of the existing drainage channel EF. The basin drains towards the southeast towards drainage channel EF but will be conveyed south towards subbasin F4. Current planning documents call for medium density dwelling units. The basin is 12.84 acres, with a composite impervious value of 45.00% and runoff rates for the 5 and 100 year of 11.36 cfs and 32.93 cfs respectively.
- Subbasin F4 is located west of the existing drainage channel EF and south of subbasins F1 and F3. The basin drains towards the southeast towards detention pond F. Current planning documents call for medium and medium-high density dwelling units. The basin is 51.81 acres, with a composite impervious value of 49.54% and runoff rates for the 5 and 100 year of 42.32 cfs and 124.89 cfs respectively.
- Subbasin G1 is located west of the existing drainage channel EFT along the northern property boundary. The basin drains towards the southeast towards detention pond G. Current planning documents call for medium density dwelling units and a park. The basin is 20.13 acres, with a composite impervious value of 36.52% and runoff rates for the 5 and 100 year of 13.78 cfs and 43.95 cfs respectively.
- Subbasin G2 is located east of the existing drainage channel EFT along the northern property boundary. The basin drains towards the southeast towards detention pond G. Current planning documents call for low density dwelling units. The basin is 15.14 acres, with a composite impervious value of 25.00% and runoff rates for the 5 and 100 year of 6.55 cfs and 23.95 cfs respectively.
- Subbasin H1 is located in the northeast corner of the site and east of the existing drainage channel EFT. The basin drains towards the south towards subbasin H4. Current planning documents call for low density dwelling units and smallpark. The basin is 20.71 acres, with a composite impervious value of 24.49% and runoff rates for the 5 and 100 year of 5.68 cfs and 27.62 cfs respectively.
- Subbasin H2 is located south of basin G2 and east of the existing drainage channel EFT. The basin drains towards the south towards subbasin H4. Current planning documents call for medium density dwelling units and smallpark. The basin is 18.55 acres, with a composite impervious value of 46.68% and runoff rates for the 5 and 100 year of 16.24 cfs and 47.62 cfs respectively.

- Subbasin H3 is located south of basin H2 and east of the existing drainage channel EFT. The basin drains towards the southeast towards subbasin H4. Current planning documents call for medium density dwelling units and smallpark. The basin is 6.01 acres, with a composite impervious value of 40.57% and runoff rates for the 5 and 100 year of 5.21 cfs and 15.60 cfs respectively.
- Subbasin H4 is located south of basin H2 and east of the existing drainage channel EFT and basin H3. The basin drains towards the south towards detention pond H. Current planning documents call for medium density dwelling units and park/open space area. The basin is 27.65 acres, with a composite impervious value of 38.24% and runoff rates for the 5 and 100 year of 20.93 cfs and 64.71 cfs respectively.

The above mentioned basins are large planning area basins and as drainage reports are developed for the individual developed parcels additional drainage reports and calculations will be required. It is expected that storm drainage infrastructure consisting of inlets, storm sewer and open drainage channels will be constructed as the property develops.

- Offsite Basins as shown in the Meridian Ranch MDDP include basins HG4, HG5, HG6A, HG6B, HG13, and HG14. Flow contributing to the site from these basins will be routed through the existing tributaries. Flow rates as shown in the MDDP Ranch report include the following flows and associated tributary areas.

Offsite Flow Summary					
Basin Description	**Ultimate Design Point**	**Basin Area (ac)**	**Receiving Tributary**	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
HG4	G6	57	Main Stem	2	42
HG5	G6	72	Main Stem	3	52
HG6A	G6	88	Main Stem	3	51
HG6B	G6	66	Main Stem	2	35
HG13	G08	54	Main Stem Tributary 2	4	59
HG14	G08	147	Main Stem Tributary 2	5	83

Offsite Flow Summary				
Design Point	**Basin Area (ac)**	**Receiving Tributary**	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
G6	760	Main Stem	36	628
G08	201	Main Stem Tributary 2	8	122

These basins along with the offsite basins which lie east of Eastoneville Road contribute flows onto the site through the major tributaries. Estimate oncoming flows for each tributary are as follows:

Offsite Flow Summary		
Tributary	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
Main Stem	36	628
Main Stem Tributary 2	8	122
East Fork Tributary*	56	116
East Fork*	175	357

*Flows from Gieck Ranch DBPS, Oct 2010

As hydraulic analysis continues for the channels, these offsite flows will be used to size the channels for proper conveyance of the flow however it should be noted that the flows mentioned for the Main Stem and Main Stem Tributary 2 assume proper conveyance of the flow through (below or above) Eastonville Road. Due to the unknown nature of these conditions at the time of buildout, a probable scenario of the split flows will require analysis and agreed upon flow rates to each channel will be required. Currently some of the flow shown going to the Main Stem Tributary 2 may be diverted into the Main Stem Tributary. Previous analysis done by JR Engineering assumed approximately 160 additional cfs going to the Main Stem Tributary #2 during the 100 year event and as such it is recommended the following flows be used for analysis of the oncoming offsite flows:

Revised Offsite Flow Summary		
Tributary	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
Main Stem**	67	413
Main Stem Tributary 2**	59	280
East Fork Tributary*	61	217
East Fork*	180	595

*Flows from Gieck Ranch DBPS, Oct 2010

**Flows from 4 Way Ranch LOMR, Mar 2004

Please note that the preliminary drainage reports will be required to reconcile any differences between the various reports done for these channels.

b. Methodology

Design rainfall was determined utilizing figures from the NOAA Atlas 14, Volume 8, Version 2 to determine the 5-year and 100-year rainfall values for 1, 6 and 24-hour events. The 1-hour rainfall depths are 1.22 and 2.50 in/hr respectively, 6 hour 1.79 and 3.87 in/hr respectively and 2.36 and 4.90 in/hr for the 24 hour event. The rainfall values were then used as inputs into the Colorado Urban Hydrograph Procedure (CUHP) spreadsheets to determine runoff values for both pre-development and post-development site.

CUHP is an evolution of the Snyder unit hydrograph and is calibrated for use along the Colorado Front Range. 1 Hour rainfall amounts are input into the program to produce a storm hyetograph that is then uses to calculate a storm hydrograph for each basin depending on the subbasins properties including slope, length, shape, impervious area, pervious depression storage area, and various infiltration rates. Tabular hydrographs are then computed and can be used in EPA SWMM. The CUHP results are included within Appendix B.

EPA SWMM was used to determine flow routing via the kinematic wave method. Subbasins were routed to their respective design points and detention ponds for both the developed and predeveloped condition to determine peak runoff amounts for the 5-year and 100-year storm events. Information from these models along with information and calculations performed in the Colorado Springs BMP spreadsheets was used to determine pond sizing calculations and release rates.

c. Basin Hydrology

A summary of the flows for both the predeveloped and developed cases for each basin, subbasin and Pond are found on next page along with the full computation found in Appendix B.

SWMM Basin and Pond Summary						
Basin Description	**Basin Area (ac)**	**% Impervious**	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**	**5 Year Pond Volume (ac-ft)**	**100 Year Pond Volume (ac-ft)**
A1	45.38	35.22%	30.72	100.64		
			Pond A		1.83	3.50
B1	37.00	45.00%	29.46	97.08		
B2	24.89	43.26%	12.02	42.26		
B3	118.90	49.42%	92.76	295.27		
			Pond B		5.90	19.00
C1	77.83	51.20%	77.99	238.03		
			Pond C		3.91	6.87
D1	24.33	44.14%	24.15	70.07		
D2	77.90	62.10%	98.47	252.18		
			Pond D		6.61	10.19
E1	88.60	19.54%	46.88	178.04		
			Pond E		1.96	2.44
F1	33.73	25.00%	16.28	58.95		
F2	67.64	51.39%	60.11	170.90		
F3	12.84	45.00%	11.36	32.93		
F4	51.81	46.54%	42.32	124.89		
			Pond F		7.38	12.62
G1	20.13	36.52%	13.78	43.95		
G2	15.14	25.00%	6.55	23.95		
			Pond G		0.72	2.03
H1	20.71	24.49%	5.68	27.62		
H2	18.55	43.68%	16.24	47.62		
H3	6.01	40.57%	5.21	15.60		
H4	27.65	38.24%	20.93	64.71		
			Pond H		2.93	6.17

IV. Hydraulic Analysis

a. Major Drainageways

In general the site runoff runs into the 4 major drainageways and in a southeasterly direction. These basins are described in more detail below:

The Main Stem (MS) in the south western portion of the site, the Main Stem Tributary #2 (MST2) to the north and east of the Main Stem, the East Fork Tributary (EFT) in the middle of the site north and east of MST2, and the East Fork Upper (EF)

The Main Stem (MS) is in the southwestern portion of the site. Offsite flows collect and are conveyed under Eastonville Road via a culvert. MS travels in a southeasterly direction and combines with the Main Stem Tributary #2 (MST2) just off site and then is conveyed past Highway 24 via a culvert. Jurisdictional wetlands exist within this channel and the area is within a Zone A floodplain towards the southern portion of the site. This channel sees only intermittent flows at this time however once development occurs there may be a more constant baseflow.

MST2 crosses Eastonville road via an existing culvert and flows through the site in a southeasterly direction. An existing breached stock pond exists in the approximate center point of the channel within the site. Portions of this channel are within a mapped floodplain as shown in the existing FIRM Panel. Per a July email from the USACE this drainage channel was determined to be a non-jurisdictional waters/wetland.

The East Fork tributary (EFT) crosses the north property line and are conveyed through the site via a natural channel. The channel has been mapped as a Zone A floodplain per the existing FIRM panel. There is no existing crossing for this section of the drainage channel below Highway 24 and instead the flows are conveyed to the north east towards the East Fork Upper (EF). Per a July email from the USACE this drainage channel was determined to be a non-jurisdictional waters/wetland.

The EF crosses the north property line approximately 1500’ east of the EFT crossing. The flow through the site is via a natural channel and travels in a southeasterly direction. The channel is mapped as a Zone A floodplain, and the channel crosses Highway 24 via an existing shallow bridge. The EF and EFT eventually merge approximately 1750 southeast of the site, however as mentioned above Highway 24 blocks the flow of the EFT and flows are conveyed northeast to the EF bridge crossing.

Per SWMM modeling the current velocities will require channel stabilization. The channels are to be engineered later in the design which will likely include a combination of channel widening, lowering of slope facilitated by the implementation of drop structures to meet non erosive velocity requirements. Bank stabilization, should it be necessary, may include coir rolls, erosion control blankets, live willow staking, soil lifts and/or other measures to ensure successful bank stabilization. These drainageways will require further analysis and design which will be completed as the project progresses.

V. Environmental Evaluations

a. Significant existing or potential wetland and riparian areas impacts

As part of this work, the developer has engaged Ecosystem Services, LLC (ECOS) to perform environmental studies of the site that will be submitted with the planning documents. Major information from these report related to the wetlands shows that two of the tributaries trough the site, the Main Stem

and the East Fork contain jurisdictional wetlands and the other two tributaries, the East Fork Tributary and the Main Stem Tributary #2 are non-jurisdictional wetlands.

At this time, only minor improvements to the jurisdictional channels are proposed. These stream improvements will be made with keeping the natural habitat intact and the natural function of these channels as it is to maintain the wetland habitat. The non-jurisdictional channels will be modified and the design of those channels is forthcoming.

b. Stormwater quality considerations and proposed practices

As part of the development, full spectrum detention facilities will be installed to provide water quality for the development. The facilities will be designed using El Paso County criteria and provide stormwater quality by slowing the release of stormwater captured by the ponds and allowing solids to settle out. Additionally when possible the revised drainage channels, which were not jurisdictional wetlands, will be used to convey stormwater via a natural channel. Stormwater must be treated before entering the natural channels. The natural channel will provide an pervious means to transport stormwater and provide some water quality benefits as well.

On site practices for the homes, schools, churches and other buildings should use means such that impervious areas drain across pervious area to allow for infiltration during the minor events. This would include discharge of the gutters onto landscape areas vs. directly connecting to storm sewer and using natural ditches and swales where it is logical and makes sense to convey stormwater inlieu of storm sewer piping.

c. Permitting requirements

When work infringes upon the wetlands or floodplain a 404 Permit will be required. If the work within the waterways is minimal, it will likely be covered under a nationwide 404 permit; it is however possible that an individual permits will be required.

The Colorado Department of Public Health and Environment will require permits for any disturbance that exceed 1 acre of land. Should groundwater be encountered, a dewatering permit will also be required.

El Paso County will require an Erosion and Stormwater Quality Control Permit and any other construction permits required to complete the construction of the site.

FEMA will require a permit for floodplain development prior to the commencement of any construction or development within any special flood hazard area (SFHA).

FEMA will require a letter of map revision (LOMR) should work alter the base flood elevation (BFE) of any area falling withing the floodplain as shown in FEMA FIRM 08041C0556G and FIRM 08041C0552G (eff. 12/7/2018).

d. 4-Step Process

In accordance with the Engineering Criteria Manual I.7.2.A and DCM V2, this site has implemented the four-step process to minimize adverse impacts of urbanization. The four-step process includes reducing runoff volumes, stabilizing drainageways, treating the water quality capture volume, and considering the need for Industrial Commercial BMPs.

Step 1 – Reducing Runoff Volumes: The development of the project site includes a variety of land uses including open and vegetated areas interspersed to help disconnect imperious areas and reduce runoff volumes.

Step 2 – Stabilize Drainageways: Altered channels will be designed in a manner that provides water quality benefits through infiltration and the removal of pollutants via phytoremediation. Vegetation will also be selected to stabilize the channel by reducing the velocity of flows and decreasing any scour. Should the final channel require, grade control structures may be implemented to further reduce flow velocities and protect against erosion. These improvements will help stabilize drainageways.

Step 3 – Provide WQCV: Runoff from this development is treated through capture and slow release of the WQCV via detention ponds that are designed per current El Paso County DCM V2.

Step 4 – Consider the need for Industrial and Commercial BMP's: A site specific storm water quality and erosion control plan and narrative will be prepared with subsequent land use approvals prepared in conjunction with the report prior to any construction. Site specific temporary source control BMPs as well as permanent BMPs are detailed in this plan and narrative. Guidelines detailed in the El Paso DCM V2 4.2 pertaining to the covering and storage handline and spill containment and control shall be followed as necessary.

VI. Selected Plan

a. Plan Hydrology

This MDDP schematically addressed on-site and off-site drainage patterns using the existing topography and proposed land use plan for the overall drainage design. Individual preliminary and final drainage reports will better define the planning areas as the site is developed. These reports will include inlet design, storm sewer hydraulics, street design and other requirements typical of more detailed drainage reports.

The overall site is divided into 8 separate major basins, basins A-H and contribute to individual detention ponds for each major basin. Basin sizes range from 35 acres to 181 acres in size. Basins A, B, C and D drain and eventually discharge into the Main Stem and Main Strem Tributary #2. Basins E, F, G, and H drain towards the East Fork Drainage channel.

The sub-basins are described in additional detail above.

b. Detention Ponds

The site plans propose the construction of 8 separate full spectrum detention facilities.

- Pond A is located in the southwest corner of the site and discharges into the Main Stem drainageway. The pond is planned to store a maximum of 4.05 ac-ft during the 100 year event and have a peak outflow of 55.9 cfs which is slightly below the pre development peak outflow of 57.1 cfs. The 5 year storage volume is 2.46 ac-ft with a peak outflow of 3.7 cfs.

- Pond B is located to the east of Pond A and the Main Stem and discharges into the Main Stem Tributary #2. The pond is planned to store a maximum of 16.60 ac-ft during the 100 year event and have a peak outflow of 165.4 cfs which is slightly above the pre development peak outflow of 164.2 cfs. The 5 year storage volume is 8.44 ac-ft with a peak outflow of 2.6 cfs.

- Pond C is located near the center of the western portion of the site near the existing Main Stem Tributary #2. The pond discharges into a revised open channel to be designed and discharges to the Main Stem Tributary #2 which merges with the Main Stem Tributary just off site. The pond is planned to store a maximum of 6.91 ac-ft during the 100 year event and have a peak outflow of 119.2 cfs which is slightly below the pre development peak outflow of 120.2 cfs. The 5 year storage volume is 4.07 ac-ft with a peak outflow of 1.5 cfs.

- Pond D is located near the southern portion of the site adjacent to Highway 24. The pond discharges into the Main Stem right after the Main Stem and Main Stem Tributary #2 merge. The pond is planned to store a maximum of 9.41 ac-ft during the 100 year event and have a peak outflow of 154.4 cfs which equals the predevelopment peak flow rate. The 5 year storage volume is 6.28 ac-ft with a peak outflow of 2.0 cfs.

- Pond E is located in the middle of the site just east of the East Fork drainage way. The pond discharges into the East Fork drainageway. The pond is planned to store a maximum of 2.40 ac-ft during the 100 year event and have a peak outflow of 163.4 cfs which is greater than the pre development peak outflow of 157.99 cfs. The 5 year storage volume is 1.70 ac-ft with a peak outflow of 18.8 cfs.

- Pond F is located near the south east corner of the site just west of the East Fork Tributary drainageway. The pond discharges into the East Fork Tributary drainageway. The pond is planned to store a maximum of 12.40 ac-ft during the 100 year event and have a peak outflow of 235.5 cfs which is greater than the pre development peak outflow of 221.11 cfs. The 5 year storage volume is 8.07 ac-ft with a peak outflow of 14.5 cfs.

- Pond G is located near the north east corner of the site just west of the East Fork Tributary drainageway. The pond discharges into the East Fork Tributary drainageway at an upstream location within the site. The pond is planned to store a maximum of 2.54 ac-ft during the 100 year event and have a peak outflow of 50.7 cfs which is slightly greater than the pre development peak outflow of 48.48 cfs. The 5 year storage volume is 1.69 ac-ft with a peak outflow of 9.1 cfs.

- Pond H is located near the south east corner of the site just east of the East Fork Tributary drainageway and adjacent to Highway 24. The pond discharges into the East Fork Tributary drainageway. The pond is planned to store a maximum of 6.60 ac-ft during the 100 year event and have a peak outflow of 99.1 cfs which matches the pred development peak outflow. The 5 year storage volume is 4.03 ac-ft with a peak outflow of 1.3 cfs.

Overall runoff from the site will by and large match the predevelopment peak flows. The volume of water will increase however as the drainage channels are designs, continuous simulation models will be done to see the effects of prolonged runoff rates. Predevelopment and post development flows for the 5-year and 100-year events are summarized in the following table for the 4 site outfalls.

OUTFALL	Predevelopment		Postdevelopment*	
	5 year	100 year	5 year	100 year
1	80.03	479.80	67.69	466.95
2	85.96	597.41	61.68	536.11
3	30.00	154.35	8.58	160.70
4	341.05	1335.77	276.10	1291.25

*Values to be refined with Preliminary and Final Drainage Reports for each filing

VII. Drawings

Please refer to the appendices for vicinity maps and drainage basin maps.

VIII. Summary

Grandview Reserve is a large master planned community consisting of various densities of dwelling units to include single family homes, multifamily homes, parks, institutional sites, and commercial areas. Due to development increased runoff will occur. In order to mitigate downstream impacts 8 large full spectrum detention facilities will be built to reduce the runoff rate to near historic levels. These detention facilities will provide water quality enhancements in order to account for the increased urbanization of the upstream catchment areas.

Additional analysis will be required and completed to review the hydraulics of the proposed major drainage channels and be included in future submittals. The proposed design, as described in this report, is not anticipated to cause any adverse impact to downstream properties however as noted previously due to the increased volume of water, downstream tributaries will see increases in the volume of flow. It is advised that low impact design be taken into account when designing and developing each filing. This shall include those items listed in the four step process above and any additional measures that are within reason to disconnect impervious areas and increase infiltration. This will alleviate the additional volume of water due to development. Although the rate will remain at or below historic levels, the amount of time the channels will see water will increase which may cause more channel movement than historic. Downstream planning efforts should allow for the natural migration and movement of the channel by continuing to provide large floodplain areas to allow movement of the channel.

IX. References

El Paso County – Drainage Criteria Manual, 2014

City of Colorado Springs – Drainage Criteria Manual, May 2014

Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018

Unnamed Tributary Black Squirrel Cree, Four Way Ranch Letter of Map Revisions, Kiowa Engineering, March 2004

Haegler and Gieck Drainage Basins Letter of Map Revision, Four Way Ranch Subdivision, Kiowa, March 2004

Unnamed Tributary Black Squirrel Creek Drainage Basin, Letter of Map Revision, Elbert Road Site, Kiowa Engineering, February 2006

Geick Ranch Drainage Basin Planning Study (DBPS), Drexel Barrell, October 2010 (not approved)

EPC Engineering Criteria Manual (Appendix I updated July, 2019)

Meridian Ranch MDDP, January 2018

Appendix A

Drainage Basins

El Paso County
Colorado

Legend

- Drainage Basins Source: Muller Engineering Company (1988)
- US Interstate Highways
- US Highways
- Colorado State Highways
- Major Roadways
- Local Streets & Roads

Creeks

- Perennial
- Intermittent
- Lakes & Reservoirs
- Summits
- Unincorporated Urban Areas
- Incorporated Cities
- Military
- Forest
- County Lines

N W E S

Miles

0 0.5 1 2 3 4 5

Douglas County
Elbert County
Teller County
Lincoln County
Fremont County
Pueblo County

SITE

Upper Monument Creek FOMO5800
West Cherry Creek CYCY0400
Dirty Woman Creek FOMO5200
East Cherry Creek CYCY0200
West Kiowa Creek KIKI0200
East Kiowa Creek KIKI0400
Bijou Creek BIBI0200
Upper Big Sandy Creek BGBG1400
Lenard BGBG1200
Antelope Creek BGBG0800
Simla BGBG0400
Ramah BGBG0600
Mustang Creek BGBG0200
Calhan BGBG1000
Monument Rock FOMO5000
Jackson Creek FOMO4400
Black Forest FOMO4200
Monument Branch FOMO3800
Black Squirrel Creek FOMO3600
Beaver Creek FOMO4600
Pike National Forest
Air Force Academy FOMO3200
USAF Academy
Kettle Creek FOMO3000
Pine Creek FOMO2800
Upper Black Squirrel CHBS2000
Upper Bracket Creek CHBR0600
North Fork HOHO0400
Peyton
Bennett Ranch CHWS1200
Geick Ranch CHMS0400
La Vega Ranch CHBR0400
Horse Creek HOHO0600
Falcon CHWS1400
Falcon
Hook And Line Ranch CHBS1800
Little Horse Creek HOHO0200
Steels Fork HOPO1000
Baggett CHBR0200
Cottonwood Creek FOMO2200
Sand Creek FOFO4000
Solbers Ranch CHWS0800
Haegler Ranch CHMS0200
Curtis Ranch CHWS1000
West Big Springs Creek CHBG0200
Upper Big Springs Creek CHBG0400
Rush HOPO0800
Upper Fountain FOFO7600
Cheyenne Mountain Zoo
Cheyenne Mountain State Park
Cheyenne Mountain Air Force Station
Camp Creek FOFO5800
Douglas Creek FOMO1000
Templeton Gap FOMO1200
Williams Canyon FOFO7200
Cascade
Chipita Park
Manitou Springs
Manitou Reservoir FOFO7400
COLORADO SPRINGS
Shooks Run FOFO4400
Ruxton Creek FOFO7000
Sutherland Creek FOFO6400
Upper Beaver Creek BEBE0400
Bear Creek FOFO4800
Spring Creek FOFO4200
Peterson AFB
Peterson Field FOFO3400
Municipal Airport
Jimmy Camp Creek FOFO2000
Livestock Company CHWS0400
West Squirrel CHWS0600
Ellicott
Yoder
Rush
Telephone Exchange CHWS0200
Ellicott Consolidated CHBS1200
Ellicott CHBS1600
Lower Big Springs Creek CHBS1400
Upper Pond Creek HOPO0600
Lower Pond Creek HOPO0400
Upper East Chico CHEC0400
Schriever AFB
Crows Roost CHBS1000
Drennan CHDS0400
Middle East Chico CHEC0200
Truckton
Southwest Area FOFO4600
Fishers Canyon FOFO3600
Windmill Gulch FOFO3000
Big Johnson FOFO2600
Fort Carson FOFO2200
Upper Williams Creek FOWI0600
Upper Chico Creek CHCH1600
Upper Dry Squirrel CHDS0200
Upper Williams Tributary FOWI0400
West Chico Tributary CHCH1200
Haynes Creek HAHA0600
St.lukes HOPO0200
Lower Black Squirrel CHBS0600
Squirrel Creek CHBS0200
Little Fountain Creek FOFO1800
Calhan Reservoir FOFO1400
FOUNTAIN
Chico Creek CHCH1400
Lower Williams Creek FOFO1000
Lower Williams Tributary FOWI0200
Fort Carson
Sand Canyon FOFO1600
Lower Dry Squirrel CHBS0400
East Kramer KRKR0600
Kramer Creek KRKR0400
Turkey Creek TUTU0200
Lower East Chico CHCH0800
East Haynes HAHA0400
Sand Creek FOFO0600
Hammer Ranch CHCH0600
Williams Ranch FOFO0400
Midway Ranch FOFO0800
Finch Ranch CHCH0400
Windmill CHCH0200
West Haynes HAHA0200
West Kramer KRKR0200
West Chico Creek CHCH0600
Red Creek BEBE0200
Young Hollow FOFO0200

possible updates 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, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

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/.

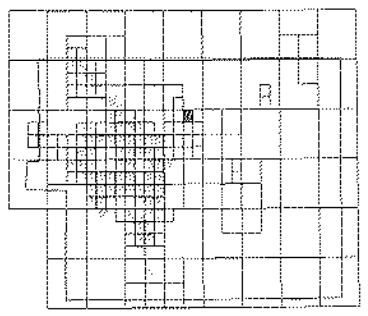
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

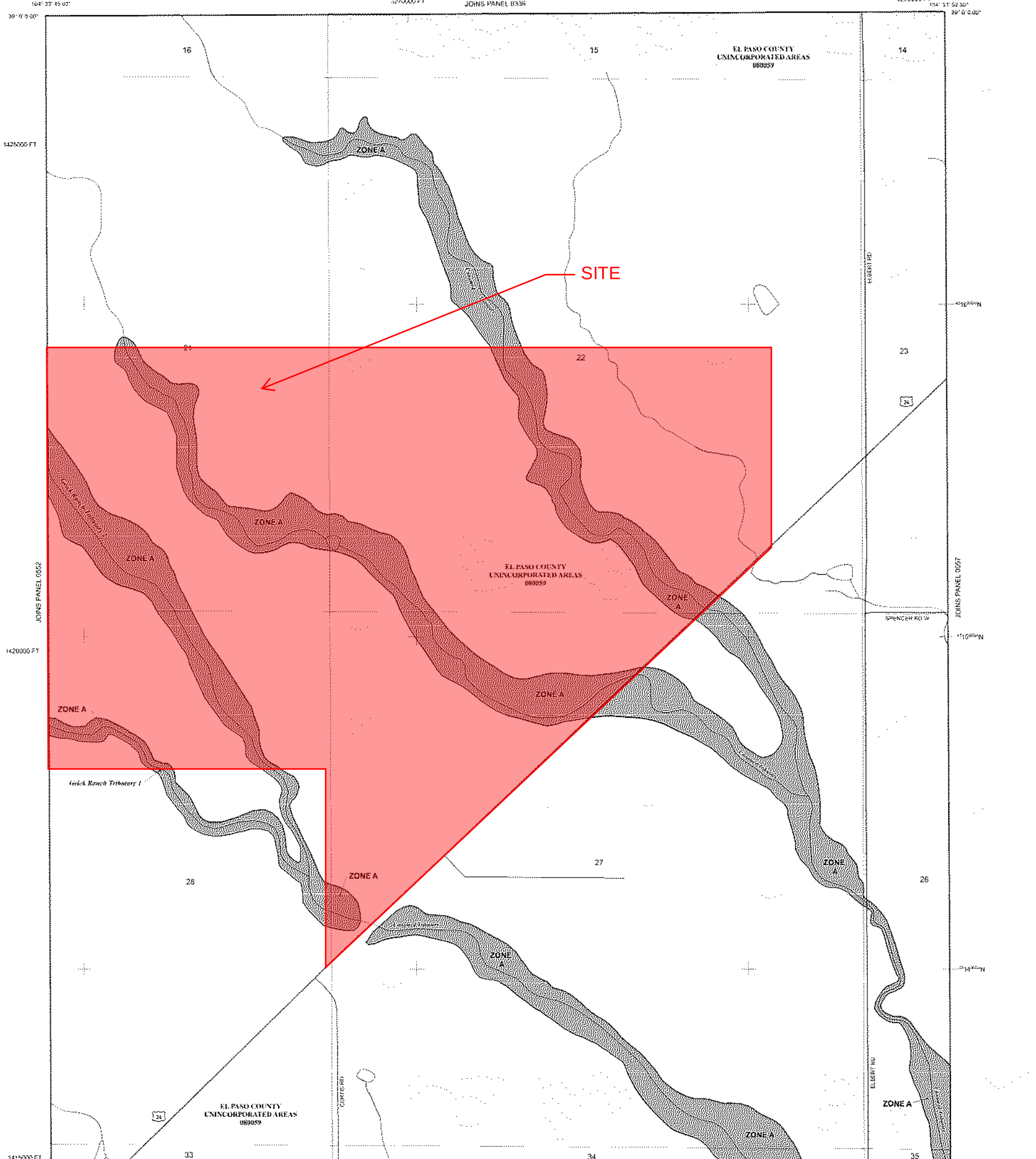
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

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.



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' 00.00", 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

PANEL 0556G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 556 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0556	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
08041C0556G

MAP REVISED

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.

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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.

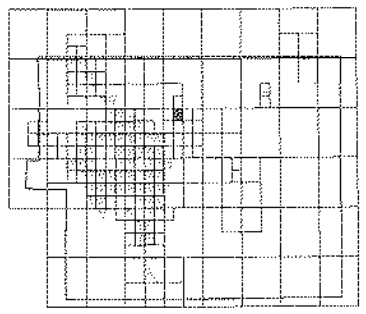
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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

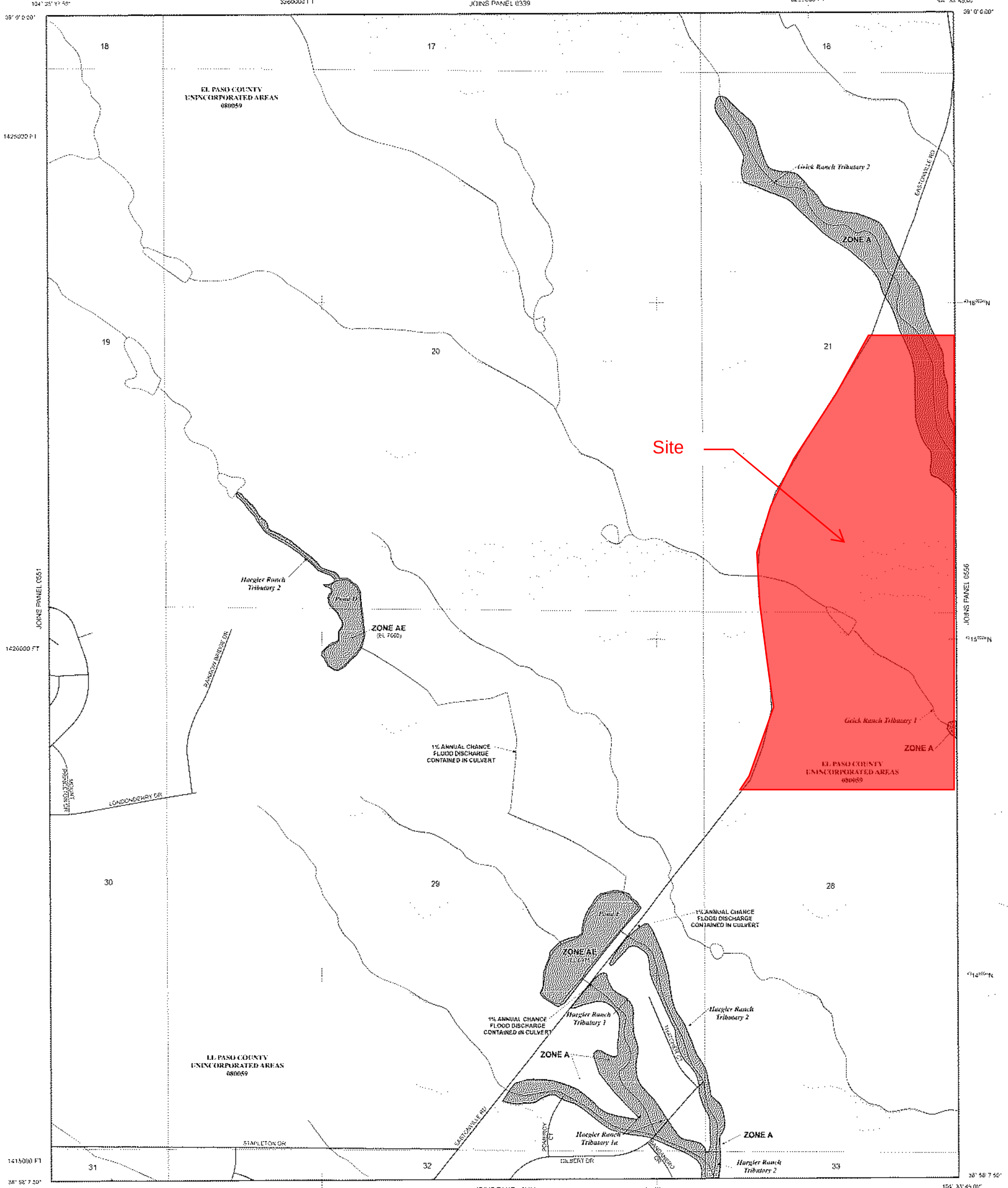
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



FLOOD INSURANCE RATE MAP LEGEND

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 (EL 957)	Base Flood Elevation line and value; elevation in feet*
	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 0552G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 552 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

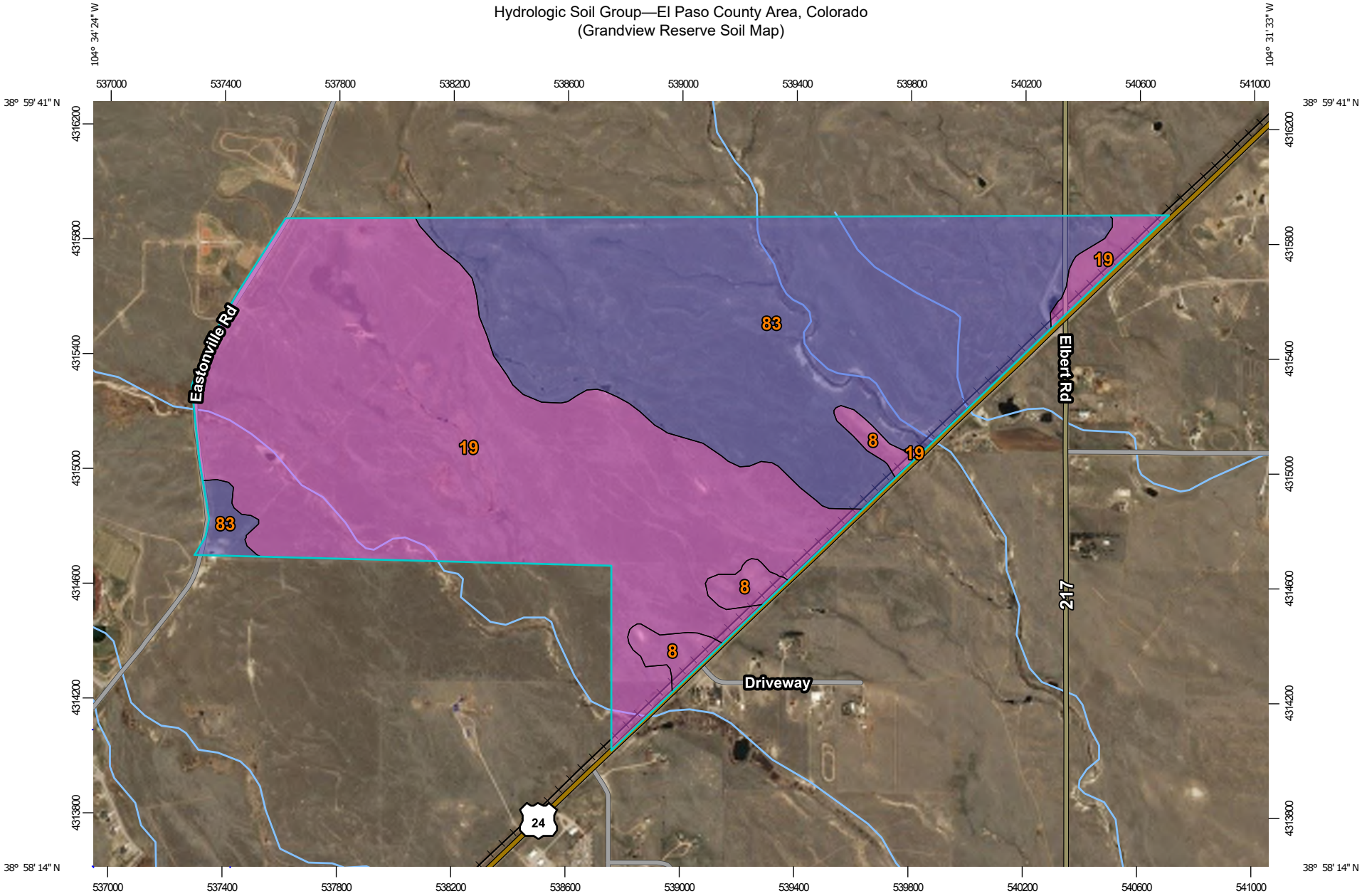
COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0552	G

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
08041C0552G

MAP REVISED

Hydrologic Soil Group—El Paso County Area, Colorado
(Grandview Reserve Soil Map)



Map Scale: 1:18,800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

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.

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 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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	22.4	2.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	450.7	52.5%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	385.4	44.9%
Totals for Area of Interest			**858.5**	**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

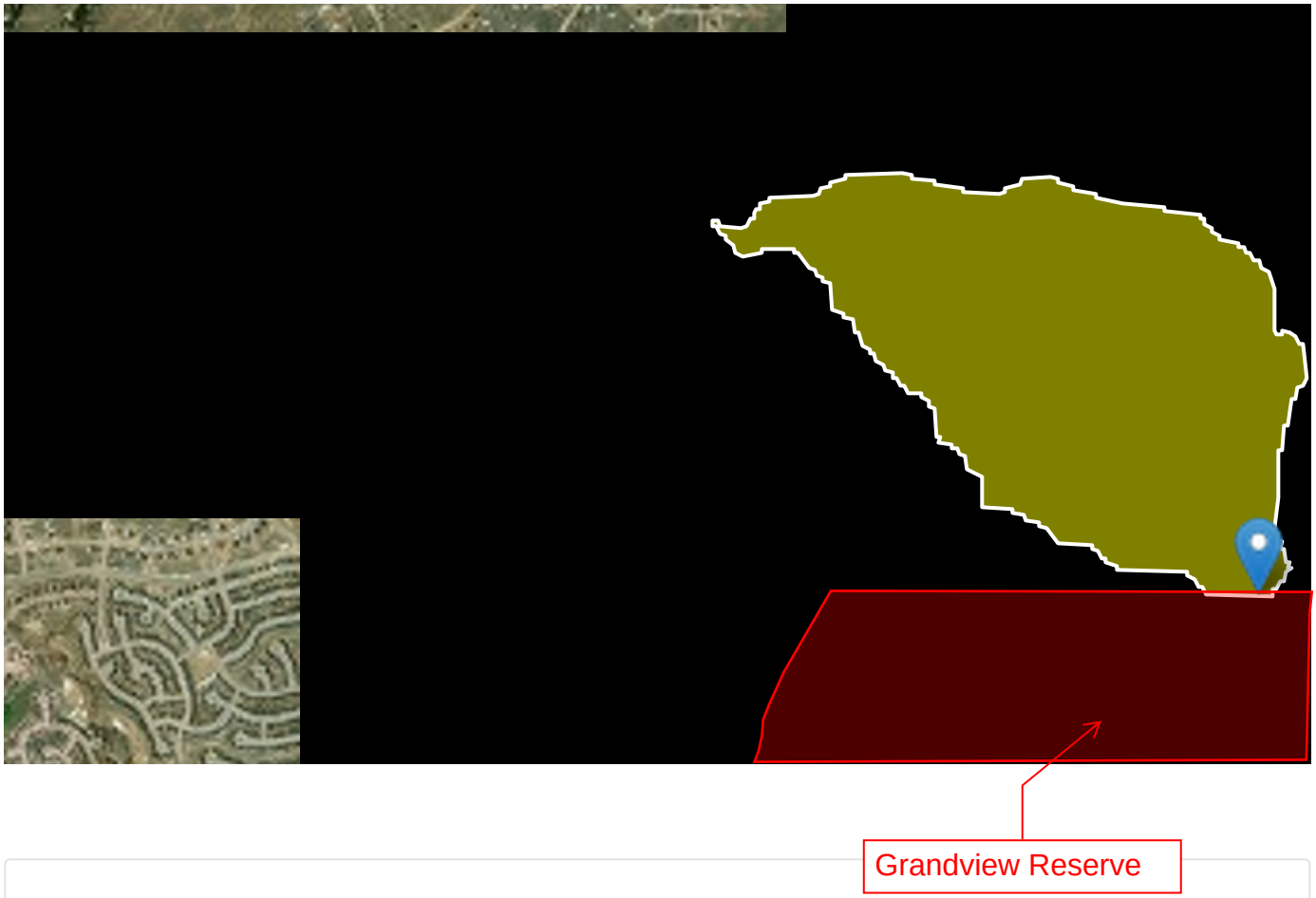
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

EAST FORK

Region ID: CO
Workspace ID: CO20200817220340831000
Clicked Point (Latitude, Longitude): 38.99090, -104.54663
Time: 2020-08-17 16:03:57 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	4	percent
DRNAREA	Area that drains to a point on a stream	0.84	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.9	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.86	inches

Parameter Code	Parameter Description	Value	Unit
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	58.28	dimensionless
RUNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensionless

Application Version: 4.4.0

EAST FORK TRIBUTARY BASIN DELINATION

Region ID: CO
Workspace ID: CO20200817220732890000
Clicked Point (Latitude, Longitude): 38.99085, -104.55989
Time: 2020-08-17 16:07:50 -0600

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
DRNAREA	Area that drains to a point on a stream	0.22	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.92	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.86	inches

Parameter Code	Parameter Description	Value	Unit
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	54.53	dimensionless
RUNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.23	dimensionless

Application Version: 4.4.0

MAIN STEM

Region ID: CO
Workspace ID: CO20200817221517278000
Clicked Point (Latitude, Longitude): 38.98969, -104.56703
Time: 2020-08-17 16:15:34 -0600

Basin Characteristics

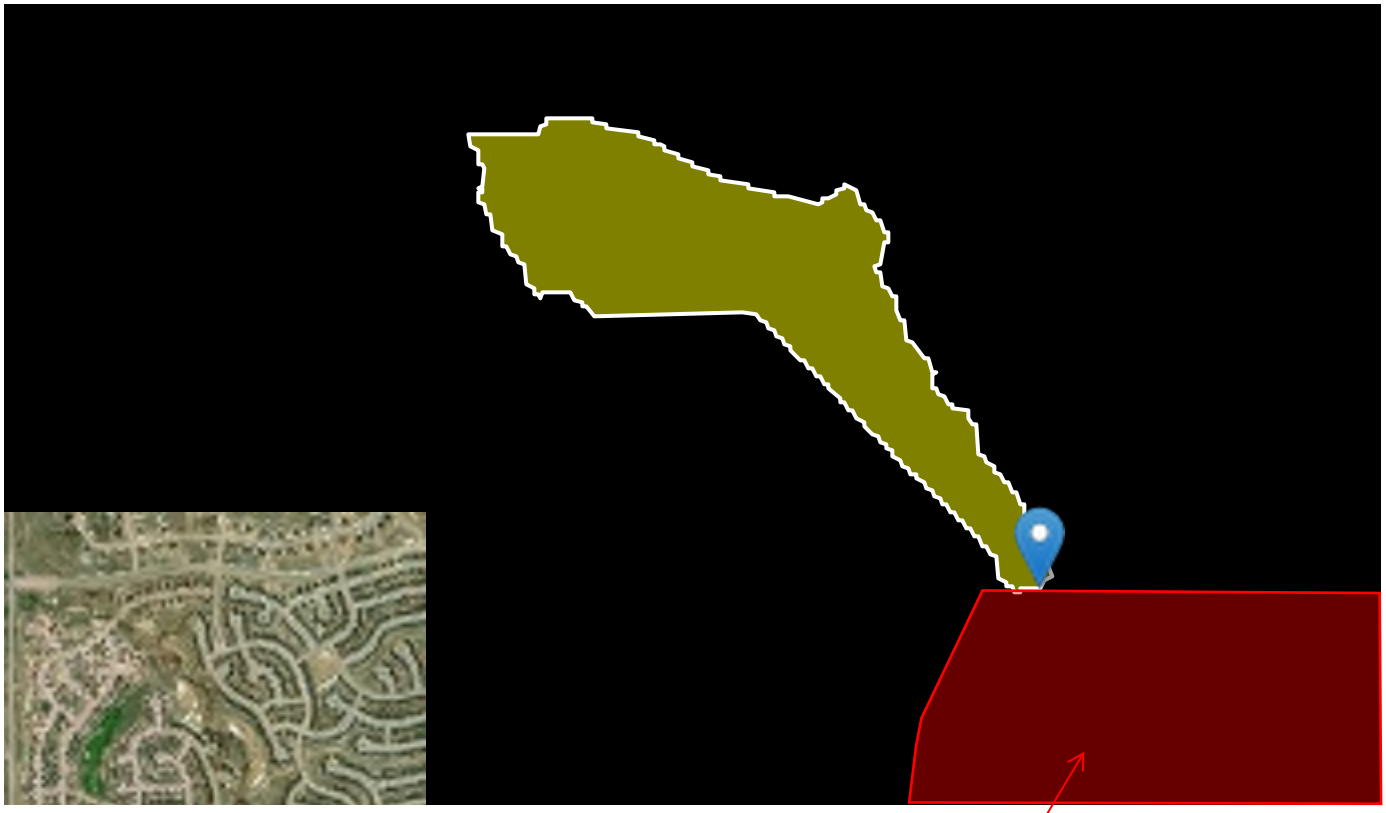
Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
DRNAREA	Area that drains to a point on a stream	0.17	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.87	inches

Parameter Code	Parameter Description	Value	Unit
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	55.04	dimensionless
RUNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.22	dimensionless

Application Version: 4.4.0

MAIN STEM TRIBUTARY NUMBER 2

Region ID: CO
Workspace ID: CO20200817221139984000
Clicked Point (Latitude, Longitude): 38.99101, -104.56354
Time: 2020-08-17 16:11:57 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	3	percent
DRNAREA	Area that drains to a point on a stream	0.44	square miles
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	4.94	inches
I24H2Y	Maximum 24-hour precipitation that occurs on average once in 2 years - Equivalent to precipitation intensity index	1.87	inches

Parameter Code	Parameter Description	Value	Unit
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	56.49	dimensionless
RUNCO_CO	Soil runoff coefficient as defined by Verdin and Gross (2017)	0.23	dimensionless

Application Version: 4.4.0

Appendix B

Basin Description	Park/Open Space	High Density/Schools	Med/High Density	Med Density	Low Density	Commercial	Total Impervious	Total Acreage	Composite Percent Impervious	Predominant Soil Group	5 Year C Factor	100 Year C Factor
Impervious Percentage	10%	65%	55%	45%	25%	75%						
A1	12.68	0.00	0.00	32.70	0.00	0.00	15.98	45.38	35.22%	B	0.38	0.71
					Pond A			**45.38**	**35.22%**			
B1	0.00	0.00	0.00	37.00	0.00	0.00	16.65	37.00	45.00%	A	0.4	0.61
B2	1.24	0.00	0.00	23.65	0.00	0.00	10.77	24.89	43.26%	A	0.38	0.59
B3	7.42	12.64	53.20	45.64	0.00	0.00	58.76	118.90	49.42%	A	0.36	0.5
					Pond B			**180.79**	**47.66%**			
C1	4.19	30.61	1.70	41.33	0.00	0.00	39.85	77.83	51.20%	A	0.38	0.59
					Pond C			**77.83**	**51.20%**			
D1	0.60	0.00	0.00	23.73	0.00	0.00	10.74	24.33	44.14%	A	0.39	0.6
D2	5.60	64.10	0.00	0.00	0.00	8.20	48.38	77.90	62.10%	A	0.39	0.6
					Pond D			**102.23**	**57.82%**			
E1	32.26	0.00	0.00	0.00	56.34	0.00	17.31	88.60	19.54%	B	0.12	0.59
					Pond E			**88.60**	**19.54%**			
F1	0.00	0.00	0.00	0.00	33.73	0.00	8.43	33.73	25.00%	B	0.15	0.61
F2	18.34	40.50	0.00	0.00	0.00	8.80	34.76	67.64	51.39%	B	0.36	0.7
F3	0.00	0.00	0.00	12.84	0.00	0.00	5.78	12.84	45.00%	B	0.45	0.74
F4	6.24	0.00	29.80	15.77	0.00	0.00	24.11	51.81	46.54%	B	0.37	0.64
					Pond F			**166.02**	**44.02%**			
G1	4.88	0.00	0.00	15.25	0.00	0.00	7.35	20.13	36.52%	B	0.25	0.66
G2	0.00	0.00	0.00	0.00	15.14	0.00	3.79	15.14	25.00%	B	0.45	0.74
					Pond G			**35.27**	**31.57%**			
H1	0.70	0.00	0.00	0.00	20.01	0.00	5.07	20.71	24.49%	A	0.38	0.75
H2	0.70	0.00	0.00	17.85	0.00	0.00	8.10	18.55	43.68%	B	0.43	0.75
H3	0.76	0.00	0.00	5.25	0.00	0.00	2.44	6.01	40.57%	B	0.4	0.72
H4	5.34	0.00	0.00	22.31	0.00	0.00	10.57	27.65	38.24%	B	0.37	0.7
					Pond H			**72.92**	**35.91%**			

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.157	0.143	37.3	5.59	19.4	3.95	9.3	57	164,729	0.25	40,666	35.0	13	40,592	0.29
B1		0.158	0.131	33.0	4.82	17.2	3.41	8.0	53	134,310	0.08	11,390	35.0	4	11,363	0.12
B2		0.158	0.109	58.5	6.42	30.4	4.54	10.7	20	90,351	0.08	7,662	40.0	2	7,665	0.07
B3		0.158	0.221	39.1	8.15	20.3	5.76	13.6	142	431,607	0.08	36,602	40.0	12	36,572	0.10
C1		0.158	0.183	30.3	5.75	15.7	4.06	9.6	120	281,797	0.08	23,898	35.0	10	23,870	0.13
D1		0.157	0.108	31.5	4.11	16.4	2.91	6.9	36	88,318	0.25	21,803	35.0	8	21,721	0.33
D2		0.157	0.182	37.7	6.77	19.6	4.78	11.3	97	282,777	0.25	69,809	40.0	22	69,820	0.29
E1		0.157	0.193	28.9	5.77	15.0	4.08	9.6	144	321,618	0.25	79,397	35.0	32	79,287	0.37
F1		0.157	0.125	37.2	5.07	19.4	3.58	8.5	42	122,440	0.25	30,227	35.0	10	30,151	0.29
F2		0.157	0.171	45.1	7.42	23.5	5.24	12.4	70	245,533	0.25	60,614	40.0	16	60,563	0.24
F3		0.157	0.081	37.8	3.84	19.6	2.72	6.4	16	46,609	0.25	11,506	35.0	4	11,472	0.28
F4		0.157	0.151	43.2	6.52	22.5	4.61	10.9	56	186,981	0.25	46,160	40.0	13	46,174	0.25
G1		0.157	0.099	38.8	4.45	20.2	3.14	7.4	24	73,072	0.25	18,039	35.0	6	17,996	0.28
G2		0.157	0.087	42.3	4.33	22.0	3.06	7.2	17	54,958	0.25	13,567	35.0	4	13,536	0.26
H1		0.158	0.101	43.7	4.89	22.7	3.45	8.1	22	75,177	0.08	6,375	35.0	2	6,365	0.09
H2		0.157	0.095	37.0	4.21	19.2	2.97	7.0	24	67,337	0.25	16,623	35.0	5	16,581	0.29
H3		0.157	0.057	32.6	2.94	16.9	2.08	4.9	9	21,816	0.25	5,384	35.0	2	5,324	0.32
H4		0.157	0.114	36.7	4.72	19.1	3.33	7.9	35	100,370	0.25	24,778	35.0	8	24,718	0.29

Printouts for Storm Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.11	0.05	0.01	0.08	0.10	0.09	0.16	0.27	0.09	0.10	0.04	0.09	0.06	0.04	0.02	0.06	0.02	0.08
25	4.37	0.49	0.15	0.79	0.97	3.50	6.05	10.68	3.53	3.91	1.60	3.64	2.24	1.57	0.20	2.24	0.93	3.12
30	10.53	3.60	1.09	6.02	7.25	7.38	16.27	26.19	8.12	11.07	3.32	9.60	4.86	3.39	1.51	4.78	1.85	6.93
35	13.03	4.33	1.65	10.87	9.95	8.12	21.83	32.34	9.70	15.57	3.65	12.69	5.57	3.87	1.85	5.37	1.92	8.07
40	12.83	4.07	1.66	11.85	9.38	7.47	22.23	30.31	9.45	16.46	3.47	12.98	5.40	3.78	1.79	5.14	1.75	7.79
45	11.55	3.53	1.62	11.26	7.98	6.50	20.38	26.01	8.49	15.82	3.11	12.23	4.86	3.47	1.67	4.59	1.53	6.96
50	10.17	3.04	1.54	10.00	6.77	5.67	17.95	22.15	7.48	14.39	2.76	11.00	4.32	3.11	1.50	4.06	1.35	6.14
55	9.05	2.66	1.43	8.60	5.79	4.90	15.88	18.86	6.66	12.88	2.47	9.83	3.87	2.81	1.33	3.61	1.17	5.45
60	7.99	2.29	1.30	7.68	4.93	4.29	14.03	16.29	5.88	11.66	2.18	8.89	3.45	2.54	1.21	3.19	1.03	4.80
65	7.10	2.03	1.20	6.77	4.36	3.80	12.42	14.16	5.23	10.56	1.95	8.00	3.08	2.27	1.09	2.84	0.92	4.27
70	6.40	1.81	1.12	5.94	3.79	3.34	11.15	12.11	4.73	9.49	1.77	7.19	2.79	2.06	0.98	2.57	0.82	3.86
75	5.77	1.58	1.04	5.41	3.22	2.88	10.06	10.06	4.26	8.60	1.60	6.55	2.52	1.88	0.89	2.31	0.71	3.47
80	5.13	1.36	0.96	4.88	2.66	2.41	8.99	8.20	3.79	7.91	1.42	5.99	2.27	1.72	0.82	2.05	0.60	3.07
85	4.50	1.14	0.88	4.36	2.14	2.00	7.91	6.93	3.32	7.26	1.25	5.45	2.01	1.56	0.75	1.79	0.50	2.68
90	3.87	0.93	0.82	3.84	1.88	1.73	6.84	6.11	2.85	6.61	1.08	4.92	1.75	1.39	0.68	1.53	0.43	2.28
95	3.26	0.83	0.77	3.32	1.69	1.55	5.78	5.38	2.41	5.96	0.91	4.39	1.50	1.23	0.61	1.30	0.38	1.94
100	2.83	0.75	0.72	2.81	1.50	1.38	4.97	4.66	2.10	5.31	0.79	3.85	1.29	1.07	0.54	1.14	0.35	1.70
105	2.57	0.68	0.68	2.39	1.31	1.22	4.48	3.95	1.91	4.67	0.72	3.32	1.15	0.92	0.47	1.04	0.31	1.55
110	2.35	0.60	0.63	2.21	1.12	1.06	4.09	3.25	1.74	4.03	0.66	2.90	1.06	0.82	0.40	0.95	0.27	1.41
115	2.13	0.53	0.58	2.03	0.93	0.90	3.72	2.54	1.58	3.55	0.60	2.63	0.97	0.76	0.36	0.86	0.24	1.27
120	1.92	0.45	0.53	1.86	0.74	0.74	3.35	1.84	1.42	3.27	0.54	2.44	0.88	0.70	0.34	0.77	0.20	1.14
125	1.70	0.38	0.49	1.68	0.55	0.58	2.99	1.14	1.26	3.04	0.49	2.25	0.79	0.64	0.31	0.68	0.16	1.01
130	1.49	0.30	0.44	1.50	0.36	0.43	2.63	0.49	1.10	2.81	0.43	2.07	0.71	0.59	0.29	0.59	0.13	0.87
135	1.28	0.22	0.39	1.33	0.17	0.27	2.27	0.14	0.94	2.59	0.37	1.89	0.62	0.53	0.26	0.51	0.09	0.74
140	1.06	0.15	0.35	1.15	0.01	0.12	1.91	0.06	0.79	2.37	0.31	1.71	0.53	0.48	0.24	0.42	0.05	0.61
145	0.85	0.08	0.33	0.98	0.01	0.03	1.55	0.04	0.63	2.16	0.25	1.53	0.45	0.42	0.22	0.33	0.02	0.47
150	0.64	0.01	0.31	0.80	0.01	0.01	1.19	0.03	0.47	1.94	0.20	1.35	0.36	0.37	0.19	0.25	0.01	0.34
155	0.43	0.00	0.29	0.62	0.01	0.01	0.84	0.02	0.32	1.72	0.14	1.17	0.28	0.32	0.17	0.16	0.00	0.21
160	0.22	0.00	0.28	0.45	0.00	0.01	0.48	0.02	0.16	1.51	0.08	0.99	0.19	0.26	0.15	0.07	0.00	0.09
165	0.08	0.00	0.26	0.27	0.00	0.00	0.19	0.01	0.06	1.29	0.03	0.81	0.11	0.21	0.12	0.02	0.00	0.03
170	0.03	0.00	0.24	0.11	0.00	0.00	0.06	0.01	0.02	1.07	0.01	0.64	0.04	0.15	0.10	0.01	0.00	0.01
175	0.01	0.00	0.23	0.01	0.00	0.00	0.03	0.00	0.01	0.86	0.00	0.46	0.01	0.10	0.07	0.01	0.00	0.01
180	0.01	0.00	0.21	0.01	0.00	0.00	0.02	0.00	0.01	0.64	0.00	0.28	0.01	0.05	0.05	0.00	0.00	0.01
185	0.01	0.00	0.20	0.01	0.00	0.00	0.01	0.00	0.01	0.43	0.00	0.12	0.00	0.01	0.03	0.00	0.00	0.00
190	0.01	0.00	0.18	0.00	0.00	0.00	0.01	0.00	0.00	0.22	0.00	0.03	0.00	0.01	0.01	0.00	0.00	0.00
195	0.00	0.00	0.16	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
205	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
210	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
215	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
235	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
275	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
285	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
325	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
335	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Printouts for Unit Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	40.28	42.09	12.13	63.61	82.42	32.48	55.24	98.24	32.62	35.61	14.87	33.35	20.73	14.60	17.60	20.82	8.64	28.84
10	57.05	52.23	19.82	128.67	120.14	35.66	95.11	143.90	42.37	66.66	15.76	55.34	24.18	16.70	22.15	23.32	8.39	35.18
15	55.14	49.14	19.80	142.11	113.71	32.86	95.34	135.22	40.64	69.88	14.91	55.08	23.11	16.08	21.50	22.10	7.65	33.53
20	50.23	42.59	19.29	135.55	96.28	27.58	88.48	111.47	36.78	67.16	13.37	52.19	21.00	14.87	20.10	19.77	6.45	30.09
25	42.58	36.47	18.42	120.63	81.39	24.10	76.12	94.77	31.35	61.81	11.56	47.11	18.05	13.08	17.96	17.02	5.72	25.74
30	38.19	31.93	17.17	102.86	69.70	20.86	66.79	79.97	28.11	53.81	10.39	40.94	16.29	11.74	15.92	15.24	4.99	23.02
35	33.80	27.39	15.55	91.99	58.90	17.81	59.27	68.09	24.87	48.71	9.22	37.24	14.54	10.64	14.50	13.46	4.28	20.30
40	29.41	24.26	14.30	81.13	52.19	15.90	51.76	59.63	21.63	44.21	8.05	33.54	12.78	9.53	13.08	11.71	3.85	17.61
45	26.49	21.61	13.35	70.68	45.48	14.00	46.02	51.18	19.57	39.70	7.32	29.84	11.49	8.43	11.66	10.66	3.41	16.01
50	23.93	18.96	12.40	64.49	38.78	12.09	41.69	42.72	17.67	35.20	6.62	26.88	10.45	7.76	10.59	9.61	2.98	14.41
55	21.37	16.30	11.45	58.31	32.07	10.19	37.36	34.27	15.77	32.56	5.93	24.72	9.41	7.10	9.75	8.56	2.54	12.81
60	18.81	13.65	10.50	52.12	25.36	8.28	33.03	27.80	13.87	29.94	5.23	22.56	8.38	6.45	8.92	7.50	2.10	11.21
65	16.25	11.00	9.72	45.94	22.24	6.95	28.70	24.98	11.97	27.33	4.53	20.40	7.34	5.79	8.08	6.45	1.71	9.61
70	13.69	9.78	9.16	39.75	20.01	6.31	24.37	22.16	10.07	24.72	3.84	18.25	6.30	5.14	7.24	5.40	1.56	8.01
75	11.32	8.90	8.59	33.57	17.77	5.68	20.04	19.34	8.39	22.11	3.17	16.09	5.27	4.48	6.40	4.58	1.42	6.85
80	10.47	8.01	8.03	28.12	15.53	5.04	18.15	16.52	7.75	19.50	2.94	13.93	4.65	3.83	5.56	4.23	1.27	6.31
85	9.62	7.13	7.47	26.06	13.30	4.41	16.71	13.70	7.12	16.89	2.71	11.77	4.31	3.30	4.72	3.88	1.13	5.78
90	8.76	6.25	6.91	24.00	11.06	3.77	15.27	10.89	6.49	14.28	2.48	10.65	3.96	3.08	4.25	3.53	0.98	5.25
95	7.91	5.36	6.34	21.94	8.83	3.14	13.82	8.07	5.86	13.26	2.24	9.93	3.62	2.86	3.97	3.18	0.84	4.71
100	7.06	4.48	5.78	19.87	6.59	2.50	12.38	5.25	5.22	12.39	2.01	9.21	3.27	2.64	3.69	2.83	0.69	4.18
105	6.20	3.59	5.22	17.81	4.36	1.87	10.94	2.43	4.59	11.51	1.78	8.49	2.92	2.42	3.41	2.48	0.55	3.65
110	5.35	2.71	4.65	15.75	2.12	1.23	9.49	0.00	3.96	10.64	1.55	7.77	2.58	2.20	3.13	2.13	0.40	3.11
115	4.50	1.82	4.09	13.69	0.00	0.60	8.05		3.32	9.77	1.32	7.05	2.23	1.99	2.85	1.78	0.26	2.58
120	3.64	0.94	3.83	11.63		0.00	6.61		2.69	8.90	1.08	6.33	1.89	1.77	2.57	1.43	0.11	2.04
125	2.79	0.06	3.65	9.57			5.17		2.06	8.03	0.85	5.62	1.54	1.55	2.29	1.08	0.00	1.51
130	1.94	0.00	3.46	7.50			3.72		1.43	7.16	0.62	4.90	1.20	1.33	2.02	0.72		0.98
135	1.08		3.27	5.44			2.28		0.79	6.29	0.39	4.18	0.85	1.11	1.74	0.37		0.44
140	0.23		3.08	3.38			0.84		0.16	5.42	0.16	3.46	0.50	0.89	1.46	0.02		0.00
145	0.00		2.90	1.32			0.00		0.00	4.55	0.00	2.74	0.16	0.68	1.18	0.00		
150			2.71	0.00						3.68		2.02	0.00	0.46	0.90			
155			2.52							2.81		1.30		0.24	0.62			
160			2.33							1.94		0.58		0.02	0.34			
165			2.15							1.07		0.00		0.00	0.06			
170			1.96							0.20					0.00			
175			1.77							0.00								
180			1.58															
185			1.40															
190			1.21															
195			1.02															
200			0.83															
205			0.64															
210			0.46															
215			0.27															
220			0.08															
225			0.00															

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.156	0.142	37.3	5.57	19.4	3.93	9.3	57	164,729	1.56	257,605	45.0	67	257,125	1.47
B1		0.157	0.130	33.0	4.80	17.2	3.39	8.0	53	134,310	1.17	157,714	40.0	49	157,336	1.32
B2		0.157	0.109	58.5	6.39	30.4	4.52	10.6	20	90,351	1.17	106,094	50.0	21	106,130	0.83
B3		0.157	0.220	39.1	8.11	20.3	5.73	13.5	142	431,607	1.17	506,815	45.0	140	506,418	1.18
C1		0.157	0.182	30.3	5.72	15.7	4.04	9.5	120	281,797	1.17	330,900	40.0	111	330,490	1.43
D1		0.156	0.107	31.5	4.10	16.4	2.90	6.8	36	88,318	1.56	138,112	40.0	40	137,590	1.64
D2		0.156	0.181	37.7	6.75	19.6	4.77	11.2	97	282,777	1.56	442,208	45.0	115	442,279	1.47
E1		0.156	0.192	28.8	5.76	15.0	4.07	9.6	144	321,618	1.56	502,948	40.0	158	502,220	1.78
F1		0.156	0.124	37.2	5.06	19.4	3.57	8.4	42	122,440	1.56	191,472	45.0	49	190,993	1.47
F2		0.156	0.170	45.1	7.40	23.5	5.23	12.3	70	245,533	1.56	383,966	50.0	87	383,641	1.28
F3		0.156	0.081	37.7	3.83	19.6	2.71	6.4	16	46,609	1.56	72,888	45.0	18	72,670	1.43
F4		0.156	0.150	43.2	6.50	22.5	4.59	10.8	56	186,981	1.56	292,403	45.0	68	292,494	1.32
G1		0.156	0.099	38.8	4.44	20.2	3.14	7.4	24	73,072	1.56	114,270	45.0	28	113,996	1.41
G2		0.156	0.087	42.3	4.31	22.0	3.05	7.2	17	54,958	1.56	85,944	45.0	20	85,743	1.32
H1		0.157	0.100	43.7	4.86	22.7	3.44	8.1	22	75,177	1.17	88,277	45.0	22	88,139	1.06
H2		0.156	0.095	37.0	4.20	19.2	2.97	7.0	24	67,337	1.56	105,301	45.0	27	105,031	1.46
H3		0.156	0.057	32.6	2.93	16.9	2.07	4.9	9	21,816	1.56	34,116	40.0	10	33,729	1.58
H4		0.156	0.114	36.7	4.70	19.1	3.32	7.8	35	100,370	1.56	156,958	45.0	41	156,578	1.48

Printouts for Storm Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
20	0.19	0.10	0.03	0.16	0.20	0.16	0.27	0.47	0.16	0.17	0.07	0.16	0.10	0.07	0.04	0.10	0.04	0.14
25	8.12	3.13	0.92	4.86	6.18	6.49	11.23	19.84	6.56	7.27	2.97	6.77	4.15	2.92	1.31	4.16	1.72	5.78
30	34.59	26.76	8.08	44.30	53.77	25.80	50.87	85.32	27.24	33.89	11.70	30.29	16.76	11.74	11.22	16.64	6.64	23.63
35	55.93	43.27	15.49	97.67	95.72	36.82	90.40	139.23	42.28	63.07	16.51	52.88	24.75	17.20	18.33	24.08	8.94	35.59
40	64.93	48.76	18.92	129.21	110.70	40.00	109.38	157.99	48.34	79.01	18.22	63.75	27.87	19.43	21.16	26.79	9.51	40.19
45	66.80	48.19	20.36	140.35	108.85	39.34	114.87	155.63	49.45	85.76	18.42	67.82	28.46	20.06	21.89	27.12	9.32	40.86
50	64.59	44.98	20.74	138.21	100.81	37.49	112.26	146.93	47.76	86.73	17.78	67.62	27.55	19.63	21.22	26.14	8.91	39.39
55	61.26	40.75	20.19	127.94	90.29	34.77	106.51	135.02	45.25	83.59	16.83	64.71	26.19	18.75	19.74	24.71	8.30	37.23
60	57.64	36.45	19.11	117.17	79.70	32.18	100.16	123.69	42.57	79.90	15.87	61.71	24.78	17.90	18.34	23.24	7.72	34.96
65	54.17	32.98	18.06	106.73	71.53	30.21	94.06	114.66	40.04	76.47	14.98	58.85	23.43	17.05	17.02	21.88	7.28	32.86
70	49.50	29.39	16.95	95.81	63.09	26.87	86.32	101.69	36.49	71.24	13.57	54.41	21.31	15.53	15.43	19.83	6.47	29.87
75	44.49	25.88	15.77	86.25	54.40	23.41	77.73	86.59	32.81	64.76	12.22	49.38	19.24	14.13	13.98	17.82	5.68	26.80
80	39.66	22.48	14.61	77.59	45.94	20.04	69.44	72.09	29.24	59.04	10.92	44.90	17.27	12.84	12.74	15.86	4.91	23.82
85	35.05	19.22	13.48	69.37	38.02	16.98	61.48	60.25	25.85	53.80	9.69	40.70	15.40	11.62	11.61	14.01	4.19	20.99
90	30.75	16.13	12.47	61.54	32.26	14.46	54.04	51.51	22.66	48.89	8.53	36.78	13.66	10.48	10.54	12.25	3.57	18.32
95	26.60	13.89	11.62	54.03	28.03	12.58	46.90	44.50	19.60	44.35	7.40	33.11	11.95	9.39	9.51	10.59	3.11	15.80
100	22.94	12.24	10.86	46.67	24.54	11.06	40.40	38.42	16.94	39.99	6.40	29.55	10.37	8.32	8.50	9.19	2.75	13.72
105	20.31	10.86	10.14	40.05	21.41	9.70	35.55	32.88	15.01	35.72	5.68	26.07	9.12	7.30	7.50	8.16	2.43	12.18
110	18.18	9.62	9.45	35.53	18.50	8.47	31.77	27.72	13.44	31.55	5.10	22.87	8.17	6.44	6.54	7.31	2.14	10.90
115	16.30	8.47	8.77	32.01	15.69	7.31	28.48	22.84	12.06	27.80	4.58	20.38	7.35	5.79	5.80	6.55	1.87	9.75
120	14.59	7.37	8.10	28.94	12.97	6.22	25.53	18.25	10.79	24.99	4.12	18.44	6.63	5.26	5.26	5.86	1.61	8.71
125	13.00	6.29	7.44	26.14	10.33	5.18	22.79	13.83	9.62	22.73	3.68	16.78	5.96	4.78	4.81	5.22	1.37	7.73
130	11.49	5.24	6.78	23.51	7.70	4.19	20.20	9.50	8.50	20.76	3.27	15.27	5.33	4.35	4.41	4.61	1.14	6.80
135	10.07	4.20	6.11	20.95	5.08	3.19	17.76	5.87	7.45	18.98	2.89	13.89	4.74	3.94	4.05	4.03	0.92	5.93
140	8.73	3.16	5.48	18.46	2.69	2.20	15.47	3.75	6.46	17.33	2.52	12.59	4.18	3.56	3.69	3.48	0.69	5.09
145	7.39	2.12	5.01	16.03	1.47	1.36	13.20	2.42	5.47	15.78	2.16	11.37	3.64	3.20	3.35	2.93	0.47	4.26
150	6.05	1.15	4.66	13.61	0.84	0.87	10.94	1.51	4.47	14.31	1.79	10.21	3.10	2.86	3.02	2.38	0.29	3.42
155	4.72	0.63	4.37	11.19	0.46	0.56	8.68	0.88	3.48	12.94	1.43	9.09	2.55	2.51	2.69	1.83	0.18	2.58
160	3.38	0.36	4.11	8.77	0.25	0.35	6.42	0.45	2.49	11.57	1.06	7.96	2.01	2.17	2.36	1.28	0.12	1.77
165	2.17	0.20	3.86	6.35	0.13	0.20	4.29	0.17	1.60	10.20	0.72	6.83	1.47	1.83	2.03	0.80	0.07	1.09
170	1.37	0.11	3.63	3.98	0.05	0.11	2.67	0.04	1.00	8.84	0.44	5.70	0.97	1.49	1.70	0.51	0.04	0.70
175	0.88	0.05	3.40	2.12	0.01	0.04	1.71	0.03	0.65	7.48	0.28	4.58	0.60	1.15	1.37	0.33	0.02	0.45
180	0.56	0.02	3.18	1.17	0.00	0.01	1.09	0.02	0.41	6.11	0.18	3.45	0.39	0.80	1.05	0.20	0.01	0.28
185	0.33	0.00	2.96	0.66	0.00	0.01	0.67	0.02	0.25	4.75	0.11	2.36	0.25	0.50	0.72	0.12	0.00	0.16
190	0.18	0.00	2.74	0.36	0.00	0.01	0.38	0.01	0.13	3.39	0.06	1.46	0.15	0.32	0.41	0.06	0.00	0.08
195	0.08	0.00	2.52	0.19	0.00	0.00	0.19	0.01	0.06	2.17	0.03	0.93	0.08	0.21	0.22	0.03	0.00	0.03
200	0.02	0.00	2.30	0.09	0.00	0.00	0.07	0.01	0.02	1.36	0.01	0.60	0.04	0.13	0.12	0.01	0.00	0.01
205	0.01	0.00	2.07	0.03	0.00	0.00	0.02	0.00	0.01	0.88	0.00	0.37	0.01	0.08	0.07	0.00	0.00	0.01
210	0.01	0.00	1.85	0.00	0.00	0.00	0.01	0.00	0.01	0.56	0.00	0.22	0.00	0.04	0.04	0.00	0.00	0.00
215	0.01	0.00	1.63	0.00	0.00	0.00	0.01	0.00	0.00	0.33	0.00	0.11	0.00	0.02	0.02	0.00	0.00	0.00
220	0.00	0.00	1.41	0.00	0.00	0.00	0.01	0.00	0.00	0.18	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00
225	0.00	0.00	1.19	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
230	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
235	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
240	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
245	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
265	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
275	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
285	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
305	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
325	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
335	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Printouts for Unit Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	40.40	42.25	12.21	64.08	82.83	32.53	55.47	98.57	32.71	35.78	14.89	33.49	20.77	14.63	17.67	20.86	8.64	28.91
10	57.06	52.24	19.84	129.10	120.16	35.66	95.22	143.91	42.37	66.77	15.76	55.38	24.18	16.70	22.15	23.33	8.39	35.19
15	55.13	49.12	19.80	142.11	113.65	32.85	95.32	135.16	40.63	69.88	14.91	55.08	23.11	16.08	21.49	22.10	7.65	33.52
20	50.21	42.56	19.29	135.46	96.16	27.57	88.44	111.36	36.77	67.15	13.37	52.17	21.00	14.87	20.09	19.76	6.45	30.08
25	42.57	36.46	18.41	120.46	81.35	24.10	76.05	94.73	31.34	61.78	11.56	47.08	18.04	13.08	17.95	17.02	5.72	25.74
30	38.18	31.92	17.16	102.78	69.66	20.85	66.76	79.93	28.10	53.77	10.39	40.93	16.29	11.74	15.92	15.24	4.99	23.02
35	33.79	27.37	15.54	91.92	58.88	17.80	59.25	68.07	24.86	48.70	9.22	37.23	14.53	10.63	14.50	13.46	4.28	20.29
40	29.40	24.25	14.30	81.06	52.17	15.90	51.73	59.61	21.62	44.19	8.04	33.53	12.78	9.53	13.08	11.71	3.85	17.61
45	26.48	21.60	13.35	70.65	45.46	13.99	46.01	51.16	19.56	39.69	7.32	29.82	11.49	8.43	11.66	10.66	3.41	16.01
50	23.92	18.95	12.40	64.46	38.75	12.09	41.68	42.70	17.67	35.18	6.62	26.87	10.45	7.76	10.59	9.61	2.97	14.41
55	21.36	16.29	11.45	58.28	32.04	10.18	37.35	34.24	15.77	32.55	5.93	24.71	9.41	7.10	9.75	8.55	2.54	12.81
60	18.80	13.64	10.50	52.09	25.33	8.28	33.02	27.79	13.87	29.94	5.23	22.56	8.38	6.45	8.91	7.50	2.10	11.20
65	16.24	10.99	9.72	45.91	22.24	6.95	28.69	24.97	11.97	27.33	4.53	20.40	7.34	5.79	8.07	6.45	1.71	9.60
70	13.68	9.78	9.16	39.72	20.00	6.31	24.36	22.15	10.07	24.71	3.84	18.24	6.30	5.14	7.23	5.39	1.56	8.00
75	11.32	8.90	8.59	33.53	17.76	5.68	20.03	19.33	8.39	22.10	3.17	16.08	5.26	4.48	6.39	4.58	1.42	6.85
80	10.47	8.01	8.03	28.11	15.53	5.04	18.15	16.52	7.75	19.49	2.94	13.92	4.65	3.83	5.56	4.23	1.27	6.31
85	9.61	7.13	7.47	26.05	13.29	4.41	16.71	13.70	7.12	16.88	2.71	11.77	4.31	3.30	4.72	3.88	1.13	5.78
90	8.76	6.24	6.90	23.99	11.06	3.77	15.26	10.88	6.49	14.27	2.48	10.65	3.96	3.08	4.25	3.53	0.98	5.25
95	7.91	5.36	6.34	21.93	8.82	3.14	13.82	8.06	5.85	13.25	2.24	9.93	3.61	2.86	3.97	3.18	0.84	4.71
100	7.05	4.47	5.78	19.87	6.58	2.50	12.38	5.24	5.22	12.38	2.01	9.21	3.27	2.64	3.69	2.83	0.69	4.18
105	6.20	3.59	5.21	17.80	4.35	1.87	10.93	2.42	4.59	11.51	1.78	8.49	2.92	2.42	3.41	2.48	0.55	3.64
110	5.35	2.70	4.65	15.74	2.11	1.23	9.49	0.00	3.95	10.64	1.55	7.77	2.58	2.20	3.13	2.13	0.40	3.11
115	4.49	1.82	4.09	13.68	0.00	0.60	8.05		3.32	9.77	1.32	7.05	2.23	1.99	2.85	1.78	0.25	2.58
120	3.64	0.94	3.83	11.62		0.00	6.60		2.69	8.90	1.08	6.33	1.89	1.77	2.57	1.43	0.11	2.04
125	2.79	0.05	3.65	9.56			5.16		2.06	8.03	0.85	5.61	1.54	1.55	2.29	1.07	0.00	1.51
130	1.93	0.00	3.46	7.49			3.72		1.42	7.16	0.62	4.89	1.19	1.33	2.01	0.72		0.97
135	1.08		3.27	5.43			2.27		0.79	6.29	0.39	4.17	0.85	1.11	1.73	0.37		0.44
140	0.23		3.08	3.37			0.83		0.16	5.42	0.15	3.45	0.50	0.89	1.45	0.02		0.00
145	0.00		2.90	1.31			0.00		0.00	4.55	0.00	2.74	0.16	0.67	1.17	0.00		
150			2.71	0.00						3.68		2.02	0.00	0.46	0.89			
155			2.52							2.81		1.30		0.24	0.61			
160			2.33							1.94		0.58		0.02	0.34			
165			2.14							1.07		0.00		0.00	0.06			
170			1.96							0.20					0.00			
175			1.77							0.00								
180			1.58															
185			1.39															
190			1.21															
195			1.02															
200			0.83															
205			0.64															
210			0.46															
215			0.27															
220			0.08															
225			0.00															

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.097	0.131	25.0	4.03	13.0	2.84	6.7	85	164,729	0.57	94,676	35.0	31	94,308	0.68
B1		0.092	0.139	18.2	3.44	9.5	2.43	5.7	95	134,310	0.58	77,837	30.0	29	77,220	0.80
B2		0.093	0.113	33.3	4.40	17.3	3.11	7.3	35	90,351	0.56	50,405	35.0	12	50,284	0.48
B3		0.109	0.171	35.1	6.09	18.2	4.30	10.2	159	431,607	0.31	135,184	35.0	37	135,109	0.31
C1		0.089	0.205	15.3	3.91	7.9	2.76	6.5	238	281,797	0.64	181,072	30.0	76	180,336	0.97
D1		0.092	0.115	17.3	3.03	9.0	2.14	5.1	66	88,318	0.67	59,557	30.0	24	58,560	0.99
D2		0.084	0.229	15.9	4.30	8.3	3.04	7.2	229	282,777	0.87	246,138	30.0	98	245,292	1.26
E1		0.114	0.151	26.8	4.61	13.9	3.25	7.7	155	321,618	0.41	131,675	35.0	47	131,227	0.53
F1		0.107	0.097	32.8	3.94	17.1	2.78	6.6	48	122,440	0.47	56,968	35.0	16	56,751	0.48
F2		0.088	0.198	21.9	4.83	11.4	3.41	8.1	145	245,533	0.75	184,862	35.0	60	183,986	0.89
F3		0.092	0.087	20.4	2.87	10.6	2.03	4.8	30	46,609	0.68	31,862	30.0	11	31,302	0.88
F4		0.121	0.121	41.5	5.37	21.6	3.79	8.9	58	186,981	0.36	67,763	35.0	17	67,675	0.34
G1		0.096	0.093	25.2	3.31	13.1	2.34	5.5	37	73,072	0.59	43,083	30.0	14	42,758	0.68
G2		0.107	0.067	37.3	3.43	19.4	2.42	5.7	19	54,958	0.47	25,571	35.0	7	25,468	0.43
H1		0.109	0.078	39.3	3.85	20.4	2.72	6.4	25	75,177	0.31	23,258	35.0	6	23,195	0.27
H2		0.092	0.101	20.5	3.09	10.6	2.18	5.2	42	67,337	0.67	45,076	30.0	16	44,528	0.88
H3		0.094	0.058	19.2	2.36	10.0	1.67	3.9	15	21,816	0.64	13,878	30.0	5	13,432	0.87
H4		0.095	0.111	22.8	3.45	11.9	2.44	5.7	57	100,370	0.61	61,173	30.0	21	60,592	0.76

Printouts for Unit Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	77.33	93.25	30.09	102.59	220.53	65.84	199.90	128.93	44.36	115.64	29.50	42.62	37.03	18.62	23.03	42.42	14.61	55.54
10	82.78	86.57	34.71	158.92	211.37	57.29	212.53	153.31	47.44	142.37	26.77	58.18	35.84	18.73	24.44	38.99	12.72	53.96
15	70.87	64.60	32.47	154.15	146.87	42.55	148.71	136.86	43.94	117.23	20.78	56.54	30.18	17.61	23.25	30.20	9.82	43.13
20	57.63	49.16	28.07	139.10	107.74	32.08	108.63	110.77	37.50	92.72	16.66	52.59	24.96	15.66	21.07	24.25	7.67	35.72
25	47.82	39.67	24.21	116.79	80.83	25.68	83.75	93.90	32.69	72.89	13.46	46.34	20.75	13.62	18.22	19.53	6.26	28.56
30	39.89	30.81	21.23	103.58	53.91	19.28	58.88	77.26	28.57	61.39	11.05	41.06	17.44	12.21	16.48	16.06	5.00	24.34
35	34.20	21.94	18.25	90.37	40.79	13.08	41.89	67.52	24.45	50.16	8.64	37.09	14.97	10.80	14.74	12.59	3.73	20.17
40	28.51	17.08	16.20	78.14	31.82	10.94	33.60	57.77	21.87	38.93	6.23	33.12	12.50	9.45	13.00	9.12	2.78	16.00
45	22.81	14.12	14.45	70.52	22.85	8.81	25.30	48.03	19.44	28.50	5.21	29.15	10.02	8.61	11.70	7.55	2.35	11.83
50	17.12	11.17	12.70	62.89	13.88	6.68	17.01	38.28	17.01	24.76	4.40	26.80	7.55	7.77	10.67	6.39	1.93	10.13
55	15.14	8.21	10.96	55.26	4.91	4.55	8.72	30.20	14.58	21.02	3.60	24.47	6.69	6.93	9.63	5.24	1.51	8.74
60	13.25	5.26	9.21	47.63	0.00	2.41	0.43	26.95	12.15	17.28	2.80	22.14	5.86	6.09	8.60	4.08	1.09	7.35
65	11.35	2.30	7.46	40.01		0.28	0.00	23.70	9.73	13.53	1.99	19.80	5.04	5.25	7.56	2.92	0.66	5.96
70	9.45	0.00	6.57	32.38		0.00		20.45	8.85	9.79	1.19	17.47	4.21	4.41	6.53	1.77	0.24	4.57
75	7.55		5.99	29.45				17.20	8.04	6.05	0.39	15.14	3.39	3.73	5.49	0.61	0.00	3.18
80	5.65		5.41	26.90				13.96	7.23	2.30	0.00	12.80	2.56	3.45	4.78	0.00		1.79
85	3.76		4.83	24.36				10.71	6.42	0.00		11.25	1.74	3.17	4.43			0.40
90	1.86		4.24	21.82				7.46	5.61			10.48	0.92	2.89	4.09			0.00
95	0.00		3.66	19.28				4.21	4.80			9.70	0.09	2.61	3.74			
100			3.08	16.73				0.96	3.99			8.92	0.00	2.33	3.40			
105			2.50	14.19				0.00	3.18			8.14		2.05	3.05			
110			1.91	11.65					2.37			7.37		1.77	2.71			
115			1.33	9.11					1.57			6.59		1.49	2.36			
120			0.75	6.57					0.76			5.81		1.21	2.02			
125			0.16	4.02					0.00			5.03		0.93	1.67			
130			0.00	1.48								4.25		0.65	1.33			
135				0.00								3.48		0.37	0.98			
140												2.70		0.09	0.64			
145												1.92		0.00	0.29			
150												1.14			0.00			
155												0.37						
160												0.00						

Printouts for Storm Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.36	0.64	0.20	0.23	1.74	0.44	2.08	0.18	0.10	0.95	0.20	0.04	0.18	0.04	0.05	0.28	0.09	0.30
15	2.32	4.09	1.30	1.64	11.12	2.79	13.53	1.21	0.67	6.30	1.29	0.24	1.17	0.28	0.33	1.79	0.56	1.93
20	6.67	9.83	3.33	5.52	26.84	6.88	33.61	5.50	2.52	16.68	3.21	1.29	3.22	1.04	1.05	4.47	1.38	5.10
25	20.87	22.60	7.93	17.10	59.49	18.93	77.51	25.66	9.83	42.33	8.75	7.68	9.89	4.07	3.28	12.38	4.00	15.21
30	30.38	29.46	11.46	31.45	75.68	24.15	98.47	43.67	15.39	59.83	11.36	14.72	13.78	6.23	5.43	16.24	5.21	20.93
35	30.72	26.67	12.02	36.88	66.79	21.82	89.51	46.88	16.28	60.11	10.60	17.33	13.54	6.55	5.68	15.19	4.80	20.15
40	27.81	22.58	11.45	35.92	54.47	18.39	74.71	42.71	15.34	53.80	9.29	17.30	12.26	6.29	5.48	13.31	4.14	17.97
45	24.51	19.22	10.58	32.86	44.66	15.44	62.27	37.28	13.93	46.86	8.06	16.18	10.85	5.79	5.07	11.52	3.55	15.68
50	21.78	16.55	9.82	29.65	36.85	13.05	52.12	32.55	12.68	41.47	7.06	14.80	9.70	5.34	4.66	10.08	3.07	13.90
55	19.37	13.99	9.08	26.95	30.79	10.72	43.60	28.65	11.43	36.51	6.07	13.55	8.65	4.91	4.30	8.67	2.59	12.22
60	17.19	12.08	8.45	24.37	26.55	9.18	37.60	25.43	10.42	31.82	5.18	12.40	7.70	4.50	3.96	7.40	2.19	10.64
65	15.12	10.81	7.94	22.29	22.96	8.12	32.85	22.34	9.59	27.79	4.57	11.31	6.80	4.17	3.65	6.51	1.94	9.21
70	13.24	9.76	7.45	20.59	19.65	7.15	28.46	19.37	8.80	25.18	4.16	10.45	5.97	3.90	3.41	5.91	1.74	8.23
75	11.79	8.53	6.89	18.85	16.26	6.00	23.71	16.54	7.92	22.91	3.71	9.69	5.33	3.60	3.17	5.26	1.52	7.41
80	10.62	7.22	6.30	17.03	13.53	4.85	19.26	14.42	6.99	20.51	3.23	8.91	4.82	3.27	2.93	4.59	1.29	6.62
85	9.57	6.07	5.76	15.23	12.11	3.89	16.78	12.86	6.11	18.18	2.78	8.12	4.36	2.94	2.68	3.95	1.07	5.87
90	8.59	5.20	5.35	13.56	11.42	3.34	15.58	11.48	5.49	15.96	2.36	7.34	3.93	2.63	2.44	3.35	0.88	5.16
95	7.65	4.76	5.07	12.35	10.98	3.08	14.84	10.17	5.07	13.90	2.00	6.56	3.52	2.36	2.21	2.83	0.74	4.47
100	6.58	4.29	4.75	11.49	9.92	2.75	13.45	8.75	4.63	11.66	1.65	5.77	3.04	2.14	2.00	2.33	0.63	3.69
105	5.52	3.91	4.43	10.66	9.00	2.49	12.15	7.33	4.21	9.81	1.45	5.11	2.58	1.98	1.85	2.03	0.57	2.99
110	4.54	3.64	4.12	9.86	8.35	2.30	11.26	5.94	3.80	8.73	1.33	4.64	2.14	1.83	1.74	1.86	0.53	2.52
115	3.70	3.43	3.83	9.09	7.88	2.17	10.60	4.61	3.41	8.10	1.24	4.29	1.76	1.69	1.63	1.74	0.49	2.27
120	3.19	3.19	3.52	8.32	7.31	2.00	9.84	3.37	3.02	7.53	1.15	3.97	1.51	1.55	1.52	1.61	0.46	2.09
125	2.62	2.47	3.05	7.36	5.48	1.52	7.54	2.39	2.55	6.26	0.91	3.63	1.23	1.38	1.38	1.28	0.35	1.70
130	2.11	1.84	2.57	6.30	3.83	1.12	5.34	1.80	2.09	4.91	0.70	3.29	0.99	1.21	1.23	0.99	0.27	1.34
135	1.69	1.37	2.11	5.27	2.67	0.82	3.79	1.42	1.65	3.82	0.54	2.96	0.80	1.05	1.09	0.76	0.20	1.06
140	1.35	1.02	1.70	4.28	1.82	0.60	2.64	1.13	1.23	2.98	0.42	2.63	0.64	0.89	0.95	0.58	0.15	0.84
145	1.08	0.74	1.34	3.35	1.21	0.42	1.78	0.90	0.87	2.30	0.31	2.32	0.51	0.74	0.82	0.44	0.11	0.65
150	0.86	0.52	1.07	2.50	0.80	0.29	1.19	0.71	0.64	1.75	0.23	2.01	0.41	0.59	0.69	0.33	0.08	0.50
155	0.67	0.37	0.89	1.83	0.51	0.20	0.79	0.56	0.52	1.31	0.17	1.71	0.32	0.45	0.57	0.24	0.06	0.38
160	0.51	0.25	0.74	1.42	0.29	0.14	0.47	0.43	0.42	0.98	0.13	1.41	0.25	0.33	0.45	0.18	0.04	0.29
165	0.40	0.16	0.62	1.18	0.13	0.08	0.23	0.33	0.34	0.73	0.09	1.12	0.19	0.24	0.34	0.13	0.03	0.22
170	0.31	0.09	0.51	0.98	0.03	0.04	0.08	0.25	0.28	0.52	0.06	0.83	0.15	0.18	0.25	0.09	0.02	0.16
175	0.23	0.04	0.42	0.82	0.00	0.01	0.00	0.19	0.22	0.36	0.04	0.55	0.11	0.15	0.19	0.05	0.01	0.11
180	0.17	0.01	0.35	0.67	0.00	0.00	0.00	0.14	0.18	0.23	0.02	0.35	0.08	0.12	0.15	0.03	0.00	0.08
185	0.12	0.00	0.29	0.56	0.00	0.00	0.00	0.10	0.14	0.13	0.01	0.24	0.06	0.10	0.13	0.01	0.00	0.05
190	0.08	0.00	0.23	0.46	0.00	0.00	0.00	0.07	0.11	0.06	0.00	0.19	0.04	0.08	0.11	0.00	0.00	0.03
195	0.05	0.00	0.19	0.38	0.00	0.00	0.00	0.05	0.09	0.02	0.00	0.15	0.02	0.07	0.09	0.00	0.00	0.01
200	0.02	0.00	0.15	0.30	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.12	0.01	0.05	0.08	0.00	0.00	0.00
205	0.01	0.00	0.11	0.24	0.00	0.00	0.00	0.02	0.05	0.00	0.00	0.10	0.00	0.04	0.06	0.00	0.00	0.00
210	0.00	0.00	0.08	0.18	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.08	0.00	0.03	0.05	0.00	0.00	0.00
215	0.00	0.00	0.06	0.14	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.06	0.00	0.03	0.04	0.00	0.00	0.00
220	0.00	0.00	0.04	0.10	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05	0.00	0.02	0.03	0.00	0.00	0.00
225	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.01	0.03	0.00	0.00	0.00
230	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.02	0.00	0.00	0.00
235	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.00	0.00	0.00
240	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00
245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
275	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.096	0.134	24.4	4.01	12.7	2.83	6.7	87	164,729	1.93	317,756	40.0	101	316,720	2.22
B1		0.091	0.141	17.8	3.42	9.2	2.42	5.7	98	134,310	1.82	243,813	35.0	97	241,630	2.62
B2		0.092	0.115	32.5	4.38	16.9	3.09	7.3	36	90,351	1.79	161,555	40.0	42	161,041	1.70
B3		0.089	0.250	19.5	5.26	10.2	3.72	8.8	285	431,607	1.88	813,554	40.0	295	807,930	2.48
C1		0.088	0.210	14.7	3.88	7.6	2.74	6.5	247	281,797	1.91	539,141	35.0	238	535,192	3.07
D1		0.092	0.116	17.1	3.02	8.9	2.14	5.0	67	88,318	2.03	179,570	35.0	70	176,587	2.88
D2		0.083	0.230	15.8	4.30	8.2	3.04	7.2	231	282,777	2.25	634,968	35.0	252	632,818	3.24
E1		0.113	0.150	26.5	4.56	13.8	3.23	7.6	157	321,618	1.75	563,176	40.0	178	561,356	2.01
F1		0.106	0.096	32.4	3.90	16.9	2.76	6.5	49	122,440	1.81	221,916	40.0	59	221,037	1.75
F2		0.088	0.199	21.7	4.82	11.3	3.40	8.0	146	245,533	2.12	520,116	40.0	171	517,601	2.53
F3		0.091	0.088	20.1	2.86	10.5	2.02	4.8	30	46,609	2.04	95,234	35.0	33	93,473	2.56
F4		0.090	0.168	22.4	4.39	11.7	3.10	7.3	108	186,981	2.06	385,413	40.0	125	383,174	2.42
G1		0.095	0.095	24.6	3.29	12.8	2.33	5.5	38	73,072	1.94	142,048	40.0	44	140,977	2.18
G2		0.106	0.067	36.8	3.40	19.2	2.41	5.7	19	54,958	1.81	99,609	45.0	24	99,196	1.58
H1		0.107	0.078	38.6	3.80	20.1	2.69	6.3	25	75,177	1.49	111,730	45.0	28	111,424	1.33
H2		0.092	0.102	20.2	3.08	10.5	2.18	5.1	43	67,337	2.03	136,549	35.0	48	134,796	2.57
H3		0.093	0.059	18.9	2.36	9.8	1.66	3.9	15	21,816	1.99	43,454	35.0	16	42,019	2.60
H4		0.094	0.113	22.3	3.44	11.6	2.43	5.7	58	100,370	1.96	197,106	35.0	65	195,054	2.34

Printouts for Storm Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.94	1.68	0.52	4.22	4.78	1.15	5.37	0.48	0.27	2.45	0.53	1.71	0.48	0.11	0.13	0.73	0.23	0.79
15	3.15	5.42	1.79	15.33	15.49	3.64	18.05	1.65	0.90	8.65	1.69	5.85	1.57	0.37	0.45	2.35	0.73	2.57
20	8.70	11.45	4.00	34.16	32.52	8.58	40.38	7.60	3.38	20.68	4.00	14.14	4.16	1.40	1.40	5.60	1.74	6.52
25	28.66	29.50	10.41	82.19	78.37	24.79	95.14	38.37	14.16	53.76	11.42	39.02	13.48	5.86	4.98	16.26	5.32	20.51
30	74.80	79.47	28.38	209.96	197.61	59.58	206.21	118.53	40.66	125.47	27.36	93.76	34.55	16.72	18.14	39.34	13.13	51.86
35	97.97	97.08	39.09	293.34	238.03	70.07	252.18	167.02	54.90	167.34	32.93	122.79	43.48	22.15	25.18	47.62	15.60	64.71
40	100.64	91.72	42.26	295.27	217.83	65.95	236.84	178.04	58.95	170.90	31.93	124.89	43.95	23.88	27.51	46.23	14.96	64.17
45	95.76	81.74	41.60	270.79	188.54	59.25	209.67	171.37	58.16	160.16	29.55	117.59	41.86	23.95	27.62	42.78	13.70	60.43
50	88.61	71.93	39.52	241.02	158.77	52.39	182.92	159.94	55.68	145.90	26.81	107.63	38.81	23.14	26.37	38.80	12.35	55.33
55	80.64	61.06	36.70	210.38	128.15	44.77	154.98	145.85	52.10	131.63	23.79	97.40	35.39	21.94	24.69	34.43	10.81	49.97
60	73.72	51.53	33.93	181.32	108.02	38.53	133.43	134.19	48.66	118.30	21.04	88.02	32.46	20.78	23.06	30.45	9.45	45.14
65	67.40	45.18	31.76	156.70	93.56	34.56	118.85	123.94	46.04	106.27	18.72	79.39	29.76	19.73	21.51	27.09	8.44	40.65
70	57.62	37.36	28.86	133.61	72.90	28.24	97.25	107.68	41.56	90.84	15.78	67.48	25.37	18.01	19.61	22.80	7.03	34.05
75	48.65	30.42	25.90	111.95	54.03	22.66	76.20	90.77	36.98	77.55	13.35	57.62	21.48	16.38	17.89	19.26	5.84	28.96
80	41.32	23.90	22.84	92.09	37.59	17.26	56.56	75.87	32.23	65.51	11.01	48.88	18.30	14.67	16.16	15.88	4.69	24.47
85	35.33	18.17	19.94	74.04	27.23	12.61	40.76	64.74	27.82	54.76	8.95	41.21	15.71	13.05	14.51	12.91	3.68	20.55
90	30.19	13.24	17.37	58.22	21.17	8.92	31.25	55.66	23.97	45.42	7.12	34.55	13.49	11.51	12.93	10.27	2.78	17.14
95	25.62	9.81	15.52	44.14	17.61	6.75	25.52	47.90	21.14	36.94	5.47	28.49	11.50	10.09	11.40	7.89	2.02	14.01
100	21.38	7.91	14.06	33.30	15.21	5.47	21.73	40.83	18.87	29.27	4.09	22.92	9.66	8.92	9.98	5.89	1.52	11.11
105	17.42	6.73	12.77	27.35	13.68	4.57	19.13	34.26	16.87	22.78	3.22	17.88	7.94	8.04	8.89	4.60	1.23	8.49
110	13.78	5.95	11.60	23.68	12.61	3.96	17.35	28.05	15.05	18.35	2.68	13.86	6.34	7.30	8.07	3.81	1.03	6.41
115	10.62	5.43	10.50	21.24	11.96	3.53	16.10	22.23	13.36	15.62	2.31	11.46	4.94	6.63	7.37	3.28	0.89	5.17
120	8.32	5.07	9.45	19.57	11.75	3.23	15.37	16.77	11.75	13.81	2.05	9.95	3.86	6.02	6.74	2.90	0.79	4.39
125	6.31	3.83	8.12	15.88	8.79	2.37	11.92	11.58	10.02	11.03	1.55	7.84	2.90	5.36	6.08	2.19	0.58	3.35
130	4.73	2.80	6.80	11.73	6.09	1.72	8.39	8.10	8.35	8.30	1.14	5.91	2.18	4.72	5.44	1.60	0.42	2.49
135	3.52	2.07	5.52	8.70	4.24	1.26	6.01	5.78	6.72	6.17	0.83	4.41	1.63	4.12	4.82	1.17	0.31	1.84
140	2.61	1.55	4.31	6.55	2.89	0.93	4.27	4.12	5.15	4.58	0.63	3.26	1.22	3.56	4.24	0.88	0.23	1.34
145	1.91	1.13	3.21	4.92	1.91	0.66	2.93	2.90	3.70	3.47	0.47	2.44	0.90	3.00	3.67	0.66	0.17	0.99
150	1.39	0.81	2.32	3.64	1.29	0.47	2.00	2.02	2.57	2.64	0.35	1.86	0.66	2.45	3.11	0.50	0.13	0.75
155	1.04	0.58	1.76	2.65	0.79	0.33	1.33	1.36	1.85	1.99	0.26	1.41	0.49	1.91	2.56	0.37	0.09	0.57
160	0.80	0.40	1.36	1.97	0.41	0.22	0.80	0.91	1.35	1.51	0.20	1.08	0.37	1.40	2.02	0.28	0.07	0.44
165	0.62	0.26	1.05	1.39	0.15	0.13	0.40	0.69	0.98	1.15	0.14	0.84	0.29	0.96	1.49	0.20	0.05	0.34
170	0.49	0.14	0.81	0.91	0.02	0.07	0.13	0.54	0.70	0.85	0.10	0.63	0.23	0.68	1.00	0.14	0.03	0.25
175	0.37	0.06	0.63	0.53	0.00	0.02	0.00	0.43	0.50	0.58	0.06	0.45	0.18	0.50	0.66	0.09	0.02	0.18
180	0.28	0.02	0.49	0.26	0.00	0.00	0.00	0.33	0.35	0.37	0.03	0.30	0.13	0.36	0.46	0.05	0.01	0.12
185	0.19	0.00	0.39	0.08	0.00	0.00	0.00	0.25	0.26	0.21	0.01	0.18	0.09	0.26	0.33	0.02	0.00	0.07
190	0.12	0.00	0.32	0.00	0.00	0.00	0.00	0.18	0.21	0.09	0.00	0.09	0.06	0.19	0.24	0.00	0.00	0.04
195	0.07	0.00	0.26	0.00	0.00	0.00	0.00	0.12	0.17	0.02	0.00	0.03	0.03	0.13	0.18	0.00	0.00	0.01
200	0.03	0.00	0.21	0.00	0.00	0.00	0.00	0.07	0.13	0.00	0.00	0.00	0.02	0.10	0.13	0.00	0.00	0.00
205	0.01	0.00	0.16	0.00	0.00	0.00	0.00	0.04	0.10	0.00	0.00	0.00	0.00	0.08	0.10	0.00	0.00	0.00
210	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.01	0.08	0.00	0.00	0.00	0.00	0.06	0.07	0.00	0.00	0.00
215	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.05	0.06	0.00	0.00	0.00
220	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.04	0.05	0.00	0.00	0.00
225	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.00	0.00
230	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00
235	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00
240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
245	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
265	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Printouts for Unit Hydrographs

flow in cfs

time in minutes	A1	B1	B2	B3	C1	D1	D2	E1	F1	F2	F3	F4	G1	G2	H1	H2	H3	H4
5	79.48	95.51	30.93	212.33	229.82	66.81	201.50	131.02	45.09	117.17	29.92	92.63	37.90	18.89	23.57	43.06	14.85	56.70
10	84.67	87.92	35.54	282.68	215.27	57.76	213.46	154.59	47.98	143.83	27.05	104.96	36.56	18.95	24.84	39.42	12.85	54.86
15	71.63	65.18	33.09	218.45	147.65	42.75	148.95	137.43	44.32	117.53	20.92	85.95	30.43	17.77	23.57	30.43	9.89	43.38
20	58.21	48.97	28.30	170.33	107.98	32.20	108.75	111.17	37.59	92.99	16.68	69.02	25.18	15.74	21.25	24.29	7.66	35.92
25	47.87	39.61	24.48	132.75	78.94	25.61	83.53	93.98	32.85	72.85	13.48	54.84	20.77	13.71	18.39	19.57	6.27	28.68
30	40.08	30.32	21.34	107.50	49.89	19.02	58.31	77.43	28.63	61.37	11.00	46.28	17.51	12.26	16.59	16.00	4.96	24.34
35	34.09	21.04	18.21	82.24	39.94	13.05	41.79	67.50	24.41	49.89	8.52	38.16	14.92	10.82	14.79	12.42	3.65	20.00
40	28.10	16.93	16.26	57.04	30.26	10.85	33.38	57.58	21.90	38.40	6.04	30.04	12.33	9.48	12.98	8.85	2.77	15.66
45	22.11	13.83	14.43	48.62	20.58	8.66	24.98	47.65	19.41	28.45	5.18	21.93	9.74	8.62	11.74	7.51	2.33	11.51
50	16.99	10.74	12.59	40.20	10.90	6.46	16.57	37.72	16.92	24.63	4.35	18.95	7.50	7.76	10.67	6.32	1.89	10.06
55	15.00	7.64	10.76	31.78	1.22	4.26	8.16	30.14	14.43	20.80	3.52	16.25	6.63	6.90	9.60	5.12	1.46	8.61
60	13.00	4.55	8.92	23.36	0.00	2.07	0.00	26.83	11.95	16.97	2.70	13.54	5.77	6.04	8.53	3.93	1.02	7.17
65	11.00	1.45	7.15	14.94		0.00		23.53	9.65	13.14	1.87	10.83	4.91	5.18	7.46	2.74	0.58	5.72
70	9.01	0.00	6.53	6.53				20.22	8.82	9.32	1.04	8.13	4.04	4.32	6.39	1.55	0.15	4.27
75	7.01		5.92	0.00				16.91	7.99	5.49	0.22	5.42	3.18	3.72	5.32	0.36	0.00	2.82
80	5.01		5.31					13.60	7.16	1.66	0.00	2.72	2.31	3.43	4.76	0.00		1.38
85	3.02		4.70					10.29	6.33	0.00		0.01	1.45	3.15	4.41			0.00
90	1.02		4.09					6.98	5.50			0.00	0.59	2.86	4.05			
95	0.00		3.47					3.67	4.67				0.00	2.57	3.69			
100			2.86					0.36	3.84					2.29	3.34			
105			2.25					0.00	3.01					2.00	2.98			
110			1.64						2.18					1.71	2.62			
115			1.03						1.35					1.43	2.27			
120			0.41						0.52					1.14	1.91			
125			0.00						0.00					0.85	1.55			
130														0.57	1.19			
135														0.28	0.84			
140														0.00	0.48			
145															0.12			
150															0.00			

Appendix C

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  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
  --------------------------------------------------------------
SWMM Pre Development 5 Year

  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ NO
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Flow Routing Method ...... KINWAVE
  Starting Date ............ 01/01/2005 00:00:00
  Ending Date .............. 01/01/2005 06:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:05:00
  Routing Time Step ........ 30.00 sec


  *************************        Volume        Volume
  Flow Routing Continuity        acre-feet      10^6 gal
  *************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         0.000         0.000
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........        12.024         3.918
  External Outflow .........        12.024         3.918
  Flooding Loss ............         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.000
  Continuity Error (%) .....        -0.002
```

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.08	0.31	6945.31	0 00:35	0.30
24	JUNCTION	0.10	0.44	6934.44	0 00:40	0.44
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.10	0.48	6911.48	0 00:35	0.48
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.11	0.48	6900.48	0 00:35	0.48
65	JUNCTION	0.17	0.69	6880.69	0 00:36	0.69
66	JUNCTION	0.24	0.89	6868.89	0 00:40	0.89
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0 00:00	0.00
73	JUNCTION	0.11	0.43	6902.43	0 00:35	0.42

80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.11	0.48	6872.48	0	00:35	0.47
85	JUNCTION	0.06	0.30	6874.30	0	00:35	0.30
PondC	JUNCTION	0.00	0.00	6956.00	0	00:00	0.00
PondA	JUNCTION	0.00	0.00	6949.00	0	00:00	0.00
PondB	JUNCTION	0.11	0.44	6911.44	0	00:41	0.43
PondE	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
PondG	JUNCTION	0.11	0.42	6900.42	0	00:36	0.42
PondH	JUNCTION	0.11	0.47	6866.47	0	00:36	0.47
PondF	JUNCTION	0.24	0.89	6866.89	0	00:41	0.88
PondD	JUNCTION	0.10	0.48	6881.48	0	00:37	0.47
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.00	0.00	6865.00	0	00:00	0.00
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
31	OUTFALL	0.00	0.00	6953.00	0	00:00	0.00
51	OUTFALL	0.00	0.00	6920.00	0	00:00	0.00
74	OUTFALL	0.00	0.00	6897.00	0	00:00	0.00
67	OUTFALL	0.00	0.00	6865.50	0	00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	13.03	13.03	0 00:35	0.304	0.304	0.000
20	JUNCTION	4.33	4.33	0 00:35	0.085	0.085	0.000
21	JUNCTION	1.66	1.66	0 00:40	0.0573	0.0573	0.000

22		JUNCTION	11.85	11.85	0	00:40	0.274	
0.274	0.000							
23		JUNCTION	0.00	5.99	0	00:35	0	
0.142	0.000							
24		JUNCTION	0.00	11.85	0	00:40	0	
0.274	0.000							
30		JUNCTION	9.95	9.95	0	00:35	0.179	
0.179	0.000							
40		JUNCTION	8.12	8.12	0	00:35	0.162	
0.162	0.000							
41		JUNCTION	22.23	22.23	0	00:40	0.522	
0.522	0.000							
42		JUNCTION	0.00	8.12	0	00:35	0	
0.162	0.000							
50		JUNCTION	32.34	32.34	0	00:35	0.593	
0.593	0.000							
60		JUNCTION	9.70	9.70	0	00:35	0.226	
0.226	0.000							
61		JUNCTION	16.46	16.46	0	00:40	0.453	
0.453	0.000							
62		JUNCTION	3.65	3.65	0	00:35	0.0858	
0.0858	0.000							
63		JUNCTION	12.98	12.98	0	00:40	0.345	
0.345	0.000							
64		JUNCTION	0.00	13.35	0	00:35	0	
0.311	0.000							
65		JUNCTION	0.00	26.04	0	00:36	0	
0.657	0.000							
66		JUNCTION	0.00	16.46	0	00:40	0	
0.453	0.000							
70		JUNCTION	5.57	5.57	0	00:35	0.135	
0.135	0.000							
71		JUNCTION	3.87	3.87	0	00:35	0.101	
0.101	0.000							
72		JUNCTION	0.00	3.87	0	00:35	0	
0.101	0.000							
73		JUNCTION	0.00	3.87	0	00:35	0	
0.101	0.000							
80		JUNCTION	1.85	1.85	0	00:35	0.0476	
0.0476	0.000							
81		JUNCTION	5.37	5.37	0	00:35	0.124	
0.124	0.000							
82		JUNCTION	1.92	1.92	0	00:35	0.0398	
0.0398	0.000							
83		JUNCTION	8.07	8.07	0	00:35	0.185	
0.185	0.000							
84		JUNCTION	0.00	7.22	0	00:35	0	
0.172	0.000							

85		JUNCTION	0.00	1.92	0	00:35	0
0.0398	0.000						
PondC		JUNCTION	0.00	9.95	0	00:35	0
0.179	0.000						
PondA		JUNCTION	0.00	13.03	0	00:35	0
0.304	0.000						
PondB		JUNCTION	0.00	17.56	0	00:41	0
0.416	0.000						
PondE		JUNCTION	0.00	32.34	0	00:35	0
0.593	0.000						
PondG		JUNCTION	0.00	9.42	0	00:36	0
0.236	0.000						
PondH		JUNCTION	0.00	17.11	0	00:36	0
0.397	0.000						
PondF		JUNCTION	0.00	42.32	0	00:41	0
1.11	0.000						
PondD		JUNCTION	0.00	30.00	0	00:38	0
0.685	0.000						
Outfall2		OUTFALL	0.00	17.56	0	00:41	0
0.416	0.000						
Outfall1		OUTFALL	0.00	13.03	0	00:35	0
0.304	0.000						
Outfall4		OUTFALL	0.00	17.11	0	00:36	0
0.397	0.000						
Outfall3		OUTFALL	0.00	30.00	0	00:38	0
0.685	0.000						
31		OUTFALL	0.00	9.95	0	00:35	0
0.179	0.000						
51		OUTFALL	0.00	32.34	0	00:35	0
0.593	0.000						
74		OUTFALL	0.00	9.42	0	00:36	0
0.236	0.000						
67		OUTFALL	0.00	42.32	0	00:41	0
1.11	0.000						

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	67.36	3.82	17.56	0.416
Outfall1	55.28	3.40	13.03	0.304
Outfall4	59.31	4.14	17.11	0.397
Outfall3	60.56	7.00	30.00	0.685
31	50.97	2.17	9.95	0.179
51	51.53	7.12	32.34	0.593
74	58.61	2.49	9.42	0.236
67	65.97	10.41	42.32	1.110
System	58.70	40.55	169.75	3.918

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	13.03	0	00:35			
200	DUMMY	4.33	0	00:35			
201	DUMMY	1.66	0	00:40			
202	CONDUIT	5.95	0	00:36	10.09	0.00	0.04
204	DUMMY	11.85	0	00:40			
205	CONDUIT	11.83	0	00:41	11.82	0.01	0.06
300	DUMMY	9.95	0	00:35			
400	DUMMY	8.12	0	00:35			
401	CONDUIT	8.03	0	00:37	8.38	0.02	0.10
402	DUMMY	22.23	0	00:40			
500	DUMMY	32.34	0	00:35			
601	DUMMY	16.46	0	00:40			
602	CONDUIT	16.42	0	00:41	6.99	0.07	0.18
603	DUMMY	9.70	0	00:35			
604	DUMMY	3.65	0	00:35			
605	CONDUIT	13.32	0	00:36	11.62	0.01	0.07
606	DUMMY	12.98	0	00:40			
607	CONDUIT	26.04	0	00:36	12.42	0.02	0.09
700	DUMMY	5.57	0	00:35			
701	DUMMY	3.87	0	00:35			
702	DUMMY	3.87	0	00:35			
703	CONDUIT	3.86	0	00:36	4.80	0.01	0.08
801	DUMMY	1.85	0	00:35			

802	DUMMY	5.37	0	00:35			
803	CONDUIT	7.18	0	00:36	6.34	0.01	0.07
804	DUMMY	1.92	0	00:35			
806	DUMMY	8.07	0	00:35			
805	CONDUIT	1.91	0	00:37	4.00	0.01	0.06
301	DUMMY	9.95	0	00:35			
101	DUMMY	13.03	0	00:35			
206	DUMMY	17.56	0	00:41			
501	DUMMY	32.34	0	00:35			
704	DUMMY	9.42	0	00:36			
807	DUMMY	17.11	0	00:36			
608	DUMMY	42.32	0	00:41			
403	DUMMY	30.00	0	00:38			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Apr 10 17:42:01 2020
Analysis ended on: Fri Apr 10 17:42:01 2020
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/01/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	193.874	63.177
External Outflow	193.874	63.177
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.000	

****
Highest Flow Instability Indexes
****
Link 205 (1)
Link 206 (1)

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.08	0.31	6945.31	0 00:35	0.30
24	JUNCTION	0.13	0.58	6934.58	0 00:40	0.58
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.10	0.48	6911.48	0 00:35	0.48
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.11	0.48	6900.48	0 00:35	0.48
65	JUNCTION	0.17	0.69	6880.69	0 00:36	0.69
66	JUNCTION	0.24	0.89	6868.89	0 00:40	0.89
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0 00:00	0.00

73	JUNCTION	0.11	0.43	6902.43	0	00:35	0.42
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.11	0.48	6872.48	0	00:35	0.47
85	JUNCTION	0.06	0.30	6874.30	0	00:35	0.30
PondC	JUNCTION	0.00	0.00	6956.00	0	00:00	0.00
PondA	JUNCTION	0.00	0.00	6949.00	0	00:00	0.00
PondB	JUNCTION	0.13	0.58	6911.58	0	00:40	0.58
PondE	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
PondG	JUNCTION	0.11	0.42	6900.42	0	00:36	0.42
PondH	JUNCTION	0.11	0.47	6866.47	0	00:36	0.47
PondF	JUNCTION	0.24	0.89	6866.89	0	00:41	0.88
PondD	JUNCTION	0.10	0.48	6881.48	0	00:37	0.47
31	JUNCTION	0.00	0.00	6953.00	0	00:00	0.00
51	JUNCTION	0.00	0.00	6920.00	0	00:00	0.00
67	JUNCTION	0.00	0.00	6865.50	0	00:00	0.00
74	JUNCTION	0.00	0.00	6897.00	0	00:00	0.00
OS1	JUNCTION	0.00	0.00	6950.00	0	00:00	0.00
OS2	JUNCTION	0.00	0.00	6924.00	0	00:00	0.00
OS3	JUNCTION	0.00	0.00	6930.00	0	00:00	0.00
OS4	JUNCTION	0.00	0.00	6905.00	0	00:00	0.00
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.00	0.00	6865.00	0	00:00	0.00
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	13.03	13.03	0 00:35	0.304		

0.304	0.000						
20		JUNCTION	4.33	4.33	0	00:35	0.085
0.085	0.000						
21		JUNCTION	1.66	1.66	0	00:40	0.0573
0.0573	0.000						
22		JUNCTION	11.85	11.85	0	00:40	0.274
0.274	0.000						
23		JUNCTION	0.00	5.99	0	00:35	0
0.142	0.000						
24		JUNCTION	0.00	21.23	0	00:40	0
0.452	0.000						
30		JUNCTION	9.95	9.95	0	00:35	0.179
0.179	0.000						
40		JUNCTION	8.12	8.12	0	00:35	0.162
0.162	0.000						
41		JUNCTION	22.23	22.23	0	00:40	0.522
0.522	0.000						
42		JUNCTION	0.00	8.12	0	00:35	0
0.162	0.000						
50		JUNCTION	32.34	32.34	0	00:35	0.593
0.593	0.000						
60		JUNCTION	9.70	9.70	0	00:35	0.226
0.226	0.000						
61		JUNCTION	16.46	16.46	0	00:40	0.453
0.453	0.000						
62		JUNCTION	3.65	3.65	0	00:35	0.0858
0.0858	0.000						
63		JUNCTION	12.98	12.98	0	00:40	0.345
0.345	0.000						
64		JUNCTION	0.00	13.35	0	00:35	0
0.311	0.000						
65		JUNCTION	0.00	26.04	0	00:36	0
0.657	0.000						
66		JUNCTION	0.00	16.46	0	00:40	0
0.453	0.000						
70		JUNCTION	5.57	5.57	0	00:35	0.135
0.135	0.000						
71		JUNCTION	3.87	3.87	0	00:35	0.101
0.101	0.000						
72		JUNCTION	0.00	3.87	0	00:35	0
0.101	0.000						
73		JUNCTION	0.00	3.87	0	00:35	0
0.101	0.000						
80		JUNCTION	1.85	1.85	0	00:35	0.0476
0.0476	0.000						
81		JUNCTION	5.37	5.37	0	00:35	0.124
0.124	0.000						
82		JUNCTION	1.92	1.92	0	00:35	0.0398

0.0398	0.000						
83		JUNCTION	8.07	8.07	0	00:35	0.185
0.185	0.000						
84		JUNCTION	0.00	7.22	0	00:35	0
0.172	0.000						
85		JUNCTION	0.00	1.92	0	00:35	0
0.0398	0.000						
PondC		JUNCTION	0.00	9.95	0	00:35	0
0.179	0.000						
PondA		JUNCTION	0.00	13.03	0	00:35	0
0.304	0.000						
PondB		JUNCTION	0.00	26.96	0	00:40	0
0.594	0.000						
PondE		JUNCTION	0.00	32.34	0	00:35	0
0.593	0.000						
PondG		JUNCTION	0.00	189.42	0	00:36	0
29.3	0.000						
PondH		JUNCTION	0.00	17.11	0	00:36	0
0.397	0.000						
PondF		JUNCTION	0.00	42.32	0	00:41	0
1.11	0.000						
PondD		JUNCTION	0.00	30.00	0	00:38	0
0.685	0.000						
31		JUNCTION	0.00	9.95	0	00:35	0
0.179	0.000						
51		JUNCTION	0.00	93.34	0	00:35	0
10.4	0.000						
67		JUNCTION	0.00	231.47	0	00:40	0
30.4	0.000						
74		JUNCTION	0.00	189.42	0	00:36	0
29.3	0.000						
OS1		JUNCTION	67.00	67.00	0	00:00	10.8
10.8	0.000						
OS2		JUNCTION	59.00	59.00	0	00:00	9.53
9.53	0.000						
OS3		JUNCTION	61.00	61.00	0	00:00	9.86
9.85	0.000						
OS4		JUNCTION	180.00	180.00	0	00:00	29.1
29.1	0.000						
Outfall2		OUTFALL	0.00	85.96	0	00:40	0
10.1	0.000						
Outfall1		OUTFALL	0.00	80.03	0	00:35	0
11.1	0.000						
Outfall4		OUTFALL	0.00	341.05	0	00:36	0
41.2	0.000						
Outfall3		OUTFALL	0.00	30.00	0	00:38	0
0.685	0.000						

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	100.00	62.68	85.96	10.120
Outfall1	100.00	68.88	80.03	11.121
Outfall4	100.00	255.45	341.05	41.246
Outfall3	60.56	7.00	30.00	0.685
System	90.14	394.01	536.81	63.172

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	13.03	0	00:35			
200	DUMMY	4.33	0	00:35			
201	DUMMY	1.66	0	00:40			
202	CONDUIT	5.95	0	00:36	10.09	0.00	0.04
204	DUMMY	11.85	0	00:40			
205	CONDUIT	21.20	0	00:40	14.13	0.01	0.08
300	DUMMY	9.95	0	00:35			
400	DUMMY	8.12	0	00:35			
401	CONDUIT	8.03	0	00:37	8.38	0.02	0.10
402	DUMMY	22.23	0	00:40			
500	DUMMY	32.34	0	00:35			
601	DUMMY	16.46	0	00:40			
602	CONDUIT	16.42	0	00:41	6.99	0.07	0.18
603	DUMMY	9.70	0	00:35			

604	DUMMY	3.65	0	00:35			
605	CONDUIT	13.32	0	00:36	11.62	0.01	0.07
606	DUMMY	12.98	0	00:40			
607	CONDUIT	26.04	0	00:36	12.42	0.02	0.09
700	DUMMY	5.57	0	00:35			
701	DUMMY	3.87	0	00:35			
702	DUMMY	3.87	0	00:35			
703	CONDUIT	3.86	0	00:36	4.80	0.01	0.08
801	DUMMY	1.85	0	00:35			
802	DUMMY	5.37	0	00:35			
803	CONDUIT	7.18	0	00:36	6.34	0.01	0.07
804	DUMMY	1.92	0	00:35			
806	DUMMY	8.07	0	00:35			
805	CONDUIT	1.91	0	00:37	4.00	0.01	0.06
301	DUMMY	9.95	0	00:35			
101	DUMMY	13.03	0	00:35			
206	DUMMY	26.96	0	00:40			
501	DUMMY	32.34	0	00:35			
704	DUMMY	189.42	0	00:36			
807	DUMMY	17.11	0	00:36			
608	DUMMY	42.32	0	00:41			
403	DUMMY	30.00	0	00:38			
41	DUMMY	9.95	0	00:35			
42	DUMMY	93.34	0	00:35			
43	DUMMY	231.47	0	00:40			
44	DUMMY	189.42	0	00:36			
45	DUMMY	180.00	0	00:00			
46	DUMMY	67.00	0	00:00			
47	DUMMY	59.00	0	00:00			
48	DUMMY	61.00	0	00:00			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Sep 21 16:32:27 2020
Analysis ended on: Mon Sep 21 16:32:27 2020
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

SWMM 100 Year Pre Development

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/01/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

********** Flow Routing Continuity **********	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	82.644	26.931
External Outflow	82.609	26.919
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.043	

****
Highest Flow Instability Indexes
****
Link 608 (1)

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.04
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.21	0.59	6945.59	0 00:45	0.58
24	JUNCTION	0.36	1.43	6935.43	0 00:45	1.42
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.24	1.05	6912.05	0 00:40	1.05
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.27	1.04	6901.04	0 00:45	1.03
65	JUNCTION	0.43	1.52	6881.52	0 00:45	1.52
66	JUNCTION	0.61	2.08	6870.08	0 00:50	2.08
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0 00:00	0.00
73	JUNCTION	0.27	0.94	6902.94	0 00:45	0.94

80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.32	1.19	6873.19	0	00:45	1.18
85	JUNCTION	0.15	0.64	6874.64	0	00:40	0.64
PondC	JUNCTION	0.00	0.00	6956.00	0	00:00	0.00
PondA	JUNCTION	0.00	0.00	6949.00	0	00:00	0.00
PondB	JUNCTION	0.39	1.43	6912.43	0	00:46	1.42
PondE	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
PondG	JUNCTION	0.27	0.94	6900.94	0	00:46	0.94
PondH	JUNCTION	0.32	1.18	6867.18	0	00:46	1.18
PondF	JUNCTION	0.61	2.08	6868.08	0	00:51	2.08
PondD	JUNCTION	0.25	1.05	6882.05	0	00:42	1.05
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.00	0.00	6865.00	0	00:00	0.00
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
31	OUTFALL	0.00	0.00	6953.00	0	00:00	0.00
51	OUTFALL	0.00	0.00	6920.00	0	00:00	0.00
74	OUTFALL	0.00	0.00	6897.00	0	00:00	0.00
67	OUTFALL	0.00	0.00	6865.50	0	00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	13.03	13.03	0 00:35	0.304	0.304	0.000
20	JUNCTION	4.33	4.33	0 00:35	0.085	0.085	0.000
21	JUNCTION	20.74	20.74	0 00:50	0.794	0.794	0.000

22		JUNCTION	140.35	140.35	0	00:45	3.79	3.79
0.000								
23		JUNCTION	0.00	23.90	0	00:45	0	0.879
0.000								
24		JUNCTION	0.00	140.35	0	00:45	0	3.79
0.000								
30		JUNCTION	110.70	110.70	0	00:40	2.47	2.47
0.000								
40		JUNCTION	40.00	40.00	0	00:40	1.03	1.03
0.000								
41		JUNCTION	114.87	114.87	0	00:45	3.31	3.31
0.000								
42		JUNCTION	0.00	40.00	0	00:40	0	1.03
0.000								
50		JUNCTION	157.99	157.99	0	00:40	3.76	3.76
0.000								
60		JUNCTION	49.45	49.45	0	00:45	1.43	1.43
0.000								
61		JUNCTION	86.73	86.73	0	00:50	2.87	2.87
0.000								
62		JUNCTION	18.42	18.42	0	00:45	0.544	0.544
0.000								
63		JUNCTION	67.82	67.82	0	00:45	2.19	2.19
0.000								
64		JUNCTION	0.00	67.87	0	00:45	0	1.97
0.000								
65		JUNCTION	0.00	135.62	0	00:45	0	4.16
0.000								
66		JUNCTION	0.00	86.73	0	00:50	0	2.87
0.000								
70		JUNCTION	28.46	28.46	0	00:45	0.853	0.853
0.000								
71		JUNCTION	20.06	20.06	0	00:45	0.641	0.641
0.000								
72		JUNCTION	0.00	20.06	0	00:45	0	0.641
0.000								
73		JUNCTION	0.00	20.06	0	00:45	0	0.641
0.000								
80		JUNCTION	21.89	21.89	0	00:45	0.659	0.659
0.000								
81		JUNCTION	27.12	27.12	0	00:45	0.786	0.786
0.000								
82		JUNCTION	9.51	9.51	0	00:40	0.252	0.252
0.000								
83		JUNCTION	40.86	40.86	0	00:45	1.17	1.17
0.000								
84		JUNCTION	0.00	49.01	0	00:45	0	1.44
0.000								

85	JUNCTION	0.00	9.51	0	00:40	0	0.252	0.000
PondC	JUNCTION	0.00	110.70	0	00:40	0	2.47	0.000
PondA	JUNCTION	0.00	13.03	0	00:35	0	0.304	0.000
PondB	JUNCTION	0.00	164.21	0	00:46	0	4.66	0.000
PondE	JUNCTION	0.00	157.99	0	00:40	0	3.76	0.000
PondG	JUNCTION	0.00	48.48	0	00:45	0	1.49	0.000
PondH	JUNCTION	0.00	99.16	0	00:45	0	2.87	0.000
PondF	JUNCTION	0.00	221.11	0	00:46	0	7.02	0.000
PondD	JUNCTION	0.00	154.35	0	00:45	0	4.34	0.000
Outfall2	OUTFALL	0.00	164.21	0	00:46	0	4.66	0.000
Outfall1	OUTFALL	0.00	13.03	0	00:35	0	0.304	0.000
Outfall4	OUTFALL	0.00	99.16	0	00:45	0	2.87	0.000
Outfall3	OUTFALL	0.00	154.35	0	00:45	0	4.34	0.000
31	OUTFALL	0.00	110.70	0	00:40	0	2.47	0.000
51	OUTFALL	0.00	157.99	0	00:40	0	3.76	0.000
74	OUTFALL	0.00	48.48	0	00:45	0	1.49	0.000
67	OUTFALL	0.00	221.11	0	00:46	0	7.02	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	76.53	37.73	164.21	4.665
Outfall1	55.28	3.40	13.03	0.304
Outfall4	67.08	26.46	99.16	2.867
Outfall3	67.92	39.52	154.35	4.336
31	53.89	28.39	110.70	2.472
51	58.47	39.76	157.99	3.757
74	67.08	13.78	48.48	1.494
67	74.31	58.49	221.11	7.022
System	65.07	247.53	962.28	26.917

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	13.03	0	00:35			
200	DUMMY	4.33	0	00:35			
201	DUMMY	20.74	0	00:50			
202	CONDUIT	23.89	0	00:46	15.49	0.01	0.08
204	DUMMY	140.35	0	00:45			
205	CONDUIT	140.32	0	00:46	24.86	0.09	0.20
300	DUMMY	110.70	0	00:40			
400	DUMMY	40.00	0	00:40			
401	CONDUIT	39.84	0	00:42	13.30	0.10	0.21
402	DUMMY	114.87	0	00:45			
500	DUMMY	157.99	0	00:40			
601	DUMMY	86.73	0	00:50			
602	CONDUIT	86.65	0	00:51	11.22	0.36	0.42
603	DUMMY	49.45	0	00:45			
604	DUMMY	18.42	0	00:45			
605	CONDUIT	67.80	0	00:45	19.12	0.05	0.15
606	DUMMY	67.82	0	00:45			
607	CONDUIT	135.63	0	00:46	20.33	0.08	0.19
700	DUMMY	28.46	0	00:45			
701	DUMMY	20.06	0	00:45			
702	DUMMY	20.06	0	00:45			
703	CONDUIT	20.04	0	00:46	7.87	0.08	0.19
801	DUMMY	21.89	0	00:45			

802	DUMMY	27.12	0	00:45			
803	CONDUIT	48.96	0	00:46	11.36	0.06	0.17
804	DUMMY	9.51	0	00:40			
806	DUMMY	40.86	0	00:45			
805	CONDUIT	9.46	0	00:42	6.45	0.04	0.13
301	DUMMY	110.70	0	00:40			
101	DUMMY	13.03	0	00:35			
206	DUMMY	164.21	0	00:46			
501	DUMMY	157.99	0	00:40			
704	DUMMY	48.48	0	00:45			
807	DUMMY	99.16	0	00:45			
608	DUMMY	221.11	0	00:46			
403	DUMMY	154.35	0	00:45			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Apr 10 13:11:18 2020
Analysis ended on: Fri Apr 10 13:11:18 2020
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/01/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

********** Flow Routing Continuity **********	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	836.701	272.651
External Outflow	836.646	272.634
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.007	

****
Highest Flow Instability Indexes
****
Link 205 (1)
Link 608 (1)
Link 206 (1)

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.03
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.28	0.97	6945.97	0 00:45	0.97
24	JUNCTION	0.45	1.91	6935.91	0 00:45	1.91
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.24	1.05	6912.05	0 00:40	1.05
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.27	1.04	6901.04	0 00:45	1.03
65	JUNCTION	0.43	1.52	6881.52	0 00:45	1.52
66	JUNCTION	0.61	2.08	6870.08	0 00:50	2.08
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00

72	JUNCTION	0.00	0.00	6904.00	0	00:00	0.00
73	JUNCTION	0.27	0.94	6902.94	0	00:45	0.94
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.32	1.19	6873.19	0	00:45	1.18
85	JUNCTION	0.15	0.64	6874.64	0	00:40	0.64
PondC	JUNCTION	0.00	0.00	6956.00	0	00:00	0.00
PondA	JUNCTION	0.00	0.00	6949.00	0	00:00	0.00
PondB	JUNCTION	0.48	1.91	6912.91	0	00:45	1.90
PondE	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
PondG	JUNCTION	0.27	0.94	6900.94	0	00:46	0.94
PondH	JUNCTION	0.32	1.18	6867.18	0	00:46	1.18
PondF	JUNCTION	0.61	2.08	6868.08	0	00:51	2.08
PondD	JUNCTION	0.25	1.05	6882.05	0	00:42	1.05
31	JUNCTION	0.00	0.00	6953.00	0	00:00	0.00
51	JUNCTION	0.00	0.00	6920.00	0	00:00	0.00
67	JUNCTION	0.00	0.00	6865.50	0	00:00	0.00
74	JUNCTION	0.00	0.00	6897.00	0	00:00	0.00
OS1	JUNCTION	0.00	0.00	6950.00	0	00:00	0.00
OS2	JUNCTION	0.00	0.00	6924.00	0	00:00	0.00
OS3	JUNCTION	0.00	0.00	6930.00	0	00:00	0.00
OS4	JUNCTION	0.00	0.00	6905.00	0	00:00	0.00
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.00	0.00	6865.00	0	00:00	0.00
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent

10		JUNCTION	66.80	66.80	0	00:45	1.92	1.92
0.000								
20		JUNCTION	48.76	48.76	0	00:40	1.18	1.18
0.000								
21		JUNCTION	20.74	20.74	0	00:50	0.794	0.794
0.000								
22		JUNCTION	140.35	140.35	0	00:45	3.79	3.79
0.000								
23		JUNCTION	0.00	68.56	0	00:45	0	1.97
0.000								
24		JUNCTION	0.00	249.20	0	00:45	0	6.26
0.000								
30		JUNCTION	110.70	110.70	0	00:40	2.47	2.47
0.000								
40		JUNCTION	40.00	40.00	0	00:40	1.03	1.03
0.000								
41		JUNCTION	114.87	114.87	0	00:45	3.31	3.31
0.000								
42		JUNCTION	0.00	40.00	0	00:40	0	1.03
0.000								
50		JUNCTION	157.99	157.99	0	00:40	3.76	3.76
0.000								
60		JUNCTION	49.45	49.45	0	00:45	1.43	1.43
0.000								
61		JUNCTION	86.73	86.73	0	00:50	2.87	2.87
0.000								
62		JUNCTION	18.42	18.42	0	00:45	0.544	0.544
0.000								
63		JUNCTION	67.82	67.82	0	00:45	2.19	2.19
0.000								
64		JUNCTION	0.00	67.87	0	00:45	0	1.97
0.000								
65		JUNCTION	0.00	135.62	0	00:45	0	4.16
0.000								
66		JUNCTION	0.00	86.73	0	00:50	0	2.87
0.000								
70		JUNCTION	28.46	28.46	0	00:45	0.853	0.853
0.000								
71		JUNCTION	20.06	20.06	0	00:45	0.641	0.641
0.000								
72		JUNCTION	0.00	20.06	0	00:45	0	0.641
0.000								
73		JUNCTION	0.00	20.06	0	00:45	0	0.641
0.000								
80		JUNCTION	21.89	21.89	0	00:45	0.659	0.659
0.000								
81		JUNCTION	27.12	27.12	0	00:45	0.786	0.786
0.000								

82	JUNCTION	9.51	9.51	0	00:40	0.252	0.252	0.000
83	JUNCTION	40.86	40.86	0	00:45	1.17	1.17	0.000
84	JUNCTION	0.00	49.01	0	00:45	0	1.44	0.000
85	JUNCTION	0.00	9.51	0	00:40	0	0.252	0.000
PondC	JUNCTION	0.00	110.70	0	00:40	0	2.47	0.000
PondA	JUNCTION	0.00	66.80	0	00:45	0	1.92	0.000
PondB	JUNCTION	0.00	317.41	0	00:45	0	8.22	0.000
PondE	JUNCTION	0.00	157.99	0	00:40	0	3.76	0.000
PondG	JUNCTION	0.00	643.48	0	00:45	0	97.6	0.000
PondH	JUNCTION	0.00	99.16	0	00:45	0	2.87	0.000
PondF	JUNCTION	0.00	221.11	0	00:46	0	7.02	0.000
PondD	JUNCTION	0.00	154.35	0	00:45	0	4.34	0.000
31	JUNCTION	0.00	110.70	0	00:40	0	2.47	0.000
51	JUNCTION	0.00	374.99	0	00:40	0	38.8	0.000
67	JUNCTION	0.00	864.52	0	00:46	0	105	0.000
74	JUNCTION	0.00	643.48	0	00:45	0	97.6	0.000
OS1	JUNCTION	413.00	413.00	0	00:00	66.7	66.7	0.000
OS2	JUNCTION	280.00	280.00	0	00:00	45.2	45.2	0.000
OS3	JUNCTION	217.00	217.00	0	00:00	35.1	35	0.000
OS4	JUNCTION	595.00	595.00	0	00:00	96.1	96.1	0.000
Outfall2	OUTFALL	0.00	597.41	0	00:45	0	53.4	0.000
Outfall1	OUTFALL	0.00	479.80	0	00:45	0	68.6	0.000
Outfall4	OUTFALL	0.00	1335.77	0	00:45	0	146	0.000
Outfall3	OUTFALL	0.00	154.35	0	00:45	0	4.34	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	100.00	330.89	597.41	53.430
Outfall1	100.00	424.90	479.80	68.605
Outfall4	100.00	905.71	1335.77	146.242
Outfall3	67.92	39.52	154.35	4.336
System	91.98	1701.02	2567.34	272.613

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	66.80	0	00:45			
200	DUMMY	48.76	0	00:40			
201	DUMMY	20.74	0	00:50			
202	CONDUIT	68.51	0	00:45	21.36	0.04	0.14
204	DUMMY	140.35	0	00:45			
205	CONDUIT	248.90	0	00:45	29.30	0.16	0.27
300	DUMMY	110.70	0	00:40			
400	DUMMY	40.00	0	00:40			
401	CONDUIT	39.84	0	00:42	13.30	0.10	0.21
402	DUMMY	114.87	0	00:45			
500	DUMMY	157.99	0	00:40			
601	DUMMY	86.73	0	00:50			
602	CONDUIT	86.65	0	00:51	11.22	0.36	0.42

603	DUMMY	49.45	0	00:45			
604	DUMMY	18.42	0	00:45			
605	CONDUIT	67.80	0	00:45	19.12	0.05	0.15
606	DUMMY	67.82	0	00:45			
607	CONDUIT	135.63	0	00:46	20.33	0.08	0.19
700	DUMMY	28.46	0	00:45			
701	DUMMY	20.06	0	00:45			
702	DUMMY	20.06	0	00:45			
703	CONDUIT	20.04	0	00:46	7.87	0.08	0.19
801	DUMMY	21.89	0	00:45			
802	DUMMY	27.12	0	00:45			
803	CONDUIT	48.96	0	00:46	11.36	0.06	0.17
804	DUMMY	9.51	0	00:40			
806	DUMMY	40.86	0	00:45			
805	CONDUIT	9.46	0	00:42	6.45	0.04	0.13
301	DUMMY	110.70	0	00:40			
101	DUMMY	66.80	0	00:45			
206	DUMMY	317.41	0	00:45			
501	DUMMY	157.99	0	00:40			
704	DUMMY	643.48	0	00:45			
807	DUMMY	99.16	0	00:45			
608	DUMMY	221.11	0	00:46			
403	DUMMY	154.35	0	00:45			
41	DUMMY	110.70	0	00:40			
42	DUMMY	374.99	0	00:40			
43	DUMMY	864.52	0	00:46			
44	DUMMY	643.48	0	00:45			
45	DUMMY	595.00	0	00:00			
46	DUMMY	413.00	0	00:00			
47	DUMMY	280.00	0	00:00			
48	DUMMY	217.00	0	00:00			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Sep 21 16:37:19 2020
Analysis ended on: Mon Sep 21 16:37:19 2020
Total elapsed time: < 1 sec

SWMM 5 Year Post Development

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/02/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	39.629	12.914
External Outflow	23.957	7.807
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	15.654	5.101
Continuity Error (%)	0.045	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.01
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.04	0.75	6945.75	0 00:30	0.74
24	JUNCTION	0.21	1.17	6935.17	0 00:30	1.16
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
31	JUNCTION	0.17	0.20	6953.20	0 02:23	0.20
67	JUNCTION	0.16	0.59	6866.09	0 01:57	0.59
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.03	0.82	6911.82	0 00:30	0.81
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
51	JUNCTION	0.03	0.21	6920.21	0 01:12	0.21
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.03	0.66	6900.66	0 00:35	0.66
65	JUNCTION	0.05	1.10	6881.10	0 00:35	1.10
66	JUNCTION	0.08	1.71	6869.71	0 00:35	1.71

70	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0	00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0	00:00	0.00
73	JUNCTION	0.03	0.55	6902.55	0	00:35	0.54
74	JUNCTION	0.02	0.24	6897.24	0	01:15	0.24
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.04	0.80	6872.80	0	00:30	0.79
85	JUNCTION	0.02	0.48	6874.48	0	00:30	0.47
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.16	0.59	6865.59	0	01:57	0.59
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
PondB	STORAGE	5.89	6.37	6917.37	0	01:30	6.37
PondC	STORAGE	4.70	5.56	6961.56	0	02:23	5.56
PondA	STORAGE	4.01	4.67	6953.67	0	01:46	4.67
PondD	STORAGE	5.54	6.51	6887.51	0	02:25	6.51
PondE	STORAGE	4.04	4.77	6927.77	0	01:12	4.77
PondF	STORAGE	5.76	6.73	6872.73	0	02:02	6.73
PondG	STORAGE	0.11	1.20	6901.20	0	01:15	1.20
PondH	STORAGE	4.49	5.12	6871.12	0	02:09	5.12

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	30.72	30.72	0 00:35	0.705	0.705	0.000
20	JUNCTION	29.46	29.46	0 00:30	0.578	0.578	0.000
21	JUNCTION	12.02	12.02	0 00:35	0.376		

0.376	0.000							
22		JUNCTION	92.76	92.76	0	00:30	2.04	
2.04	0.000							
23		JUNCTION	0.00	40.92	0	00:30	0	
0.954	0.000							
24		JUNCTION	0.00	93.26	0	00:30	0	
2.96	0.000							
30		JUNCTION	77.99	77.99	0	00:30	1.38	
1.38	0.000							
31		JUNCTION	0.00	1.52	0	02:23	0	
0.925	0.000							
67		JUNCTION	0.00	23.06	0	01:57	0	
2.4	-0.000							
40		JUNCTION	24.15	24.15	0	00:30	0.438	
0.438	0.000							
41		JUNCTION	98.47	98.47	0	00:30	1.83	
1.83	0.000							
42		JUNCTION	0.00	24.15	0	00:30	0	
0.438	-0.000							
50		JUNCTION	46.88	46.88	0	00:35	0.982	
0.982	0.000							
51		JUNCTION	0.00	18.70	0	01:12	0	
0.69	0.000							
60		JUNCTION	16.28	16.28	0	00:35	0.424	
0.424	0.000							
61		JUNCTION	60.11	60.11	0	00:35	1.38	
1.38	0.000							
62		JUNCTION	11.36	11.36	0	00:30	0.234	
0.234	0.000							
63		JUNCTION	42.32	42.32	0	00:30	0.975	
0.975	0.000							
64		JUNCTION	0.00	26.88	0	00:35	0	
0.659	0.000							
65		JUNCTION	0.00	69.12	0	00:35	0	
1.63	0.000							
66		JUNCTION	0.00	60.11	0	00:35	0	
1.38	0.000							
70		JUNCTION	13.78	13.78	0	00:30	0.32	
0.32	0.000							
71		JUNCTION	6.55	6.55	0	00:35	0.191	
0.191	0.000							
72		JUNCTION	0.00	6.55	0	00:35	0	
0.191	0.000							
73		JUNCTION	0.00	6.55	0	00:35	0	
0.191	0.000							
74		JUNCTION	0.00	9.05	0	01:15	0	
0.51	-0.000							
80		JUNCTION	5.68	5.68	0	00:35	0.173	

0.173	0.000						
81		JUNCTION	16.24	16.24	0	00:30	0.333
0.333	0.000						
82		JUNCTION	5.21	5.21	0	00:30	0.1
0.1	0.000						
83		JUNCTION	20.93	20.93	0	00:30	0.453
0.453	0.000						
84		JUNCTION	0.00	21.67	0	00:30	0
0.507	0.000						
85		JUNCTION	0.00	5.21	0	00:30	0
0.1	0.000						
Outfall2		OUTFALL	0.00	34.45	0	01:30	0
2.22	0.000						
Outfall1		OUTFALL	0.00	5.43	0	01:46	0
0.441	0.000						
Outfall4		OUTFALL	0.00	35.27	0	01:51	0
3.71	0.000						
Outfall3		OUTFALL	0.00	2.52	0	02:25	0
1.43	0.000						
PondB		STORAGE	0.00	134.27	0	00:31	0
3.91	0.047						
PondC		STORAGE	0.00	77.99	0	00:30	0
1.38	0.005						
PondA		STORAGE	0.00	30.72	0	00:35	0
0.705	0.012						
PondD		STORAGE	0.00	120.96	0	00:30	0
2.27	0.003						
PondE		STORAGE	0.00	46.88	0	00:35	0
0.982	0.118						
PondF		STORAGE	0.00	129.20	0	00:35	0
3.01	0.014						
PondG		STORAGE	0.00	20.07	0	00:35	0
0.51	0.116						
PondH		STORAGE	0.00	47.25	0	00:32	0
1.06	0.001						

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average Volume	Avg Pcnt	Evap Pcnt	Exfil Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow
Storage Unit	1000 ft3	Full	Loss	Loss	1000 ft3	Full	days hr:min	CFS
PondB	241.825	30	0	0	296.729	37	0 01:30	34.45
PondC	111.256	19	0	0	174.130	30	0 02:23	1.52
PondA	53.736	15	0	0	79.797	22	0 01:46	5.43
PondD	192.634	28	0	0	287.984	41	0 02:24	2.52
PondE	56.473	16	0	0	85.437	24	0 01:11	18.70
PondF	235.289	29	0	0	351.325	44	0 02:02	16.38
PondG	2.647	0	0	0	31.290	6	0 01:15	9.05
PondH	88.617	17	0	0	127.653	25	0 02:09	4.21

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	99.64	2.76	34.45	2.223
Outfall1	99.67	0.55	5.43	0.441
Outfall4	99.67	4.61	35.27	3.709
Outfall3	99.69	1.78	2.52	1.434
System	99.67	9.70	73.13	7.806

****

Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	30.72	0	00:35			
200	DUMMY	29.46	0	00:30			
201	DUMMY	12.02	0	00:35			
202	CONDUIT	40.84	0	00:31	18.27	0.02	0.11
203	CONDUIT	1.52	0	02:24	6.34	0.00	0.05
204	DUMMY	92.76	0	00:30			
205	CONDUIT	93.43	0	00:31	22.09	0.06	0.17
300	DUMMY	77.99	0	00:30			
400	DUMMY	24.15	0	00:30			
401	CONDUIT	23.53	0	00:32	11.46	0.06	0.16
402	DUMMY	98.47	0	00:30			
500	DUMMY	46.88	0	00:35			
601	DUMMY	60.11	0	00:35			
602	CONDUIT	60.09	0	00:35	10.17	0.25	0.34
603	DUMMY	16.28	0	00:35			
604	DUMMY	11.36	0	00:30			
605	CONDUIT	26.88	0	00:35	14.61	0.02	0.09
606	DUMMY	42.32	0	00:30			
607	CONDUIT	69.12	0	00:31	16.65	0.04	0.14
700	DUMMY	13.78	0	00:30			
701	DUMMY	6.55	0	00:35			
702	DUMMY	6.55	0	00:35			
703	CONDUIT	6.54	0	00:36	5.62	0.03	0.11
801	DUMMY	5.68	0	00:35			
802	DUMMY	16.24	0	00:30			
803	CONDUIT	21.49	0	00:32	8.87	0.03	0.11
804	DUMMY	5.21	0	00:30			
806	DUMMY	20.93	0	00:30			
805	CONDUIT	5.08	0	00:32	5.42	0.02	0.09
808	CONDUIT	23.06	0	01:57	2.25	0.00	0.06
800	CONDUIT	8.95	0	01:25	2.34	0.00	0.02
600	CONDUIT	18.26	0	01:17	5.75	0.00	0.03
101	DUMMY	5.43	0	01:46			
206	DUMMY	34.45	0	01:30			
301	DUMMY	1.52	0	02:23			
501	DUMMY	18.70	0	01:12			
704	DUMMY	9.05	0	01:15			
807	DUMMY	4.21	0	02:09			
608	DUMMY	16.38	0	02:02			
403	DUMMY	2.52	0	02:25			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Apr 13 19:10:46 2020
Analysis ended on: Mon Apr 13 19:10:46 2020
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/02/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

********** Flow Routing Continuity **********	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	949.387	309.372
External Outflow	930.375	303.177
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	20.095	6.548
Continuity Error (%)	-0.114	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.04	0.75	6945.75	0 00:30	0.74
24	JUNCTION	0.21	1.17	6935.17	0 00:30	1.16
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
31	JUNCTION	0.17	0.20	6953.20	0 02:23	0.20
67	JUNCTION	1.87	1.97	6867.47	0 01:59	1.97
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.03	0.82	6911.82	0 00:30	0.81
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
51	JUNCTION	0.71	0.71	6920.71	0 00:32	0.71
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.03	0.66	6900.66	0 00:35	0.66
65	JUNCTION	0.05	1.10	6881.10	0 00:35	1.10
66	JUNCTION	0.08	1.71	6869.71	0 00:35	1.71
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00

71	JUNCTION	0.00	0.00	6908.00	0	00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0	00:00	0.00
73	JUNCTION	0.03	0.55	6902.55	0	00:35	0.54
74	JUNCTION	1.36	1.40	6898.40	0	01:15	1.40
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.04	0.80	6872.80	0	00:30	0.79
85	JUNCTION	0.02	0.48	6874.48	0	00:30	0.47
OS1	JUNCTION	0.45	0.45	6953.05	0	00:00	0.45
OS3	JUNCTION	0.71	0.71	6923.51	0	00:00	0.71
OS4	JUNCTION	1.21	1.21	6901.01	0	00:00	1.21
OS2	JUNCTION	0.42	0.42	6924.42	0	00:00	0.42
Outfall2	OUTFALL	0.42	0.42	6910.42	0	03:03	0.42
Outfall1	OUTFALL	0.45	0.45	6947.45	0	01:12	0.45
Outfall4	OUTFALL	1.87	1.97	6866.97	0	01:59	1.97
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
PondB	STORAGE	6.42	6.96	6917.96	0	02:52	6.96
PondC	STORAGE	4.70	5.56	6961.56	0	02:23	5.56
PondA	STORAGE	5.16	6.43	6955.43	0	02:35	6.43
PondD	STORAGE	5.57	6.66	6887.66	0	02:07	6.65
PondE	STORAGE	3.99	4.85	6927.85	0	01:03	4.85
PondF	STORAGE	5.76	6.72	6872.72	0	02:04	6.72
PondG	STORAGE	0.11	1.20	6901.20	0	01:15	1.20
PondH	STORAGE	4.38	5.01	6871.01	0	02:39	5.01

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	30.72	30.72	0 00:35	0.705	0.705	0.000

20	JUNCTION	29.46	29.46	0	00:30	0.578	0.578	0.000
21	JUNCTION	12.02	12.02	0	00:35	0.376	0.376	0.000
22	JUNCTION	92.76	92.76	0	00:30	2.04	2.04	0.000
23	JUNCTION	0.00	40.92	0	00:30	0	0.954	0.000
24	JUNCTION	0.00	93.26	0	00:30	0	2.96	0.000
30	JUNCTION	77.99	77.99	0	00:30	1.38	1.38	0.000
31	JUNCTION	0.00	1.52	0	02:23	0	0.925	0.000
67	JUNCTION	0.00	201.42	0	01:59	0	147	0.000
40	JUNCTION	24.15	24.15	0	00:30	0.438	0.438	0.000
41	JUNCTION	98.47	98.47	0	00:30	1.83	1.83	0.000
42	JUNCTION	0.00	24.15	0	00:30	0	0.438	-0.000
50	JUNCTION	46.88	46.88	0	00:35	0.982	0.982	0.000
51	JUNCTION	0.00	85.04	0	01:03	0	50	0.000
60	JUNCTION	16.28	16.28	0	00:35	0.424	0.424	0.000
61	JUNCTION	60.11	60.11	0	00:35	1.38	1.38	0.000
62	JUNCTION	11.36	11.36	0	00:30	0.234	0.234	0.000
63	JUNCTION	42.32	42.32	0	00:30	0.975	0.975	0.000
64	JUNCTION	0.00	26.88	0	00:35	0	0.659	0.000
65	JUNCTION	0.00	69.12	0	00:35	0	1.63	0.000
66	JUNCTION	0.00	60.11	0	00:35	0	1.38	0.000
70	JUNCTION	13.78	13.78	0	00:30	0.32	0.32	0.000
71	JUNCTION	6.55	6.55	0	00:35	0.191	0.191	0.000
72	JUNCTION	0.00	6.55	0	00:35	0	0.191	0.000
73	JUNCTION	0.00	6.55	0	00:35	0	0.191	0.000

74	JUNCTION	0.00	189.05	0	01:15	0	146	0.000
80	JUNCTION	5.68	5.68	0	00:35	0.173	0.173	0.000
81	JUNCTION	16.24	16.24	0	00:30	0.333	0.333	0.000
82	JUNCTION	5.21	5.21	0	00:30	0.1	0.1	0.000
83	JUNCTION	20.93	20.93	0	00:30	0.453	0.453	0.000
84	JUNCTION	0.00	21.67	0	00:30	0	0.507	0.000
85	JUNCTION	0.00	5.21	0	00:30	0	0.1	0.000
OS1	JUNCTION	67.00	67.00	0	00:00	54.1	54.1	0.000
OS3	JUNCTION	61.00	61.00	0	00:00	49.3	49.3	0.000
OS4	JUNCTION	180.00	180.00	0	00:00	145	145	0.000
OS2	JUNCTION	59.00	59.00	0	00:00	47.7	47.7	0.000
Outfall2	OUTFALL	0.00	61.68	0	02:52	0	49.4	0.000
Outfall1	OUTFALL	0.00	67.69	0	02:35	0	54.5	0.000
Outfall4	OUTFALL	0.00	276.10	0	01:07	0	198	0.000
Outfall3	OUTFALL	0.00	8.58	0	02:07	0	1.45	0.000
PondB	STORAGE	0.00	134.27	0	00:31	0	3.91	-0.000
PondC	STORAGE	0.00	77.99	0	00:30	0	1.38	0.005
PondA	STORAGE	0.00	30.72	0	00:35	0	0.705	0.003
PondD	STORAGE	0.00	120.96	0	00:30	0	2.27	0.003
PondE	STORAGE	0.00	46.88	0	00:35	0	0.982	0.190
PondF	STORAGE	0.00	129.20	0	00:35	0	3.01	0.010
PondG	STORAGE	0.00	20.07	0	00:35	0	0.51	0.116
PondH	STORAGE	0.00	47.25	0	00:32	0	1.06	0.003

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondB	321.956	38	0	0	389.908	46	0 02:51	2.68
PondC	111.256	19	0	0	174.130	30	0 02:23	1.52
PondA	59.417	29	0	0	88.970	44	0 02:35	0.69
PondD	184.527	30	0	0	278.950	45	0 02:07	8.58
PondE	46.471	16	0	0	72.497	25	0 01:03	24.04
PondF	238.240	29	0	0	353.902	43	0 02:03	15.59
PondG	2.647	0	0	0	31.289	6	0 01:15	9.05
PondH	86.593	14	0	0	132.766	21	0 02:39	1.11

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CFS	CFS	10^6 gal
Outfall2	99.97	61.16	61.68	49.385
Outfall1	99.97	67.44	67.69	54.456
Outfall4	99.89	245.24	276.10	197.866
Outfall3	99.69	1.80	8.58	1.447
System	99.88	375.63	407.24	303.154

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	30.72	0	00:35			
200	DUMMY	29.46	0	00:30			
201	DUMMY	12.02	0	00:35			
202	CONDUIT	40.84	0	00:31	18.27	0.02	0.11
203	CONDUIT	1.52	0	02:24	6.34	0.00	0.05
204	DUMMY	92.76	0	00:30			
205	CONDUIT	93.43	0	00:31	22.09	0.06	0.17
300	DUMMY	77.99	0	00:30			
400	DUMMY	24.15	0	00:30			
401	CONDUIT	23.53	0	00:32	11.46	0.06	0.16
402	DUMMY	98.47	0	00:30			
500	DUMMY	46.88	0	00:35			
601	DUMMY	60.11	0	00:35			
602	CONDUIT	60.09	0	00:35	10.17	0.25	0.34
603	DUMMY	16.28	0	00:35			
604	DUMMY	11.36	0	00:30			
605	CONDUIT	26.88	0	00:35	14.61	0.02	0.09
606	DUMMY	42.32	0	00:30			
607	CONDUIT	69.12	0	00:31	16.65	0.04	0.14
700	DUMMY	13.78	0	00:30			
701	DUMMY	6.55	0	00:35			
702	DUMMY	6.55	0	00:35			
703	CONDUIT	6.54	0	00:36	5.62	0.03	0.11
801	DUMMY	5.68	0	00:35			
802	DUMMY	16.24	0	00:30			
803	CONDUIT	21.49	0	00:32	8.87	0.03	0.11
804	DUMMY	5.21	0	00:30			
806	DUMMY	20.93	0	00:30			
805	CONDUIT	5.08	0	00:32	5.42	0.02	0.09

808	CONDUIT	201.42	0	01:59	4.47	0.03	0.20
800	CONDUIT	189.04	0	01:19	6.57	0.02	0.14
600	CONDUIT	84.88	0	01:06	9.93	0.00	0.06
EastForkTrib	CONDUIT	61.00	0	00:32	3.08	0.01	0.07
EastFork	CONDUIT	180.00	0	00:24	4.29	0.03	0.15
MainStem	CONDUIT	67.00	0	01:15	2.39	0.00	0.05
MainStemTrib	CONDUIT	59.00	0	03:06	2.28	0.00	0.04
101	DUMMY	0.69	0	02:35			
206	DUMMY	2.68	0	02:52			
301	DUMMY	1.52	0	02:23			
501	DUMMY	24.04	0	01:03			
704	DUMMY	9.05	0	01:15			
807	DUMMY	1.11	0	02:39			
608	DUMMY	15.59	0	02:04			
403	DUMMY	8.58	0	02:07			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Sep 21 16:22:13 2020
Analysis ended on: Mon Sep 21 16:22:14 2020
Total elapsed time: 00:00:01

SWMM 100 Year Post Development

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/02/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

**********	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	123.320	40.186
External Outflow	105.086	34.244
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	18.084	5.893
Continuity Error (%)	0.122	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 30.00 sec
Average Time Step : 30.00 sec
Maximum Time Step : 30.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.02
Percent Not Converging : 0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.06	1.35	6946.35	0 00:35	1.34
24	JUNCTION	0.27	2.22	6936.22	0 00:51	2.22
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
31	JUNCTION	0.24	1.68	6954.68	0 00:59	1.68
67	JUNCTION	0.24	2.30	6867.80	0 01:13	2.30
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.05	1.40	6912.40	0 00:35	1.38
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
51	JUNCTION	0.04	0.74	6920.74	0 00:49	0.74
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.06	1.19	6901.19	0 00:40	1.19
65	JUNCTION	0.09	1.92	6881.92	0 00:40	1.92

66	JUNCTION	0.13	3.12	6871.12	0	00:40	3.12
70	JUNCTION	0.00	0.00	6923.00	0	00:00	0.00
71	JUNCTION	0.00	0.00	6908.00	0	00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0	00:00	0.00
73	JUNCTION	0.06	1.02	6903.02	0	00:45	1.02
74	JUNCTION	0.05	0.60	6897.60	0	01:12	0.60
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.07	1.45	6873.45	0	00:40	1.45
85	JUNCTION	0.03	0.82	6874.82	0	00:35	0.81
Outfall2	OUTFALL	0.00	0.00	6910.00	0	00:00	0.00
Outfall1	OUTFALL	0.00	0.00	6947.00	0	00:00	0.00
Outfall4	OUTFALL	0.24	2.30	6867.30	0	01:13	2.30
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
PondB	STORAGE	6.72	9.85	6920.85	0	01:16	9.85
PondC	STORAGE	5.17	7.08	6963.08	0	00:59	7.08
PondA	STORAGE	5.81	8.60	6957.60	0	01:13	8.59
PondD	STORAGE	5.66	8.08	6889.08	0	01:04	8.08
PondE	STORAGE	4.04	5.84	6928.84	0	00:49	5.84
PondF	STORAGE	5.86	8.17	6874.17	0	01:09	8.17
PondG	STORAGE	0.20	2.69	6902.69	0	01:12	2.68
PondH	STORAGE	4.95	6.51	6872.51	0	01:12	6.51

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	100.64	100.64	0 00:40	2.37	2.37	0.000
20	JUNCTION	97.08	97.08	0 00:35	1.81	1.81	0.000

21		JUNCTION	42.26	42.26	0	00:40	1.2	1.2	0.000
22		JUNCTION	295.27	295.27	0	00:40	6.04	6.04	0.000
23		JUNCTION	0.00	136.17	0	00:35	0	3.01	0.000
24		JUNCTION	0.00	334.84	0	00:51	0	9.43	-0.000
30		JUNCTION	238.03	238.03	0	00:35	4	4	0.000
31		JUNCTION	0.00	115.75	0	00:59	0	3.39	0.000
67		JUNCTION	0.00	270.41	0	01:13	0	9.72	-0.000
40		JUNCTION	70.07	70.07	0	00:35	1.32	1.32	0.000
41		JUNCTION	252.18	252.18	0	00:35	4.73	4.73	0.000
42		JUNCTION	0.00	70.07	0	00:35	0	1.32	0.000
50		JUNCTION	178.04	178.04	0	00:40	4.2	4.2	0.000
51		JUNCTION	0.00	164.75	0	00:49	0	3.95	0.000
60		JUNCTION	58.95	58.95	0	00:40	1.65	1.65	0.000
61		JUNCTION	170.90	170.90	0	00:40	3.87	3.87	0.000
62		JUNCTION	32.93	32.93	0	00:35	0.699	0.699	0.000
63		JUNCTION	124.89	124.89	0	00:40	2.87	2.87	0.000
64		JUNCTION	0.00	90.88	0	00:40	0	2.35	0.000
65		JUNCTION	0.00	215.63	0	00:40	0	5.22	0.000
66		JUNCTION	0.00	170.90	0	00:40	0	3.87	0.000
70		JUNCTION	43.95	43.95	0	00:40	1.05	1.05	0.000
71		JUNCTION	23.95	23.95	0	00:45	0.742	0.742	0.000
72		JUNCTION	0.00	23.95	0	00:45	0	0.742	0.000
73		JUNCTION	0.00	23.95	0	00:45	0	0.742	0.000
74		JUNCTION	0.00	42.13	0	01:12	0	1.79	-0.000

80	JUNCTION	27.62	27.62	0	00:45	0.833	0.833	0.000
81	JUNCTION	47.62	47.62	0	00:35	1.01	1.01	0.000
82	JUNCTION	15.60	15.60	0	00:35	0.314	0.314	0.000
83	JUNCTION	64.71	64.71	0	00:35	1.46	1.46	0.000
84	JUNCTION	0.00	73.73	0	00:40	0	1.84	0.000
85	JUNCTION	0.00	15.60	0	00:35	0	0.314	0.000
Outfall2	OUTFALL	0.00	256.11	0	01:16	0	10.3	0.000
Outfall1	OUTFALL	0.00	53.95	0	01:13	0	2.03	0.000
Outfall4	OUTFALL	0.00	478.86	0	01:05	0	16.7	0.000
Outfall3	OUTFALL	0.00	160.70	0	01:04	0	5.21	0.000
PondB	STORAGE	0.00	447.00	0	00:49	0	12.4	0.062
PondC	STORAGE	0.00	238.03	0	00:35	0	4	0.130
PondA	STORAGE	0.00	100.64	0	00:40	0	2.37	0.096
PondD	STORAGE	0.00	320.21	0	00:35	0	6.05	0.105
PondE	STORAGE	0.00	178.04	0	00:40	0	4.2	0.178
PondF	STORAGE	0.00	385.87	0	00:41	0	9.08	0.109
PondG	STORAGE	0.00	67.73	0	00:40	0	1.8	0.079
PondH	STORAGE	0.00	153.03	0	00:38	0	3.61	0.143

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt		Occurrence	Outflow
Storage Unit	1000 ft3	Full	Loss	Loss	1000 ft3	Full	days hr:min	CFS
PondB	363.135	43	0	0	827.701	97	0 01:15	256.11
PondC	146.763	26	0	0	299.338	52	0 00:58	115.75
PondA	75.030	37	0	0	152.554	76	0 01:12	53.95
PondD	192.591	31	0	0	418.291	67	0 01:04	160.70
PondE	48.028	17	0	0	106.230	37	0 00:48	164.75
PondF	250.108	31	0	0	549.589	67	0 01:09	229.20
PondG	5.811	1	0	0	88.594	16	0 01:11	42.13
PondH	131.315	21	0	0	268.983	42	0 01:12	80.17

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Outfall2	99.64	12.77	256.11	10.280
Outfall1	99.69	2.53	53.95	2.035
Outfall4	99.67	20.76	478.86	16.717
Outfall3	99.69	6.47	160.70	5.209
System	99.67	42.53	924.48	34.241

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	100.64	0	00:40			
200	DUMMY	97.08	0	00:35			
201	DUMMY	42.26	0	00:40			
202	CONDUIT	136.36	0	00:36	26.17	0.08	0.19
203	CONDUIT	115.74	0	00:59	23.03	0.37	0.42
204	DUMMY	295.27	0	00:40			
205	CONDUIT	334.86	0	00:51	31.89	0.22	0.32
300	DUMMY	238.03	0	00:35			
400	DUMMY	70.07	0	00:35			
401	CONDUIT	69.37	0	00:36	15.63	0.17	0.28
402	DUMMY	252.18	0	00:35			
500	DUMMY	178.04	0	00:40			
601	DUMMY	170.90	0	00:40			
602	CONDUIT	170.58	0	00:41	13.26	0.71	0.62
603	DUMMY	58.95	0	00:40			
604	DUMMY	32.93	0	00:35			
605	CONDUIT	90.74	0	00:41	20.83	0.06	0.17
606	DUMMY	124.89	0	00:40			
607	CONDUIT	215.42	0	00:40	23.26	0.13	0.24
700	DUMMY	43.95	0	00:40			
701	DUMMY	23.95	0	00:45			
702	DUMMY	23.95	0	00:45			
703	CONDUIT	23.94	0	00:45	8.29	0.09	0.20
801	DUMMY	27.62	0	00:45			
802	DUMMY	47.62	0	00:35			
803	CONDUIT	73.66	0	00:40	12.80	0.09	0.21
804	DUMMY	15.60	0	00:35			
806	DUMMY	64.71	0	00:35			
805	CONDUIT	15.43	0	00:37	7.47	0.06	0.16
808	CONDUIT	270.40	0	01:13	4.87	0.04	0.23
800	CONDUIT	41.98	0	01:17	4.06	0.00	0.06
600	CONDUIT	164.38	0	00:51	12.48	0.01	0.09
101	DUMMY	53.95	0	01:13			
206	DUMMY	256.11	0	01:16			
301	DUMMY	115.75	0	00:59			
501	DUMMY	164.75	0	00:49			
704	DUMMY	42.13	0	01:12			
807	DUMMY	80.17	0	01:12			
608	DUMMY	229.20	0	01:09			

403	DUMMY	160.70	0	01:04

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Apr 13 19:00:38 2020
Analysis ended on: Mon Apr 13 19:00:38 2020
Total elapsed time: < 1 sec

SWMM 100 Year Output 9-21-20

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date 01/01/2005 00:00:00
Ending Date 01/02/2005 06:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 30.00 sec

********** Flow Routing Continuity **********	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	3854.070	1255.906
External Outflow	3828.229	1247.485
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	28.186	9.185
Continuity Error (%)	-0.061	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	30.00 sec
Average Time Step	:	30.00 sec
Maximum Time Step	:	30.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.02
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
10	JUNCTION	0.00	0.00	6975.00	0 00:00	0.00
20	JUNCTION	0.00	0.00	6982.00	0 00:00	0.00
21	JUNCTION	0.00	0.00	6953.00	0 00:00	0.00
22	JUNCTION	0.00	0.00	6936.00	0 00:00	0.00
23	JUNCTION	0.06	1.35	6946.35	0 00:35	1.34
24	JUNCTION	0.27	2.22	6936.22	0 00:51	2.22
30	JUNCTION	0.00	0.00	6985.00	0 00:00	0.00
31	JUNCTION	0.24	1.68	6954.68	0 00:59	1.68
67	JUNCTION	3.45	4.11	6869.61	0 01:12	4.11
40	JUNCTION	0.00	0.00	6918.00	0 00:00	0.00
41	JUNCTION	0.00	0.00	6888.00	0 00:00	0.00
42	JUNCTION	0.05	1.40	6912.40	0 00:35	1.38
50	JUNCTION	0.00	0.00	6945.00	0 00:00	0.00
51	JUNCTION	1.48	1.48	6921.48	0 00:21	1.48
60	JUNCTION	0.00	0.00	6942.00	0 00:00	0.00
61	JUNCTION	0.00	0.00	6893.00	0 00:00	0.00
62	JUNCTION	0.00	0.00	6908.00	0 00:00	0.00
63	JUNCTION	0.00	0.00	6882.00	0 00:00	0.00
64	JUNCTION	0.06	1.19	6901.19	0 00:40	1.19
65	JUNCTION	0.09	1.92	6881.92	0 00:40	1.92
66	JUNCTION	0.13	3.12	6871.12	0 00:40	3.12
70	JUNCTION	0.00	0.00	6923.00	0 00:00	0.00

71	JUNCTION	0.00	0.00	6908.00	0	00:00	0.00
72	JUNCTION	0.00	0.00	6904.00	0	00:00	0.00
73	JUNCTION	0.06	1.02	6903.02	0	00:45	1.02
74	JUNCTION	2.57	2.66	6899.66	0	01:12	2.66
80	JUNCTION	0.00	0.00	6890.00	0	00:00	0.00
81	JUNCTION	0.00	0.00	6896.00	0	00:00	0.00
82	JUNCTION	0.00	0.00	6886.00	0	00:00	0.00
83	JUNCTION	0.00	0.00	6878.00	0	00:00	0.00
84	JUNCTION	0.07	1.45	6873.45	0	00:40	1.45
85	JUNCTION	0.03	0.82	6874.82	0	00:35	0.81
OS1	JUNCTION	1.33	1.33	6953.93	0	00:00	1.33
OS3	JUNCTION	1.48	1.48	6924.28	0	00:00	1.48
OS4	JUNCTION	2.38	2.38	6902.18	0	00:00	2.38
OS2	JUNCTION	1.06	1.06	6925.06	0	00:00	1.06
Outfall2	OUTFALL	1.06	1.06	6911.06	0	01:47	1.06
Outfall1	OUTFALL	1.33	1.33	6948.33	0	00:39	1.33
Outfall4	OUTFALL	3.45	4.11	6869.11	0	01:12	4.11
Outfall3	OUTFALL	0.00	0.00	6880.00	0	00:00	0.00
PondB	STORAGE	6.72	9.85	6920.85	0	01:16	9.85
PondC	STORAGE	5.17	7.08	6963.08	0	00:59	7.08
PondA	STORAGE	5.81	8.60	6957.60	0	01:13	8.59
PondD	STORAGE	5.66	8.08	6889.08	0	01:04	8.08
PondE	STORAGE	4.04	5.84	6928.84	0	00:49	5.84
PondF	STORAGE	5.86	8.17	6874.17	0	01:09	8.17
PondG	STORAGE	0.20	2.69	6902.69	0	01:12	2.68
PondH	STORAGE	4.95	6.51	6872.51	0	01:12	6.51

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
10	JUNCTION	100.64	100.64	0 00:40	2.37	2.37	0.000

20		JUNCTION	97.08	97.08	0	00:35	1.81	1.81	0.000
21		JUNCTION	42.26	42.26	0	00:40	1.2	1.2	0.000
22		JUNCTION	295.27	295.27	0	00:40	6.04	6.04	0.000
23		JUNCTION	0.00	136.17	0	00:35	0	3.01	0.000
24		JUNCTION	0.00	334.84	0	00:51	0	9.43	-0.000
30		JUNCTION	238.03	238.03	0	00:35	4	4	0.000
31		JUNCTION	0.00	115.75	0	00:59	0	3.39	0.000
67		JUNCTION	0.00	865.98	0	01:12	0	489	0.000
40		JUNCTION	70.07	70.07	0	00:35	1.32	1.32	0.000
41		JUNCTION	252.18	252.18	0	00:35	4.73	4.73	0.000
42		JUNCTION	0.00	70.07	0	00:35	0	1.32	0.000
50		JUNCTION	178.04	178.04	0	00:40	4.2	4.2	0.000
51		JUNCTION	0.00	381.75	0	00:49	0	179	0.000
60		JUNCTION	58.95	58.95	0	00:40	1.65	1.65	0.000
61		JUNCTION	170.90	170.90	0	00:40	3.87	3.87	0.000
62		JUNCTION	32.93	32.93	0	00:35	0.699	0.699	0.000
63		JUNCTION	124.89	124.89	0	00:40	2.87	2.87	0.000
64		JUNCTION	0.00	90.88	0	00:40	0	2.35	0.000
65		JUNCTION	0.00	215.63	0	00:40	0	5.22	0.000
66		JUNCTION	0.00	170.90	0	00:40	0	3.87	0.000
70		JUNCTION	43.95	43.95	0	00:40	1.05	1.05	0.000
71		JUNCTION	23.95	23.95	0	00:45	0.742	0.742	0.000
72		JUNCTION	0.00	23.95	0	00:45	0	0.742	0.000
73		JUNCTION	0.00	23.95	0	00:45	0	0.742	0.000

74	JUNCTION	0.00	637.13	0	01:12	0	482 0.000
80	JUNCTION	27.62	27.62	0	00:45	0.833	0.833 0.000
81	JUNCTION	47.62	47.62	0	00:35	1.01	1.01 0.000
82	JUNCTION	15.60	15.60	0	00:35	0.314	0.314 0.000
83	JUNCTION	64.71	64.71	0	00:35	1.46	1.46 0.000
84	JUNCTION	0.00	73.73	0	00:40	0	1.84 0.000
85	JUNCTION	0.00	15.60	0	00:35	0	0.314 0.000
OS1	JUNCTION	413.00	413.00	0	00:00	334	334 0.000
OS3	JUNCTION	217.00	217.00	0	00:00	175	175 -0.000
OS4	JUNCTION	595.00	595.00	0	00:00	481	481 0.000
OS2	JUNCTION	280.00	280.00	0	00:00	226	226 0.000
Outfall2	OUTFALL	0.00	536.11	0	01:16	0	236 0.000
Outfall1	OUTFALL	0.00	466.95	0	01:13	0	335 0.000
Outfall4	OUTFALL	0.00	1291.25	0	01:05	0	671 0.000
Outfall3	OUTFALL	0.00	160.70	0	01:04	0	5.21 0.000
PondB	STORAGE	0.00	447.00	0	00:49	0	12.4 0.062
PondC	STORAGE	0.00	238.03	0	00:35	0	4 0.130
PondA	STORAGE	0.00	100.64	0	00:40	0	2.37 0.096
PondD	STORAGE	0.00	320.21	0	00:35	0	6.05 0.105
PondE	STORAGE	0.00	178.04	0	00:40	0	4.2 0.178
PondF	STORAGE	0.00	385.87	0	00:41	0	9.08 0.109
PondG	STORAGE	0.00	67.73	0	00:40	0	1.8 0.079
PondH	STORAGE	0.00	153.03	0	00:38	0	3.61 0.143

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondB	363.135	43	0	0	827.701	97	0 01:15	256.11
PondC	146.763	26	0	0	299.338	52	0 00:58	115.75
PondA	75.030	37	0	0	152.554	76	0 01:12	53.95
PondD	192.591	31	0	0	418.291	67	0 01:04	160.70
PondE	48.028	17	0	0	106.230	37	0 00:48	164.75
PondF	250.108	31	0	0	549.589	67	0 01:09	229.20
PondG	5.811	1	0	0	88.594	16	0 01:11	42.13
PondH	131.315	21	0	0	268.983	42	0 01:12	80.17

****
Outfall Loading Summary
****

	Flow Freq	Avg Flow	Max Flow	Total Volume

Outfall Node	Pcnt	CFS	CFS	10^6 gal
Outfall2	99.97	292.00	536.11	235.796
Outfall1	99.97	415.18	466.95	335.258
Outfall4	99.92	831.58	1291.25	671.130
Outfall3	99.69	6.47	160.70	5.209
System	99.89	1545.23	2428.13	1247.393

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
100	DUMMY	100.64	0	00:40			
200	DUMMY	97.08	0	00:35			
201	DUMMY	42.26	0	00:40			
202	CONDUIT	136.36	0	00:36	26.17	0.08	0.19
203	CONDUIT	115.74	0	00:59	23.03	0.37	0.42
204	DUMMY	295.27	0	00:40			
205	CONDUIT	334.86	0	00:51	31.89	0.22	0.32
300	DUMMY	238.03	0	00:35			
400	DUMMY	70.07	0	00:35			
401	CONDUIT	69.37	0	00:36	15.63	0.17	0.28
402	DUMMY	252.18	0	00:35			
500	DUMMY	178.04	0	00:40			
601	DUMMY	170.90	0	00:40			
602	CONDUIT	170.58	0	00:41	13.26	0.71	0.62
603	DUMMY	58.95	0	00:40			
604	DUMMY	32.93	0	00:35			
605	CONDUIT	90.74	0	00:41	20.83	0.06	0.17
606	DUMMY	124.89	0	00:40			
607	CONDUIT	215.42	0	00:40	23.26	0.13	0.24
700	DUMMY	43.95	0	00:40			
701	DUMMY	23.95	0	00:45			
702	DUMMY	23.95	0	00:45			
703	CONDUIT	23.94	0	00:45	8.29	0.09	0.20
801	DUMMY	27.62	0	00:45			
802	DUMMY	47.62	0	00:35			
803	CONDUIT	73.66	0	00:40	12.80	0.09	0.21
804	DUMMY	15.60	0	00:35			
806	DUMMY	64.71	0	00:35			
805	CONDUIT	15.43	0	00:37	7.47	0.06	0.16

808	CONDUIT	865.97	0	01:12	6.70	0.14	0.41
800	CONDUIT	637.10	0	01:15	9.35	0.06	0.27
600	CONDUIT	381.54	0	00:50	16.34	0.02	0.15
EastForkTrib	CONDUIT	217.00	0	00:21	4.75	0.02	0.15
EastFork	CONDUIT	595.00	0	00:16	6.34	0.10	0.30
MainStem	CONDUIT	413.00	0	00:40	4.75	0.03	0.13
MainStemTrib	CONDUIT	280.00	0	01:49	4.12	0.02	0.11
101	DUMMY	53.95	0	01:13			
206	DUMMY	256.11	0	01:16			
301	DUMMY	115.75	0	00:59			
501	DUMMY	164.75	0	00:49			
704	DUMMY	42.13	0	01:12			
807	DUMMY	80.17	0	01:12			
608	DUMMY	229.20	0	01:09			
403	DUMMY	160.70	0	01:04			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Sep 21 16:06:21 2020
Analysis ended on: Mon Sep 21 16:06:21 2020
Total elapsed time: < 1 sec

Appendix D

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond A
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters		
	User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	10	10	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	0.61	0.61	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	3.40	3.40	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	2.96	2.96	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	4.50	4.50	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters		
	User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	370.3	370.3	ft
B) Width of Basin at Top of EURV, W_{PCM} =	113.6	113.6	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	4.60	4.60	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	371.1	371.1	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	114.4	114.4	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	13.03				57.08	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.32				0.84	
0:10		2.12				2.93	
0:15		6.24				8.14	
0:20		19.45				26.66	
0:25		29.43				70.19	
0:30		30.68				95.65	
0:35		28.10				100.37	
0:40		24.84				96.25	
0:45		22.05				89.32	
0:50		19.61				81.43	
0:55		17.40				74.41	
1:00		15.33				68.04	
1:05		13.43				58.60	
1:10		11.93				49.54	
1:15		10.74				42.06	
1:20		9.68				35.93	
1:25		8.69				30.71	
1:30		7.74				26.07	
1:35		6.69				21.81	
1:40		5.63				17.82	
1:45		4.64				14.14	
1:50		3.79				10.94	
1:55		3.24				8.55	
2:00		2.68				6.51	
2:05		2.16				4.89	
2:10		1.73				3.64	
2:15		1.39				2.70	
2:20		1.11				1.98	
2:25		0.88				1.45	
2:30		0.68				1.07	
2:35		0.53				0.82	
2:40		0.41				0.64	
2:45		0.32				0.50	
2:50		0.24				0.39	
2:55		0.17				0.29	
3:00		0.12				0.20	
3:05		0.08				0.13	
3:10		0.05				0.07	
3:15		0.02				0.03	
3:20		0.01				0.01	
3:25		0.00				0.00	
3:30							
3:35							
3:40							
3:45							
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5:50							
5:55							
6:00							

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 2 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond A
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

	Input Parameters User Input	Input Parameters COS DCM	
A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)	$H_{weir\ front}$ =	4.50	4.50 ft
B) Overflow Weir Front Edge Length (inside edge of dropbox)	$L_{weir\ front}$ =	8.00	9.00 ft
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)	$S_{weir\ sides}$ =	0.00	0.00 ft / ft
D) Horizontal Length of Weir Sides (inside edge of dropbox)	Horizontal $L_{weir\ sides}$ =	8.00	5.00 ft
E) Overflow Grate Open Area % (grate open area / total grate area)	Grate Open Area =	70%	70% %
F) Debris Clogging %	Debris Clogging =	50%	50% %
G) Height of Grate Upper Edge (at back side of dropbox)	$H_{grate\ top}$ =	4.50	4.50 ft
H) Overflow Grate Slope Length (inside edge of dropbox)	Slope $L_{weir\ sides}$ =	8.00	5.00 ft
I) Overflow Grate Open Area (without debris)	Open Area $_{(No\ Clogging)}$ =	44.80	31.50 sq ft
J) Overflow Grate Open Area (with debris)	Open Area $_{(Clogged)}$ =	22.40	15.75 sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

	Input Parameters User Input	Input Parameters COS DCM	
B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)	Pipe Invert Depth =	1.50	1.50 ft
C) Outlet Pipe Diameter	Pipe Diameter =	36.00	30.00 inches
D) Restrictor Plate Height above Pipe Invert	Plate Height =	22.42	28.11 inches
E) Half-Central Angle of Restrictor Plate on Pipe	Theta =	1.82	2.63 radians
F) Outlet Orifice Area	Outlet Ao =	4.63	4.78 sq ft
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert	$Outlet_{centroid}$ =	1.06	1.22 ft
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)	Open Area Ratio =	9.68	6.59

8. Emergency Spillway (Rectangular or Trapezoidal)

	Input Parameters User Input	Input Parameters COS DCM	
A) Spillway Invert Stage (relative to Stage = 0 ft)	$H_{spillway\ invert}$ =	5.90	6.00 ft
B) Spillway Crest Length	$L_{spillway\ crest}$ =	42.00	33.00 ft
C) Spillway End Slopes (H:V)	$S_{spillway\ ends}$ =	4.00	4.00 ft / ft
D) Freeboard above Maximum Water Surface	Freeboard Depth=	1.00	1.00 ft
E) Spillway Design Flow Depth	Flow $Depth_{spillway}$ =	0.80	1.00 ft
F) Stage at Top of Freeboard	Freeboard Top Stage =	7.70	8.00 ft
G) Basin Area at Top of Freeboard	Max Basin Area =	1.27	1.29 acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.64	1.66		2.16				7.27	
Predevelopment Peak Q (cfs) =	N/A	N/A		13.0				57.1	
Peak Inflow (cfs) =	N/A	N/A		30.7				100.4	
Peak Outflow (cfs) =	0.3	0.5		4.6				56.3	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.4				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.1				1.2	
Time to Drain 97% of Volume (hr) =	39	69		73				61	
Time to Drain 99% of Volume (hr) =	41	72		77				72	
Maximum Ponding Depth (ft) =	3.40	4.50		4.70				5.90	
Area at Max Ponding Depth (ac) =	0.80	0.97		0.98				1.09	
Maximum Volume Stored (ac-ft) =	0.64	1.66		1.87				3.11	

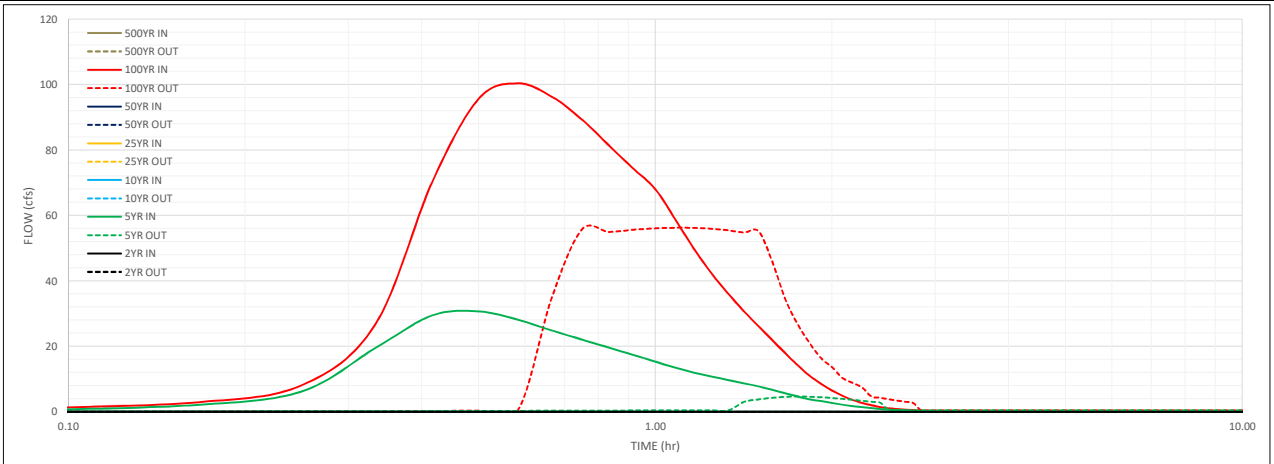
Results based on COS DCM Inputs

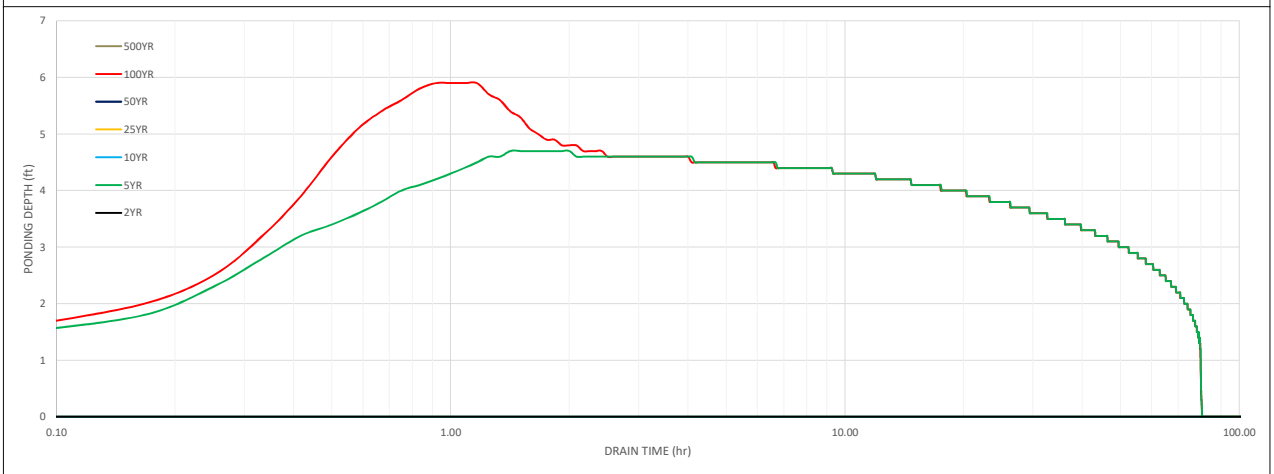
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.64	1.66		2.16				7.27	
Predevelopment Peak Q (cfs) =	N/A	N/A		13.0				57.1	
Peak Inflow (cfs) =	N/A	N/A		30.7				100.4	
Peak Outflow (cfs) =	0.3	0.5		4.3				57.5	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.3				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.2				1.8	
Time to Drain 97% of Volume (hr) =	39	69		73				61	
Time to Drain 99% of Volume (hr) =	41	72		77				72	
Maximum Ponding Depth (ft) =	3.40	4.50		4.70				5.90	
Area at Max Ponding Depth (ac) =	0.80	0.97		0.98				1.09	
Maximum Volume Stored (ac-ft) =	0.64	1.66		1.87				3.11	

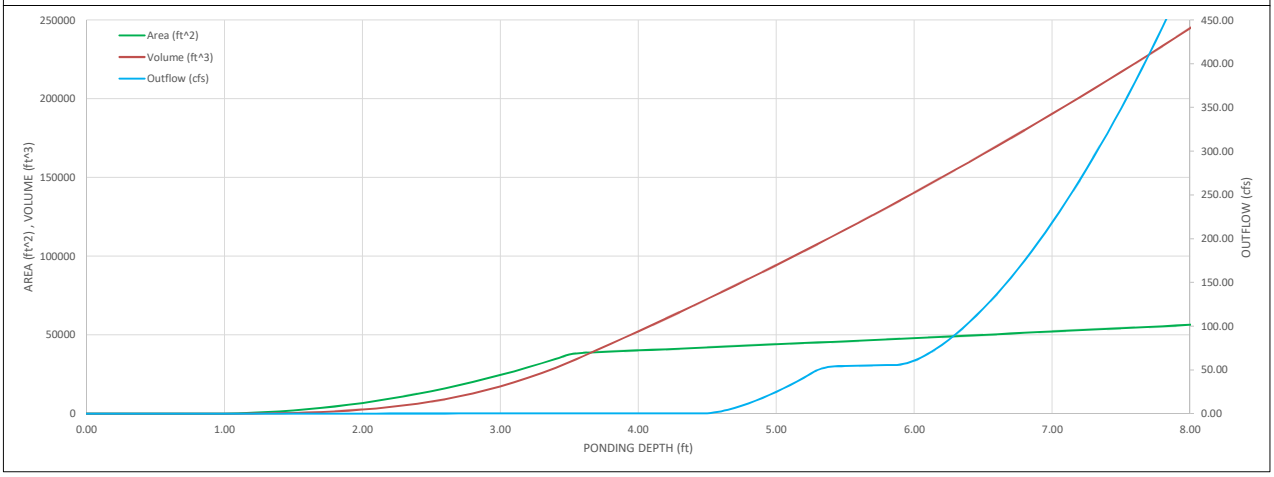
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 3 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond A
Date: April 6, 2020 — Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond B
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters: User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	14	14	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	1.49	1.49	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	4.70	4.70	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	1.49	1.49	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	6.00	6.00	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters: User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	644.7	644.7	ft
B) Width of Basin at Top of EURV, W_{PCM} =	191.2	191.2	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	6.10	6.10	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	645.5	645.5	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	192.0	192.0	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	17.56				164.21	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.69				2.08	
0:10		5.80				8.30	
0:15		16.64				20.58	
0:20		42.42				58.80	
0:25		68.16				179.82	
0:30		75.65				276.49	
0:35		71.78				307.62	
0:40		64.91				331.81	
0:45		58.24				366.22	
0:50		52.24				365.58	
0:55		47.02				346.26	
1:00		42.99				321.76	
1:05		39.68				290.00	
1:10		36.25				252.97	
1:15		32.60				216.52	
1:20		29.09				182.15	
1:25		26.07				152.09	
1:30		23.97				127.70	
1:35		22.28				109.78	
1:40		20.74				96.42	
1:45		19.35				85.46	
1:50		18.07				76.27	
1:55		16.77				68.63	
2:00		14.81				60.20	
2:05		12.66				51.42	
2:10		10.67				42.95	
2:15		8.88				35.32	
2:20		7.28				28.18	
2:25		5.90				21.64	
2:30		4.82				15.96	
2:35		4.08				11.89	
2:40		3.58				9.39	
2:45		3.19				7.53	
2:50		2.86				6.09	
2:55		2.60				4.98	
3:00		2.39				4.12	
3:05		2.22				3.47	
3:10		2.09				2.97	
3:15		1.97				2.55	
3:20		1.86				2.21	
3:25		1.77				2.08	
3:30		1.70				1.98	
3:35		1.63				1.88	
3:40		1.58				1.81	
3:45		1.54				1.75	
3:50		1.51				1.70	
3:55		1.49				1.67	
4:00		1.47				1.65	
4:05		1.46				1.64	
4:10		1.46				1.64	
4:15		1.46				1.64	
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4:35		1.45				1.63	
4:40		1.45				1.63	
4:45		1.45				1.63	
4:50		1.44				1.63	
4:55		1.44				1.63	
5:00		1.44				1.62	
5:05		1.44				1.62	
5:10		1.44				1.62	
5:15		1.43				1.62	
5:20		1.43				1.62	
5:25		1.43				1.61	
5:30		1.43				1.61	
5:35		1.43				1.61	

5:40		1.42				1.61	
5:45		1.42				1.61	
5:50		1.42				1.60	
5:55		1.42				1.60	
6:00							

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond B
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

	Input Parameters User Input	Input Parameters COS DCM	
A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)	6.00	6.00	ft
B) Overflow Weir Front Edge Length (inside edge of dropbox)	17.00	17.00	ft
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)	0.00	0.00	ft / ft
D) Horizontal Length of Weir Sides (inside edge of dropbox)	17.00	7.00	ft
E) Overflow Grate Open Area % (grate open area / total grate area)	70%	70%	%
F) Debris Clogging %	50%	50%	%
G) Height of Grate Upper Edge (at back side of dropbox)	6.00	6.00	ft
H) Overflow Grate Slope Length (inside edge of dropbox)	17.00	7.00	ft
I) Overflow Grate Open Area (without debris)	202.30	83.30	sq ft
J) Overflow Grate Open Area (with debris)	101.15	41.65	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

	Input Parameters User Input	Input Parameters COS DCM	
B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)	1.50	1.50	ft
C) Outlet Pipe Diameter	54.00	48.00	inches
D) Restrictor Plate Height above Pipe Invert	37.00	42.00	inches
E) Half-Central Angle of Restrictor Plate on Pipe	1.95	2.42	radians
F) Outlet Orifice Area	11.61	11.66	sq ft
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert	1.73	1.87	ft
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)	17.42	7.14	

8. Emergency Spillway (Rectangular or Trapezoidal)

	Input Parameters User Input	Input Parameters COS DCM	
A) Spillway Invert Stage (relative to Stage = 0 ft)	9.50	9.30	ft
B) Spillway Crest Length	136.00	122.00	ft
C) Spillway End Slopes (H:V)	4.00	4.00	ft / ft
D) Freeboard above Maximum Water Surface	1.00	1.00	ft
E) Spillway Design Flow Depth	0.90	1.00	ft
F) Stage at Top of Freeboard	11.40	11.30	ft
G) Basin Area at Top of Freeboard	3.70	3.68	acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	2.41	5.73		6.67				31.72	
Predevelopment Peak Q (cfs) =	N/A	N/A		17.6				164.2	
Peak Inflow (cfs) =	N/A	N/A		75.7				366.2	
Peak Outflow (cfs) =	1.1	1.4		1.4				166.4	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.1				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.0				0.8	
Time to Drain 97% of Volume (hr) =	40	68		76				61	
Time to Drain 99% of Volume (hr) =	42	72		80				73	
Maximum Ponding Depth (ft) =	4.70	6.00		6.10				9.10	
Area at Max Ponding Depth (ac) =	1.92	2.83		2.85				3.32	
Maximum Volume Stored (ac-ft) =	2.41	5.73		6.04				15.28	

Results based on COS DCM Inputs

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	2.41	5.73		6.67				31.72	
Predevelopment Peak Q (cfs) =	N/A	N/A		17.6				164.2	
Peak Inflow (cfs) =	N/A	N/A		75.7				366.2	
Peak Outflow (cfs) =	1.1	1.4		1.4				166.5	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.1				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.0				2.0	
Time to Drain 97% of Volume (hr) =	40	68		76				61	
Time to Drain 99% of Volume (hr) =	42	72		80				73	
Maximum Ponding Depth (ft) =	4.70	6.00		6.10				9.20	
Area at Max Ponding Depth (ac) =	1.92	2.83		2.85				3.34	
Maximum Volume Stored (ac-ft) =	2.41	5.73		6.04				15.62	

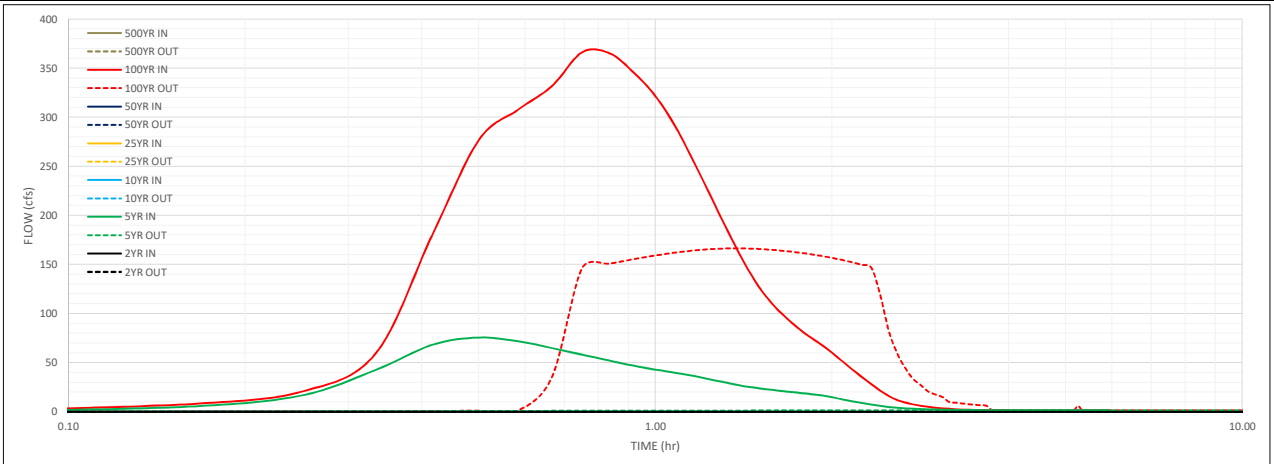
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

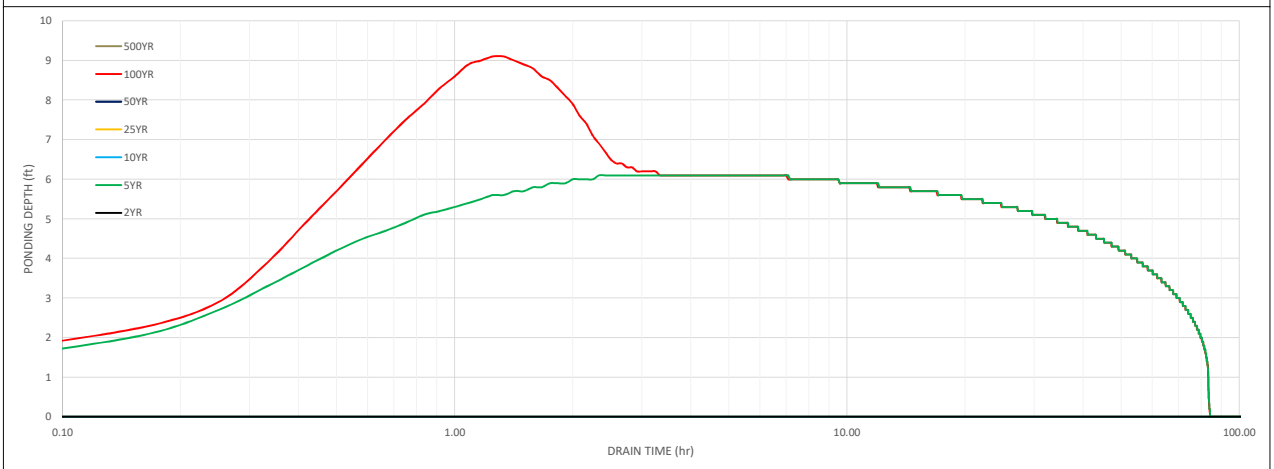
COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) **Sheet 3 of 3**

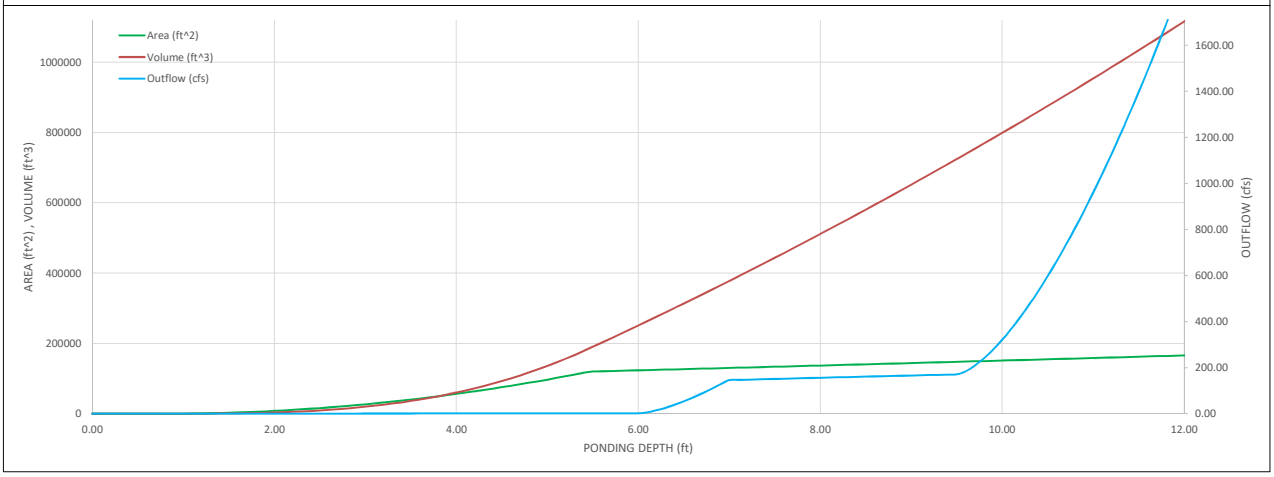
Designer: Chris McFarland

Project: Grandview Reserve Pond B

Date: April 6, 2020 Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond C
Date: April 6, 2020 — Last Edited: April 08, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

A) Average Infiltration Rate of WQCV
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface
C) Underdrain Outlet Orifice Area
D) Number of WQCV Orifice Rows
E) Vertical Spacing between WQCV Orifice Rows
F) WQCV Orifice Area (A_o) per Row
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth)
H) EURV Orifice Area (A_o) in Single Row
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth)
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s)

Input Parameters	User Input	COS DCM	
i =	N/A	N/A	in / hr
y =	N/A	N/A	inches
Underdrain Ao =	N/A	N/A	sq in
# WQCV rows =	12	12	
Orifice Spacing =	4.0	4.0	inches
WQCV Ao =	1.05	1.05	sq in
Max Stage $_{WQCV}$ =	4.00	4.00	ft
EURV Ao =	17.07	17.07	sq in
Max Stage $_{EURV}$ =	6.00	6.00	ft
Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

A) Length of Basin at Top of EURV
B) Width of Basin at Top of EURV
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge)
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge)
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge)
F) Average Side Slopes of Flood Control Surcharge above Transition Bench
   (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.)

Input Parameters	User Input	COS DCM	
L_{PCM} =	453.3	453.3	ft
W_{PCM} =	177.8	177.8	ft
Stage at Top of Bench =	6.10	6.10	ft
L_{Bench} =	454.1	454.1	ft
W_{Bench} =	178.6	178.6	ft
$Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	9.95				120.21	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		1.75				4.56	
0:10		11.33				15.20	
0:15		27.93				32.42	
0:20		61.14				76.70	
0:25		78.99				190.43	
0:30		71.29				238.04	
0:35		58.22				222.59	
0:40		47.28				193.29	
0:45		38.58				162.70	
0:50		32.22				131.89	
0:55		27.64				110.47	
1:00		23.60				95.05	
1:05		20.00				74.37	
1:10		16.49				54.92	
1:15		14.05				38.35	
1:20		12.80				27.93	
1:25		12.09				21.76	
1:30		11.62				18.07	
1:35		10.55				15.64	
1:40		9.56				14.06	
1:45		8.84				12.98	
1:50		8.33				12.35	
1:55		7.74				12.15	
2:00		5.88				9.32	
2:05		4.08				6.49	
2:10		2.79				4.48	
2:15		1.86				3.04	
2:20		1.21				1.99	
2:25		0.80				1.32	
2:30		0.49				0.80	
2:35		0.25				0.40	
2:40		0.09				0.14	
2:45		0.01				0.01	
2:50		0.00				0.00	
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3:05							
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Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond C
Date: April 6, 2020 — Last Edited: April 08, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)
B) Overflow Weir Front Edge Length (inside edge of dropbox)
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)
D) Horizontal Length of Weir Sides (inside edge of dropbox)
E) Overflow Grate Open Area % (grate open area / total grate area)
F) Debris Clogging %
G) Height of Grate Upper Edge (at back side of dropbox)
H) Overflow Grate Slope Length (inside edge of dropbox)
I) Overflow Grate Open Area (without debris)
J) Overflow Grate Open Area (with debris)

Input Parameters	User Input	COS DCM	
$H_{weir\ front}$ =	6.00	6.00	ft
$L_{weir\ front}$ =	12.00	11.00	ft
$S_{weir\ sides}$ =	0.00	0.00	ft / ft
Horizontal $L_{weir\ sides}$ =	12.00	11.00	ft
Grate Open Area =	70%	70%	%
Debris Clogging =	50%	50%	%
$H_{grate\ top}$ =	6.00	6.00	ft
Slope $L_{weir\ sides}$ =	12.00	11.00	ft
Open Area $_{(No\ Clogging)}$ =	100.80	84.70	sq ft
Open Area $_{(Clogged)}$ =	50.40	42.35	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)
C) Outlet Pipe Diameter
D) Restrictor Plate Height above Pipe Invert
E) Half-Central Angle of Restrictor Plate on Pipe
F) Outlet Orifice Area
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)

Input Parameters	User Input	COS DCM	
Pipe Invert Depth =	1.50	1.50	ft
Pipe Diameter =	48.00	42.00	inches
Plate Height =	33.13	39.36	inches
Theta =	1.96	2.63	radians
Outlet Ao =	9.25	9.37	sq ft
$Outlet_{centroid}$ =	1.54	1.71	ft
Open Area Ratio =	10.90	9.04	

8. Emergency Spillway (Rectangular or Trapezoidal)

A) Spillway Invert Stage (relative to Stage = 0 ft)
B) Spillway Crest Length
C) Spillway End Slopes (H:V)
D) Freeboard above Maximum Water Surface
E) Spillway Design Flow Depth
F) Stage at Top of Freeboard
G) Basin Area at Top of Freeboard

Input Parameters	User Input	COS DCM	
$H_{spillway\ invert}$ =	8.00	999.00	ft
$L_{spillway\ crest}$ =	79.00	42.00	ft
$S_{spillway\ ends}$ =	4.00	4.00	ft / ft
Freeboard Depth=	1.00	1.00	ft
Flow $Depth_{spillway}$ =	1.00		ft
Freeboard Top Stage =	10.00		ft
Max Basin Area =	2.34		acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.36	4.79		4.34				12.42	
Predevelopment Peak Q (cfs) =	N/A	N/A		10.0				120.2	
Peak Inflow (cfs) =	N/A	N/A		79.0				238.0	
Peak Outflow (cfs) =	0.6	1.7		1.5				119.2	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.2				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Orifice Plate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		N/A				1.2	
Time to Drain 97% of Volume (hr) =	39	67		65				63	
Time to Drain 99% of Volume (hr) =	41	72		69				72	
Maximum Ponding Depth (ft) =	4.00	6.00		5.60				7.10	
Area at Max Ponding Depth (ac) =	1.32	1.85		1.80				1.98	
Maximum Volume Stored (ac-ft) =	1.36	4.79		4.07				6.91	

Results based on COS DCM Inputs

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.36	4.79		4.34				12.42	
Predevelopment Peak Q (cfs) =	N/A	N/A		10.0				120.2	
Peak Inflow (cfs) =	N/A	N/A		79.0				238.0	
Peak Outflow (cfs) =	0.6	1.7		1.5				116.8	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.2				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Orifice Plate				Overflow Grate	
Max Velocity through Grate =	N/A	N/A		N/A				1.3	
Time to Drain 97% of Volume (hr) =	39	67		65				63	
Time to Drain 99% of Volume (hr) =	41	72		69				72	
Maximum Ponding Depth (ft) =	4.00	6.00		5.60				7.10	
Area at Max Ponding Depth (ac) =	1.32	1.85		1.80				1.98	
Maximum Volume Stored (ac-ft) =	1.36	4.79		4.07				6.91	

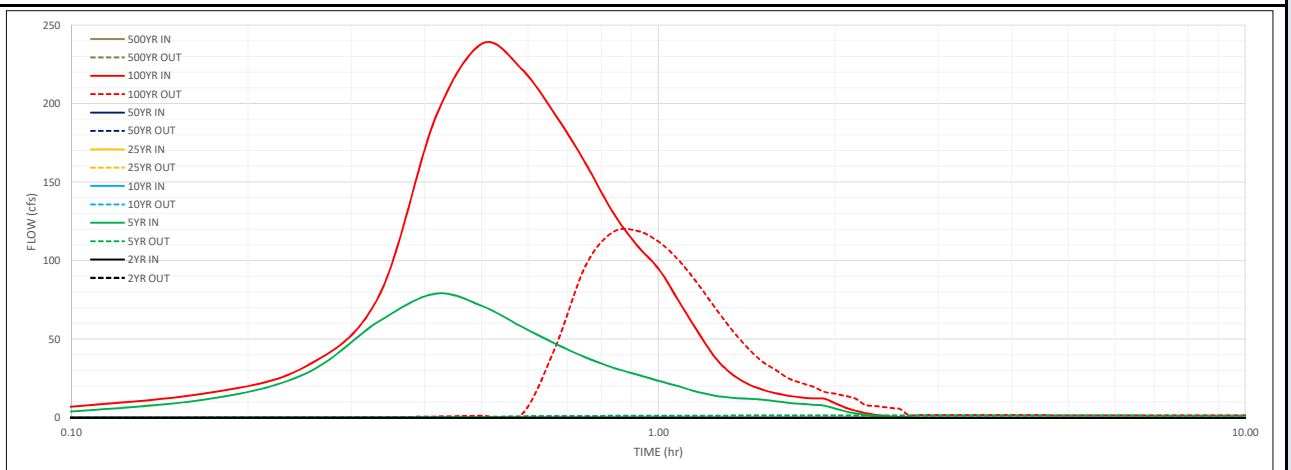
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

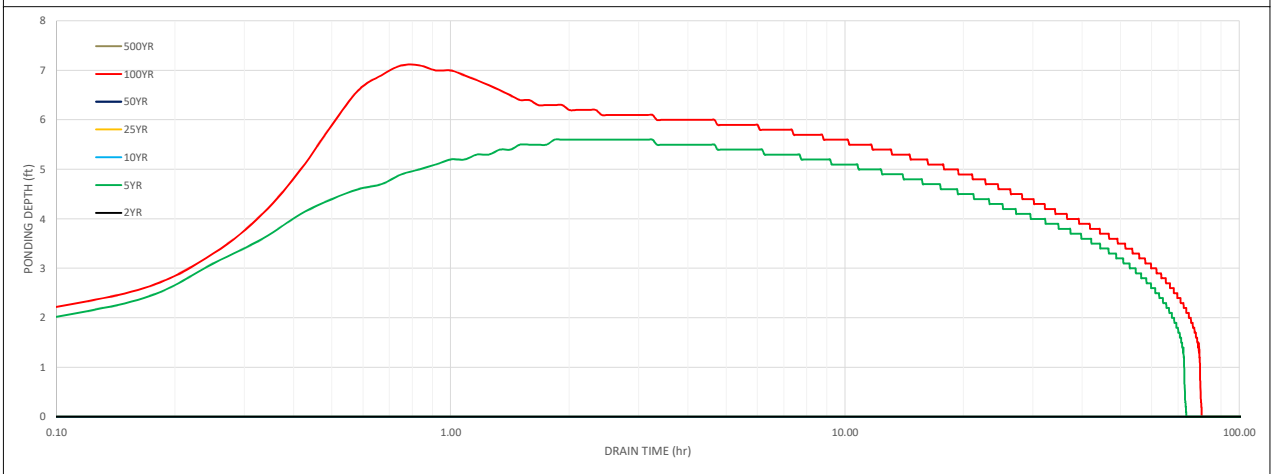
COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) **Sheet 3 of 3**

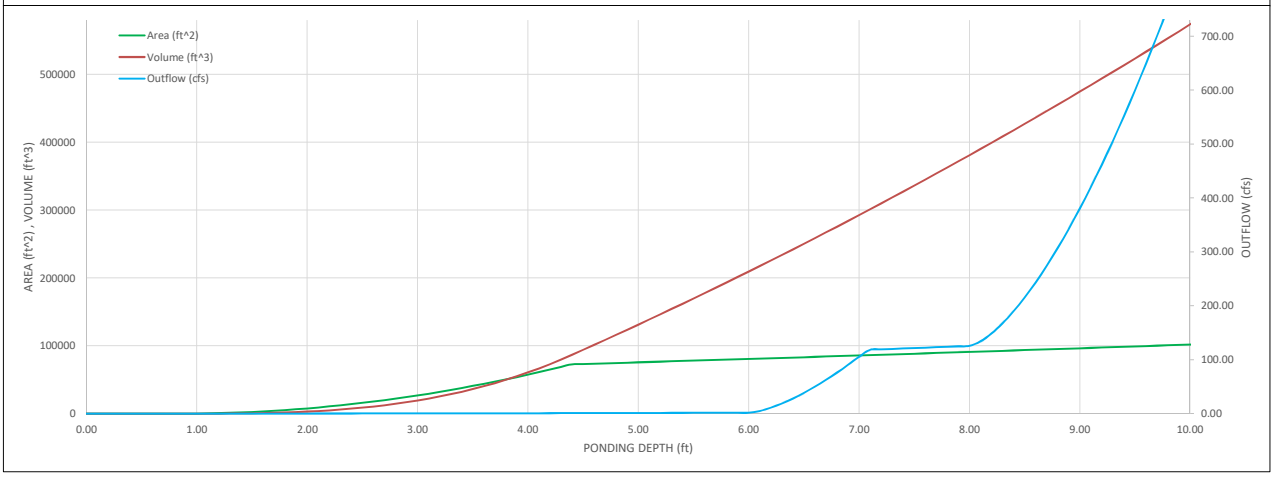
Designer: Chris McFarland

Project: Grandview Reserve Pond C

Date: April 6, 2020 Last Edited: April 08, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 1 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond D
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters		
	User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	13	13	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	1.34	1.34	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	4.50	4.50	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	20.83	20.83	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	6.50	6.50	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters		
	User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	588.5	588.5	ft
B) Width of Basin at Top of EURV, W_{PCM} =	180.1	180.1	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	6.60	6.60	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	589.3	589.3	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	180.9	180.9	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	30.00				154.35	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		1.91				5.05	
0:10		13.55				18.88	
0:15		36.44				44.44	
0:20		87.25				108.47	
0:25		118.48				244.10	
0:30		113.01				314.40	
0:35		95.70				305.49	
0:40		80.03				273.09	
0:45		67.12				239.63	
0:50		56.09				204.40	
0:55		48.05				175.96	
1:00		41.91				156.02	
1:05		36.47				129.55	
1:10		30.68				102.47	
1:15		25.11				77.55	
1:20		21.41				56.75	
1:25		19.34				42.46	
1:30		18.14				33.79	
1:35		16.52				28.16	
1:40		14.92				24.40	
1:45		13.77				21.80	
1:50		12.92				19.98	
1:55		12.02				18.83	
2:00		9.58				15.10	
2:05		6.95				10.86	
2:10		4.98				7.82	
2:15		3.53				5.61	
2:20		2.44				3.93	
2:25		1.66				2.73	
2:30		1.13				1.86	
2:35		0.72				1.18	
2:40		0.41				0.67	
2:45		0.20				0.31	
2:50		0.08				0.11	
2:55		0.04				0.05	
3:00		0.02				0.02	
3:05		0.01				0.01	
3:10		0.01				0.01	
3:15		0.00				0.00	
3:20						0.00	
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Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond D
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)
B) Overflow Weir Front Edge Length (inside edge of dropbox)
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)
D) Horizontal Length of Weir Sides (inside edge of dropbox)
E) Overflow Grate Open Area % (grate open area / total grate area)
F) Debris Clogging %
G) Height of Grate Upper Edge (at back side of dropbox)
H) Overflow Grate Slope Length (inside edge of dropbox)
I) Overflow Grate Open Area (without debris)
J) Overflow Grate Open Area (with debris)

Input Parameters	User Input	COS DCM	
$H_{weir\ front}$ =	6.50	6.50	ft
$L_{weir\ front}$ =	11.00	9.00	ft
$S_{weir\ sides}$ =	0.00	0.00	ft / ft
Horizontal $L_{weir\ sides}$ =	11.00	9.00	ft
Grate Open Area =	70%	70%	%
Debris Clogging =	50%	50%	%
$H_{grate\ top}$ =	6.50	6.50	ft
Slope $L_{weir\ sides}$ =	11.00	9.00	ft
Open Area $_{(No\ Clogging)}$ =	84.70	56.70	sq ft
Open Area $_{(Clogged)}$ =	42.35	28.35	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)
C) Outlet Pipe Diameter
D) Restrictor Plate Height above Pipe Invert
E) Half-Central Angle of Restrictor Plate on Pipe
F) Outlet Orifice Area
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)

Input Parameters	User Input	COS DCM	
Pipe Invert Depth =	1.50	1.50	ft
Pipe Diameter =	48.00	48.00	inches
Plate Height =	44.00	44.00	inches
Theta =	2.56	2.56	radians
Outlet Ao =	12.07	12.07	sq ft
$Outlet_{centroid}$ =	1.93	1.93	ft
Open Area Ratio =	7.02	4.70	

8. Emergency Spillway (Rectangular or Trapezoidal)

A) Spillway Invert Stage (relative to Stage = 0 ft)
B) Spillway Crest Length
C) Spillway End Slopes (H:V)
D) Freeboard above Maximum Water Surface
E) Spillway Design Flow Depth
F) Stage at Top of Freeboard
G) Basin Area at Top of Freeboard

Input Parameters	User Input	COS DCM	
$H_{spillway\ invert}$ =	8.00	999.00	ft
$L_{spillway\ crest}$ =	105.00	42.00	ft
$S_{spillway\ ends}$ =	4.00	4.00	ft / ft
Freeboard Depth=	1.00	1.00	ft
Flow $Depth_{spillway}$ =	1.00		ft
Freeboard Top Stage =	10.00		ft
Max Basin Area =	2.95		acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.96	6.56		6.97				18.57	
Predevelopment Peak Q (cfs) =	N/A	N/A		30.0				154.4	
Peak Inflow (cfs) =	N/A	N/A		118.5				314.4	
Peak Outflow (cfs) =	0.9	2.2		2.2				161.7	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.1				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Orifice Plate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		N/A				1.8	
Time to Drain 97% of Volume (hr) =	40	67		70				62	
Time to Drain 99% of Volume (hr) =	42	72		75				72	
Maximum Ponding Depth (ft) =	4.50	6.50		6.50				7.90	
Area at Max Ponding Depth (ac) =	1.71	2.43		2.43				2.63	
Maximum Volume Stored (ac-ft) =	1.96	6.56		6.59				10.13	

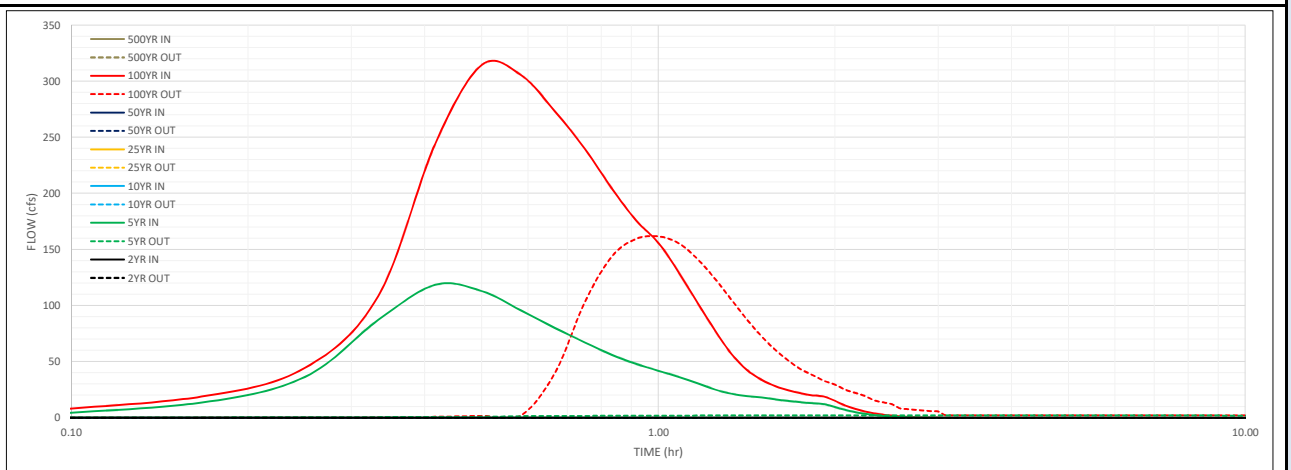
Results based on COS DCM Inputs

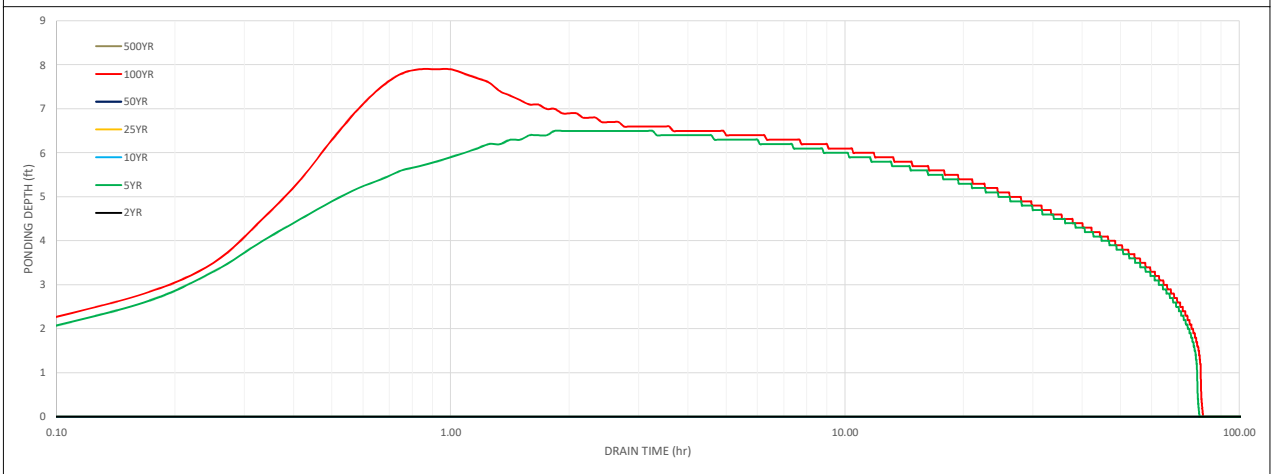
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.96	6.56		6.97				18.57	
Predevelopment Peak Q (cfs) =	N/A	N/A		30.0				154.4	
Peak Inflow (cfs) =	N/A	N/A		118.5				314.4	
Peak Outflow (cfs) =	0.9	2.2		2.2				153.1	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.1				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Orifice Plate				Overflow Grate	
Max Velocity through Grate =	N/A	N/A		N/A				2.8	
Time to Drain 97% of Volume (hr) =	40	67		70				63	
Time to Drain 99% of Volume (hr) =	42	72		75				72	
Maximum Ponding Depth (ft) =	4.50	6.50		6.50				8.10	
Area at Max Ponding Depth (ac) =	1.71	2.43		2.43				2.66	
Maximum Volume Stored (ac-ft) =	1.96	6.56		6.59				10.66	

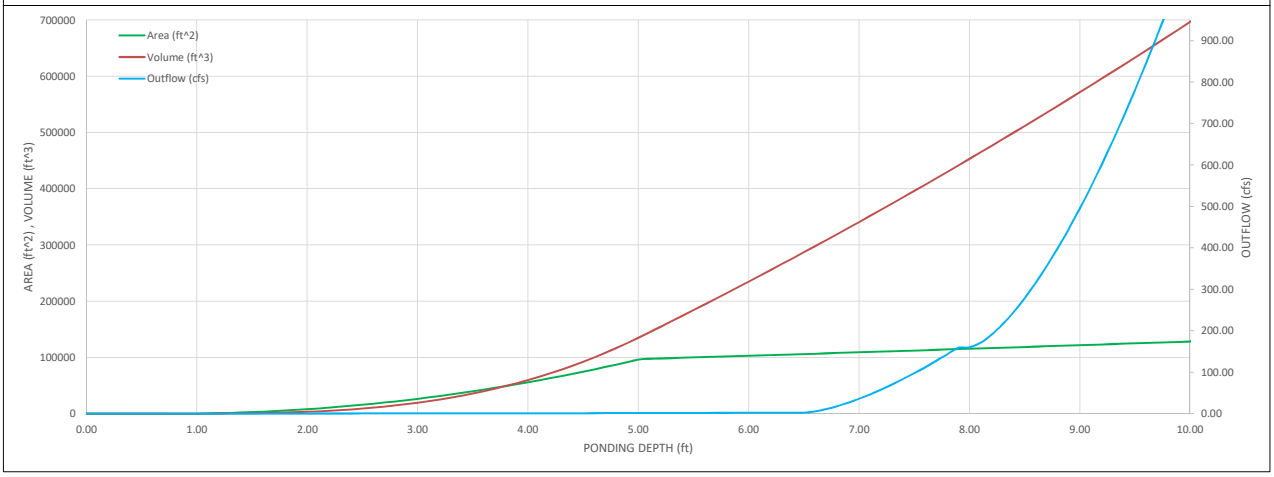
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) **Sheet 3 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond D
Date: April 6, 2020 Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond E
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters: User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	10	10	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	0.67	0.67	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	3.60	3.60	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	0.67	0.67	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	4.50	4.50	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters: User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	327.0	327.8	ft
B) Width of Basin at Top of EURV, W_{PCM} =	127.7	127.7	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	4.60	4.60	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	327.8	327.8	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	128.5	128.5	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	32.34				157.99	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.16				0.43	
0:10		1.11				1.54	
0:15		5.07				7.00	
0:20		23.64				35.29	
0:25		41.87				110.52	
0:30		46.56				162.17	
0:35		43.13				176.94	
0:40		37.83				172.03	
0:45		33.03				161.08	
0:50		29.04				147.26	
0:55		25.75				135.35	
1:00		22.65				124.96	
1:05		19.67				109.31	
1:10		16.82				92.46	
1:15		14.63				77.36	
1:20		13.01				65.86	
1:25		11.61				56.57	
1:30		10.30				48.68	
1:35		8.90				41.54	
1:40		7.47				34.92	
1:45		6.08				28.67	
1:50		4.75				22.81	
1:55		3.50				17.32	
2:00		2.49				12.10	
2:05		1.86				8.45	
2:10		1.45				6.02	
2:15		1.16				4.29	
2:20		0.92				3.03	
2:25		0.73				2.11	
2:30		0.57				1.42	
2:35		0.44				0.96	
2:40		0.34				0.71	
2:45		0.26				0.55	
2:50		0.20				0.44	
2:55		0.15				0.34	
3:00		0.11				0.26	
3:05		0.07				0.19	
3:10		0.05				0.13	
3:15		0.03				0.08	
3:20		0.02				0.04	
3:25		0.01				0.02	
3:30		0.00				0.00	
3:35		0.00				0.00	
3:40		0.00					
3:45		0.00					
3:50		0.00					
3:55		0.00					
4:00		0.00					
4:05		0.00					
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Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond E
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

	Input Parameters User Input	Input Parameters COS DCM	
A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)	$H_{weir\ front}$ =	4.50	4.50	ft
B) Overflow Weir Front Edge Length (inside edge of dropbox)	$L_{weir\ front}$ =	15.00	9.00	ft
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)	$S_{weir\ sides}$ =	0.00	0.00	ft / ft
D) Horizontal Length of Weir Sides (inside edge of dropbox)	Horizontal $L_{weir\ sides}$ =	15.00	9.00	ft
E) Overflow Grate Open Area % (grate open area / total grate area)	Grate Open Area =	70%	70%	%
F) Debris Clogging %	Debris Clogging =	50%	50%	%
G) Height of Grate Upper Edge (at back side of dropbox)	$H_{grate\ top}$ =	4.50	4.50	ft
H) Overflow Grate Slope Length (inside edge of dropbox)	Slope $L_{weir\ sides}$ =	15.00	9.00	ft
I) Overflow Grate Open Area (without debris)	Open Area $_{(No\ Clogging)}$ =	157.50	56.70	sq ft
J) Overflow Grate Open Area (with debris)	Open Area $_{(Clogged)}$ =	78.75	28.35	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction (Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

	Input Parameters User Input	Input Parameters COS DCM	
B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)	Pipe Invert Depth =	1.50	1.50	ft
C) Outlet Pipe Diameter	Pipe Diameter =	60.00	54.00	inches
D) Restrictor Plate Height above Pipe Invert	Plate Height =	43.00	50.00	inches
E) Half-Central Angle of Restrictor Plate on Pipe	Theta =	2.02	2.59	radians
F) Outlet Orifice Area	Outlet Ao =	15.06	15.37	sq ft
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert	$Outlet_{centroid}$ =	1.99	2.18	ft
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)	Open Area Ratio =	10.46	3.69	

8. Emergency Spillway (Rectangular or Trapezoidal)

	Input Parameters User Input	Input Parameters COS DCM	
A) Spillway Invert Stage (relative to Stage = 0 ft)	$H_{spillway\ invert}$ =	5.80	999.00	ft
B) Spillway Crest Length	$L_{spillway\ crest}$ =	100.00	42.00	ft
C) Spillway End Slopes (H:V)	$S_{spillway\ ends}$ =	4.00	4.00	ft / ft
D) Freeboard above Maximum Water Surface	Freeboard Depth=	1.00	1.00	ft
E) Spillway Design Flow Depth	Flow $Depth_{spillway}$ =	0.70		ft
F) Stage at Top of Freeboard	Freeboard Top Stage =	7.50		ft
G) Basin Area at Top of Freeboard	Max Basin Area =	1.22		acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.81	1.70		3.01				12.89	
Predevelopment Peak Q (cfs) =	N/A	N/A		32.3				158.0	
Peak Inflow (cfs) =	N/A	N/A		46.6				176.9	
Peak Outflow (cfs) =	0.3	0.4		18.0				164.2	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.6				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.1				1.0	
Time to Drain 97% of Volume (hr) =	44	69		71				54	
Time to Drain 99% of Volume (hr) =	46	72		76				69	
Maximum Ponding Depth (ft) =	3.60	4.50		4.80				5.70	
Area at Max Ponding Depth (ac) =	0.88	0.96		0.98				1.06	
Maximum Volume Stored (ac-ft) =	0.81	1.70		1.99				2.91	

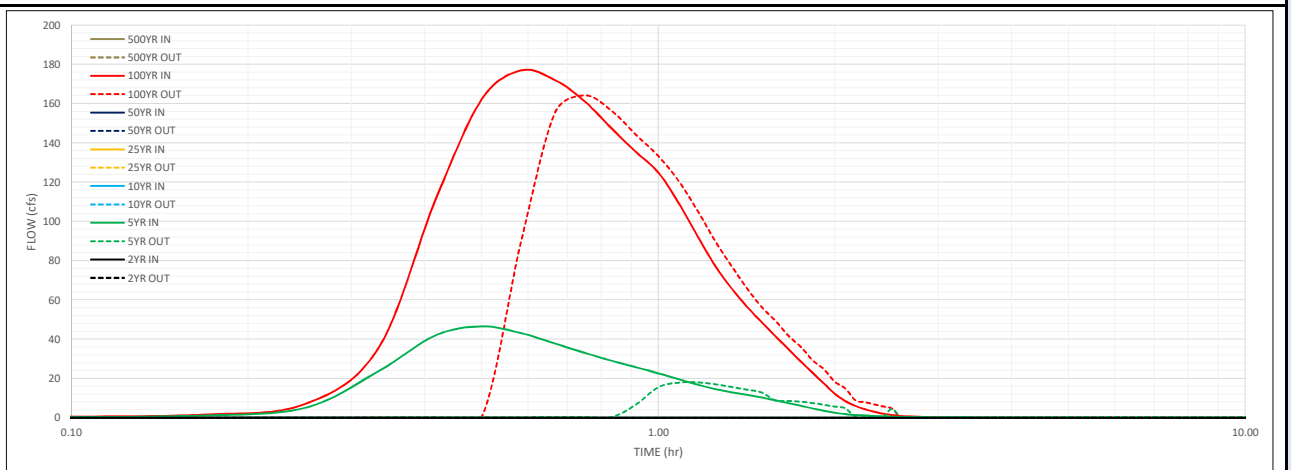
Results based on COS DCM Inputs

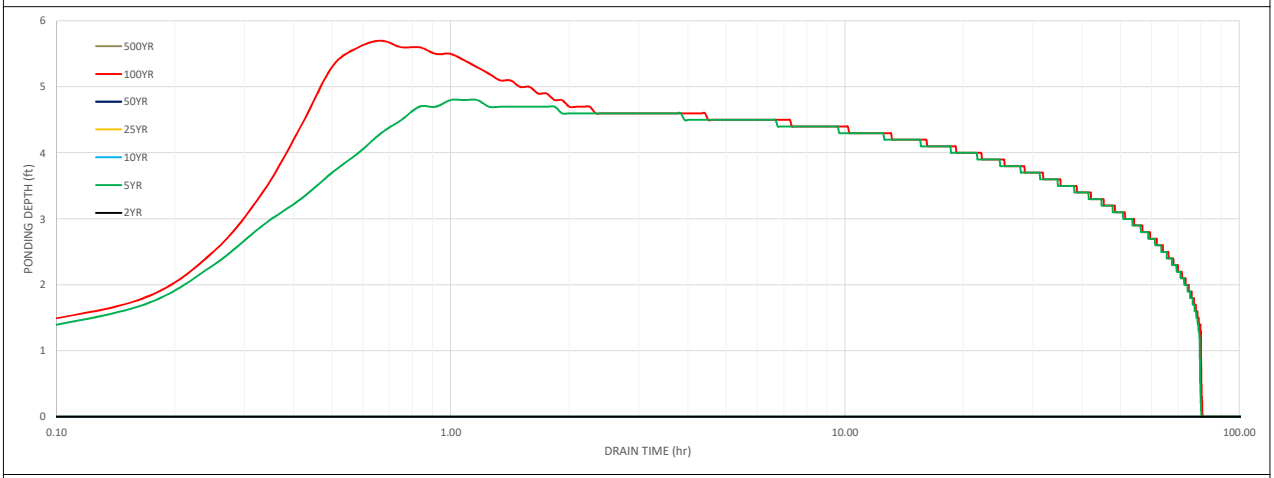
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.81	1.70		3.01				12.89	
Predevelopment Peak Q (cfs) =	N/A	N/A		32.3				158.0	
Peak Inflow (cfs) =	N/A	N/A		46.6				176.9	
Peak Outflow (cfs) =	0.3	0.4		16.3				153.2	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.5				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Overflow Grate	
Max Velocity through Grate =	N/A	N/A		0.3				2.8	
Time to Drain 97% of Volume (hr) =	44	69		71				54	
Time to Drain 99% of Volume (hr) =	46	72		76				69	
Maximum Ponding Depth (ft) =	3.60	4.50		4.90				6.10	
Area at Max Ponding Depth (ac) =	0.88	0.96		0.99				1.10	
Maximum Volume Stored (ac-ft) =	0.81	1.70		2.09				3.34	

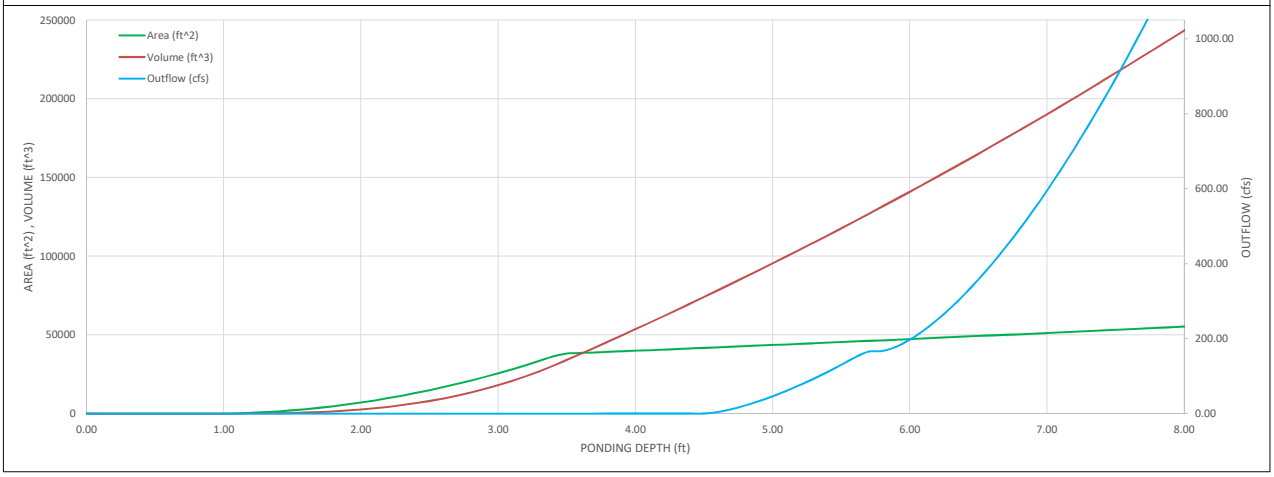
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) **Sheet 3 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond E
Date: April 6, 2020 Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond F
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters: User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	14	13	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	1.55	1.47	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	4.80	4.50	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	1.55	7.84	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	6.00	6.00	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters: User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	570.9	570.9	ft
B) Width of Basin at Top of EURV, W_{PCM} =	217.0	217.0	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	6.10	6.10	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	571.7	571.7	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	217.8	217.8	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	42.34				221.11	

B) Adjust "Time Interval" to match hydrograph data

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time Interval: 5.0 minutes

Time (min)	Post-Development Storm Inflow Hydrographs (cfs)						
	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.52				1.80	
0:10		5.98				8.99	
0:15		19.71				25.32	
0:20		58.79				77.64	
0:25		94.74				207.48	
0:30		103.82				301.83	
0:35		97.47				329.97	
0:40		87.23				323.46	
0:45		77.84				304.34	
0:50		69.34				281.05	
0:55		61.26				257.82	
1:00		54.52				237.51	
1:05		49.46				211.11	
1:10		45.22				185.26	
1:15		40.70				161.15	
1:20		36.24				139.03	
1:25		32.06				119.17	
1:30		28.34				101.90	
1:35		24.61				86.26	
1:40		21.24				72.79	
1:45		19.05				62.33	
1:50		17.44				54.79	
1:55		16.04				48.91	
2:00		13.99				42.35	
2:05		11.69				35.81	
2:10		9.57				29.96	
2:15		7.79				24.91	
2:20		6.28				20.57	
2:25		5.03				16.95	
2:30		4.03				13.95	
2:35		3.21				11.42	
2:40		2.52				9.20	
2:45		1.92				7.18	
2:50		1.38				5.32	
2:55		0.95				3.69	
3:00		0.65				2.49	
3:05		0.46				1.70	
3:10		0.33				1.17	
3:15		0.24				0.81	
3:20		0.18				0.56	
3:25		0.14				0.38	
3:30		0.11				0.26	
3:35		0.08				0.18	
3:40		0.06				0.13	
3:45		0.05				0.10	
3:50		0.03				0.07	
3:55		0.02				0.05	
4:00		0.02				0.04	
4:05		0.01				0.03	
4:10		0.01				0.02	
4:15		0.00				0.01	
4:20						0.01	
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6:00							

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond F
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type

Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)

(Assumes that top of grate is flush with the top of the concrete dropbox)

A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)
B) Overflow Weir Front Edge Length (inside edge of dropbox)
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)
D) Horizontal Length of Weir Sides (inside edge of dropbox)
E) Overflow Grate Open Area % (grate open area / total grate area)
F) Debris Clogging %
G) Height of Grate Upper Edge (at back side of dropbox)
H) Overflow Grate Slope Length (inside edge of dropbox)
I) Overflow Grate Open Area (without debris)
J) Overflow Grate Open Area (with debris)

Input Parameters	User Input	COS DCM	
$H_{weir\ front}$ =	6.00	6.00	ft
$L_{weir\ front}$ =	13.00	10.00	ft
$S_{weir\ sides}$ =	0.00	0.00	ft / ft
Horizontal $L_{weir\ sides}$ =	13.00	10.00	ft
Grate Open Area =	70%	70%	%
Debris Clogging =	50%	50%	%
$H_{grate\ top}$ =	6.00	6.00	ft
Slope $L_{weir\ sides}$ =	13.00	10.00	ft
Open Area $_{(No\ Clogging)}$ =	118.30	70.00	sq ft
Open Area $_{(Clogged)}$ =	59.15	35.00	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice)

Circular Outlet Pipe w/ Restrictor Plate

B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)
C) Outlet Pipe Diameter
D) Restrictor Plate Height above Pipe Invert
E) Half-Central Angle of Restrictor Plate on Pipe
F) Outlet Orifice Area
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)

Input Parameters	User Input	COS DCM	
Pipe Invert Depth =	1.50	1.50	ft
Pipe Diameter =	66.00	60.00	inches
Plate Height =	46.05	54.00	inches
Theta =	1.98	2.50	radians
Outlet Ao =	17.70	18.61	sq ft
$Outlet_{centroid}$ =	2.14	2.38	ft
Open Area Ratio =	6.68	3.76	

8. Emergency Spillway (Rectangular or Trapezoidal)

A) Spillway Invert Stage (relative to Stage = 0 ft)
B) Spillway Crest Length
C) Spillway End Slopes (H:V)
D) Freeboard above Maximum Water Surface
E) Spillway Design Flow Depth
F) Stage at Top of Freeboard
G) Basin Area at Top of Freeboard

Input Parameters	User Input	COS DCM	
$H_{spillway\ invert}$ =	7.60	999.00	ft
$L_{spillway\ crest}$ =	126.00	42.00	ft
$S_{spillway\ ends}$ =	4.00	4.00	ft / ft
Freeboard Depth=	1.00	1.00	ft
Flow $Depth_{spillway}$ =	0.90		ft
Freeboard Top Stage =	9.50		ft
Max Basin Area =	3.37		acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	2.62	5.94		7.80				26.37	
Predevelopment Peak Q (cfs) =	N/A	N/A		42.3				221.1	
Peak Inflow (cfs) =	N/A	N/A		103.8				330.0	
Peak Outflow (cfs) =	1.1	1.5		15.1				227.3	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.4				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.2				1.9	
Time to Drain 97% of Volume (hr) =	42	68		72				61	
Time to Drain 99% of Volume (hr) =	45	72		77				72	
Maximum Ponding Depth (ft) =	4.80	6.00		6.30				7.60	
Area at Max Ponding Depth (ac) =	2.12	2.84		2.89				3.08	
Maximum Volume Stored (ac-ft) =	2.62	5.94		6.82				10.70	

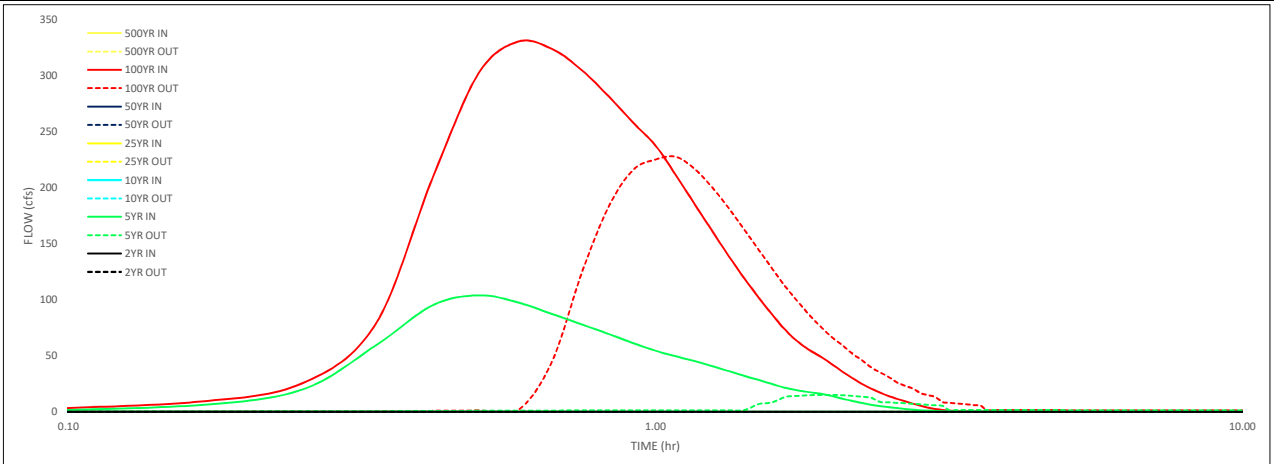
Results based on COS DCM Inputs

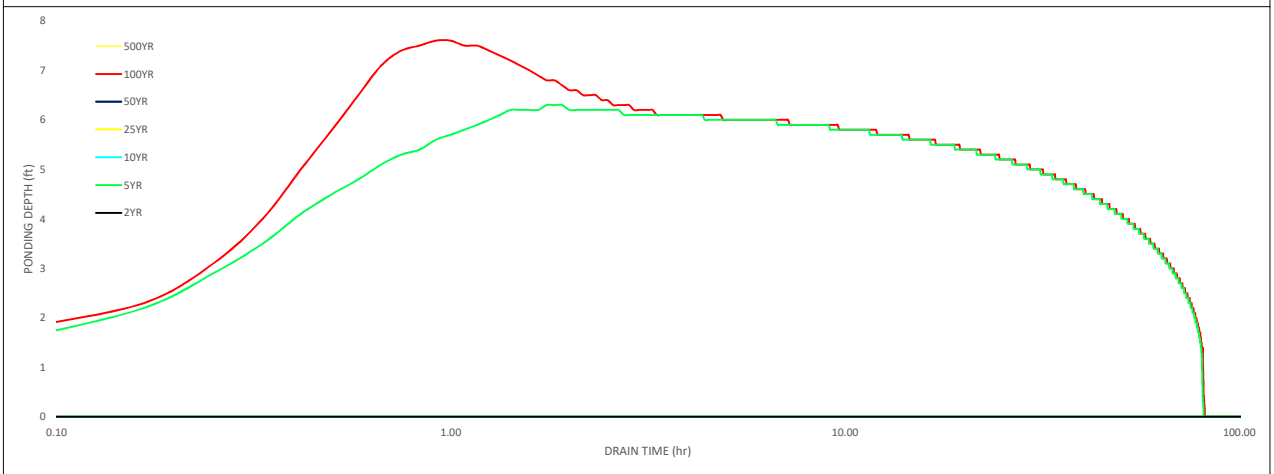
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	2.21	5.94		7.80				26.37	
Predevelopment Peak Q (cfs) =	N/A	N/A		42.3				221.1	
Peak Inflow (cfs) =	N/A	N/A		103.8				330.0	
Peak Outflow (cfs) =	1.1	1.4		13.2				214.5	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.3				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Overflow Grate	
Max Velocity through Grate =	N/A	N/A		0.2				3.0	
Time to Drain 97% of Volume (hr) =	36	69		74				63	
Time to Drain 99% of Volume (hr) =	38	73		78				73	
Maximum Ponding Depth (ft) =	4.50	6.00		6.30				7.80	
Area at Max Ponding Depth (ac) =	1.81	2.84		2.89				3.11	
Maximum Volume Stored (ac-ft) =	2.21	5.94		6.82				11.32	

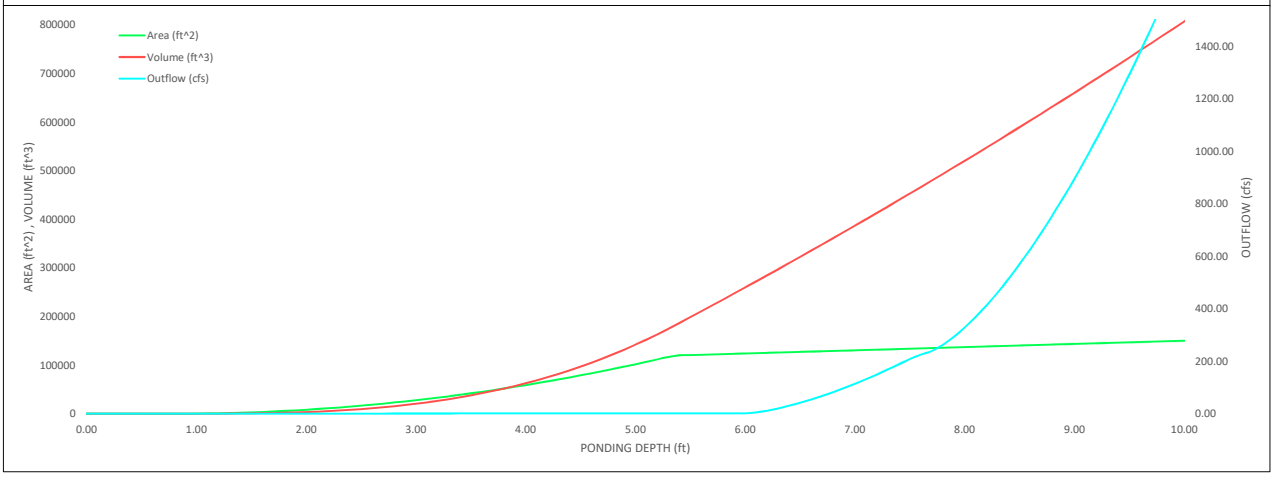
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 3 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond F
Date: April 6, 2020 — Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters		
	User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	9	9	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	0.49	0.49	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	3.20	3.20	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	1.94	1.94	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	4.00	4.00	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters		
	User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	349.7	349.7	ft
B) Width of Basin at Top of EURV, W_{PCM} =	105.4	105.4	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	4.10	4.10	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	350.5	350.5	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	106.2	106.2	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	9.42				48.48	

B) Adjust "Time Interval" to match hydrograph data

Time Interval: 5.0 minutes

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.18				0.49	
0:10		1.27				1.75	
0:15		3.86				5.05	
0:20		12.69				17.55	
0:25		19.21				47.38	
0:30		20.06				63.86	
0:35		18.72				67.51	
0:40		16.88				66.01	
0:45		15.24				62.38	
0:50		13.74				57.86	
0:55		12.37				53.71	
1:00		11.12				49.93	
1:05		10.01				44.10	
1:10		9.05				38.52	
1:15		8.20				33.58	
1:20		7.42				29.30	
1:25		6.67				25.48	
1:30		5.98				22.03	
1:35		5.28				18.97	
1:40		4.64				16.31	
1:45		4.05				13.93	
1:50		3.52				11.83	
1:55		3.12				10.10	
2:00		2.67				8.48	
2:05		2.26				7.10	
2:10		1.90				5.93	
2:15		1.58				4.93	
2:20		1.30				4.04	
2:25		1.05				3.25	
2:30		0.82				2.54	
2:35		0.62				1.90	
2:40		0.46				1.36	
2:45		0.35				0.99	
2:50		0.28				0.73	
2:55		0.22				0.54	
3:00		0.17				0.39	
3:05		0.13				0.28	
3:10		0.10				0.19	
3:15		0.07				0.13	
3:20		0.05				0.09	
3:25		0.04				0.07	
3:30		0.03				0.06	
3:35		0.02				0.04	
3:40		0.02				0.03	
3:45		0.01				0.03	
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Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

	Input Parameters		
	User Input	COS DCM	
A) Overflow Weir Front Edge Height (relative to Stage = 0 ft) $H_{weir\ front}$ =	4.00	4.00	ft
B) Overflow Weir Front Edge Length (inside edge of dropbox) $L_{weir\ front}$ =	26.00	26.00	ft
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate) $S_{weir\ sides}$ =	0.00	0.00	ft / ft
D) Horizontal Length of Weir Sides (inside edge of dropbox) Horizontal $L_{weir\ sides}$ =	26.00	26.00	ft
E) Overflow Grate Open Area % (grate open area / total grate area) Grate Open Area =	70%	70%	%
F) Debris Clogging % Debris Clogging =	50%	50%	%
G) Height of Grate Upper Edge (at back side of dropbox) $H_{grate\ top}$ =	4.00	4.00	ft
H) Overflow Grate Slope Length (inside edge of dropbox) Slope $L_{weir\ sides}$ =	26.00	26.00	ft
I) Overflow Grate Open Area (without debris) Open Area $_{(No\ Clogging)}$ =	473.20	473.20	sq ft
J) Overflow Grate Open Area (with debris) Open Area $_{(Clogged)}$ =	236.60	236.60	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

	Input Parameters		
	User Input	COS DCM	
B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft) Pipe Invert Depth =	1.50	1.50	ft
C) Outlet Pipe Diameter Pipe Diameter =	30.00	27.00	inches
D) Restrictor Plate Height above Pipe Invert Plate Height =	22.22	26.24	inches
E) Half-Central Angle of Restrictor Plate on Pipe Theta =	2.07	2.80	radians
F) Outlet Orifice Area Outlet Ao =	3.90	3.94	sq ft
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert $Outlet_{centroid}$ =	1.03	1.12	ft
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4) Open Area Ratio =	121.39	119.97	

8. Emergency Spillway (Rectangular or Trapezoidal)

	Input Parameters		
	User Input	COS DCM	
A) Spillway Invert Stage (relative to Stage = 0 ft) $H_{spillway\ invert}$ =	5.40	4.90	ft
B) Spillway Crest Length $L_{spillway\ crest}$ =	136.00	23.00	ft
C) Spillway End Slopes (H:V) $S_{spillway\ ends}$ =	4.00	4.00	ft / ft
D) Freeboard above Maximum Water Surface Freeboard Depth=	1.00	1.00	ft
E) Spillway Design Flow Depth Flow $Depth_{spillway}$ =	0.30	0.90	ft
F) Stage at Top of Freeboard Freeboard Top Stage =	6.70	6.80	ft
G) Basin Area at Top of Freeboard Max Basin Area =	1.08	1.09	acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.47	1.15		1.57				5.51	
Predevelopment Peak Q (cfs) =	N/A	N/A		9.4				48.5	
Peak Inflow (cfs) =	N/A	N/A		20.1				67.5	
Peak Outflow (cfs) =	0.2	0.3		9.4				47.1	
Ratio (Outflow/Predevelopment) =	N/A	N/A		1.0				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.0				0.1	
Time to Drain 97% of Volume (hr) =	41	69		73				63	
Time to Drain 99% of Volume (hr) =	43	72		78				74	
Maximum Ponding Depth (ft) =	3.20	4.00		4.10				4.80	
Area at Max Ponding Depth (ac) =	0.67	0.85		0.85				0.91	
Maximum Volume Stored (ac-ft) =	0.47	1.15		1.24				1.85	

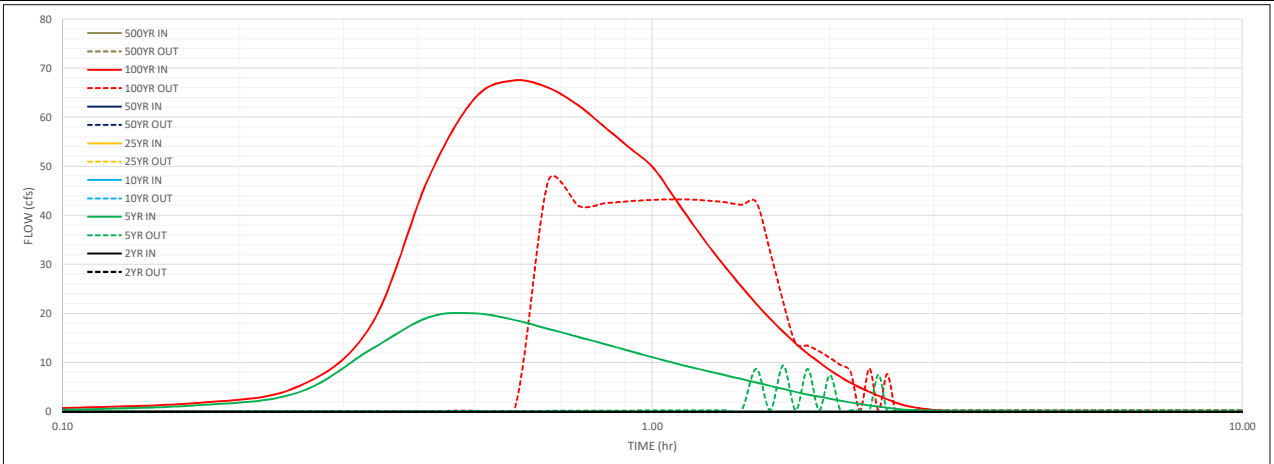
Results based on COS DCM Inputs

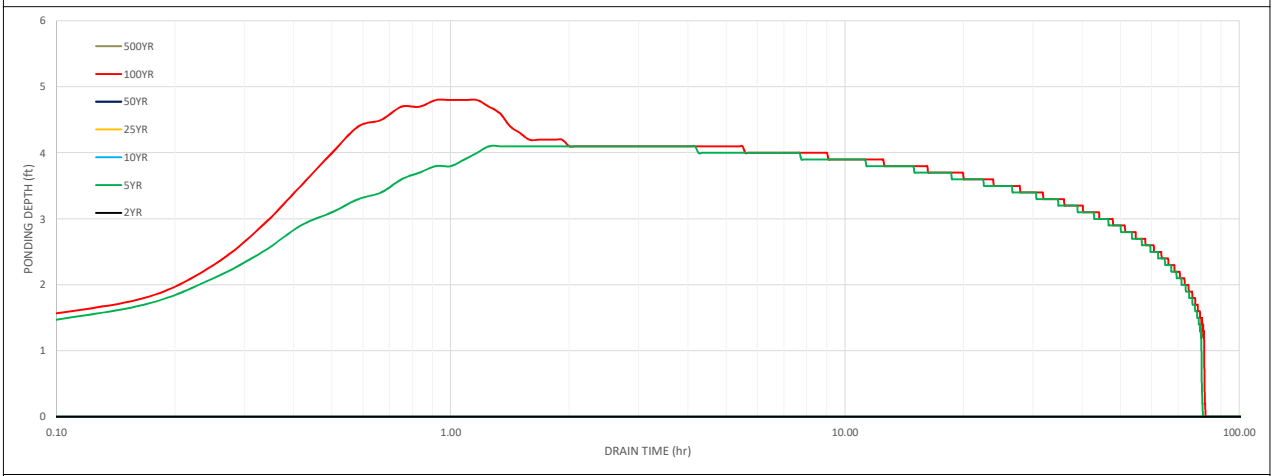
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	0.47	1.15		1.57				5.51	
Predevelopment Peak Q (cfs) =	N/A	N/A		9.4				48.5	
Peak Inflow (cfs) =	N/A	N/A		20.1				67.5	
Peak Outflow (cfs) =	0.2	0.3		9.4				47.1	
Ratio (Outflow/Predevelopment) =	N/A	N/A		1.0				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.0				0.1	
Time to Drain 97% of Volume (hr) =	41	69		73				63	
Time to Drain 99% of Volume (hr) =	43	72		78				74	
Maximum Ponding Depth (ft) =	3.20	4.00		4.10				4.80	
Area at Max Ponding Depth (ac) =	0.67	0.85		0.85				0.91	
Maximum Volume Stored (ac-ft) =	0.47	1.15		1.24				1.85	

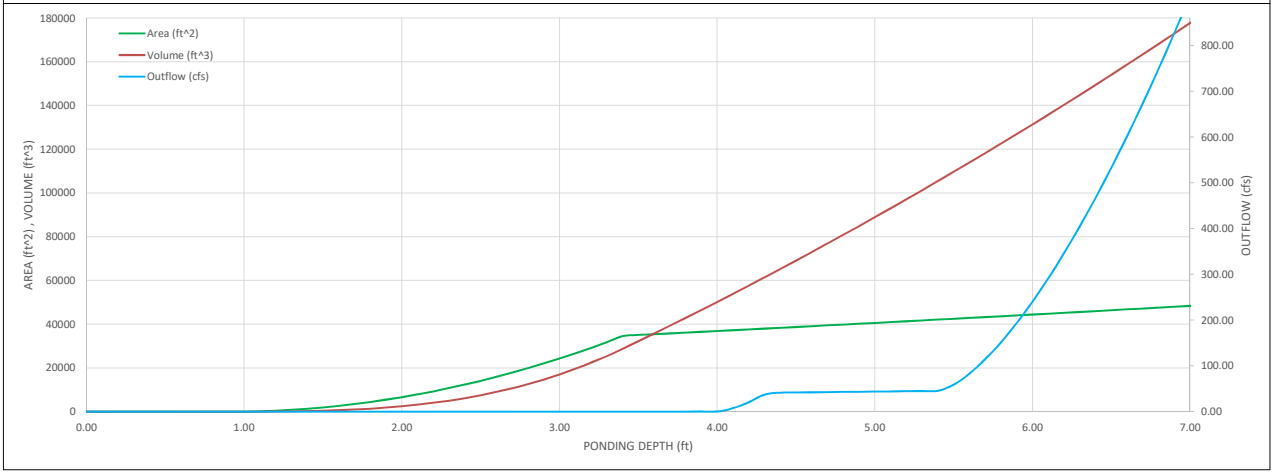
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 3 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020







Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 1 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020

1. Select WQCV/EURV PCM Type:
   Imports the Stage-Area-Volume-Discharge information from the corresponding PCM worksheet. The selected PCM worksheet must be completed before the import will work.

Extended Detention Basin (EDB)

2. WQCV/EURV Outlet Details

	Input Parameters: User Input	COS DCM	
A) Average Infiltration Rate of WQCV, i =	N/A	N/A	in / hr
B) Depth to Centroid of Underdrain Outlet Orifice from filter media surface, y =	N/A	N/A	inches
C) Underdrain Outlet Orifice Area, Underdrain Ao =	N/A	N/A	sq in
D) Number of WQCV Orifice Rows, # WQCV rows =	11	11	
E) Vertical Spacing between WQCV Orifice Rows, Orifice Spacing =	4.0	4.0	inches
F) WQCV Orifice Area (A_o) per Row, WQCV Ao =	0.86	0.86	sq in
G) Maximum Stage of WQCV (includes ISD and Trickle Channel Depth), Max Stage $_{WQCV}$ =	3.80	3.80	ft
H) EURV Orifice Area (A_o) in Single Row, EURV Ao =	4.73	4.73	sq in
I) Maximum Stage of EURV (includes ISD and Trickle Channel Depth), Max Stage $_{EURV}$ =	5.00	5.00	ft
J) Discharge Coefficient for all WQCV/EURV Outlet Orifice(s), Cd =	0.60	0.60	

3. Flood Control Surcharge Basin Geometry (above EURV) - See Figure
   Default Flood Surcharge Geometry inputs represent a continuation of the PCM Geometry in an upward direction without a transition bench.

	Input Parameters: User Input	COS DCM	
A) Length of Basin at Top of EURV, L_{PCM} =	468.4	468.4	ft
B) Width of Basin at Top of EURV, W_{PCM} =	141.1	141.1	ft
C) Stage at Top of Transition Bench (Bottom of Flood Control Surcharge), Stage at Top of Bench =	5.10	5.10	ft
D) Length of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), L_{Bench} =	469.2	469.2	ft
E) Width of Basin at Top of Transition Bench (Bottom of Flood Control Surcharge), W_{Bench} =	141.9	141.9	ft
F) Average Side Slopes of Flood Control Surcharge above Transition Bench (Recommend no steeper than 3H:1V slope. Use zero for vertical walls.), $Z_{Surcharge}$ =	4.00	4.00	ft / ft

User can override default flood surcharge geometry inputs to create a transition bench between the top of the PCM and the Flood Surcharge Volume by entering larger dimensions in C), D), and E).
See the Figure to the right.

Bench Slope is 4H:1V in length direction
Bench Slope is 4H:1V in width direction

4. Tributary Watershed Hydrology

A) Input hydrology data (copy/paste) from model runs

Pre-Development Peak Flow (cfs)						
2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
	17.11				99.16	

B) Adjust "Time Interval" to match hydrograph data

5-yr and 100-yr Hydrology Required (Other Storms are Optional)

Time Interval: 5.0 minutes

Time	Post-Development Storm Inflow Hydrographs (cfs)						
(min)	2 Year	**5 Year**	10 Year	25 Year	50 Year	**100 Year**	500 Year
0:00		0.00				0.00	
0:05		0.41				1.20	
0:10		3.42				4.91	
0:15		10.22				13.16	
0:20		29.97				40.46	
0:25		45.35				109.08	
0:30		46.22				147.68	
0:35		41.85				152.97	
0:40		36.79				145.92	
0:45		32.51				134.77	
0:50		28.57				122.07	
0:55		24.90				110.10	
1:00		21.86				99.42	
1:05		19.69				85.33	
1:10		17.78				73.97	
1:15		15.86				63.12	
1:20		14.00				53.39	
1:25		12.24				44.73	
1:30		10.61				36.81	
1:35		9.00				29.80	
1:40		7.68				24.16	
1:45		6.80				19.99	
1:50		6.25				17.20	
1:55		5.79				15.20	
2:00		4.96				12.77	
2:05		4.07				10.46	
2:10		3.32				8.57	
2:15		2.70				7.04	
2:20		2.18				5.80	
2:25		1.75				4.76	
2:30		1.37				3.85	
2:35		1.07				3.04	
2:40		0.81				2.31	
2:45		0.60				1.65	
2:50		0.43				1.12	
2:55		0.31				0.76	
3:00		0.23				0.51	
3:05		0.17				0.34	
3:10		0.12				0.23	
3:15		0.09				0.16	
3:20		0.07				0.12	
3:25		0.06				0.09	
3:30		0.05				0.07	
3:35		0.04				0.06	
3:40		0.03				0.05	
3:45		0.03				0.04	
3:50		0.02				0.03	
3:55		0.01				0.02	
4:00		0.01				0.01	
4:05		0.01				0.01	
4:10		0.00				0.01	
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Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — Sheet 2 of 3

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020

5. Flood Control Outlet Structure Type

A) Select Flood Control Outlet Structure Type: Overflow Weir/Grate, Outlet Pipe Restriction & Emergency Spillway

6. Overflow Weir (Dropbox) and Grate (Flat or Sloped)
(Assumes that top of grate is flush with the top of the concrete dropbox)

	Input Parameters: User Input	Input Parameters: COS DCM	
A) Overflow Weir Front Edge Height (relative to Stage = 0 ft)	5.00	5.00	ft
B) Overflow Weir Front Edge Length (inside edge of dropbox)	9.00	7.00	ft
C) Overflow Weir Grate Slope (H:V, enter zero for flat grate)	0.00	0.00	ft / ft
D) Horizontal Length of Weir Sides (inside edge of dropbox)	9.00	7.00	ft
E) Overflow Grate Open Area % (grate open area / total grate area)	70%	70%	%
F) Debris Clogging %	50%	50%	%
G) Height of Grate Upper Edge (at back side of dropbox)	5.00	5.00	ft
H) Overflow Grate Slope Length (inside edge of dropbox)	9.00	7.00	ft
I) Overflow Grate Open Area (without debris)	56.70	34.30	sq ft
J) Overflow Grate Open Area (with debris)	28.35	17.15	sq ft

7. Outlet Pipe with Flow Restriction Plate

A) Select Type of Outlet Restriction
(Circular Pipe w/ Restrictor Plate, Circular Orifice or Rectangular Orifice): Circular Outlet Pipe w/ Restrictor Plate

	Input Parameters: User Input	Input Parameters: COS DCM	
B) Depth to Invert of Outlet Pipe (relative to Stage = 0 ft)	1.50	1.50	ft
C) Outlet Pipe Diameter	42.00	42.00	inches
D) Restrictor Plate Height above Pipe Invert	34.00	34.00	inches
E) Half-Central Angle of Restrictor Plate on Pipe	2.24	2.24	radians
F) Outlet Orifice Area	8.34	8.34	sq ft
G) Height of Outlet Orifice Centroid above Outlet Pipe Invert	1.54	1.54	ft
H) Ratio of Grate Open Area / 100-yr Orifice Area (should be ≥ 4)	6.80	4.11	

8. Emergency Spillway (Rectangular or Trapezoidal)

	Input Parameters: User Input	Input Parameters: COS DCM	
A) Spillway Invert Stage (relative to Stage = 0 ft)	6.70	999.00	ft
B) Spillway Crest Length	136.00	27.00	ft
C) Spillway End Slopes (H:V)	4.00	4.00	ft / ft
D) Freeboard above Maximum Water Surface	1.00	1.00	ft
E) Spillway Design Flow Depth	0.50		ft
F) Stage at Top of Freeboard	8.20		ft
G) Basin Area at Top of Freeboard	1.89		acres

9. Routed Hydrograph Results

Results based on User Input

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.03	2.73		3.25				11.08	
Predevelopment Peak Q (cfs) =	N/A	N/A		17.1				99.2	
Peak Inflow (cfs) =	N/A	N/A		46.2				153.0	
Peak Outflow (cfs) =	0.4	0.7		4.2				101.9	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.2				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Outlet Pipe	
Max Velocity through Grate =	N/A	N/A		0.0				1.7	
Time to Drain 97% of Volume (hr) =	39	68		73				62	
Time to Drain 99% of Volume (hr) =	41	72		77				72	
Maximum Ponding Depth (ft) =	3.80	5.00		5.10				6.20	
Area at Max Ponding Depth (ac) =	1.09	1.52		1.53				1.65	
Maximum Volume Stored (ac-ft) =	1.03	2.73		2.90				4.65	

Results based on COS DCM Inputs

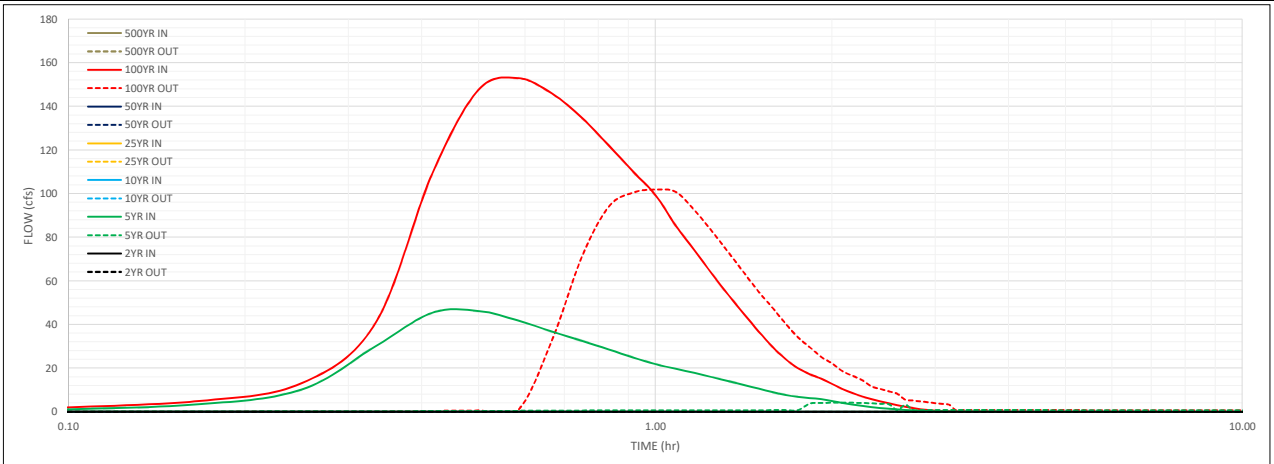
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Inflow Hydrograph Volume (ac-ft) =	1.03	2.73		3.25				11.08	
Predevelopment Peak Q (cfs) =	N/A	N/A		17.1				99.2	
Peak Inflow (cfs) =	N/A	N/A		46.2				153.0	
Peak Outflow (cfs) =	0.4	0.7		3.6				98.1	
Ratio (Outflow/Predevelopment) =	N/A	N/A		0.2				1.0	
Structure Controlling Flow =	Orifice Plate	Orifice Plate		Overflow Grate				Overflow Grate	
Max Velocity through Grate =	N/A	N/A		0.2				2.8	
Time to Drain 97% of Volume (hr) =	39	68		73				62	
Time to Drain 99% of Volume (hr) =	41	72		77				73	
Maximum Ponding Depth (ft) =	3.80	5.00		5.20				6.40	
Area at Max Ponding Depth (ac) =	1.09	1.52		1.54				1.68	
Maximum Volume Stored (ac-ft) =	1.03	2.73		3.05				4.98	

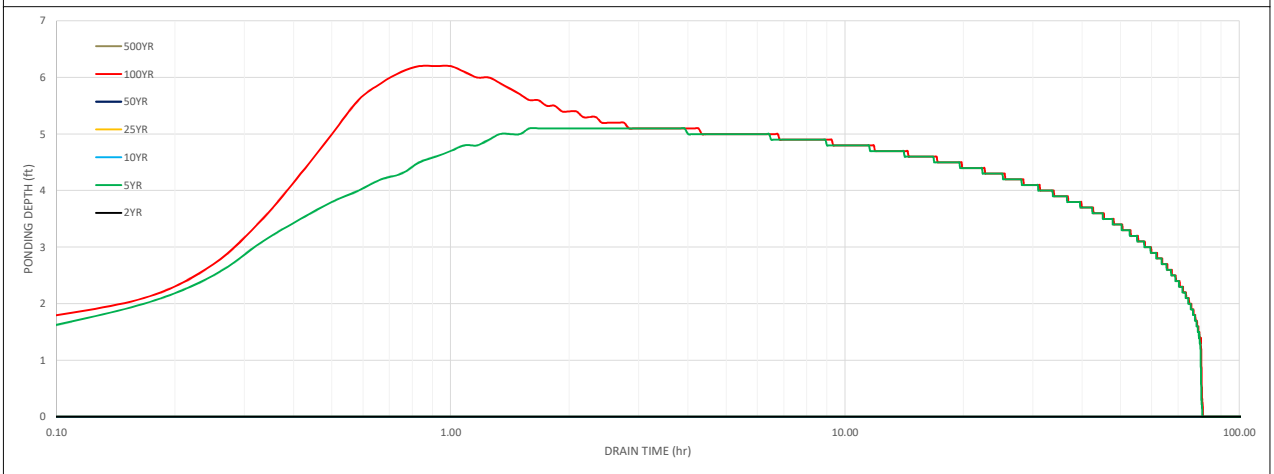
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

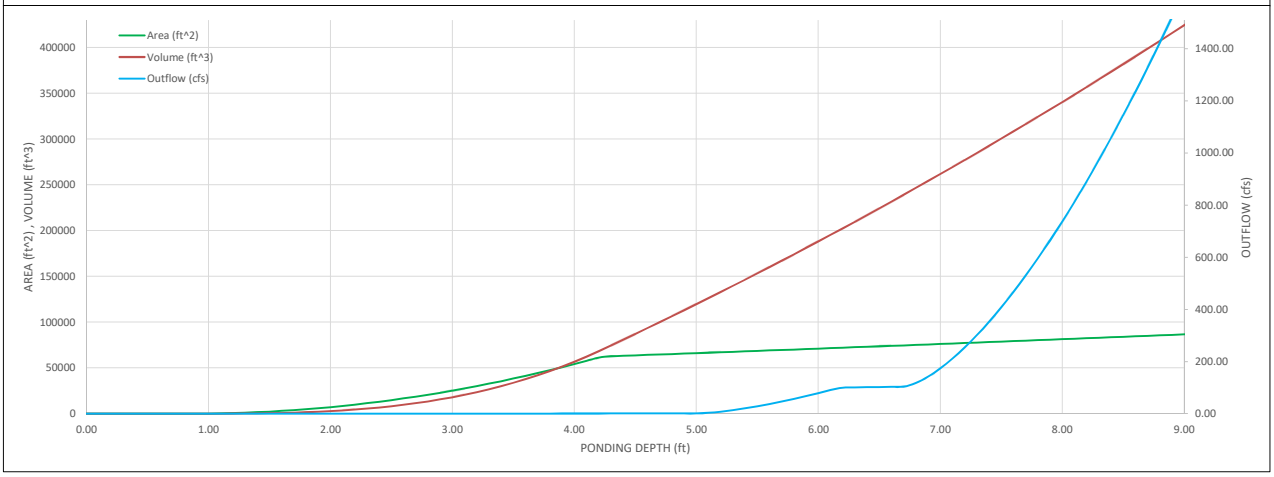
Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

COS PCM-FSD Preliminary Design (Beta Version 1.00, September 2019) — **Sheet 3 of 3**

Designer: Chris McFarland
Project: Grandview Reserve Pond G
Date: April 6, 2020 — Last Edited: April 13, 2020

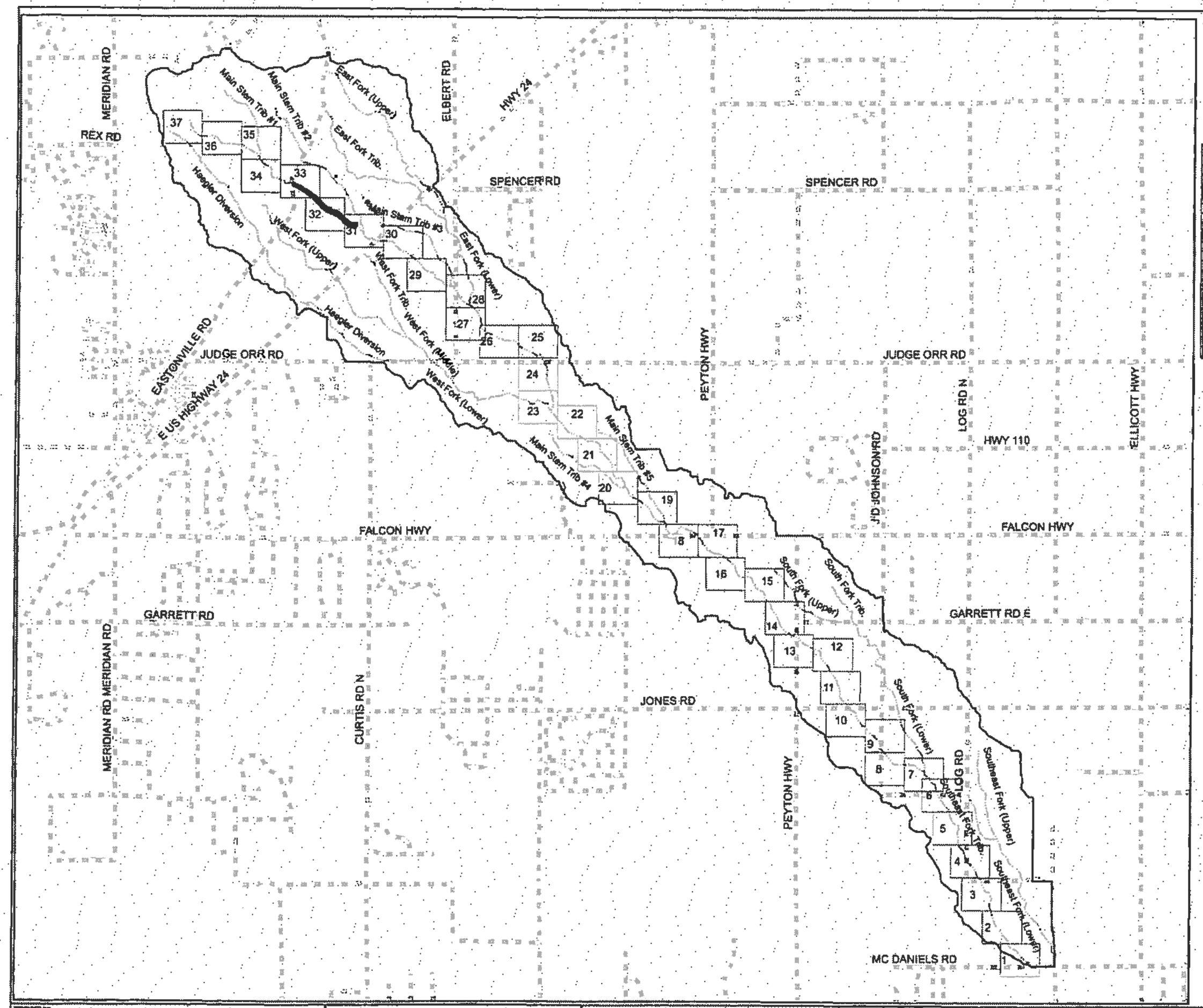






Preliminary Design Procedure Form: Full Spectrum Detention (FSD) Routing

Appendix E



THIS DRAWING IS CONCEPTUAL IN NATURE AND IS NOT TO BE USED AS THE SOLE BASIS FOR FINAL DESIGN, CONSTRUCTION, OR REMEDIAL ACTION. FURTHER STUDIES UNDER EPC DOT'S DIRECTION SHOULD BE PERFORMED PRIOR TO SUCH DECISIONS.

Legend

- Streams
- Roads
- Basin Boundary
- Matchlines

0 1 2 Miles

Drexel, Barrell & Co. Engineers / Surveyors
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2 S. 7TH STREET, COLORADO SPRINGS, COLORADO 80905 (719) 260-0887
5813 W 47TH STREET, GREELEY, COLORADO 80634 (970) 330-4845
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PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 300
COLORADO SPRINGS, COLORADO 80903
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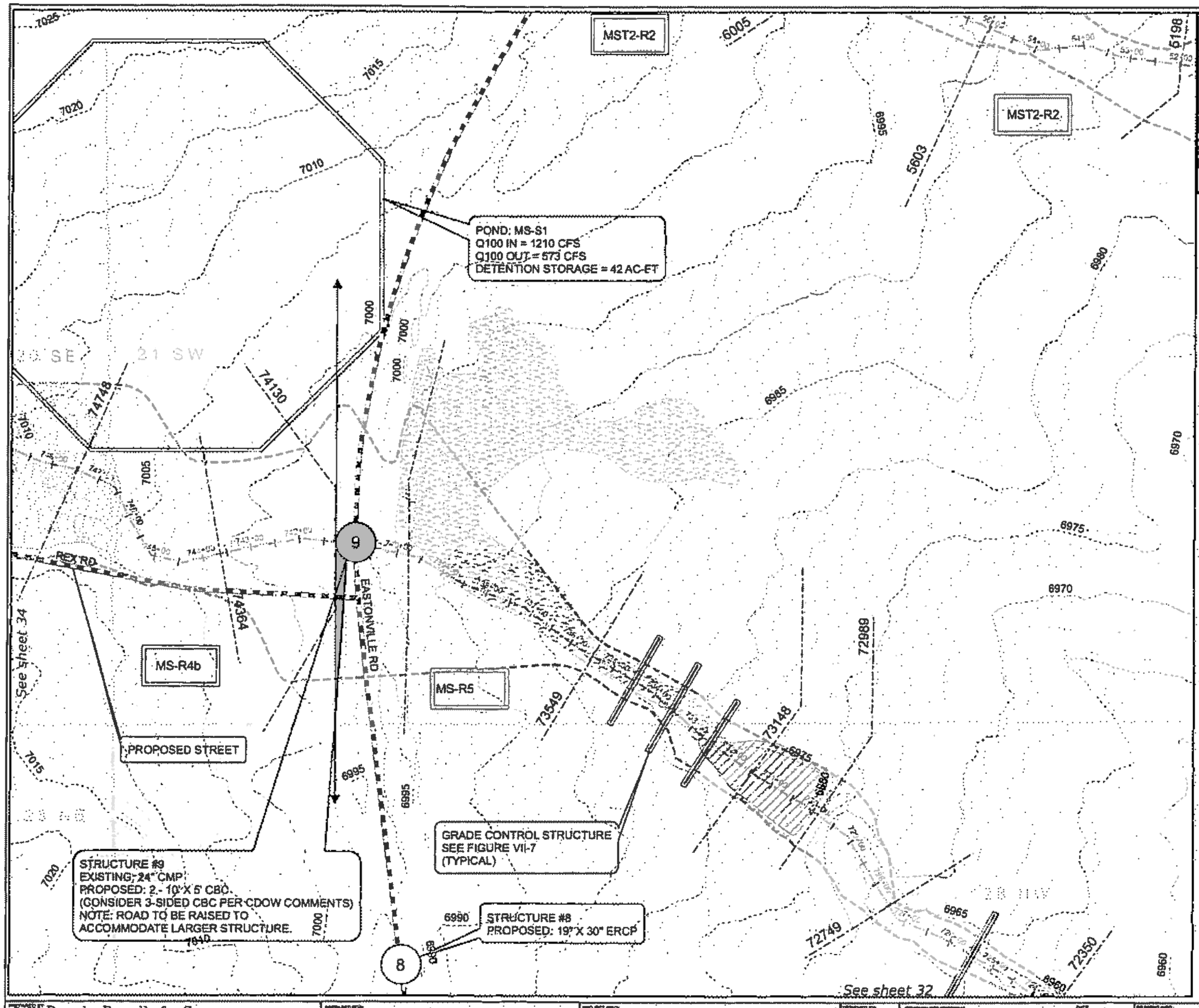
PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJB
DRAWN BY: SLF
CHECKED BY: RJB

REVISION DESCRIPTIONS | DATE

DRAWING INFO: GIECK RANCH
KEY MAP
MAIN STEM

DATE: AUGUST 2007
SCALE: 1" = 6000'
JOB NO. C7706-1
DRAWING NO. 6D 038
SHT PL
SHEET K1



Environmental Key

- Ponds
- Riparian: Good
- Riparian: Poor
- Potential Wetlands

The channel is considered dry unless shown as one of the above environmental categories.

0 100 200 Feet

Legend

- *Proposed Future Conditions 100-yr Flood Limits*
- Streams
- Reaches
- Reach Breaklines
- Cross-sections
- Roads
- Structures
- Section Lines
- 5-ft contours
- 2-ft contours

Reach	Slope (%)	Q_{100} (cfs)	V_{100} (ft/s)
MS-R4b	1.76	1094	4.24
MS-R5	1.88	573	5.00

RECOMMENDED PLAN IMPROVEMENTS

Reach	
MS-R4b	Channelization
MS-R5	Vegetation Augmentation

Note:
See Technical Addenda for grade control data.

THIS DRAWING IS CONCEPTUAL IN NATURE AND IS NOT TO BE USED AS THE SOLE BASIS FOR FINAL DESIGN, CONSTRUCTION, OR REMEDIAL ACTION. FURTHER STUDIES UNDER EPC DOT'S DIRECTION SHOULD BE PERFORMED PRIOR TO SUCH DECISIONS.

PREPARED BY: Drexel, Barrell & Co. Engineers · Surveyors
1609 26TH STREET, BOULDER, COLORADO 80301 (303) 442-4338
3 S 7TH STREET, COLORADO SPRINGS, COLORADO 80905 (719) 260-0887
6313 W 4TH STREET, GREELEY, COLORADO 80634 (970) 351-6845
CONTACT: ROBERT BENNETT, PE., CFM

PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 240
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1972

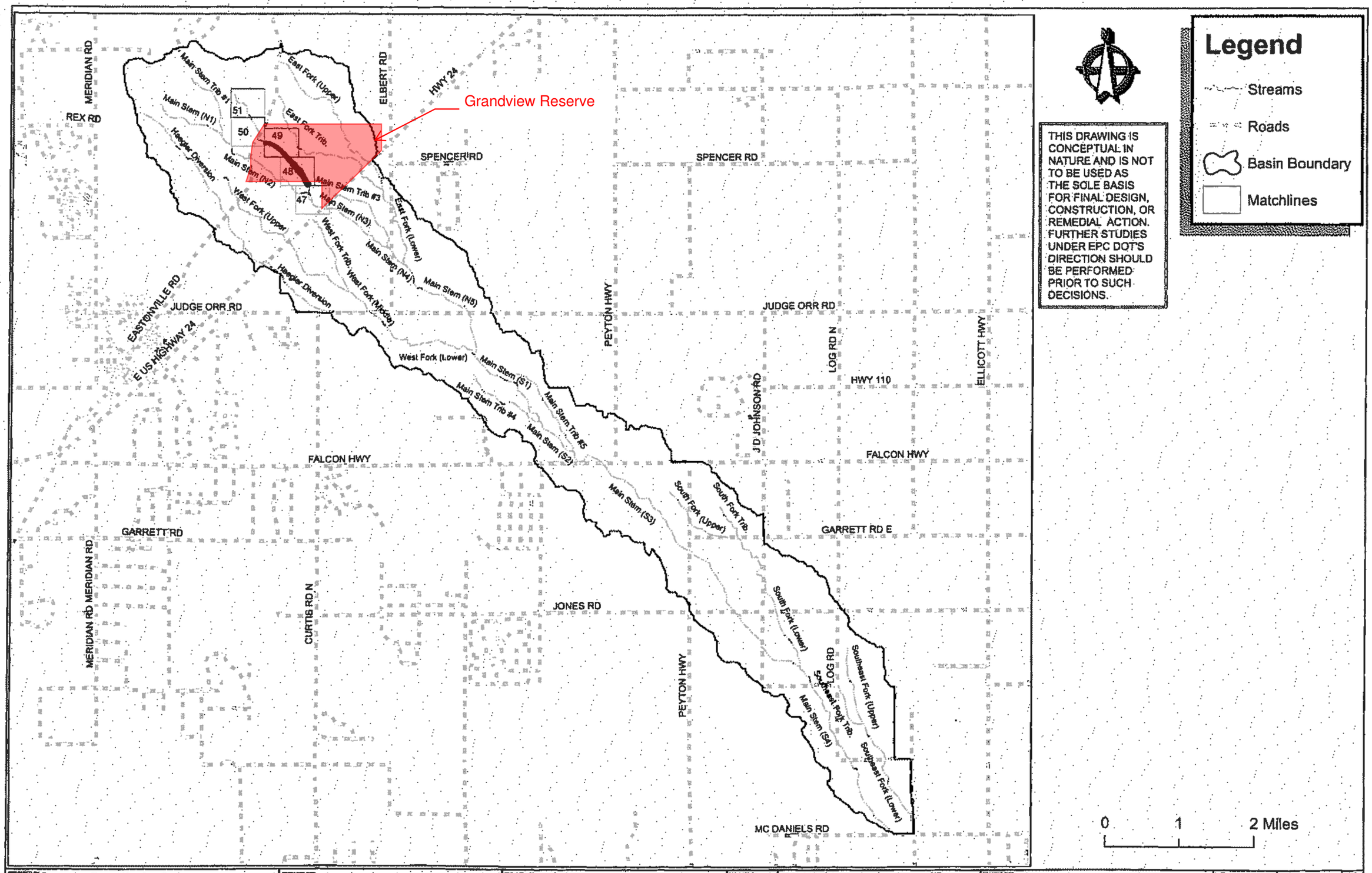
PROJECT REF.: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJS
DRAWN BY: BLF/MLM
CHECKED BY: RJS/TML

REVISION DESCRIPTION	DATE
PER EPC/DOT COMMENTS	FEBRUARY 2009
PER EPC FINAL REVIEW	JANUARY 2010

DRAWING NAME: GIECK RANCH DBPS
PLAN VIEW
MAIN STEM #33

DATE: AUGUST 2007
JOB NO.: C7706-2
SHT: PL
SCALE: H: 1" = 200' V: NONE
DRAWING NO.: 6D 038
SHEET: 33



Drexel, Barrell & Co. Engineers · Surveyors
1880 30TH STREET
3 S 7TH STREET
4613 W 4TH STREET
CONTACT: ROBERT BENNETT

PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 300
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1022

PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJB
DRAWN BY: BLP
CHECKED BY: RJB

REVISION DESCRIPTIONS | DATE

DRAWING TITLE: GIECK RANCH
KEY MAP
MAIN STEM TRIBUTARY #2

DATE: AUGUST 2007
SCALE: 1" = 6000'
JOB NO: C7706-1
DRAWING NO.: 6D 038
SET: PL
SHEET: K5

See sheet 49

GRADE CONTROL STRUCTURE
SEE FIGURE VII-7
(TYPICAL)

MST2-R2

POND: WFT1-S1
Q100 IN = 97
Q100 OUT = 66
DETENTION STORAGE = 2 AC-FT

MS-R5

28 NE

See sheet 47

Environmental Key

- Ponds
- Riparian: Good
- Riparian: Poor
- Potential Wetlands

The channel is considered dry unless shown as one of the above environmental categories.

Legend

- *Proposed Future Conditions 100-yr Flood Limits*
- Streams
- Reaches
- Reach Breaklines
- Cross-sections
- Roads
- Structures
- Section Lines
- 5-ft contours
- 2-ft contours

0 100 200 Feet

Reach	Slope (%)	Q_{100} (cfs)	V_{100} (ft/s)
MST2-R2	1.93	271	3.16

RECOMMENDED PLAN IMPROVEMENTS

Reach	
MST2-R2	Vegetation Augmentation

Note:
See Technical Addenda for grade control data.

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PREPARED BY: Drexel, Barrell & Co. Engineers · Surveyors
1609 38TH STREET, BOULDER, COLORADO 80301 (303) 442-4338
3 S 7TH STREET, COLORADO SPRINGS, COLORADO 80905 (719) 260-0887
5313 W 4TH STREET, GREELEY, COLORADO 80634 (970) 381-9648
CONTACT: ROBERT BENNETT, P.E., CFM

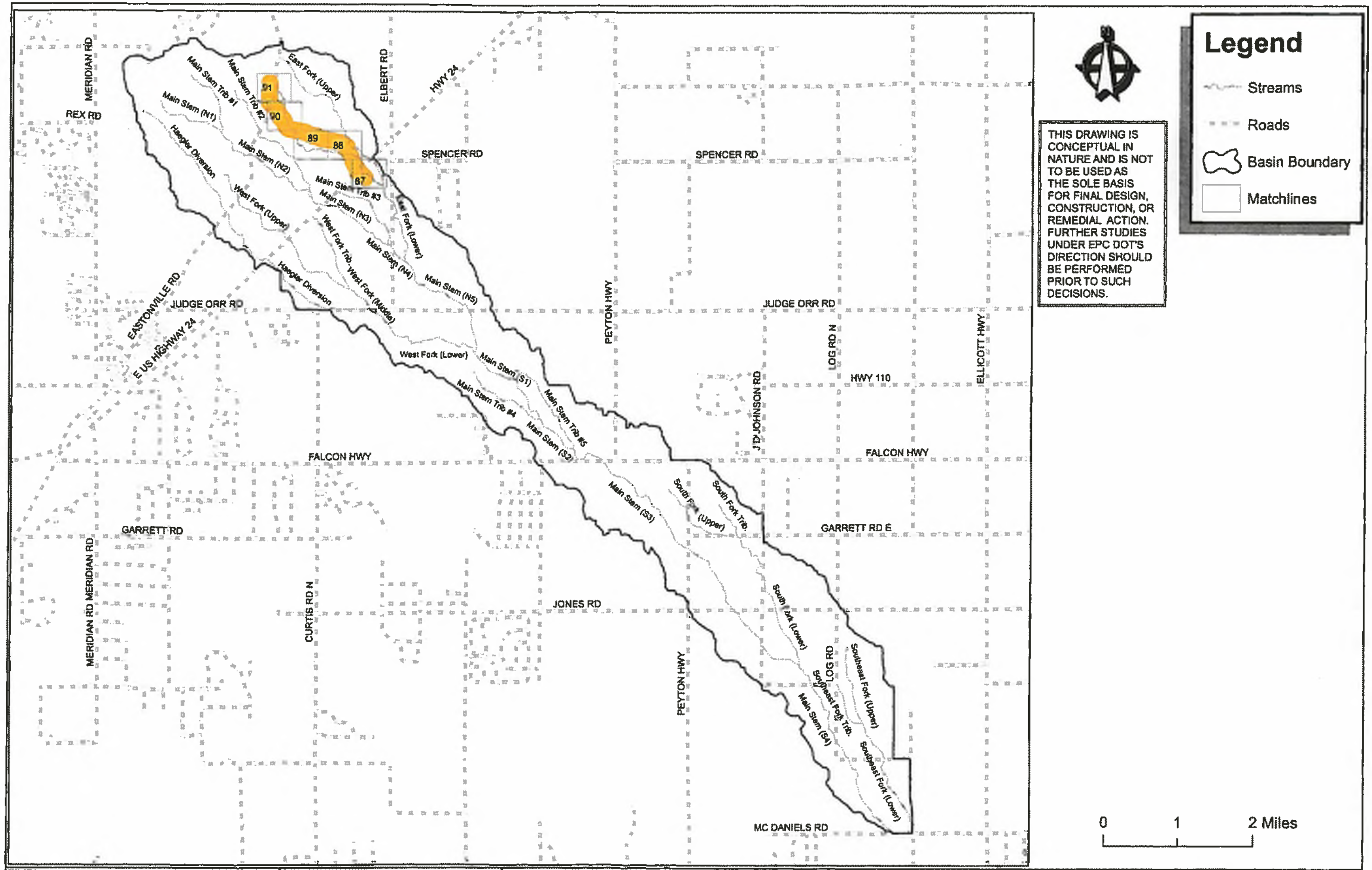
PREPARED FOR: REALTY DEVELOPMENT SERVICES
20 NORTH TEJON STREET, SUITE 500, COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1022

PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY:	REVISION DESCRIPTION:	DATE:
RJB	PER EPCDOT COMMENTS	FEBRUARY 2008
DRAWN BY:	PER EPC FINAL REVIEW	JANUARY 2010
SLF/RJB		
CHECKED BY:		
RJB/TML		

DRAWING INFO: GIECK RANCH DBPS
PLAN VIEW
MAIN STEM TRIBUTARY-2 #2

DATE:	JOB NO.	SET
AUGUST 2007	C7706-2	PL
SCALE: 1" = 200' or NONE	DRAWING NO.: 6D 038	SHEET: 48



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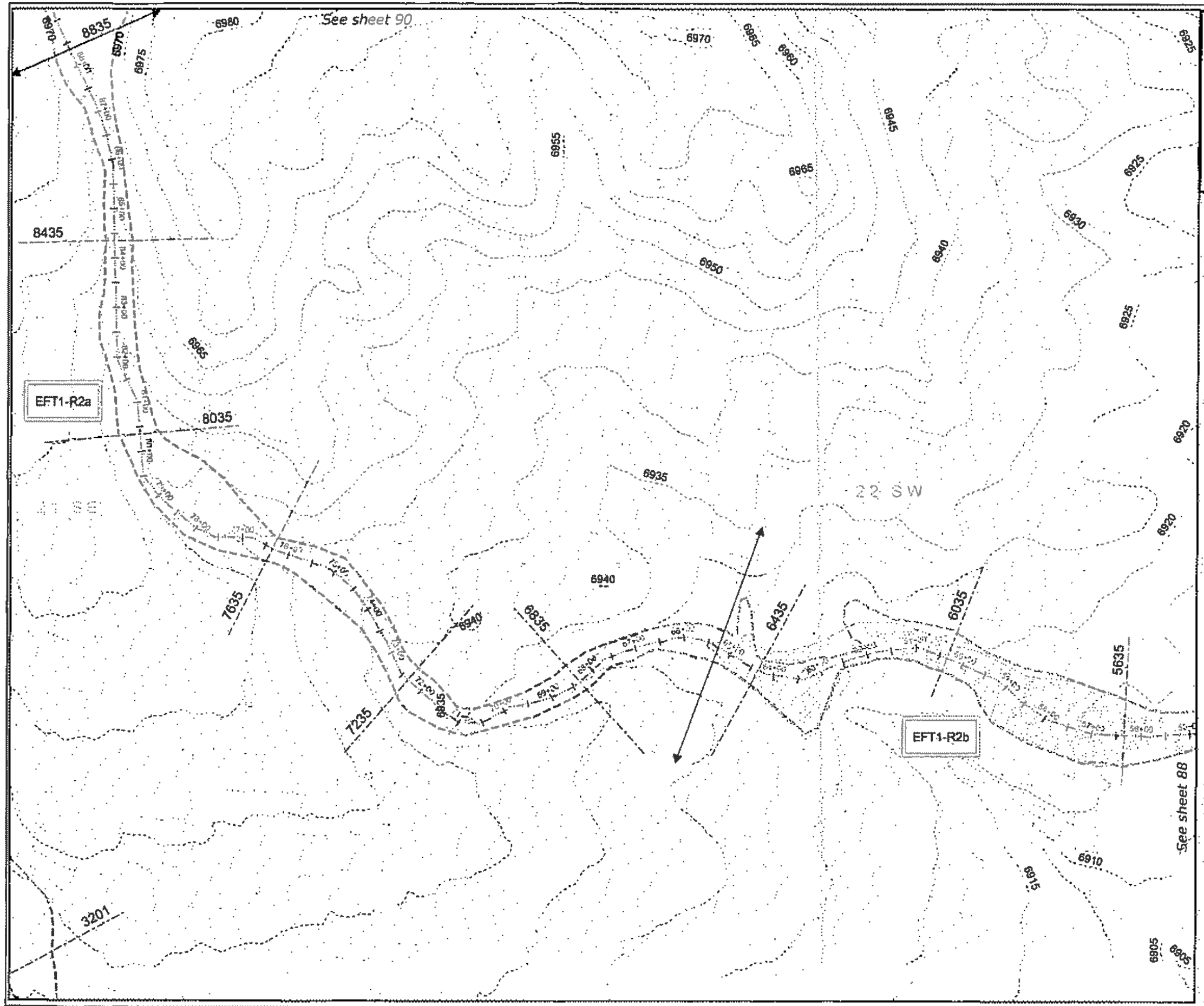
Legend

- Streams
- Roads
- Basin Boundary
- Matchlines

0 1 2 Miles

PREPARED BY: Drexel, Barrell & Co. Engineers Surveyors 1888 16TH ST #E #2 3 S 7TH STREET 6512 W 4TH STREET CONTACT: ROBERT BENNETT BOULDER, COLORADO 80301 (303) 443-4335 COLORADO SPRINGS, COLORADO 80906 (719) 955-5337 GREELEY, COLORADO 80634 (970) 351-6445	PREPARED FOR: REALTY DEVELOPMENT SERVICES 25 NORTH TEJON STREET, SUITE 300 COLORADO SPRINGS, COLORADO 80903 CONTACT: RAY O' SULLIVAN (719) 227-1822	PROJECT NAME: GIECK RANCH DRAINAGE BASIN PLANNING STUDY EL PASO COUNTY, COLORADO	DESIGNED BY: RJB DRAWN BY: BLF CHECKED BY: RJB	REVISION DESCRIPTIONS / DATE	DRAWING NAME: GIECK RANCH KEY MAP EAST FORK TRIBUTARY	DATE: AUGUST 2007 SCALE: H 1" = 6000' V	JOB NO: C7706-1 DRAWING NO.: 6D 038	SHT PL SHEET K11



Environmental Key

- Ponds
- Riparian: Good
- Riparian: Poor
- Potential Wetlands

The channel is considered dry unless shown as one of the above environmental categories.

0 100 200 Feet

Legend

- *Proposed Future Conditions 100-yr Flood Limits*
- Streams
- Reaches
- Reach Breaklines
- Cross-sections
- Roads
- Structures
- Section Lines
- 5-ft contours
- 2-ft contours

Reach	Slope (%)	Q_{100} (cfs)	V_{100} (ft/s)
EFT1-R2a	1.83	217	3.73
EFT1-R2b	1.60	217	2.68

RECOMMENDED PLAN IMPROVEMENTS

Reach	
EFT1-R2a	As-needed Improvements
EFT1-R2b	As-needed Improvements

THIS DRAWING IS CONCEPTUAL IN NATURE AND IS NOT TO BE USED AS THE SOLE BASIS FOR FINAL DESIGN, CONSTRUCTION, OR REMEDIAL ACTION. FURTHER STUDIES UNDER EPC DOT'S DIRECTION SHOULD BE PERFORMED PRIOR TO SUCH DECISIONS.

PREPARED BY: Drexel, Barrell & Co. Engineers · Surveyors
1800 38TH STREET, BOULDER, COLORADO 80301 (303) 442-4338
3 0 7TH STREET, COLORADO SPRINGS, COLORADO 80903 (719) 260-0887
6313 W 4TH STREET, GREELEY, COLORADO 80634 (970) 351-6445
CONTACT: ROBERT BENNETT, P.E., CFM

PREPARED FOR: REALTY DEVELOPMENT SERVICES
20 NORTH TEJON STREET, SUITE 300
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY D' SULLIVAN (719) 227-1022

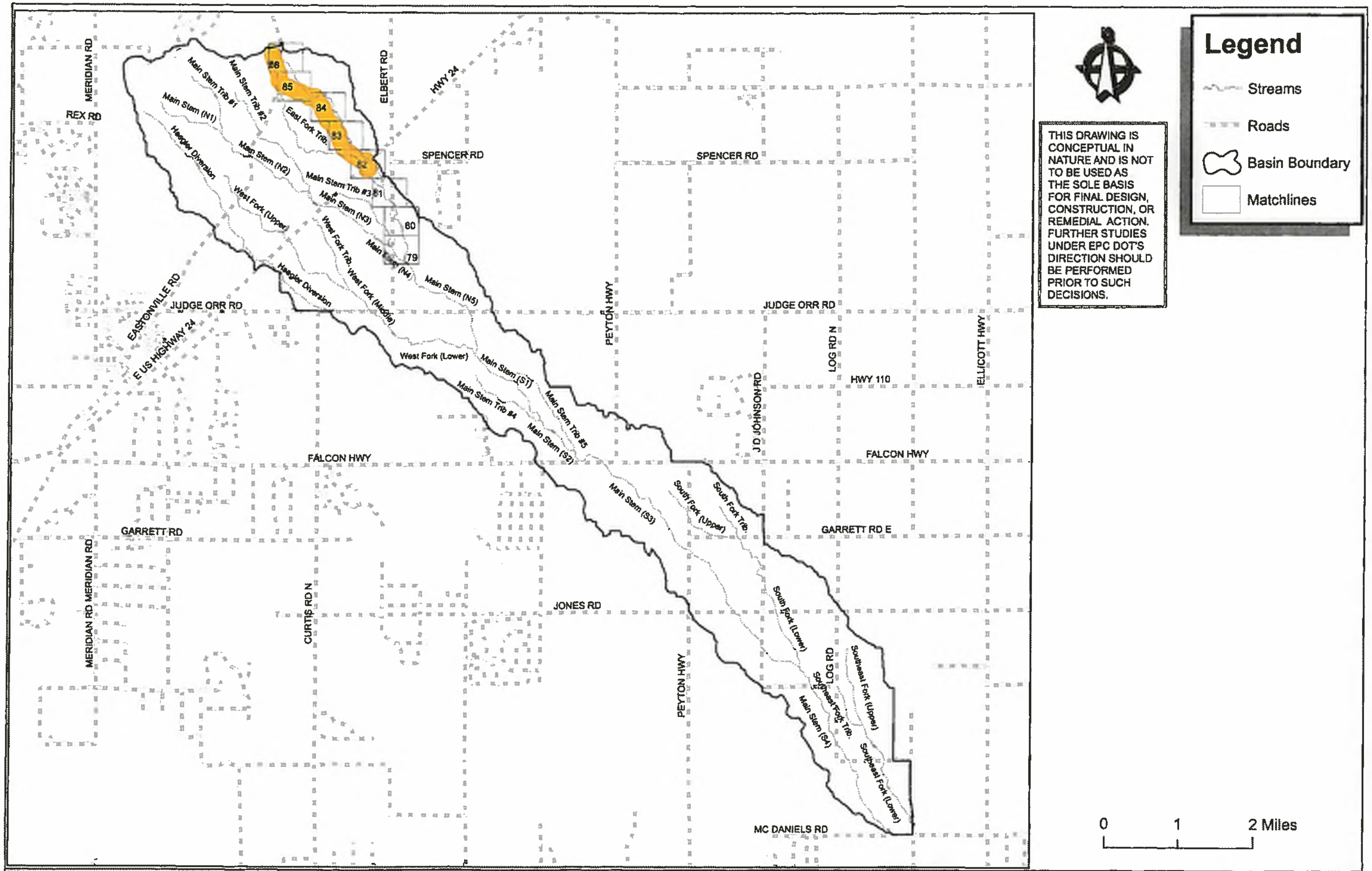
PROJECT NAME: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJB
DRAWN BY: SLF/MLM
CHECKED BY: RJB/TMK

REVISION DESCRIPTION: PCD EPC FINAL REVIEW — DATE: JANUARY 2010

DRAWING NAME: GIECK RANCH DBPS
PLAN VIEW
EAST FORK TRIBUTARY #3

DATE: AUGUST 2007
JOB NO.: C7706-2
SHT: PL
SCALE: 1" = 200' V: NONE
DRAWING NO.: 6D 038
SHEET: 89



Drexel, Barrell & Co. Engineers · Surveyors
1888 26TH STREET
3 S 7TH STREET
6313 W 4TH STREET
CONTACT: ROBERT BENNETT
BOULDER, COLORADO 80301 (303) 443-4338
COLORADO SPRINGS, COLORADO 80906 (719) 358-3087
GREELEY, COLORADO 80634 (970) 351-0648

PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 200
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1822

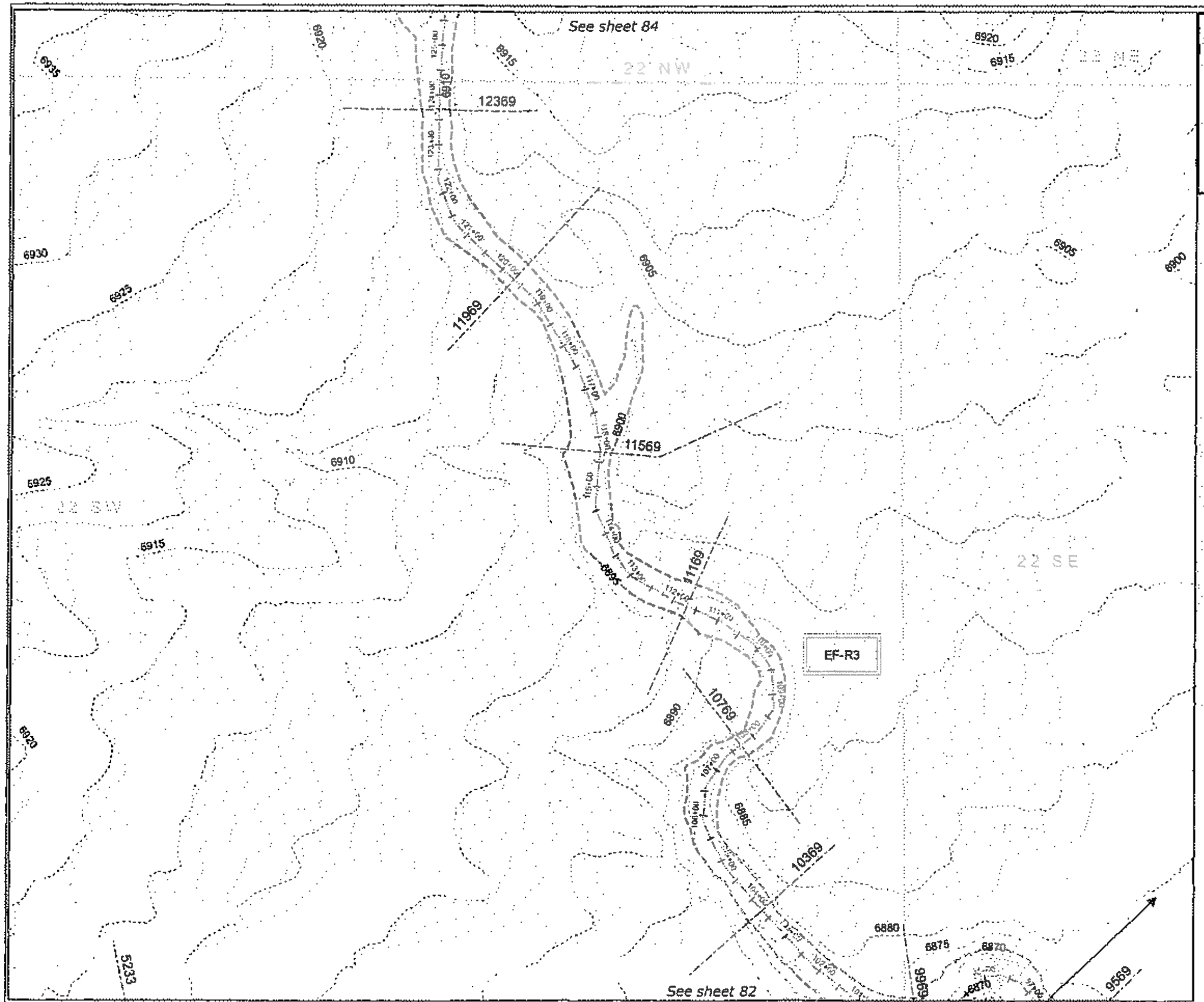
PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJS
DRAWN BY: SLF
CHECKED BY: RJS

REVISION DESCRIPTION | DATE

DRAWING INFO: GIECK RANCH
KEY MAP
EAST FORK

DATE: AUGUST 2007
SCALE: H 1" = 6000' V
JOB NO: C7706-1
DRAWING NO: 6D 038
SHEET: PL
SHEET: K10



Environmental Key

- Ponds
- Riparian: Good
- Riparian: Poor
- Potential Wetlands

The channel is considered dry unless shown as one of the above environmental categories.

0 100 200 Feet

Legend

- *Proposed Future Conditions 100-yr Flood Limits*
- Streams
- Reaches
- Reach Breaklines
- Cross-sections
- Roads
- Structures
- Section Lines
- 5-ft contours
- 2-ft contours

Reach	Slope (%)	Q_{100} (cfs)	V_{100} (ft/s)
EF-R3	1.53	595	5.09

RECOMMENDED PLAN IMPROVEMENTS

Reach	
EF-R3	As-needed Improvements

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Drexel, Barrell & Co. Engineers · Surveyors
1888 38TH STREET BOULDER, COLORADO 80301 (303) 443-4338
3 S 7TH STREET COLORADO SPRINGS, COLORADO 80905 (719) 260-0887
5613 W 4TH STREET GREELEY, COLORADO 80634 (970) 351-6445
CONTACT: ROBERT BENNETT, P.E., CFM

PREPARED FOR: REALTY DEVELOPMENT SERVICES
20 NORTH TEJON STREET, SUITE 200
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1032

PROJECT NAME: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJS
DRAWN BY: BLF/MLM
CHECKED BY: RJS/THL

DRAWING NAME: GIECK RANCH DBPS
PLAN VIEW
EAST FORK #5

DATE: AUGUST 2007
SCALE: 1" = 200'
VERT: NONE
JOB NO: C7706-2
DRAWING NO: 6D 038
SHT: PL
SHEET: 83

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 25 2019

East Fork Tributary 1 Reach 3 - Proposed Channel_Capacity

Trapezoidal

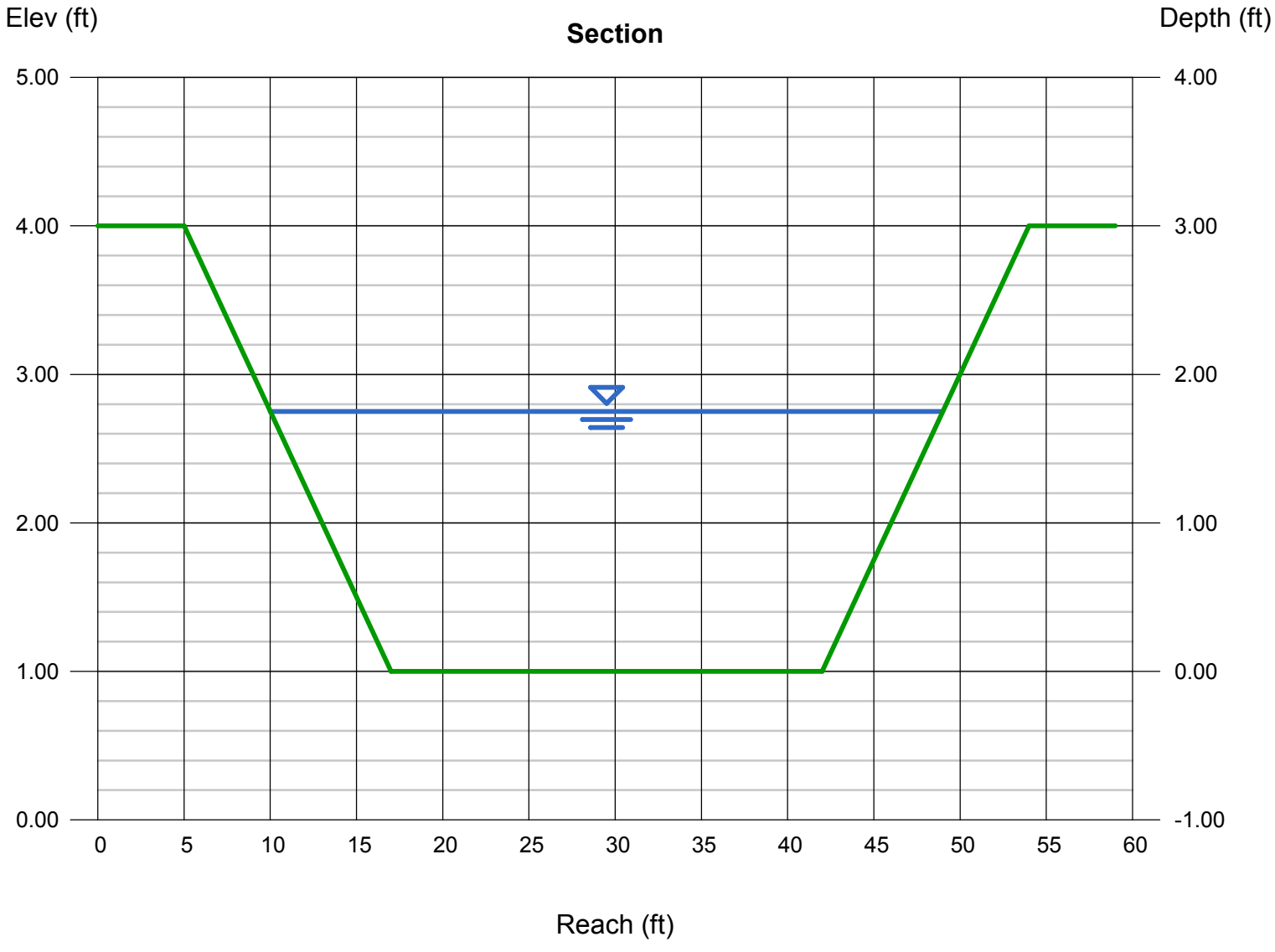
Bottom Width (ft)	= 25.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.69
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 217.00

Highlighted

Depth (ft)	= 1.75
Q (cfs)	= 217.00
Area (sqft)	= 56.00
Velocity (ft/s)	= 3.88
Wetted Perim (ft)	= 39.43
Crit Depth, Yc (ft)	= 1.24
Top Width (ft)	= 39.00
EGL (ft)	= 1.98



Channel Report

East Fork Tributary 1 Reach 3 - Proposed Channel_Velocity

Trapezoidal

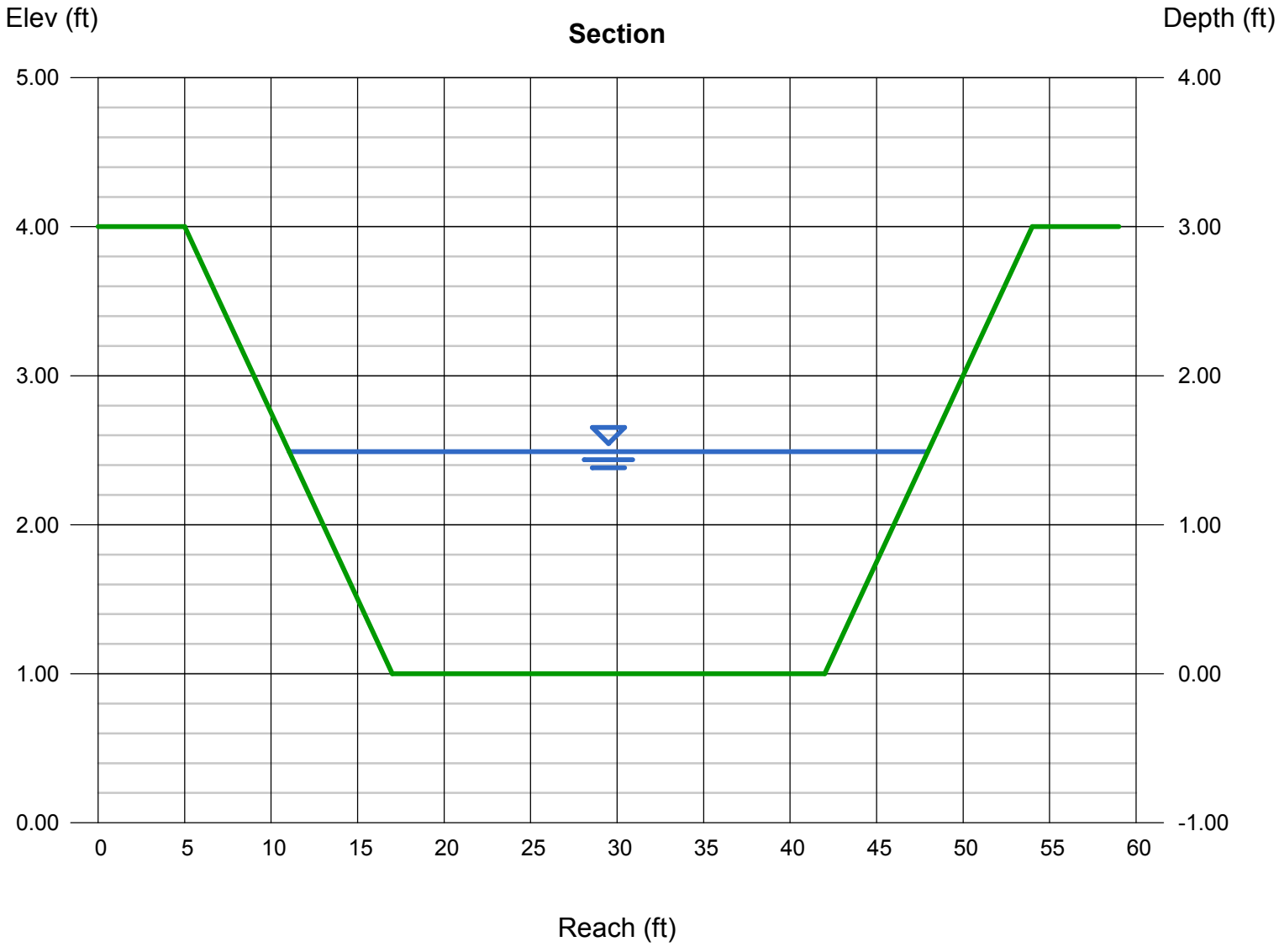
Bottom Width (ft)	= 25.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.69
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 217.00

Highlighted

Depth (ft)	= 1.49
Q (cfs)	= 217.00
Area (sqft)	= 46.13
Velocity (ft/s)	= 4.70
Wetted Perim (ft)	= 37.29
Crit Depth, Yc (ft)	= 1.24
Top Width (ft)	= 36.92
EGL (ft)	= 1.83



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 18 2019

East Fork Tributary 1 Reach 2 - Proposed Channel_Capacity

Trapezoidal

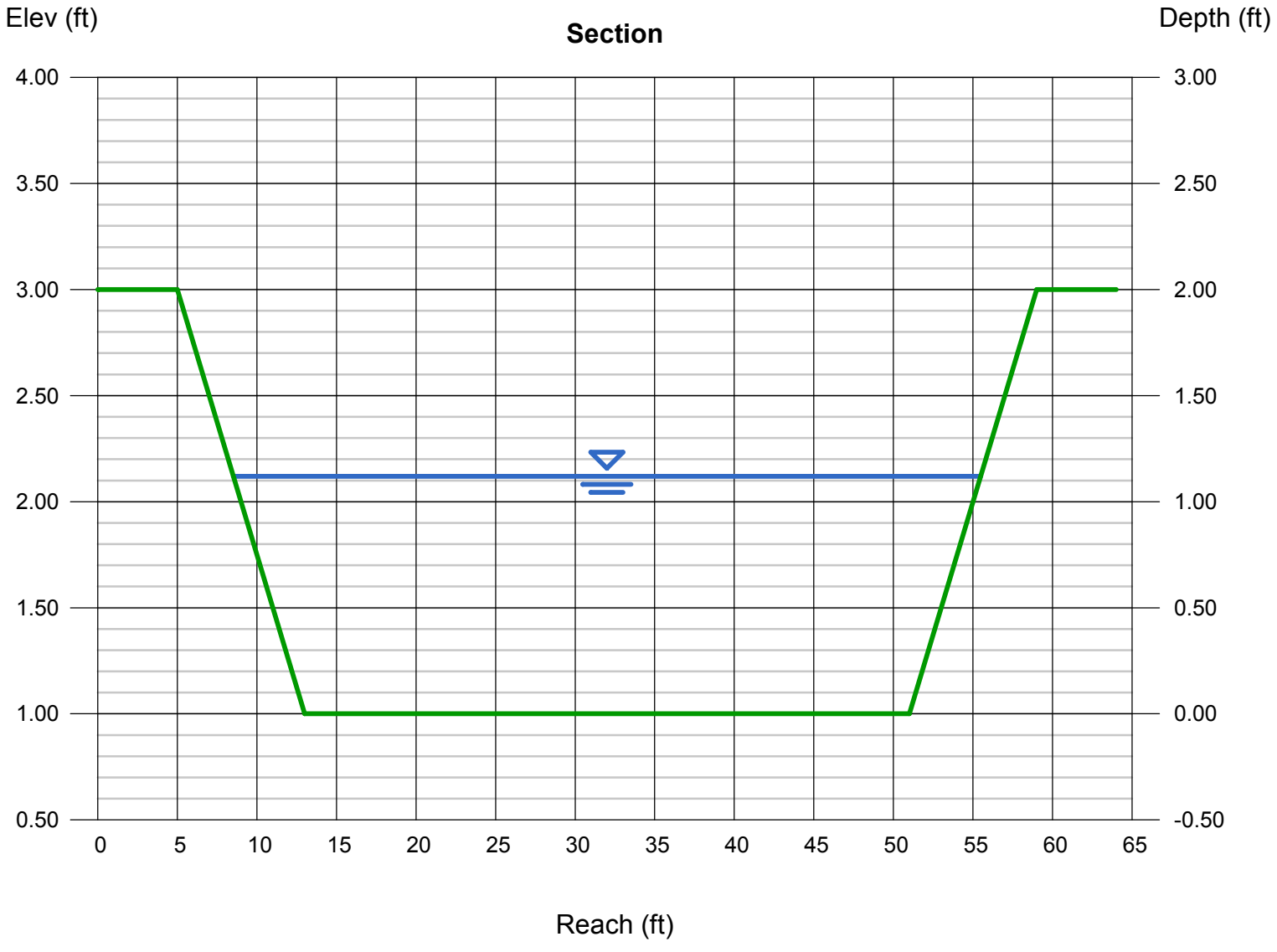
Bottom Width (ft)	= 38.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.58
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 177.00

Highlighted

Depth (ft)	= 1.12
Q (cfs)	= 177.00
Area (sqft)	= 47.58
Velocity (ft/s)	= 3.72
Wetted Perim (ft)	= 47.24
Crit Depth, Yc (ft)	= 0.86
Top Width (ft)	= 46.96
EGL (ft)	= 1.34



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jan 18 2019

East Fork Tributary 1 Reach 2 - Proposed Channel_Velocity

Trapezoidal

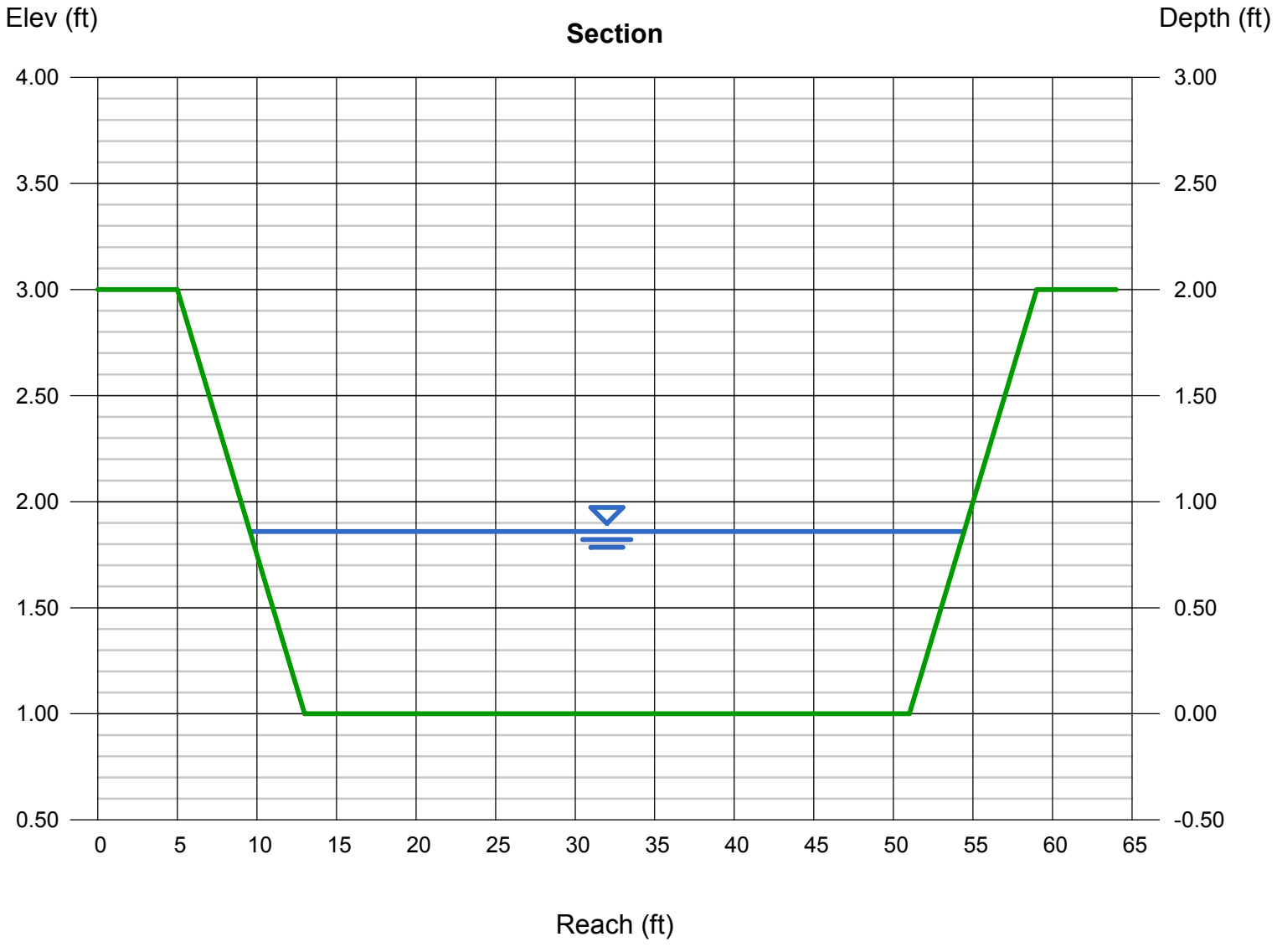
Bottom Width (ft)	= 38.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.58
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 177.00

Highlighted

Depth (ft)	= 0.86
Q (cfs)	= 177.00
Area (sqft)	= 35.64
Velocity (ft/s)	= 4.97
Wetted Perim (ft)	= 45.09
Crit Depth, Yc (ft)	= 0.86
Top Width (ft)	= 44.88
EGL (ft)	= 1.24



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 17 2019

Main Stem Trib 2

Gieck Ranch Tributary 2 - Proposed Channel Section Capacity Check

Trapezoidal

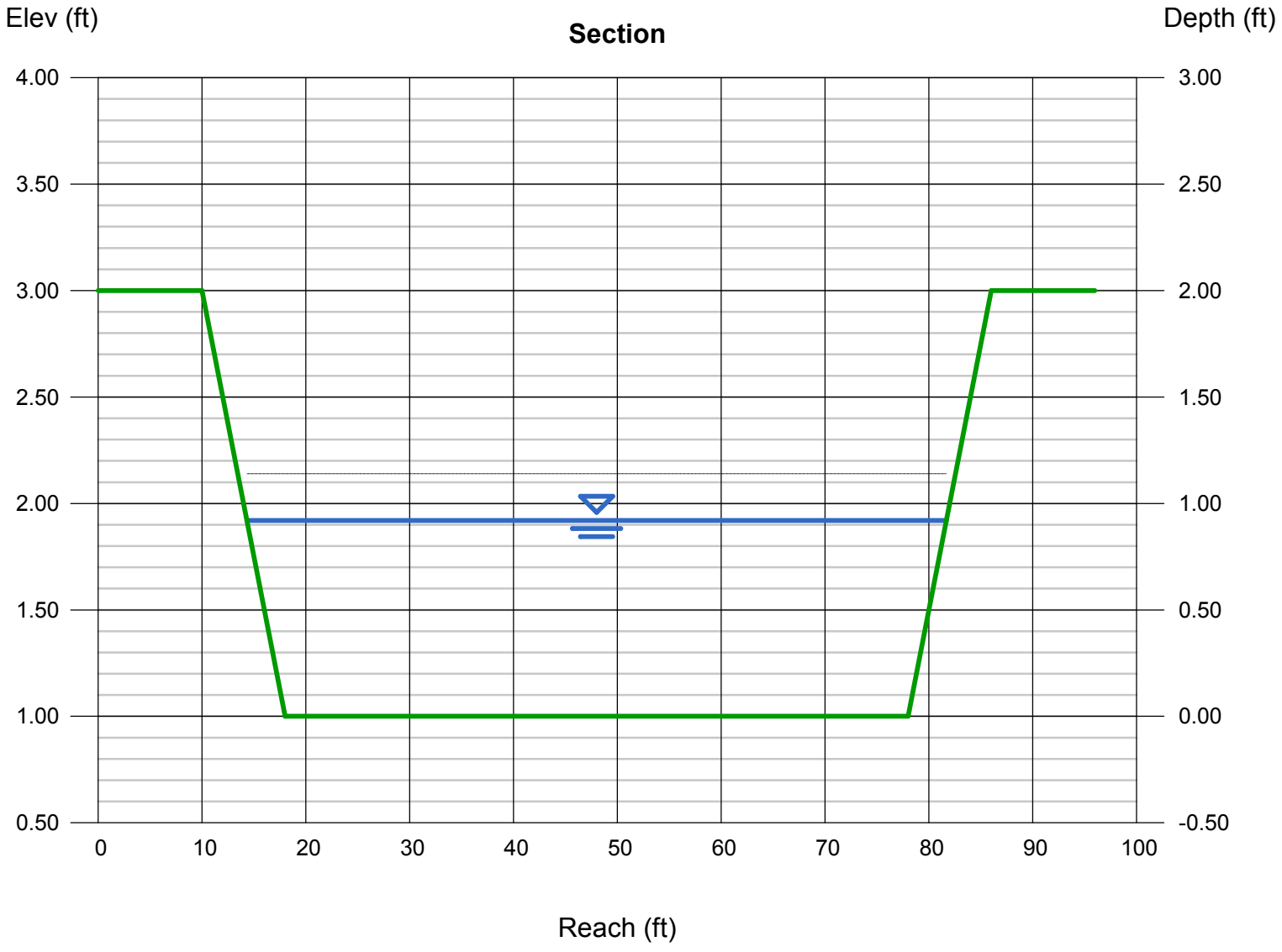
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 220.00

Highlighted

Depth (ft)	= 0.92
Q (cfs)	= 220.00
Area (sqft)	= 58.59
Velocity (ft/s)	= 3.76
Wetted Perim (ft)	= 67.59
Crit Depth, Yc (ft)	= 0.74
Top Width (ft)	= 67.36
EGL (ft)	= 1.14



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 17 2019

Main Stem Trib 2

Gieck Ranch Tributary 2 - Proposed Channel Section Velocity Check

Trapezoidal

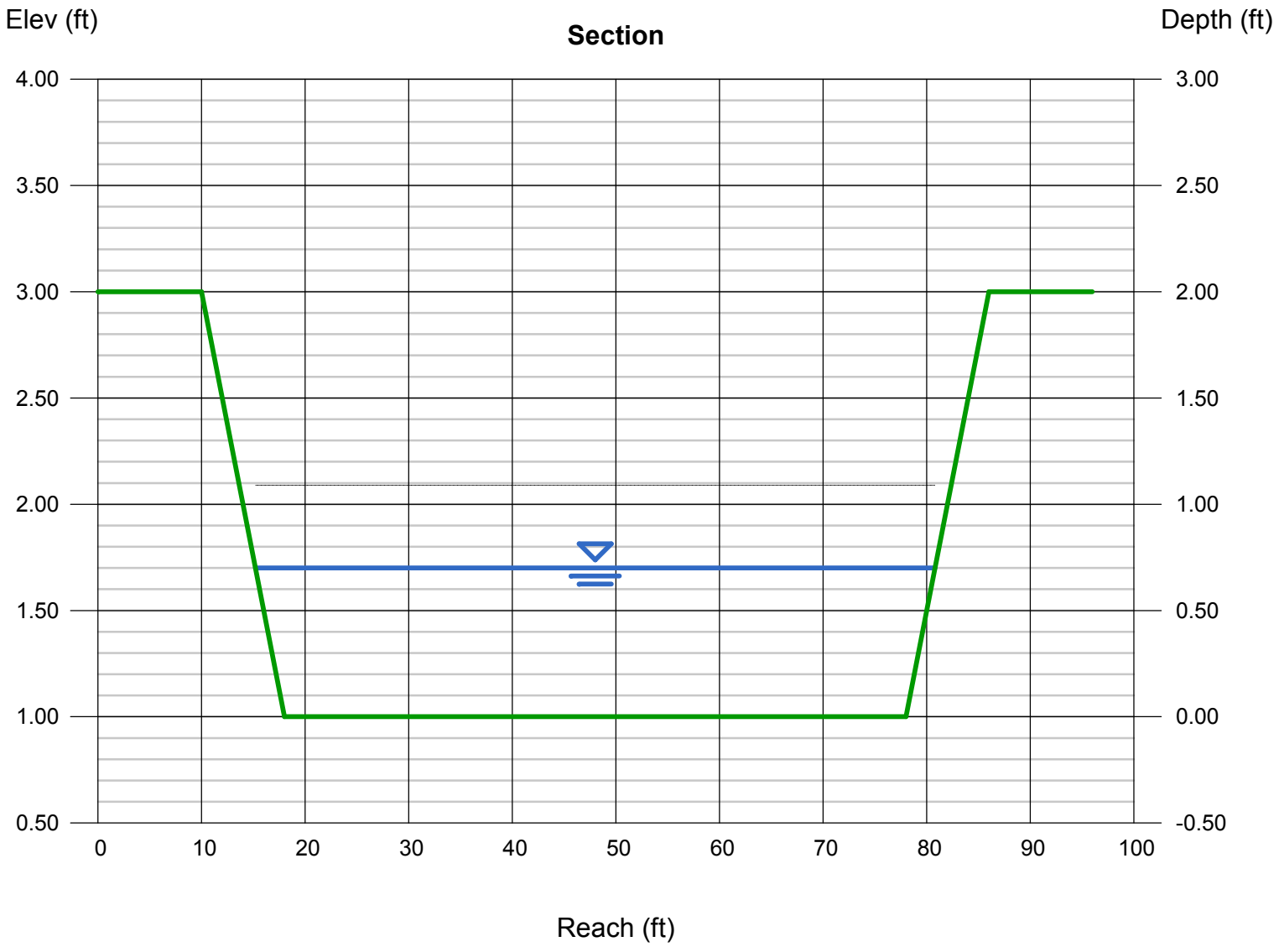
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 220.00

Highlighted

Depth (ft)	= 0.70
Q (cfs)	= 220.00
Area (sqft)	= 43.96
Velocity (ft/s)	= 5.00
Wetted Perim (ft)	= 65.77
Crit Depth, Yc (ft)	= 0.74
Top Width (ft)	= 65.60
EGL (ft)	= 1.09



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 17 2019

Gieck Ranch Tributary 2_Reach 1 - Proposed Channel Section Capacity Check

Main Stem

Trapezoidal

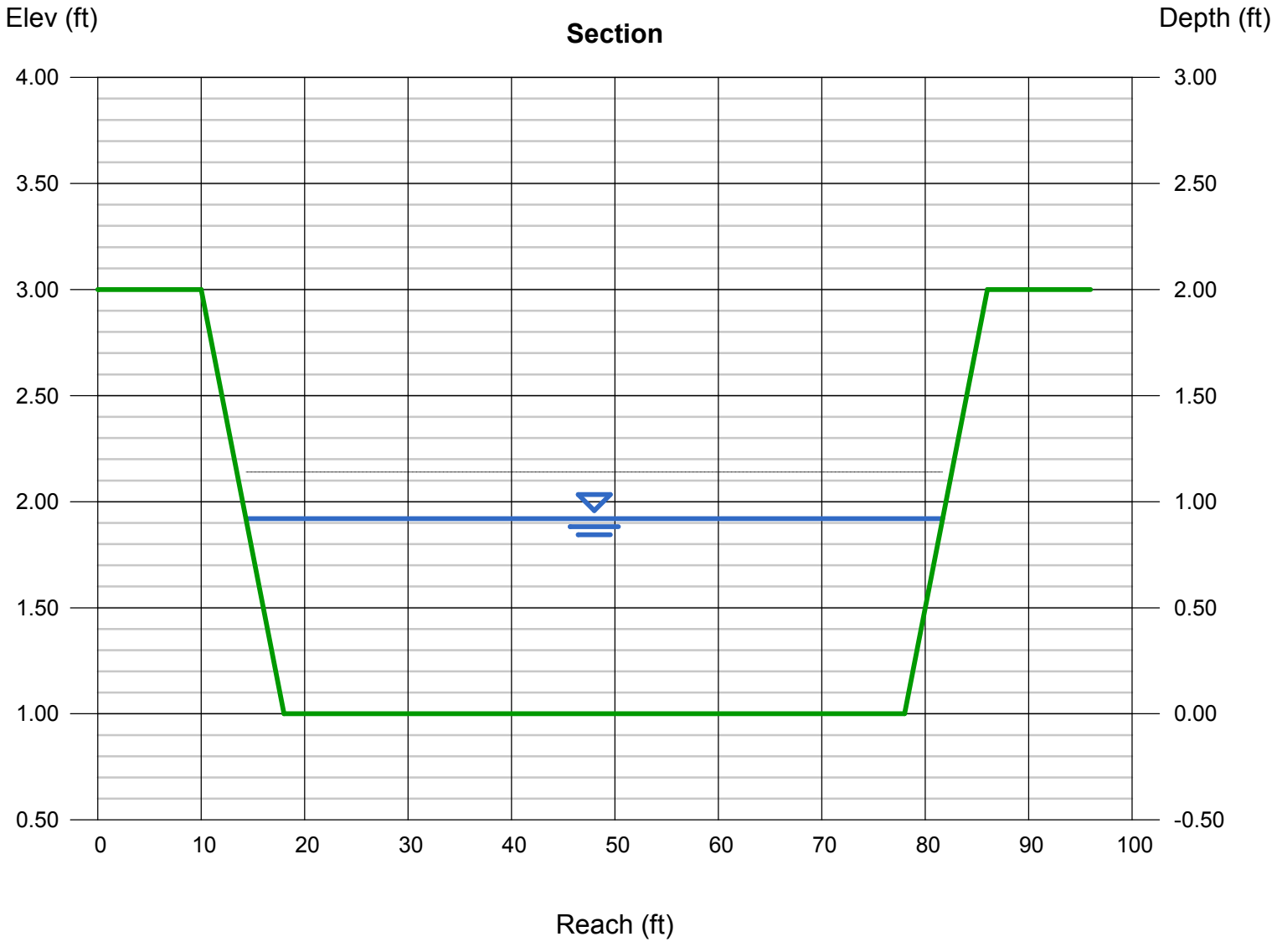
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 220.00

Highlighted

Depth (ft)	= 0.92
Q (cfs)	= 220.00
Area (sqft)	= 58.59
Velocity (ft/s)	= 3.76
Wetted Perim (ft)	= 67.59
Crit Depth, Yc (ft)	= 0.74
Top Width (ft)	= 67.36
EGL (ft)	= 1.14



Channel Report

Gieck Ranch Tributary 2, Reach 1 - Proposed Channel Section Velocity Check

Main Stem

Trapezoidal

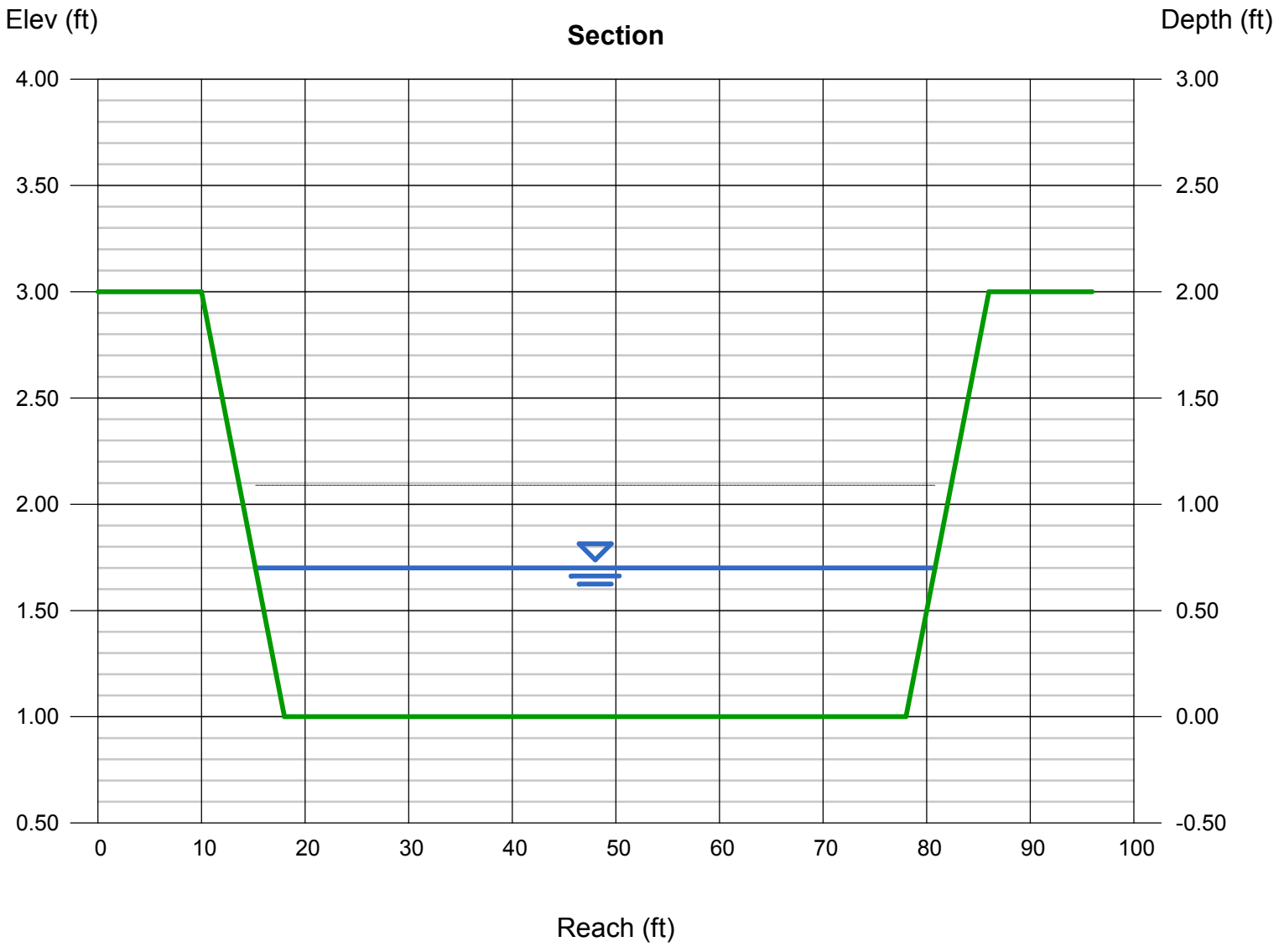
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 220.00

Highlighted

Depth (ft)	= 0.70
Q (cfs)	= 220.00
Area (sqft)	= 43.96
Velocity (ft/s)	= 5.00
Wetted Perim (ft)	= 65.77
Crit Depth, Yc (ft)	= 0.74
Top Width (ft)	= 65.60
EGL (ft)	= 1.09



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 17 2019

Gieck Ranch Tributary 2, Reach 2 - Proposed Channel Section Capacity Check

Main Stem

Trapezoidal

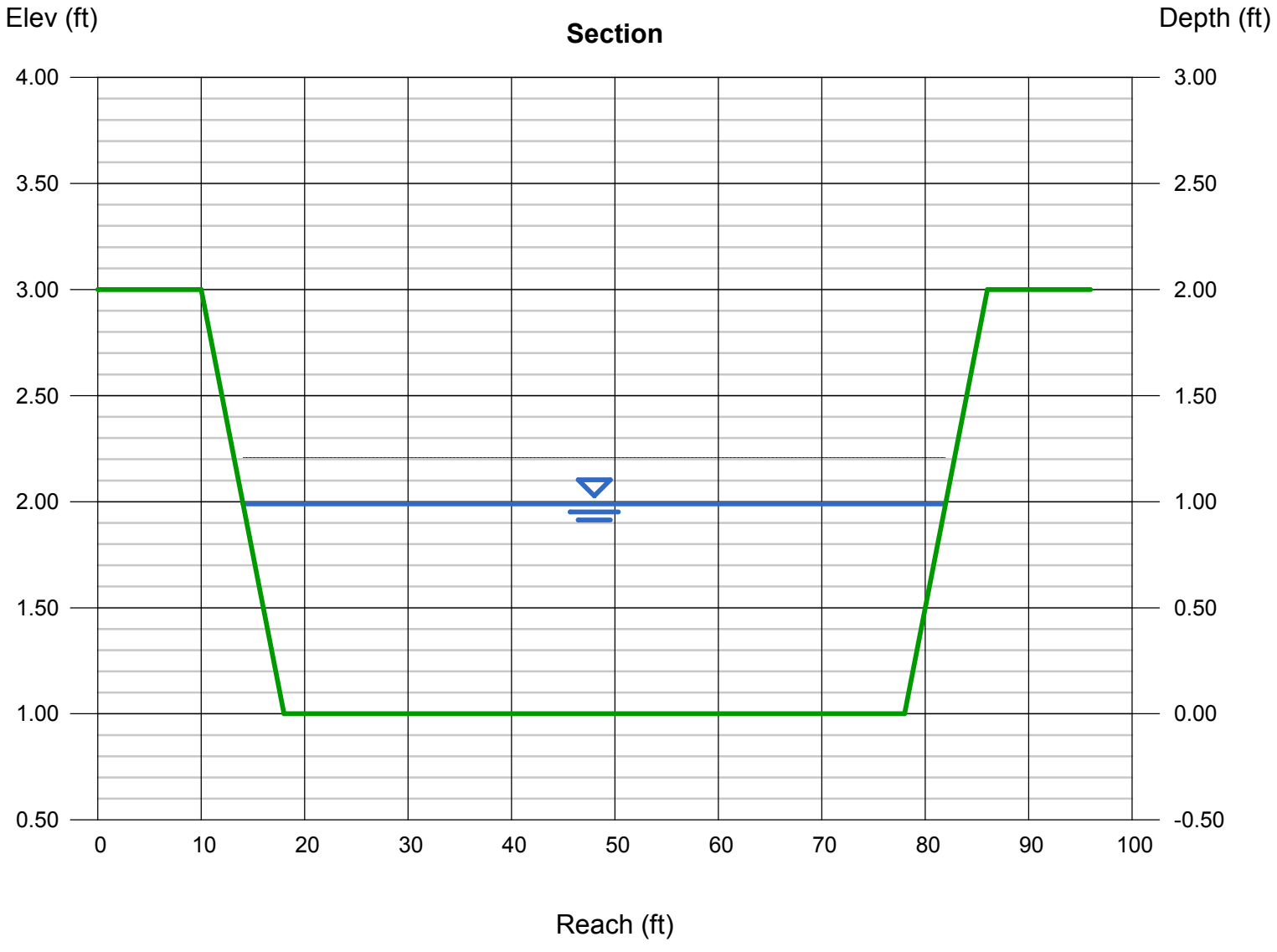
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.80
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 237.00

Highlighted

Depth (ft)	= 0.99
Q (cfs)	= 237.00
Area (sqft)	= 63.32
Velocity (ft/s)	= 3.74
Wetted Perim (ft)	= 68.16
Crit Depth, Yc (ft)	= 0.78
Top Width (ft)	= 67.92
EGL (ft)	= 1.21



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jan 17 2019

Gieck Ranch Tributary 2_Reach 2 - Proposed Channel Section Velocity Check

Main Stem

Trapezoidal

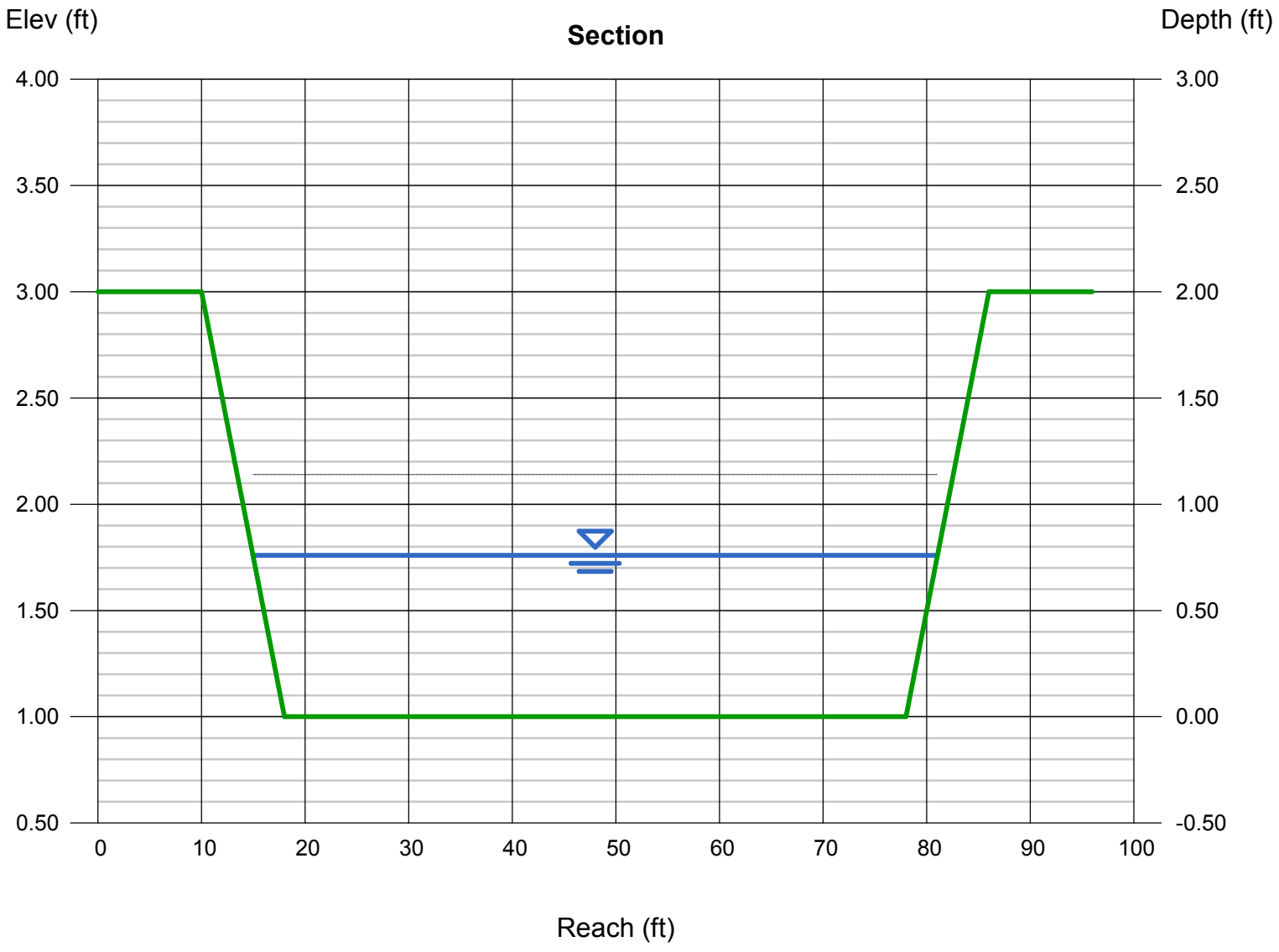
Bottom Width (ft)	= 60.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 1.80
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 237.00

Highlighted

Depth (ft)	= 0.76
Q (cfs)	= 237.00
Area (sqft)	= 47.91
Velocity (ft/s)	= 4.95
Wetted Perim (ft)	= 66.27
Crit Depth, Yc (ft)	= 0.78
Top Width (ft)	= 66.08
EGL (ft)	= 1.14



MASTER DEVELOPMENT DRAINAGE PLAN
MERIDIAN RANCH

OFFSITE FLOWS ONTO GRANDVIEW RESERVE

GRANDVIEW RESERVE

GIECK RANCH
CHMS0400

BENNETT RANCH
CHWS1200

FALCON
CHWS1400

HAEGLER RANCH
CHMS0200

GIECK BASIN
BENNETT BASIN

FUTURE POND B

EXISTING 36" CMP
EXISTING 48" CMP
EXISTING 18" CMP
EXISTING 18" CMP
EXISTING 18" CMP
3-EXISTING 48" RCP'S
EXISTING 48" RCP 24" CMP (PLUGGED)
4-EXISTING 36" RCP'S

29" x18" ARCH CMP
29" x18" ARCH CMP (floats?)
18" CMP
18" CMP
18" CMP
HP
24" CMP
36" CMP
18" CMP
18" CMP
24" CMP

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

LEGEND

- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNARY
- SCS MODEL ID / SIZE ACRES — EB15 / 65 — BASIN IDENTIFICATION
- H8 / B10 — DESIGN POINTS
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL
- 100 YEAR FLOOD PLAIN

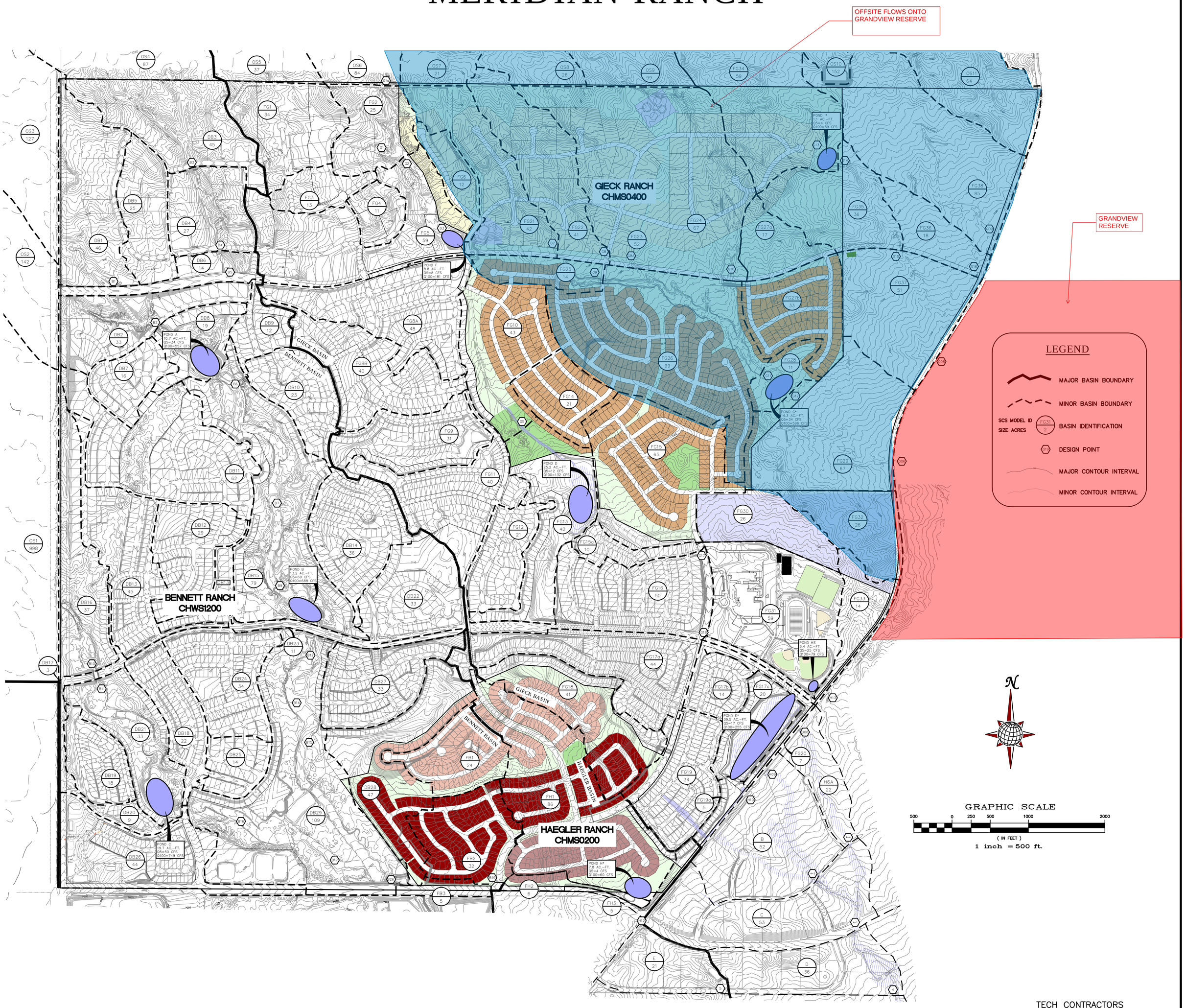
HISTORIC CONDITIONS - SCS MAP

AUG 2017

TECH CONTRACTORS
10305 ANGELES ROAD
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.7608

FIGURE 4

MASTER DEVELOPMENT DRAINAGE PLAN
MERIDIAN RANCH



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

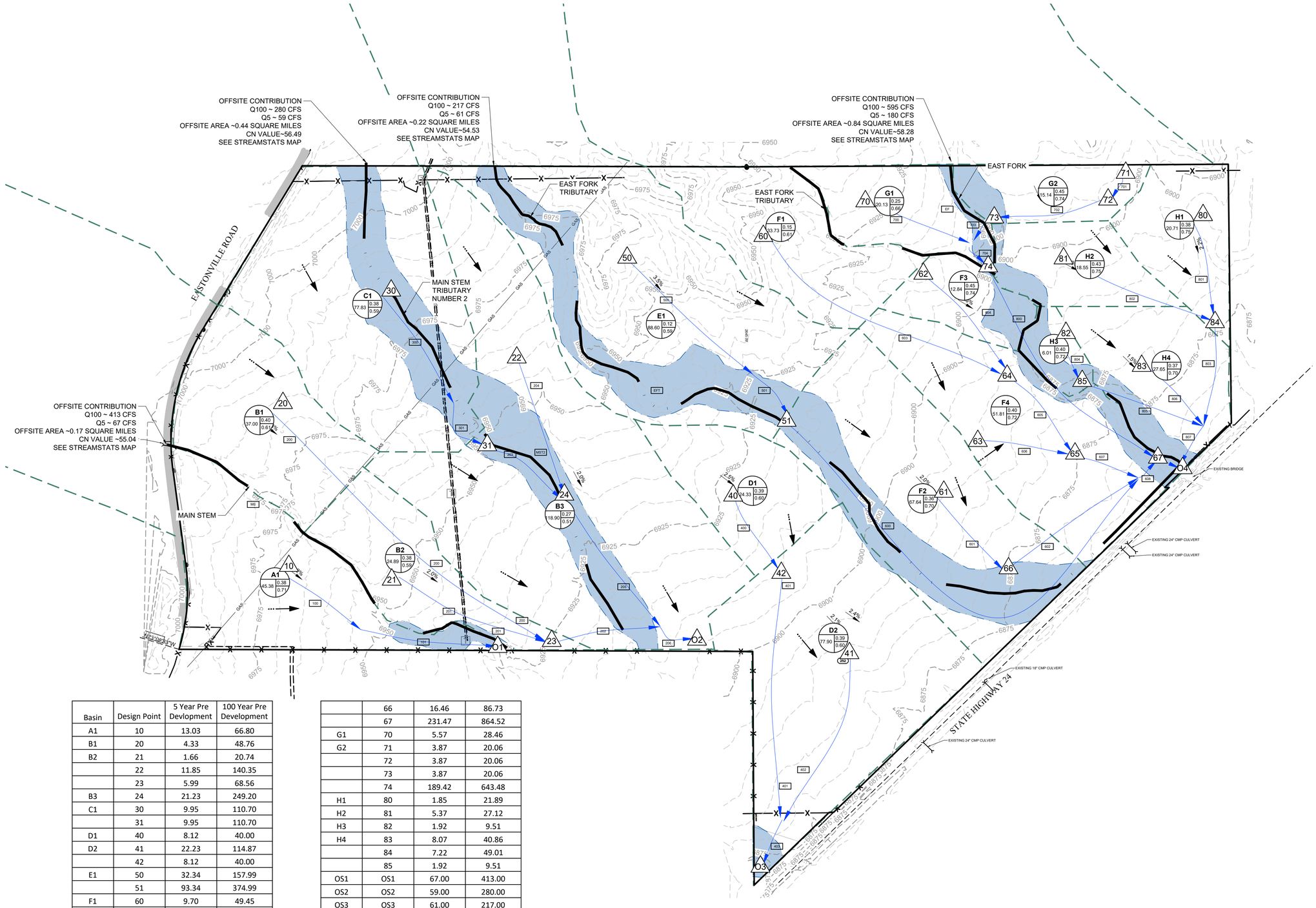
DEVELOPED CONDITIONS - SCS MAP

NOV 2017

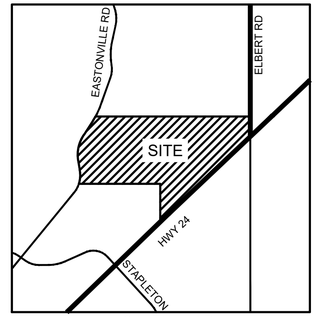
FIGURE 5

TECH CONTRACTORS
10305 ANGELES ROAD
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.7608

Appendix F



Basin	Design Point	5 Year Pre Devlopment	100 Year Pre Development
A1	10	13.03	66.80
B1	20	4.33	48.76
B2	21	1.66	20.74
	22	11.85	140.35
	23	5.99	68.56
B3	24	21.23	249.20
C1	30	9.95	110.70
	31	9.95	110.70
D1	40	8.12	40.00
D2	41	22.23	114.87
	42	8.12	40.00
E1	50	32.34	157.99
	51	93.34	374.99
F1	60	9.70	49.45
F2	61	16.46	86.73
F3	62	3.65	18.42
F4	63	12.98	67.82
	64	13.35	67.87
	65	26.04	135.62
	66	16.46	86.73
	67	231.47	864.52
G1	70	5.57	28.46
G2	71	3.87	20.06
	72	3.87	20.06
	73	3.87	20.06
	74	189.42	643.48
H1	80	1.85	21.89
H2	81	5.37	27.12
H3	82	1.92	9.51
H4	83	8.07	40.86
	84	7.22	49.01
	85	1.92	9.51
OS1	OS1	67.00	413.00
OS2	OS2	59.00	280.00
OS3	OS3	61.00	217.00
OS4	OS4	180.00	595.00
	Outfall1	80.03	479.80
	Outfall2	85.96	597.41
	Outfall3	30.00	154.35
	Outfall4	341.05	1335.77



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) BASIN DESIGNATION; AREA (AC.) XX C5, XX C100

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

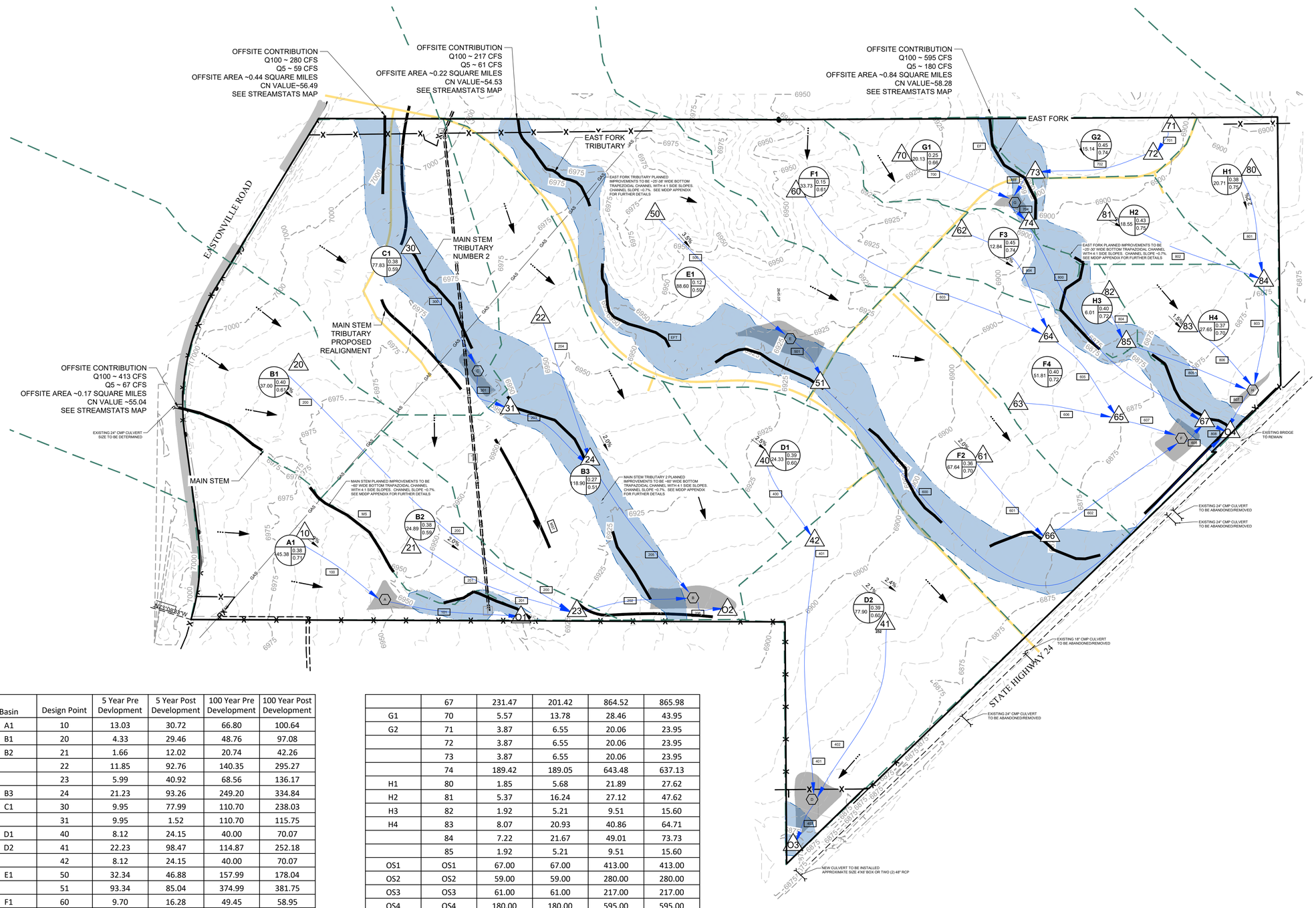
0 200 100

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

EXISTING EX1

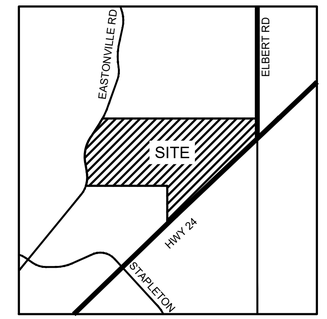
FIG.EX1



Basin	Design Point	5 Year Pre Devlopment	5 Year Post Development	100 Year Pre Development	100 Year Post Development
A1	10	13.03	30.72	66.80	100.64
B1	20	4.33	29.46	48.76	97.08
B2	21	1.66	12.02	20.74	42.26
	22	11.85	92.76	140.35	295.27
	23	5.99	40.92	68.56	136.17
B3	24	21.23	93.26	249.20	334.84
C1	30	9.95	77.99	110.70	238.03
	31	9.95	1.52	110.70	115.75
D1	40	8.12	24.15	40.00	70.07
D2	41	22.23	98.47	114.87	252.18
	42	8.12	24.15	40.00	70.07
E1	50	32.34	46.88	157.99	178.04
	51	93.34	85.04	374.99	381.75
F1	60	9.70	16.28	49.45	58.95
F2	61	16.46	60.11	86.73	170.90
F3	62	3.65	11.36	18.42	32.93
F4	63	12.98	42.32	67.82	124.89
	64	13.35	26.88	67.87	90.88
	65	26.04	69.12	135.62	215.63
	66	16.46	60.11	86.73	170.90

	67	231.47	201.42	864.52	865.98
G1	70	5.57	13.78	28.46	43.95
G2	71	3.87	6.55	20.06	23.95
	72	3.87	6.55	20.06	23.95
	73	3.87	6.55	20.06	23.95
	74	189.42	189.05	643.48	637.13
H1	80	1.85	5.68	21.89	27.62
H2	81	5.37	16.24	27.12	47.62
H3	82	1.92	5.21	9.51	15.60
H4	83	8.07	20.93	40.86	64.71
	84	7.22	21.67	49.01	73.73
	85	1.92	5.21	9.51	15.60
OS1	OS1	67.00	67.00	413.00	413.00
OS2	OS2	59.00	59.00	280.00	280.00
OS3	OS3	61.00	61.00	217.00	217.00
OS4	OS4	180.00	180.00	595.00	595.00
	Outfall1	80.03	67.69	479.80	466.95
	Outfall2	85.96	61.68	597.41	536.11
	Outfall3	30.00	8.58	154.35	160.70*
	Outfall4	341.05	276.10	1335.77	1291.25

*THIS VALUE IS HIGHER THAN PRE-EXISTING AND WILL BE ADJUSTED TO MEET CRITERIA WITH THE PRELIMINARY DRAINAGE REPORT



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) — BASIN DESIGNATION; AREA (AC.) (XX) C5 (XX) C100

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

PRELIMINARY CHANNEL GEOMETRY (BY OTHERS)

MAIN STEM
BOTTOM WIDTH: 60'
SIDE SLOPES: 4:1

MAIN STEM TRIBUTARY 2
BOTTOM WIDTH: 60'
SIDE SLOPES: 4:1

EAST FORK TRIBUTARY 1 REACH 2
BOTTOM WIDTH: 38'
SIDE SLOPES: 4:1

EAST FORK TRIBUTARY 1 REACH 1
BOTTOM WIDTH: 25'
SIDE SLOPES: 4:1

NORTH
0 400
200

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR1

FIG.DR1

IGEL, TREVOR, 4/16/2020 2:53 PM

EASTONVILLE ROAD

EAST FORK TRIBUTARY

MAIN STEM TRIBUTARY NUMBER 2

MAIN STEM TRIBUTARY PROPOSED REALIGNMENT

SEE DR3

SEE SHEET DR3

SEE SHEET DR5

234

30

C1

77.83 | 0.36 | 0.50

300

234

177

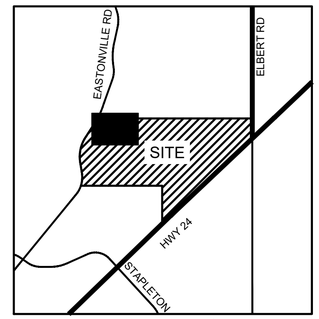
22

2.6%

2.2%

2.3%

GAS



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION — A
- POTENTIAL WATER QUALITY LOCATION — WQ
- SWMM CONVEYANCE ELEMENT — SWMM
- PROPOSED PEAK FLOW RATE (CFS) — 850
- DESIGN POINT — X
- PROPOSED BASIN LABEL — XX (BASIN DESIGNATION); AREA (AC.) XX | XX (% IMPERVIOUSNESS)

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 100

50

HRGreen

Job No.:	191897.01
Prepared By:	CMM
Date:	4/9/2020

PROPOSED DR2

FIG.DR2

HRGreen DRAWING PATH:\\hrgreen.com\HRG\Data\2019\191897.01\CAD\Dwgs\Exhibits\00-Drainage Basins.dwg

SEE SHEET DR2

SEE SHEET DR4

SEE SHEET DR6

E1
88.60
0.15
0.52

50

178

F1
33.73
0.19
0.54

59

60

3.1%

G1
20.13
0.28
0.60

70

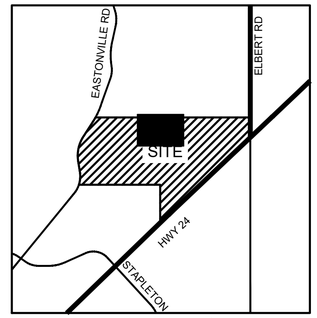
500

178

2645.09'

EAST FORK TRIBUTARY

Pond E
Tributary Area: 88.60
WQ Vol: 0.81 ac-ft
EURV Vol: 1.70 ac-ft
5 Year Vol: 1.99 ac-ft
100 Year Vol: 2.91 ac-ft



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX / AREA (AC.) / XX XX / BASIN DESIGNATION / % IMPERVIOUSNESS)

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 50 100

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR3

FIG.DR3

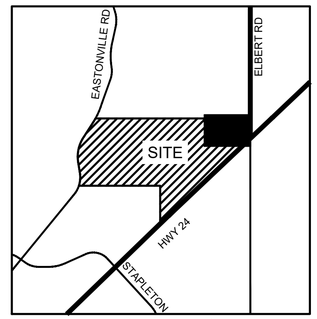
SEE SHEET DR3

EAST FORK

Pond G
Tributary Area: 35.27
WQ Vol: 0.47 ac-ft
EURV Vol: 1.15 ac-ft
5 Year Vol: 1.24 ac-ft
100 Year Vol: 1.85 ac-ft

G2	0.19	
15.14	0.54	
H1	0.15	
20.71	0.30	
H2	0.35	
18.55	0.63	
F3	0.42	
12.84	0.64	
H3	0.32	
6.01	0.61	
H4	0.30	
27.65	0.60	

SEE SHEET DR7



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION
- POTENTIAL WATER QUALITY LOCATION
- SWMM CONVEYANCE ELEMENT
- PROPOSED PEAK FLOW RATE (CFS)
- DESIGN POINT
- PROPOSED BASIN LABEL (XX / AREA (AC.) XX XX % IMPERVIOUSNESS / BASIN DESIGNATION)

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 100
50

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR4

FIG.DR4

SEE SHEET DR2

EASTONVILLE ROAD

97

20

B1
37.00 | 0.31 | 0.46

2.3%

200

97

MAIN STEM TRIBUTARY NUMBER 2

Pond C
Tributary Area: 77.63
WQ Vol: 1.36 ac-ft
EURV Vol: 4.79 ac-ft
5 Year Vol: 4.07 ac-ft
100 Year Vol: 6.91 ac-ft

C

114

301

T

200

97

B2
24.89 | 0.39 | 0.44

21

MAIN STEM

101

10

2.4%

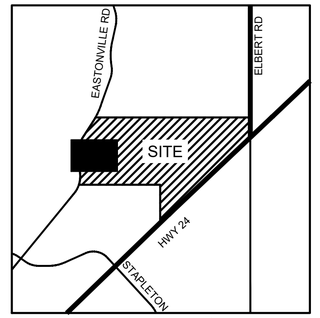
2.2%

A1
45.38 | 0.27 | 0.59

2.0%

SEE SHEET DR6

SEE SHEET DR9



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) BASIN DESIGNATION; AREA (AC.) (XX) | (XX) % IMPERVIOUSNESS

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 100
50

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR5

FIG.DR5

SEE SHEET DR3

SEE SHEET DR5

SEE SHEET DR7

SEE SHEET DR10

EAST FORK TRIBUTARY

MAIN STEM TRIBUTARY NUMBER 2

204
77

203
114

205
267

501
165

401
69

400
70

E

31

24

B3
118.90 | 0.15 | 0.30

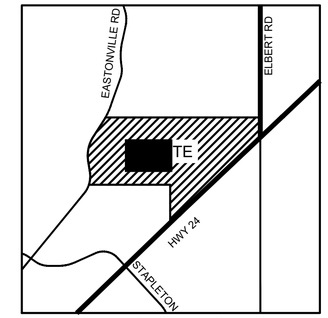
51

40
70

D1
24.33 | 0.31 | 0.46

42

2.0%
1.6%
1.5%
2.5%



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) — BASIN DESIGNATION; AREA (AC.) (XX) | % IMPERVIOUSNESS (XX)

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 100
50

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR6

FIG.DR6

SEE SHEET DR2

SEE SHEET DR3

SEE SHEET DR6

SEE SHEET DR8

SEE SHEET DR11

EAST FORK TRIBUTARY

EAST FORK

EAST FORK TRIBUTARY

64

63

65

66

61

85

F4
51.81 | 0.11 | 0.50

F2
67.64 | 0.41 | 0.67

605 | 91

606 | 74

607 | 162

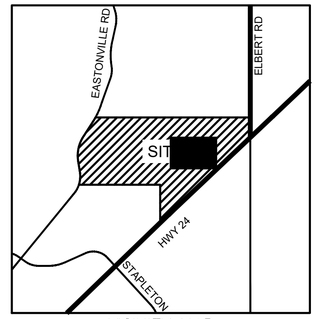
600 | 164

601 | 171

602 | 171

Pond F
Tributary Area: 165.72
WQ Vol: 2.62 ac-ft
EURV Vol: 5.94 ac-ft
5 Year Vol: 6.82 ac-ft
100 Year Vol: 10.70 ac-ft

1.9%
2.0%
2.3%



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100–YR FLOODWAY
- EXISTING 100–YR FLOODPLAIN
- PROPOSED 100–YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION — A
- POTENTIAL WATER QUALITY LOCATION — WQ
- SWMM CONVEYANCE ELEMENT — SWMM
- PROPOSED PEAK FLOW RATE (CFS) — 850
- DESIGN POINT — X
- PROPOSED BASIN LABEL — XX (BASIN DESIGNATION); AREA (AC.) XX | XX (% IMPERVIOUSNESS)

LAND USE
- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 50 100

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR7

FIG.DR7

SEE SHEET DR3

SEE SHEET DR7

SEE SHEET DR11

82

H3
6.01 | 0.32 / 0.61

83

H4
27.65 | 0.30 / 0.60

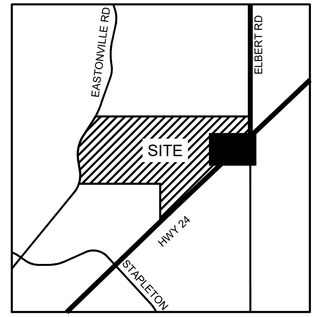
85

F4
51.81 | 0.11 / 0.50

EAST FORK

605
91
606
74
607
162
65
805
15
807
80
H
Pond H
Tributary Area: 72.92
WQ Vol: 1.03 ac-ft
EURV Vol: 2.73 ac-ft
5 Year Vol: 2.90 ac-ft
100 Year Vol: 4.65 ac-ft
67
258
808
218
608
F
Pond F
Tributary Area: 165.72
WQ Vol: 2.62 ac-ft
EURV Vol: 5.94 ac-ft
5 Year Vol: 6.82 ac-ft
100 Year Vol: 10.70 ac-ft
O4
467
602
171
2.3%
EAST FORK TRIBUTARY

6880 6875 6870 6865 6885



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
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- EXISTING MAJOR CONTOUR — 5250
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- PROPOSED BASIN LABEL (XX / AREA (AC.) XX XX % IMPERVIOUSNESS)

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NOTES:

NORTH

0 50 100

HRGreen

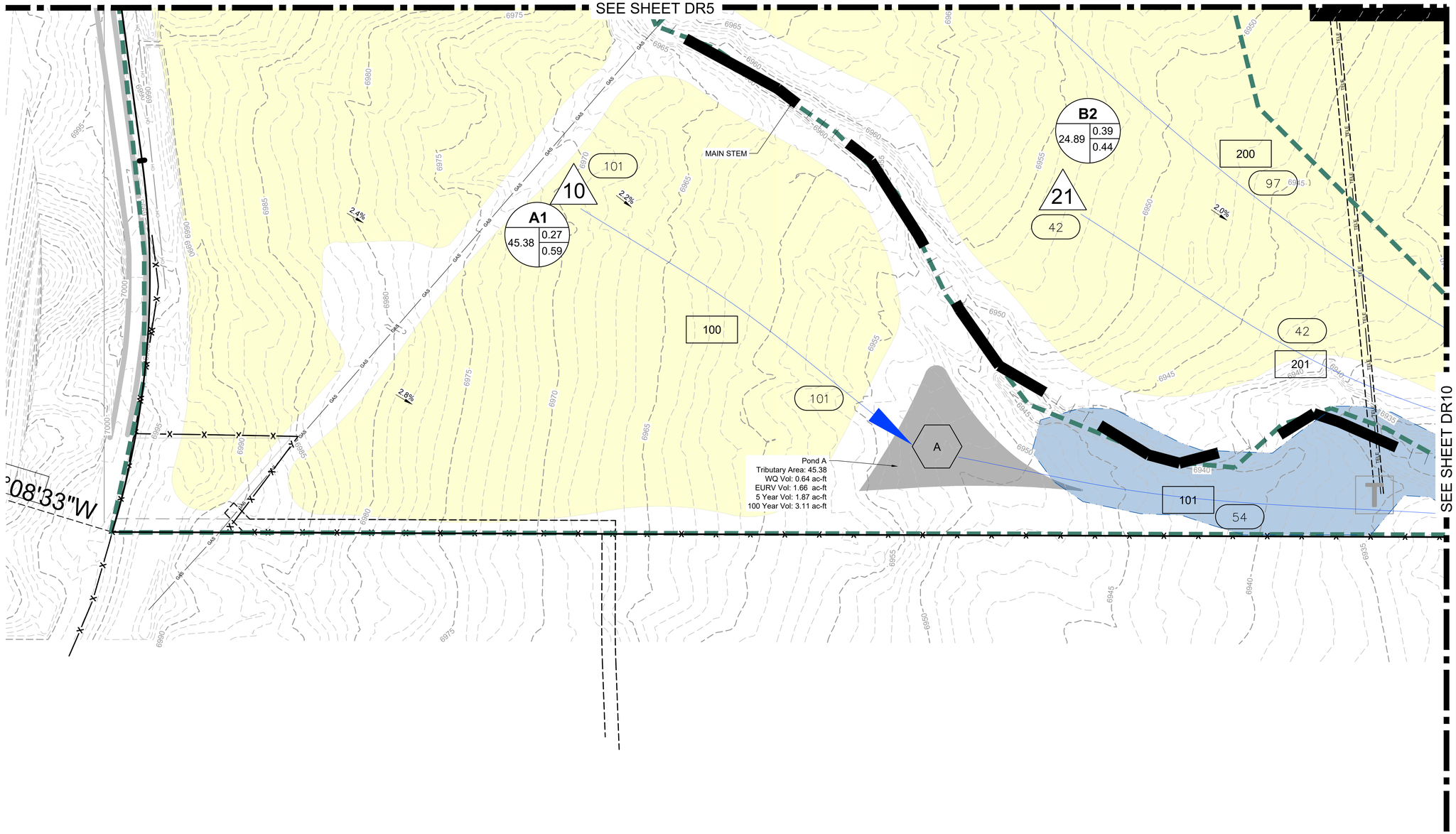
Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

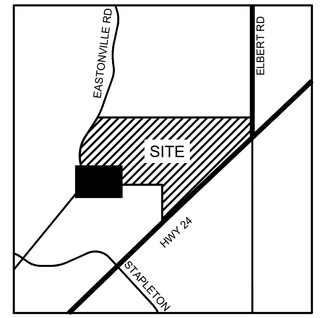
PROPOSED DR8

FIG.DR8

SEE SHEET DR5

SEE SHEET DR10





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- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
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- PROPOSED DRAINAGE CHANNEL
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- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) — BASIN DESIGNATION; AREA (AC.) XX | XX % IMPERVIOUSNESS

LAND USE

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- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 100

50

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR9

FIG.DR9

SEE SHEET DR6

SEE SHEET DR9

SEE SHEET DR11

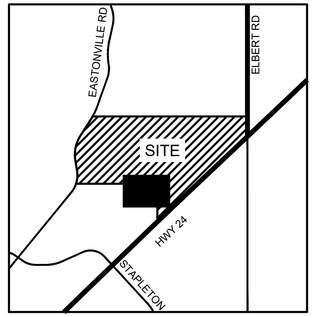
MAIN STEM TRIBUTARY NUMBER 2

Pond B
Tributary Area: 180.79
WQ Vol: 2.41 ac-ft
EURV Vol: 5.73 ac-ft
5 Year Vol: 6.04 ac-ft
100 Year Vol: 15.28 ac-ft

205
267
200
42
97
202
401
69
402
252

O1
O2
23

1.5%
2.2%
1.8%
1.7%



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
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- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
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- WATERSHED BOUNDARY
- MAJOR BASIN LINE
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- PROPOSED DETENTION LOCATION (A)
- POTENTIAL WATER QUALITY LOCATION (WQ)
- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX) — BASIN DESIGNATION; AREA (AC.) (XX) (XX) % IMPERVIOUSNESS

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH

0 50 100

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR10

FIG.DR10

SEE SHEET DR8

SEE SHEET DR10

STATE HIGHWAY 24

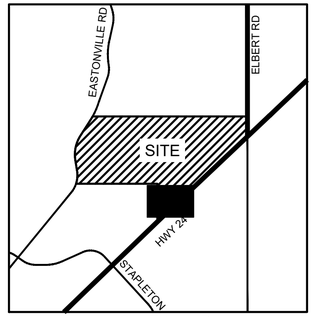
D2
77.90 | 0.47 | 0.60

41
252

402
252
401
69

Pond D
Tributary Area: 102.23
WQ Vol: 1.96 ac-ft
EURV Vol: 6.56 ac-ft
5 Year Vol: 6.59 ac-ft
100 Year Vol: 10.13 ac-ft

D
161
403
O3
161



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION (A)
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- SWMM CONVEYANCE ELEMENT (SWMM)
- PROPOSED PEAK FLOW RATE (CFS) (850)
- DESIGN POINT (X)
- PROPOSED BASIN LABEL (XX / AREA (AC.) XX XX / % IMPERVIOUSNESS)

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

NORTH
0 100
50

HRGreen

Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR11

FIG.DR11

EXHIBIT M: FEMA FLOODPLAIN MAPPING

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.

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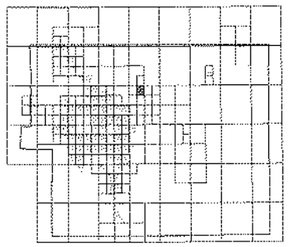
El Paso County Vertical Datum Offset Table

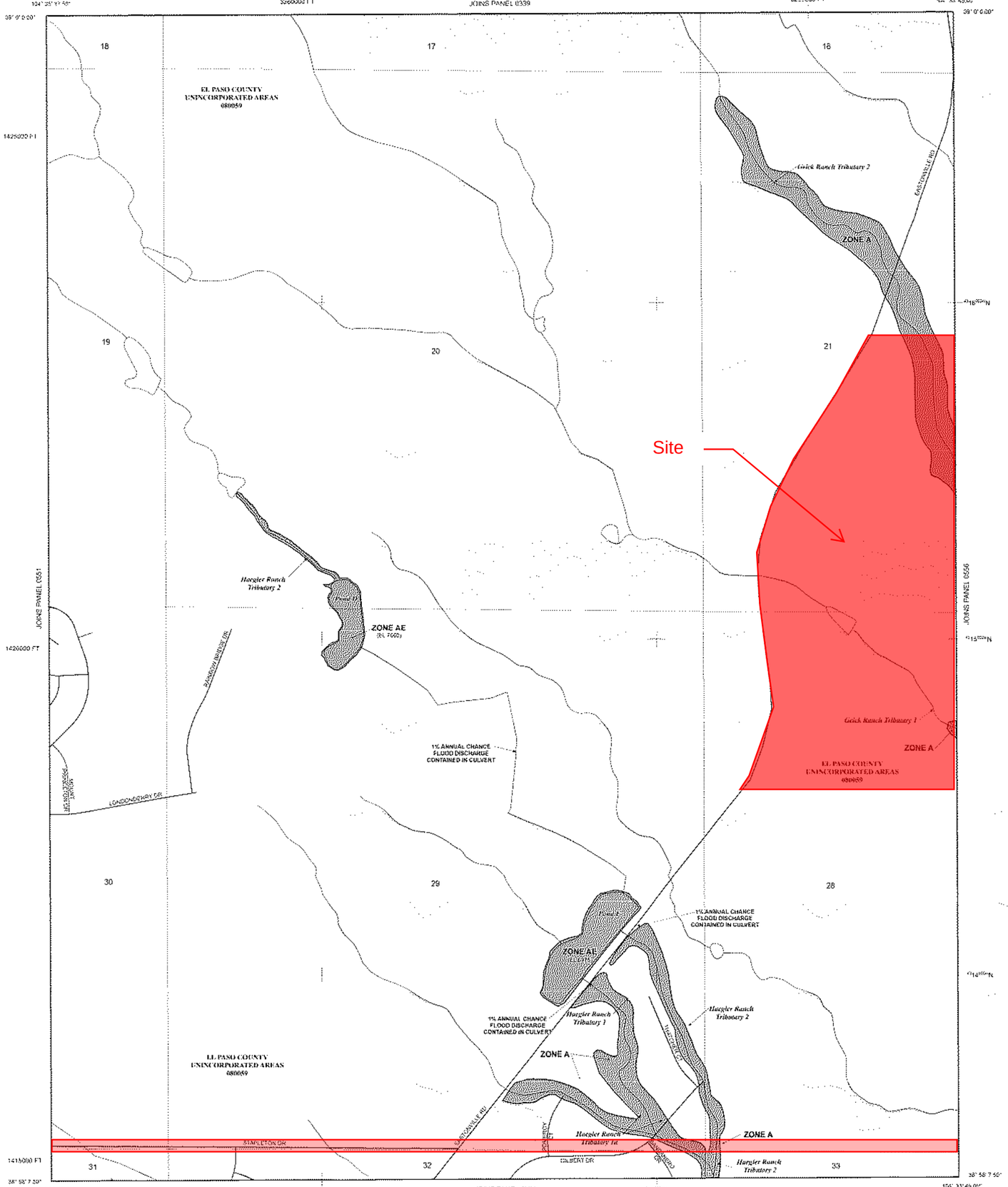
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



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 957) — 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)
4319000m N — 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

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.

NFIP

PANEL 0552G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 552 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0552	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
08041C0552G

MAP REVISED

possible updates or additional flood hazard information.

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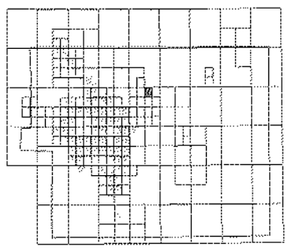
El Paso County Vertical Datum Offset Table

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



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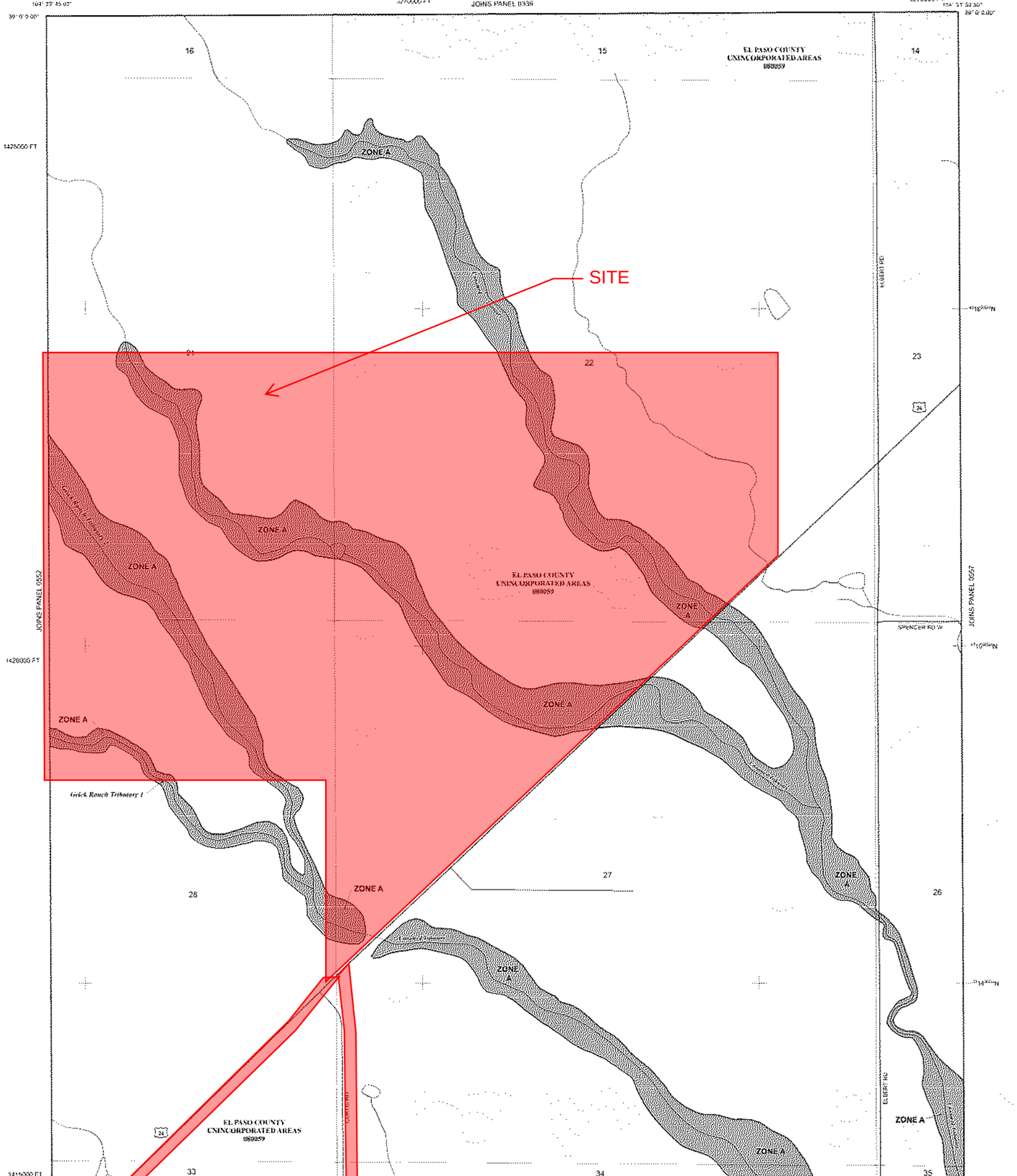


The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, 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
- 6250000 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

PANEL 0556G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 556 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0556	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
08041C0556G

MAP REVISED

possible updates 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, NNGS12
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.

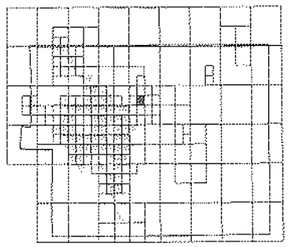
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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

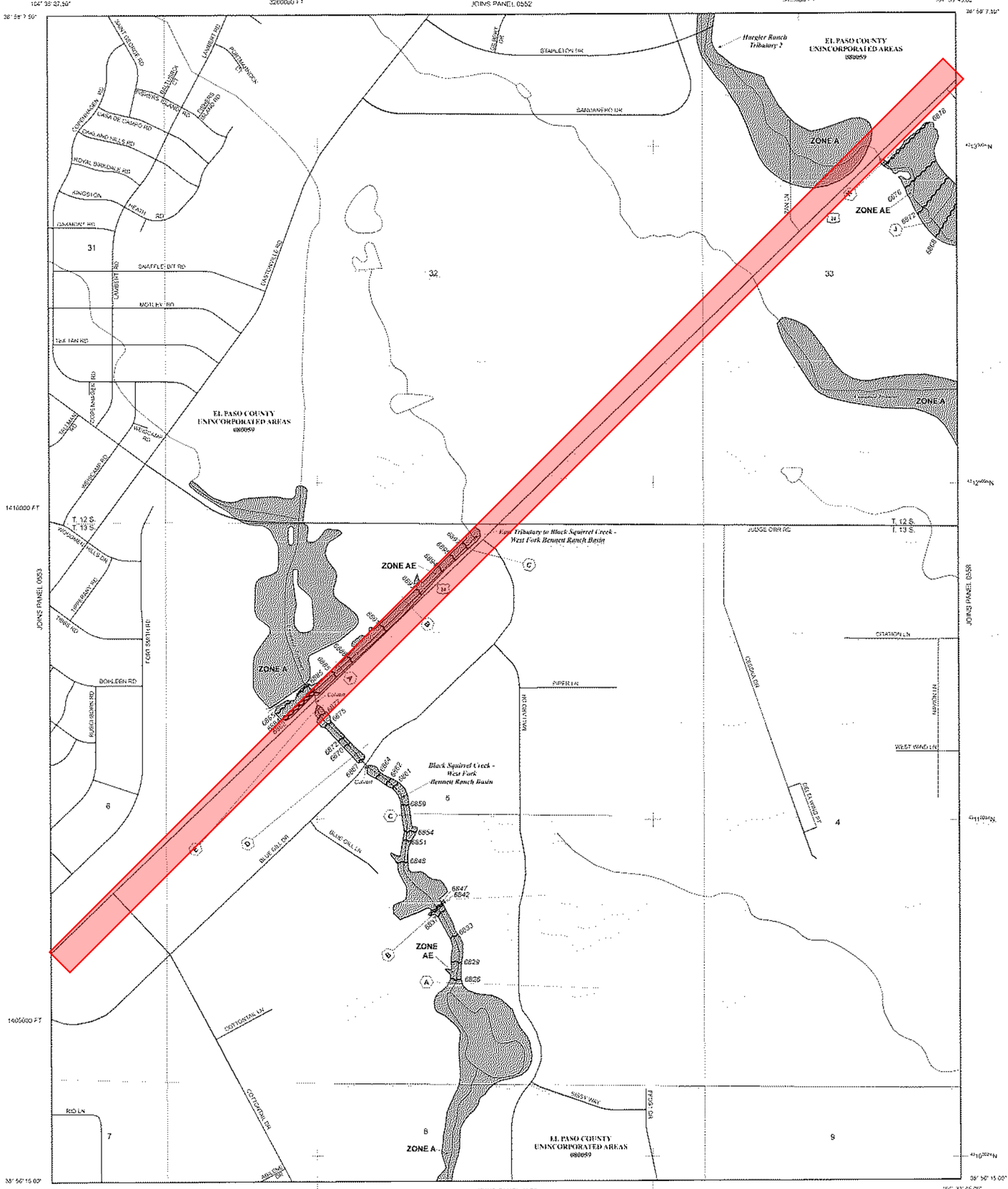
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



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 generally 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)

4320000mN — 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" = 600'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0554G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 554 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0554	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
08041C0554G

MAP REVISED

possible updates 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.

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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:

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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.

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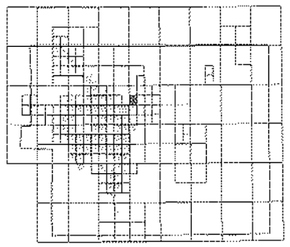
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

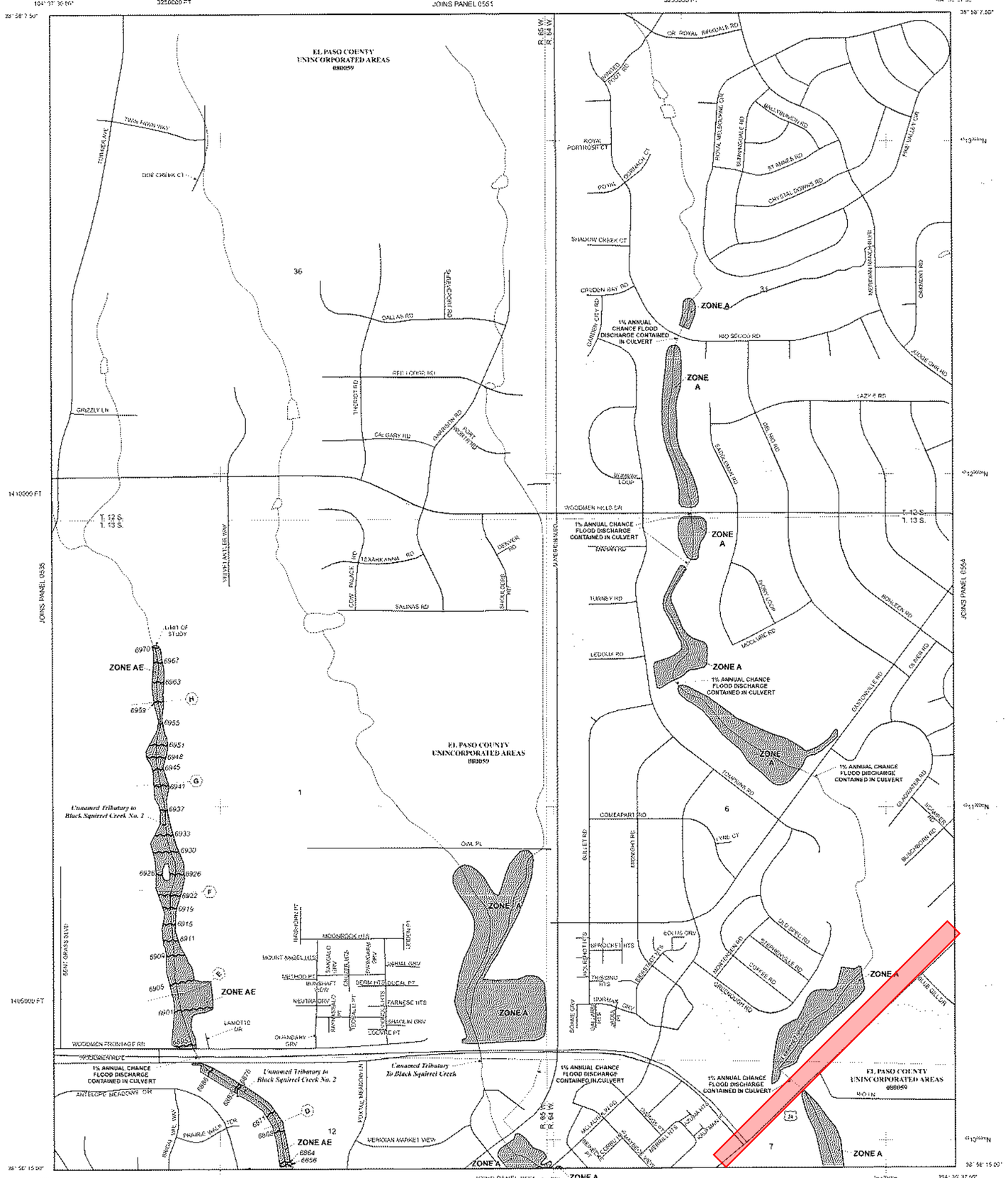
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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.



FLOOD INSURANCE RATE MAP

This FIRM panel was printed from FEMA's Map Service Center and may not include all maps, text, or updates published for this jurisdiction. Please see the Publication Info for this panel to determine if updates have occurred after this panel was printed.

PANEL 0553G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 553 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	G

Notice: This map was revised on 12/7/2018 to make a correction. This version replaces any previous versions. See the Notice to User Letter that accompanied this correction for details.

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
08041C0553G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

This 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.
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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
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- 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
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- 97° 07' 30.00", 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000 mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
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- 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

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.

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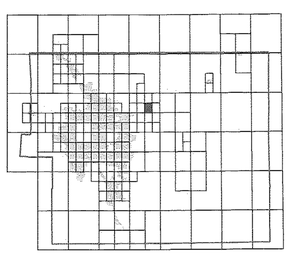
El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

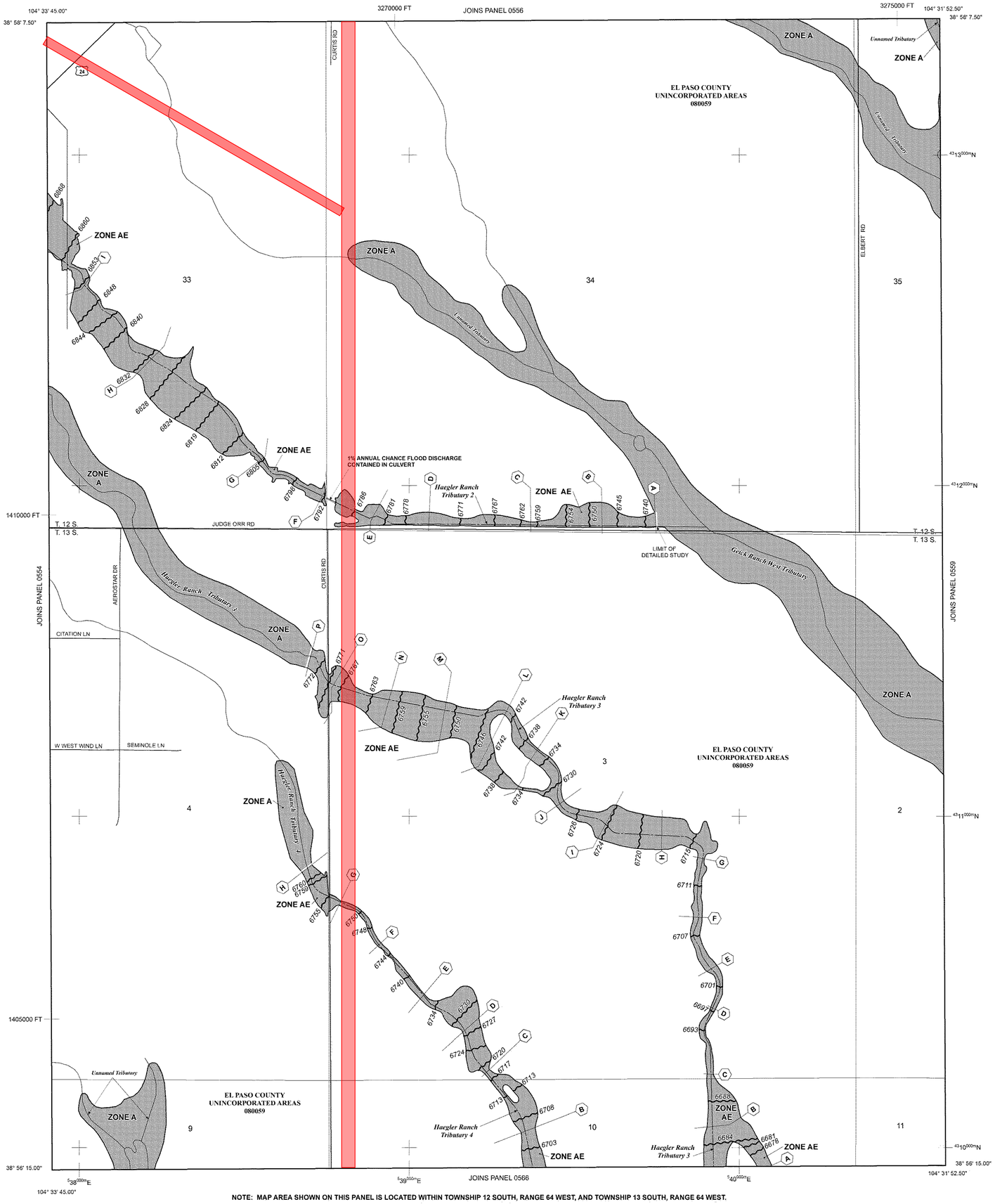
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

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 12 SOUTH, RANGE 64 WEST, AND TOWNSHIP 13 SOUTH, RANGE 64 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 0558G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 558 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0558	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
08041C0558G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

EXHIBIT N: COLORADO PARKS & WILDLIFE CORRESPONDENCE

MEMO

To:	El Paso County
From:	HR Green
Subject:	Colorado Parks and Wildlife Exhibit
Project Number:	201662
Date:	August 4, 2021

Regarding Exhibit N of the 1041 Permit, please consult the following document as evidence of Correspondence with Colorado Parks and Wildlife. HR Green is in communication with Wildlife Manager, Aaron Berscheid. Based on discussions with Aaron Berscheid, further comments regarding Grandview Development will be provided upon referral of the PUD/PD from El Paso County to Colorado Parks and Wildlife, but the general recommendations contained withing the following documents for Waterbury (the property directly south of Grandview Reserve) also apply to the Grandview Reserve property. Thank you for your consideration.

COLORADO
Parks and Wildlife
Department of Natural Resources

Area 14, Southeast Region
4255 Sinton Road
Colorado Springs, CO 80907
P 719.227.5200 | F 719.227.5264

August 12, 2020

El Paso County
ATTN: Kari Parsons
2880 International Circle,
Colorado Springs, CO 80910

Re: Grandview Reserve Sketch Plan

Dear Ms. Parsons,

Colorado Parks and Wildlife (CPW) has reviewed the plans for the Grandview Reserve Sketch Plan in El Paso County, Colorado in the northwest corner of the intersection of Elbert Road and Colorado Highway 24. Colorado Parks and Wildlife (CPW) is in receipt of the above referenced permit application and is familiar with the site. CPW offers the following comments for your consideration.

CPW recommends crossing any riparian corridors and streams at a perpendicular angle, in order to reduce impacts to natural resources, as well as spanning the corridors with structures located outside the riparian and stream zone. During construction, stream crossing by construction vehicles should be avoided. CPW requests that any new service roads that are proposed for construction in conjunction with the project avoid crossing creeks or stream beds to avoid impacts to wildlife and habitat. If any new access or maintenance roads will be constructed that cross stream habitat, CPW would like to be consulted on best management practices and options for construction to minimize impacts. A construction design for any new or reconstructed riparian crossing that actively minimizes barriers to fish passage at all water levels and mitigates any existing barriers where possible would minimize the negative impact of the project on native fish species.

CPW recommends a 100 foot buffer zone be permanently placed around the creeks and ponds. If a trail is constructed near the creek or ponds, it should be a minimum of 100 feet from the edge. This buffer zone will offer wildlife utilizing the creek and ponds less disturbance by development and decrease the likelihood of human and wildlife encounters. The existing native riparian vegetation around the creeks, the ponds and in the drainage ways should be kept intact for wildlife habitat and to increase ground stabilization.

Trails would provide excellent opportunities for wildlife viewing. However, if trails are placed too close to areas utilized by wildlife it creates disturbances resulting in reduced wildlife

viewing opportunities. CPW recommends constructing trails on the outer edges of open space areas. This minimizes wildlife disturbance and creates increased wildlife viewing opportunities. Trails near creeks and drainage areas should cross perpendicular rather than run parallel to these critical wildlife habitat areas. Crossings should occur in areas that have the least usage by wildlife in order to have minimal impacts on wildlife.
CPW recommends the development and implementation of a noxious weed control plan for the site. All disturbed soils should be monitored for noxious weeds and noxious weeds should be actively controlled until native plant revegetation and reclamation is achieved. Care should be taken to avoid the spread of noxious weeds, and all construction equipment should be cleaned prior to leaving the site. A noxious weed management plan should be developed prior to any disturbance of the site. ACPW recommends that all landscaping in the developed area should be comprised of native species. Using native species with high food and cover values in an open space area is beneficial to wildlife. This can encourage wildlife to concentrate in areas that minimize human conflicts and optimize wildlife watching opportunities. Native plant species can also provide an aesthetically pleasing landscape that requires little maintenance, and are frequently more drought-tolerant than non-native species

CPW also recommends that all areas of disturbance and exposed soils above the ordinary high water mark be re-vegetated with a native seed mix. This will contribute to the replacement of lost riparian vegetation values and minimize establishment of noxious weeds. The placement of willow sprigs or bare root stock should also be considered along the banks, especially in those areas which have been disturbed. We recommend planting of vegetation along the bank to help reduce and control erosion and contribute to bank stability over the long term. The site should be monitored for a period of at least two growing seasons. Any stands of noxious weeds that become established should be controlled with appropriate mechanical and/or chemical methods suitable for the proposed location. CPW recommends using a clean fill material, if needed, that would be conducive to growing native vegetation that will help stabilize the banks. Non-native vegetation can overrun native vegetation and can become problematic. A seed mixture of native grasses is also recommended to provide a good support system in the soil.

We appreciate being given the opportunity to comment. Please feel free to contact District Wildlife Manager, Aaron Berscheid, should you have any questions or require additional information at 719-439-9601 or via email at aaron.berscheid@state.co.us

Sincerely,

Frank McGee
Area Wildlife Manager

Cc: SE regional files
Area 14 files
Aaron Berscheid, DWM

EXHIBIT O: ECOS REPORT

Natural Features and Wetland Report for the Grandview Reserve Project in El Paso County, Colorado

August 12, 2020

Prepared for:

4 Site Investments
1271 Kelly Johnson Blvd., Ste. 100
Colorado Springs, CO 80920

Prepared by:

ecosystem services LLC

1455 Washburn Street
Erie, Colorado 80516
(p): 970-812-3267

Project Number: 2018-15-1

Ecosystem Services, LLC
Response to El Paso County Comments
Regarding The
Natural Features and Wetland Report (Report) for the
Grandview Reserve Project
in El Paso County, Colorado

Responses to County Comments RE: April 10, 2020 Report:

1) The County comments were inserted as text boxes in the April 10, 2020 Report (please refer to the County's internal copy of this marked up Report). Ecos resubmitted the Report with a revision date of July 10, 2020 in response to County comments (refer to 7/10/20 Report on file with the County).

General Response:

Ecos stated in several sections of the Report "…the Site is situated between 6,860 and 7,020 feet above mean sea level, which is higher than the 6,500-foot elevation limits documented for the species and recommended for conducting surveys by the USFWS." We did not insert ULTO references and requirements, write up an action plan and mitigation recommendations, etc. per County comments, as these actions are not required by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). In the 7/10/20 report we have attached the 2020 ESA Clearance from USFWS for this Site which states, " Ute ladies-tresses orchid and Preble's meadow jumping mouse are not likely to occupy the project site. Project is still consistent with the section 7 conclusions from 2019." Ecos also attached our request for said 2020 ESA Clearance which was mandated by the County due to a site plan change, noting that an ESA Clearance applies to a Site regardless of site plan.

Detailed Responses to each comments inserted into the April 10, 2020 Report with references to page and section:

Based on the explanation above Ecos did not make any revisions regarding ULTO, however we did insert the new Figure 2 Sketch Plan HR Green prepared that better illustrates topography (per other County comments). Our detailed response to each of the County comments are below:

- Page iii, Acronyms and Abbreviations – Ecos has not inserted the acronym "ULTO" as we do not use said acronym in our Report. The County had inserted this acronym in their comments.
- Page 1, 1.1 Purpose – We assume the notes "ULTO" (pointing at the Vegetation bullet) and "USFW survey required for a recommended 3 years for ULTO" (pointing at the Federal and State Listed, Candidate, Threatened and Endangered Species bullet) are for the County's reference as they do not belong or need to be inserted in a general "bullet" listing of resources reviewed in the Report.
- Page 9, 3.3 Vegetation – A text box stating, "Address action plan for ULTO" is pointing at an excerpt taken from the USFWS March 25, 2019 response to our 2019 ESA Clearance Request (Appendix F of April 10, 2020 Report) in which the USFWS states that, "…the project area has not yet been surveyed for ULTO…" and "The Grandview Reserve subdivision would be located between 7020 and 6860 feet above mean sea level, which is higher than the 6500-foot elevation recommended for conducting ULTO surveys." No action plan for ULTO is required under the law as the USFWS has issued a legal document in response to our 2020 Endangered Species Act (ESA) Clearance Request that states, "Ute ladies-tresses orchid and Preble's mouse are not likely to occupy the project site. Project is still consistent with the section 7 conclusions from 2019." The Agency has indicated that they have "No Concern" with our findings under the ESA. We also made sure to clarify 2 items in our 2020 Revised Report:
    - The recommendation for a ULTO survey was removed from Table 3 of the report as it prompted the USFWS to provide Survey Guidelines in their response to our 2019 ESA Clearance Request; and
    - We stated in Table 3 that "…the Site is situated between 6,860 and 7,020 feet above mean sea level, which is higher than the 6,500-foot elevation limits documented for the species and recommended for

conducting surveys by the USFWS." This fact was presented in the USFWS 2019 response to Ecos' 2019 ESA Clearance Request that the County is referencing and inserting in their comments (refer to USFWS March 25, 2019 response to Ecos 2019 ESA Clearance Request in Appendix F of April 10, 2020 Report as cited in the USFWS March 25, 2019 response excerpt referenced above).

- Page 12, Section 3.4 Wetland Habitat and Waters of the U.S., Sub-section 3.4.2 Field Assessment Findings, items 1) Jurisdictional wetland habitat and waters of the U.S. and 2) Non-Jurisdictional, Isolated Wetlands –Label each on figures". The County has requested that we label the applicable figures to indicate which Drainages are Jurisdictional and Non-Jurisdictional. Figure 6 on page 15 is the only Figure referenced in this section and the only one that represents the content of the County comments; and Figure 6 clearly labels each Drainage by alpha designation (A – D) and Jurisdictional and Non-Jurisdictional status.
- Page 28, Table 3 – A text box stating, "address mitigation, protection" is pointing at the Ute ladies tresses box in the table. No mitigation plan for ULTO is required under the law as the USFWS has issued a legal document in response to our 2020 ESA Clearance Request that states, ""Ute ladies-tresses orchid and Preble's mouse are not likely to occupy the project site. Project is still consistent with the section 7 conclusions from 2019." The Agency has indicated that they have "No Concern" with our findings under the ESA. We also made sure to clarify 2 items in our 2020 Revised Report:
    - The recommendation for a ULTO survey was removed as it prompted the USFWS to provide Survey Guidelines in their response to our 2019 ESA Clearance Request; and
    - We stated in Table 3 that "…the Site is situated between 6,860 and 7,020 feet above mean sea level, which is higher than the 6,500-foot elevation limits documented for the species and recommended for conducting surveys by the USFWS." This fact was presented in the USFWS 2019 response to Ecos' 2019 ESA Clearance Request that the County is referencing and inserting in their comments (refer to USFWS March 25, 2019 response to Ecos 2019 ESA Clearance Request in Appendix F of April 10, 2020 Report as cited in the USFWS March 25, 2019 response excerpt referenced above).

2) 6/30/20 EDARP Review; PCD Manager Comments – These comments are still referencing the March 25, 2109 letter from USFWS and as such are not applicable. As explained in our detailed response to the comments on our Report (above), we will not be implementing any of the recommendation regarding Ute-ladies-tresses orchid as they are not likely to occupy the project site as confirmed by the USFWS.

3) 4/27/20 Community Services Department, Environmental Division comments –

- Wetland habitat: The Applicant will apply for and provide a Clean Water Act Section 404 Permit to the Planning and Community Development Department prior to undertaking ground-disturbing activities if the onsite wetland areas are proposed to be impacted. Ecos has addressed this issue in 7.1 of all previous versions of the Report and again in the 7/10/20 Report.
- Wildlife Habitat: The Applicant will prepare a fencing plan to avoid negative conflicts with pronghorn in accordance with CPW guidelines. The Applicant will perform two surveys for migratory birds and their nests approximately 1 – 2 months prior to 1 week prior to construction to ensure compliance with the MBTA. Avoidance of nest take or harm is typically feasible and if not, then a permit will be processed with the USFWS. These comments are addressed below in Ecos' response to the County comments received for the 7/10/20 report.

4) 4/22/19 Community Services Department, Environmental Division comments –

- Comment 1: "Two jurisdictional wetlands have been identified on the property. A completed U.S. Army Corps of Engineers (USCOE) permit shall be provided to the Planning and Community Development Department prior to undertaking ground-disturbing activities in these jurisdictional wetland areas. The applicant is hereby on notice that the USCOE has regulatory jurisdiction over wetlands. It is the applicant's responsibility, and not El Paso County's, to ensure compliance with all applicable laws and regulations, including, but not limited to, the Clean Water Act." Ecos has addressed this issue in 7.1 of all previous versions of the Report and again in the 7/10/20 Report.

- Comment 2: “Documentation from the U.S. Fish and Wildlife Service (USFWS) shall be provided to the Planning and Community Development Department prior to project commencement where the project will result in ground disturbing activity in habitat occupied or potentially occupied by threatened or endangered species and/or where development will occur within 300 feet of the centerline of a stream or within 300 feet of the 100 year floodplain, whichever is greater.“ Ecos has provided USFWS ESA Site Clearance concurrence responses dated March 25, 2019 response to our 2019 ESA Clearance Request (Appendix F of April 10, 2020 Report) and April 29, 2020 (Appendix F of July 10, 2020 Report).
- Comment 3: “ The project will interfere with wildlife habitat. Information regarding wildlife protection measures shall be provided including fencing requirements, garbage containment, and riparian/wetland protection/buffer zones, as appropriate. Information can be obtained from Colorado Parks and Wildlife.” Fencing requirements are addressed below in Ecos’ response to the County comments received for the 7/10/20 report. Garbage containment will be addressed by the Grandview Reserve HOA. Riparian/wetland protection/buffer zones have been incorporated into the Sketch Plan by design.
- General Comment: “ It is strongly recommended that the applicant obtain the necessary approvals from all federal, state and county agencies as a part of their planning process.” Ecos references obtaining permits for all applicable environmental issues in Section 7.0 of all previous versions of the Report and again in the 7/10/20 Report.

Responses to County Comments RE: July 10, 2020 Report:

The El Paso County, Community Services Department, Environmental Division provided a comment letter dated 7/17/20. Ecos has incorporated applicable revision into this August 12, 2020 revision of the Report, as summarized below:

- Comment 1: “Two jurisdictional wetlands have been identified on the property. A completed U.S. Army Corps of Engineers (USCOE) permit shall be provided to the Planning and Community Development Department prior to undertaking ground-disturbing activities in these jurisdictional wetland areas. The applicant is hereby on notice that the USCOE has regulatory jurisdiction over wetlands. It is the applicant’s responsibility, and not El Paso County’s, to ensure compliance with all applicable laws and regulations, including, but not limited to, the Clean Water Act.” Ecos has addressed this issue in 7.1 of all previous versions of the Report and again in the 8/12/20 Report.

- Comment 2: “2. The project will interfere with wildlife habitat including pronghorn range. In accordance with Colorado Parks and Wildlife guidelines, the applicant will prepare a fencing plan to avoid negative conflicts with pronghorn.” Ecos revised Section 6.6 of the 8/12/20 Report to acknowledge this request, noting our intention to discuss this with the county, as follows: “2. Ecos has recommended that the Project minimize the installation of fencing to avoid injury to wildlife. When fencing is needed, we have specified the use of wildlife friendly fences or the inclusion of specific wildlife crossings along fence lines. Pronghorn are of particular concern because they do not jump over fences and can be injured by barbed-wire fences. The El Paso County, Community Services Department, Environmental Division has requested that fencing be installed to “avoid negative conflicts with pronghorn”. Therefore, ecos will discuss this with the County and if deemed to be in the best interest of pronghorn protection, work with the Applicant to prepare a fencing plan in accordance with Colorado Parks and Wildlife guidelines.

  Ecos’ recommendation is that fencing is not required to avoid impacts with pronghorn as they are a timid and non-confrontational species that avoids interaction with humans as a regular course of their survival. The County Environmental Divisions references fencing be installed, “In accordance with Colorado Parks and Wildlife guidelines…”, however pursuant to the CPW publication *Fencing with Wildlife in Mind* CPW does NOT advocate for the use of fences; rather they try to rationalize that fencing may not be required at all, and only provides guidelines for the portion of the public that feels they need fences for other reasons such as privacy and security.

The CPW guidance publication *Fencing with Wildlife in Mind* correctly states on page 5 in the section titled *Do You Really Need a Fence?* That, "…the best fence for wildlife is no fence at all…In some cases, though, there are good alternatives to fences. People, especially those new to mountain and foothill communities, tend to put up fencing along their property lines. If the property contains important habitat and the fence excludes wildlife, the animals lose food, water, resting areas, and travel corridors." and "There are many creative ways to define boundaries, discourage trespass, or maintain privacy. A line of trees, shrubs, and other vegetation can be used to mark a boundary, screen for privacy, beautify your landscape, and provide additional food and cover for wildlife. The areas that wildlife choose as travel corridors are often the same places that you would want to preserve in a natural state to retain the scenic amenities and aesthetic value of your property. You could also consider marking property boundaries with signs, flexible fiberglass or plastic boundary posts, or fence posts spaced at intervals without cross-wires. If you only fence the portions of your property that you need to protect, you'll be saving time, money, and wildlife."

Furthermore, in the section titled *Considerations for Fence Design* CPW states, "If a fence is needed, please consider fence placement and designs that minimize the impact on wildlife." And "Wherever possible, design your fence to provide wildlife free travel to important habitats and corridors, as well as access to water. Wetlands and riparian habitats are especially important for all wildlife." Please refer to the CPW manual at: https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf

- Comment 3: "3. The project will interfere with wildlife habitat including potentially nesting migratory birds. The applicant will perform two surveys for migratory birds and their nests approximately one to two months prior to one week prior to construction. The take of migratory birds and their nests will be avoided. The applicant is hereby on notice that the U.S. Fish and Wildlife Service has regulatory jurisdiction over migratory birds. It is the applicant's responsibility, and not El Paso County's, to ensure compliance with all applicable laws and regulations, including but not limited to, the Migratory Bird Treaty Act." Ecos has revised Section 7.3 of the 8/12/20 Report to specify that 2 surveys will be performed prior to construction pursuant to the wording recommended by the County. However, as Wildlife Biologists our typical approach includes formulating site-specific migratory bird/raptor impact avoidance recommendations by discussing the proposed Construction Start Date with the Applicant well in advance to recommend the best start date and work timeframe to avoid and/or minimize migratory bird/raptor impact. At this phase of the Project it was not yet appropriate to insert this specific language, but ecos intends to work with the Applicant as outlined in the following text. We will wait until the Construction Start Date is first proposed, make our site-specific recommendations (outlined above) and once the Construction Start Date is finalized, we then set the date for the first survey based on seasonal conditions that make nest identification most effective such that the field surveyor may have maximum opportunity to identify all potential nests. The second survey is always set one week or less prior to construction to ensure no new nest have been established.

TABLE OF CONTENTS

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LIST OF ACROYNMS AND ABBREVIATIONS

AMSL	above mean sea level
Applicant	4 Site Investments
CCRs	Codes, Covenants and Restrictions
CDA	Colorado Department of Agriculture
CNHP	Colorado Natural Heritage Program
COGCC	Colorado Oil and Gas Conservation Commission
CPW	Colorado Parks and Wildlife
CWA	Clean Water Act
Ecos or ecos	Ecosystem Services, LLC
JD	Jurisdictional under the Clean Water Act
Non-JD	Non- jurisdictional under the Clean Water Act
PMJM	Preble's meadow jumping mouse
Report	Natural Features and Wetland Report
Site	Grandview Reserve
NRCS	Natural Resource Conservation Service
NTCHS	National Technical Committee for Hydric Soils
NWI	National Wetland Inventory
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOUS	Waters of the United States

1.0 INTRODUCTION

Ecosystem Services, LLC (Ecos or ecos) was retained by 4 Site Investments (Applicant) to perform a natural resource assessment for the proposed Grandview Reserve project (Project) and to prepare this Natural Features and Wetland Report (Report).

The contact information for the Applicant and ecos representatives for this Report is provided below:

Applicant

Peter Martz
4 Site Investments
1271 Kelly Johnson Blvd., Ste. 100
Colorado Springs, Colorado 80920
Phone: 719-492-1993
pmartzlrg@comcast.net

Agent

Grant E. Gurnée, P.W.S.
Ecosystem Services, LLC
1455 Washburn Street
Erie, Colorado 80516
Phone: (970) 812-6167
grant@ecologicalbenefits.com

1.1 Purpose

The purpose of this Report is to identify and document the natural resources, ecological characteristics and existing conditions of the Project site (Site); identify potential ecological impacts associated with Site development; and provide current regulatory guidance related to potential development-related impacts to natural resources. The specific resources and issues of concern addressed in this Report are in conformance with the El Paso County requirements (refer to Section 2.0), and include:

- Mineral and Natural Resource Extraction;
- Vegetation;
- Wetland Habitat and Waters of the U.S.
- Weeds;
- Wildfire Hazard;
- Wildlife;
- Federal and State Listed, Candidate, Threatened and Endangered Species; and
- Raptors and Migratory Birds.

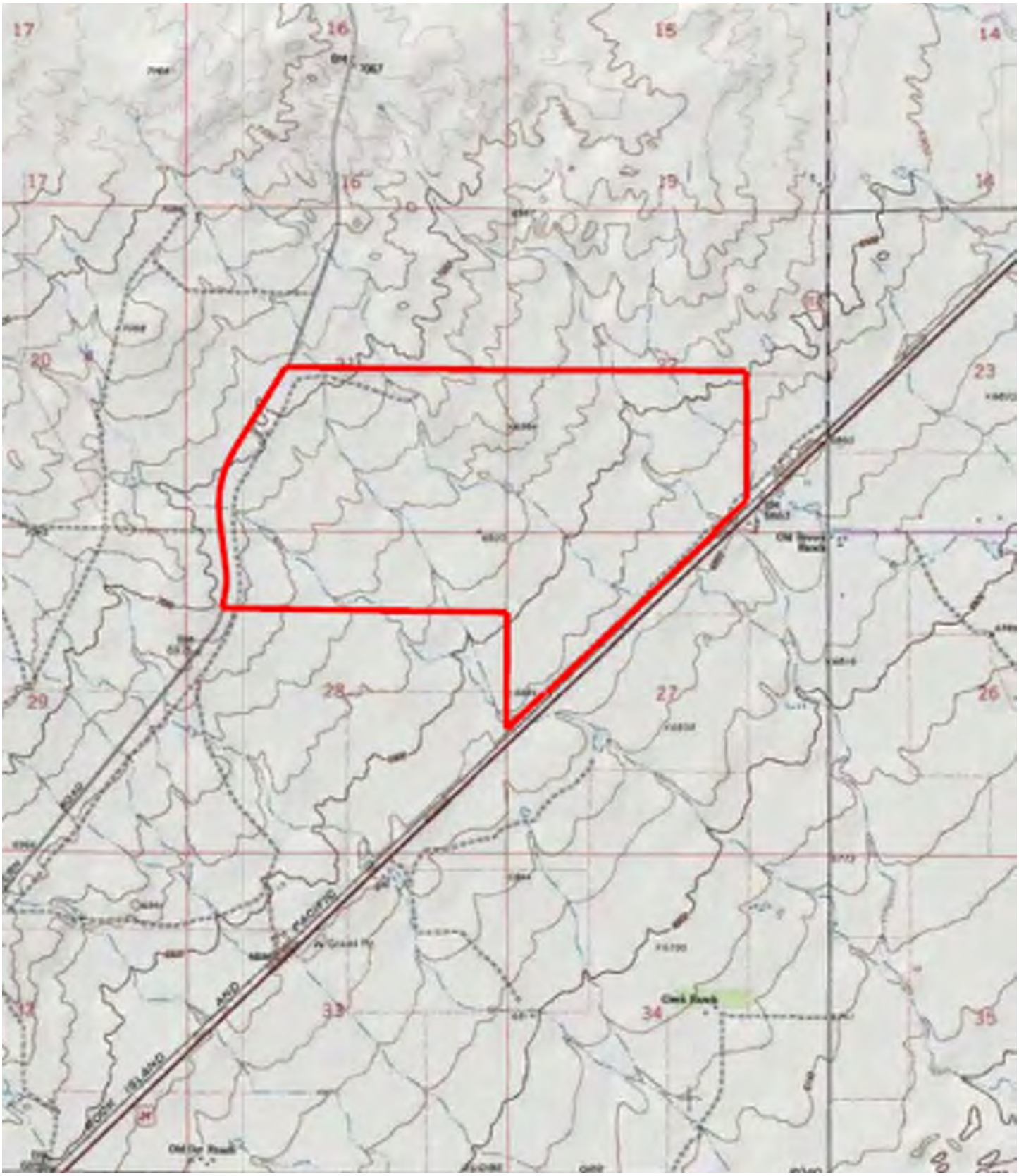
1.2 Site Location and Project Description

The Site is located in the Falcon/Peyton area of El Paso County and is bounded along the north by 4 Way Ranch Phase I, along the south by Waterbury, along the southeast by Highway 24, and along the west by Eastonville Road. There are no existing structures, roads, or other infrastructure on the Site. The Site is located approximately 4.14 miles southwest of Peyton, 4.16 miles northeast of Falcon and 4.66 miles south of Eastonville, in El Paso County, Colorado. The Site is generally located within the south ½ of Section 21, south ½ of Section 22, the north ½ of Section 27, and the north ½ of Section 28, Township 12 South, Range 64 West in El Paso County, Colorado. The center of the Site is situated at approximately Latitude 38.98541389 north, -104.55472222 east (refer to Figure 1).

The Applicant proposes to develop the 768.2-acre Site as a mixed use residential and commercial community consisting of the following:

Table 1 – Land Use Summary				
Land Use Category	**Acreage**	**Acreage %**	**Density Units/Acre**	**Units**
School	10.9 acres	1.4%	NA	NA
Church	6.1 acres	0.8%	NA	NA
Low Density Residential	134.1 acres	17.5%	2	268
Medium Density Residential	272.5 acres	35.5%	4	1090
Medium-High Density Residential	65.6 acres	8.5	8	524
High Density Residential	114.9 acres	15.0%	12	1378
Commercial	16.4 acres	2.1%	NA	NA
Open Space[1]	127.1 acres	16.5%	NA	NA
Rex Road Collector	20.6 acres	2.7%	NA	NA
TOTAL	**768.2 acres**	**100%**	**-**	**3260**
Note 1: Open Space includes: Detention, Drainage Corridors, General Open Space & Easements and R.O.W. Buffer of Eastonville Road and Highway 24				

Please refer to Figure 2.

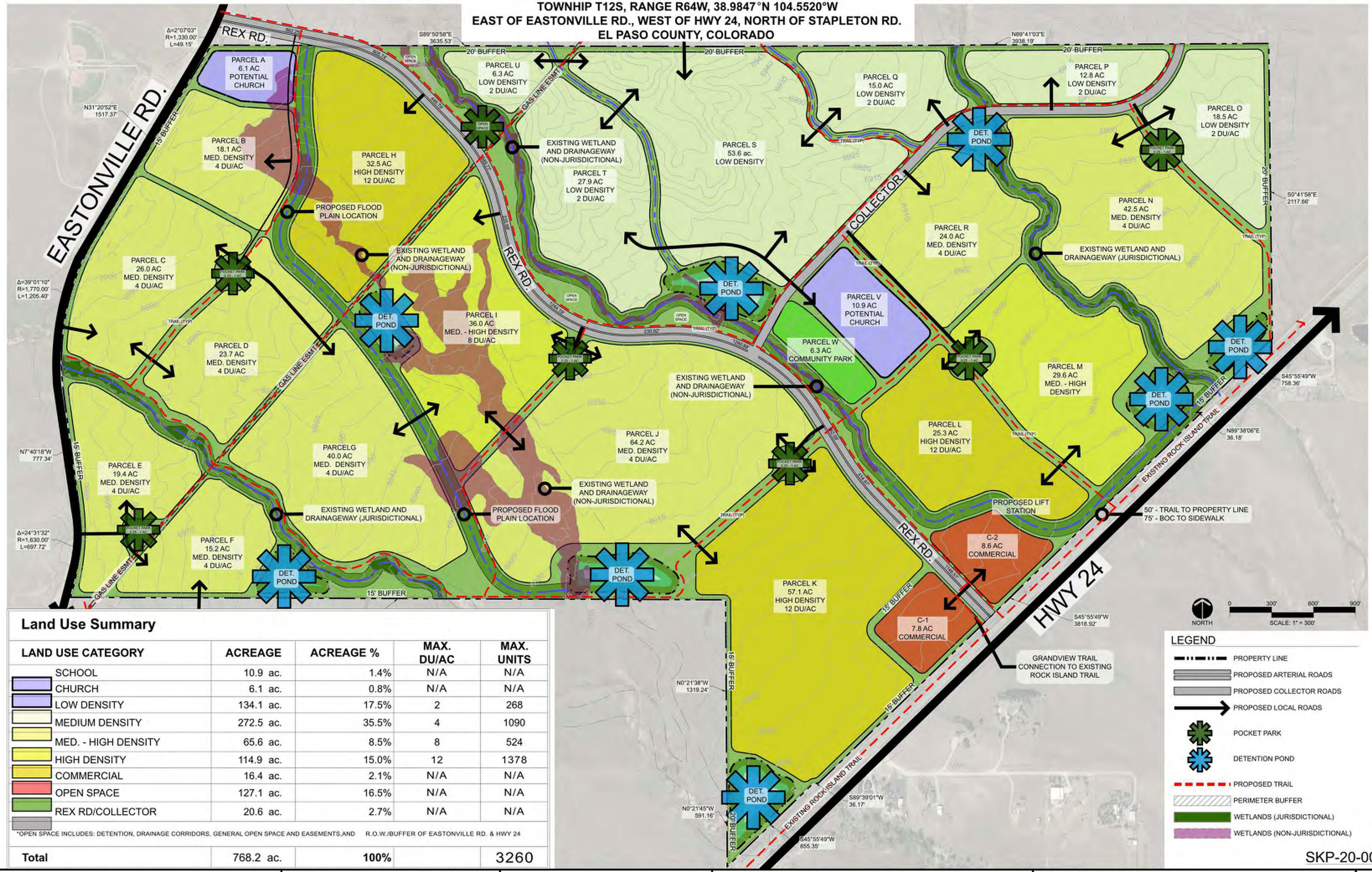


USGS 7.5 min. Quad: Falcon
Latitude: 38.985713°N
Longitude: -104.552854°W
Section 21, 22, 27 & 28, Township 12 South, Range 64 West

Figure 1 USGS SITE LOCATION MAP

GRANDVIEW RESERVE SKETCH PLAN

TOWNHIP T12S, RANGE R64W, 38.9847°N 104.5520°W
EAST OF EASTONVILLE RD., WEST OF HWY 24, NORTH OF STAPLETON RD.
EL PASO COUNTY, COLORADO



Land Use Summary

LAND USE CATEGORY	ACREAGE	ACREAGE %	MAX. DU/AC	MAX. UNITS
SCHOOL	10.9 ac.	1.4%	N/A	N/A
CHURCH	6.1 ac.	0.8%	N/A	N/A
LOW DENSITY	134.1 ac.	17.5%	2	268
MEDIUM DENSITY	272.5 ac.	35.5%	4	1090
MED. - HIGH DENSITY	65.6 ac.	8.5%	8	524
HIGH DENSITY	114.9 ac.	15.0%	12	1378
COMMERCIAL	16.4 ac.	2.1%	N/A	N/A
OPEN SPACE	127.1 ac.	16.5%	N/A	N/A
REX RD/COLLECTOR	20.6 ac.	2.7%	N/A	N/A
*OPEN SPACE INCLUDES: DETENTION, DRAINAGE CORRIDORS, GENERAL OPEN SPACE AND EASEMENTS,AND R.O.W./BUFFER OF EASTONVILLE RD. & HWY 24				
Total	768.2 ac.	**100%**		3260

LEGEND

- PROPERTY LINE
- PROPOSED ARTERIAL ROADS
- PROPOSED COLLECTOR ROADS
- PROPOSED LOCAL ROADS
- POCKET PARK
- DETENTION POND
- PROPOSED TRAIL
- PERIMETER BUFFER
- WETLANDS (JURISDICTIONAL)
- WETLANDS (NON-JURISDICTIONAL)

SKP-20-001

DRAWN BY: JAG | JOB DATE: 7/6/2020
APPROVED: PLS | JOB NUMBER: 191897
CAD DATE: ----
CAD FILE: J:\2019\191897\CAD\Dwgs\L\01-L-SHEETS

BAR IS ONE INCH ON OFFICIAL DRAWINGS. IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen.com
HRGreen

GRANDVIEW RESERVE
4 SITE INVESTMENT, LLC
FALCON, COLORADO

GRANDVIEW RESERVE SKETCH PLAN
SKETCH PLAN

SHEET SP1.2 | 2

HR GREEN Xrefs: 01-DV-D360N, xg1-ARCH DH01: 01-VICINITY MAP- 01-XL-CONCEPT: 01-DV-SURF

2.0 METHODOLOGY

Ecos performed an office assessment in which available databases, resources, literature and field guides on local flora and fauna were reviewed to gather background information on the environmental setting of the Site. We consulted several organizations, agencies, and their databases, including:

- Colorado Department of Agriculture (CDA) Noxious Weed List;
- Colorado Natural Heritage Program (CNHP);
- Colorado Oil and Gas Conservation Commission (COGCC) GIS Online;
- Colorado Parks and Wildlife (CPW);
- El Paso County Master Plan;
- El Paso County, Sub-Area Plan (provided by Client);
- Federal Emergency Management Agency (FEMA);
- Google Earth current and historic aerial imagery;
- Survey of Critical Biological Resources, El Paso County, Colorado;
- Survey of Critical Wetlands and Riparian Areas in EI Paso and Pueblo Counties, Colorado;
- U.S. Army Corps of Engineers (USACE) 1987 Corps of Engineers Wetlands Delineation Manual;
- USACE 2010 Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Great Plains Region;
- U.S. Department of Agriculture (USDA) PLANTS Database;
- U.S. Fish and Wildlife Service (USFWS) Region 6;
- USFWS National Wetland Inventory (NWI);
- USFWS IPaC database search; and
- U.S. Geological Survey (USGS).

Ecos also reviewed pertinent, site-specific background data provided by 4 Site Investments and their consulting Team, including: topographic base mapping, site development plans, and other data pertinent to the assessment.

Ecos reviewed, and incorporated the requirements of the following regulations into, this Report:

1) Chapter IV. Zoning Regulations, Section 35.13 – Development Requirements for Mineral and Natural Resource Extraction Operations;
2) Chapter V. Subdivision Regulations:
    a. Section 51.5 – Wildlife Hazard and Vegetation Reports; and
    b. Section 51.6 – Streams, Lakes, Physical Features and Wildlife Habitats.
3) Chapter 6 - General Development Standards:
    a. Section 6.3.3 - Wildfire Protection and Wildfire Mitigation;
    b. Section 6.3.7 - Noxious Weeds;

c. Section 6.3.8 – Wetlands; and
d. Section 6.3.9 – Wildlife.

4) Chapter 8 - Subdivision Design, Improvements and Dedications:
    a. Section 8.4.2 Environmental Considerations:
        i. Item A.4. – Threatened and Endangered Species Compliance; and
        ii. Item B.1. - Hazards
            1. l00-year floodplain as identified by the applicant, review agency, or the Floodplain Administrator; and
            2. Wildfire hazards as identified on the County and State wildfire hazard inventory or maps.
5) El Paso County Master Plan: Pertinent Maps and descriptors to append all of the topics, regulations and guidance referenced above, including:
    a. Wetland Habitat Maps and descriptors; and
    b. Wildlife Habitat Maps and descriptors.

Following the collection and review of existing data and background information, ecos conducted a field assessment of the Site to identify any potential impacts to natural resources associated with the Project. Field reconnaissance concentrated on identification of wetland habitat, waters of the U.S., wildlife habitat (including habitat suitable to support threatened and endangered wildlife) significant topographic features, noxious weeds and vegetation. Wetland habitat and waters of the U.S. boundaries, wildlife habitat, major vegetation communities, and significant weed stands were sketched on topographic and aerial base maps and located using a hand-held Global Positioning System as deemed necessary. Representative photographs were taken to assist in describing and documenting Site conditions and potential ecological impacts.

The office and onsite assessment data, the pertinent El Paso County regulations outlined above, and Natural Resource Assessment and Wetland report examples used in previous County land development review submittals (provided by El Paso County) were used in the preparation of the Report.

3.0 ENVIRONMENTAL SETTING

The Site is located in the Southwestern Tablelands Ecological Region (Chapman et al, 2006), which is primarily comprised of sub-humid grassland and semiarid rangeland. More specifically, the Site is located in the Foothills Grassland sub-region (26j) which contains a mix of grassland types with some small areas of isolated tallgrass prairie species that are more common much farther east. The proximity to runoff and moisture from the Front Range and the more loamy, gravelly, and deeper soils are able to support more tallgrass and midgrass species than neighboring ecoregions. Big and little bluestem, yellow indiangrass and switchgrass occur, along with foothill grassland communities. The annual precipitation of 14 to 20 inches tends to be greater than in regions farther east. Soils are loamy, gravelly, moderately deep, and mesic. Rangeland and pasture are common , with small areas of cropland. Urban and suburban

development has increased in recent years, expanding out from Colorado Springs and the greater Denver area.

3.1 Topography

The Site is generally characterized as gently sloping from northwest to southeast with four ephemeral drainages (prairie sloughs) present, two of which are discontinuous and two are tributary to Black Squirrel Creek offsite. Naturally undulating swales drain toward the sloughs, which contain wetlands in low areas and dry areas where alluvial deposits have formed. Site topography ranges from a high elevation of 7020 feet above mean sea level (AMSL) in the northwestern corner to a low elevation of 6860 feet above AMSL where the northeastern tributary exits the Site on the southeast boundary along Highway 24; for a total elevation drop of 160 feet. An ill-defined and undulating hill, which is likely an eroded remnant bluff, is present in the north-central portion of the Site. Refer to Figure 3 for the Topographic Map.

3.2 Soils

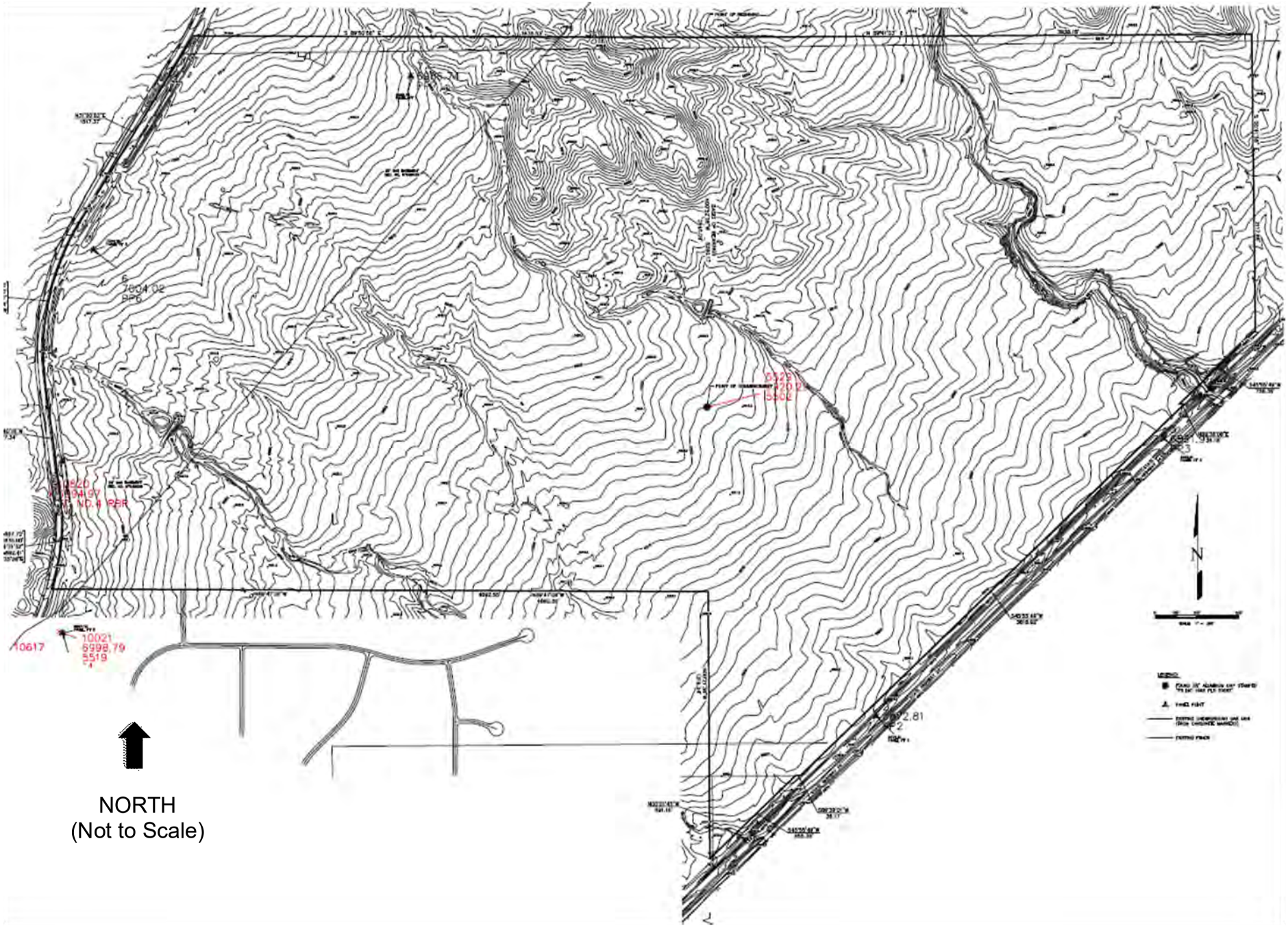
Ecos utilized the U.S. Department of Agriculture, Natural Resource Conservation Service Web Soil Survey (USDA, NRCS, 2020) to determine if hydric soils are present within the Site, as this data assist in informing the presence/absence of potential wetland habitat regulated under the Clean Water Act. The soils data were also utilized to supplement the field observations of vegetation, as the USDA provides correlation of native vegetation species by soils types. Please refer to Appendix A for the USDA Soil Map and additional information.

Blakeland loamy sand (Map Unit #8), Columbine gravelly sandy loam (Map Unit #19) and Stapleton sandy loam (Map Unit #83) are listed by the NRCS as hydric soils that are found in swales and depressions. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS, 1994) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in *Field Indicators of Hydric Soils in the United States* (USDA, NRCS, 2010).

Additional, detailed soil data for the Project are presented in the Soils & Geology Report that will be included in the Project submittal.

Figure 3



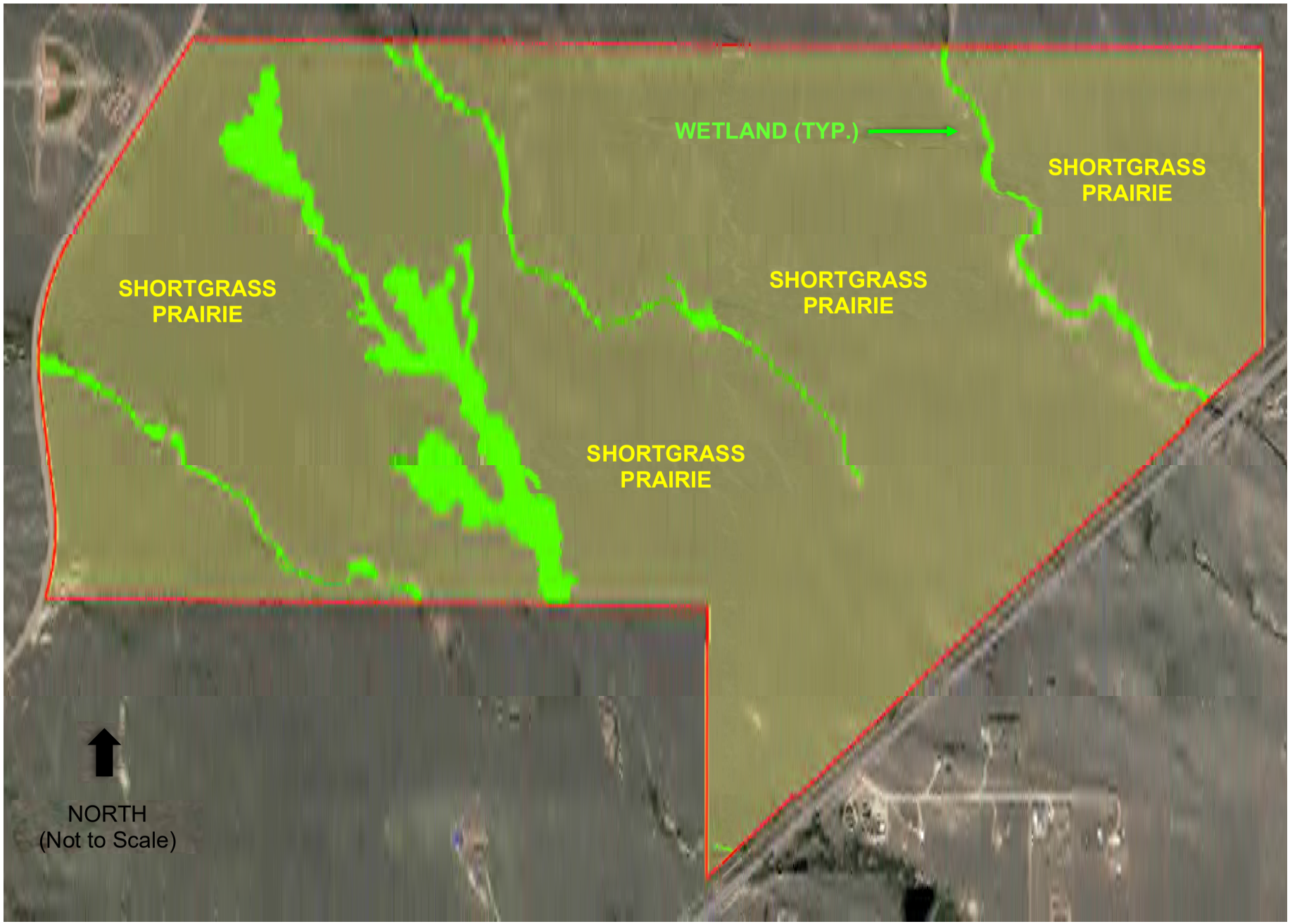
TOPOGRAPHIC MAP

3.3 Vegetation

The vegetation within the Site is primarily comprised of shortgrass prairie with wetland vegetation in the swales and sloughs (Figure 4). The shortgrass prairie is dominated by little bluestem (*Schizachyrium scoparium*), blue grama (*Bouteloua gracilis*), and buffalograss (*Bouteloua dactyloides*) with occasional associative grass and forb species including western wheatgrass (*Pascopyrum smithii*), yellow Indiangrass (*Sorghastrum nutans*), Canada wildrye (*Elymus canadensis*), needle and thread (*Hesperostipa comata*), switchgrass (*Panicum virgatum*), Western yarrow (*Achillea millefolium*), broom snakeweed (*Gutierrezia sarothrae*), fringed sage (*Artemisia frigida*), Prickly pear (*Opuntia* spp.), and prairie aster spp. (*Symphyotrichum* spp.). Occasional patches of snowberry (*Symphoricarpos albus*) and Wood's rose (*Rosa woodsii*) occupy the transitional areas between uplands and wetlands. A few, single plains cottonwood (*Populus deltoides*) occur along the drainages. The Site is heavily grazed and there are weeds scattered throughout, including Canada thistle (*Cirsium arvense*), Scotch thistle (*Onopordum acanthium*), Russian thistle (*Salsola kali*), common mullein (*Verbascum thapsus*), and yellow toadflax spp. (*Linaria vulgaris*).

Hydrophytic vegetation (wetland vegetation) is present within the swales and sloughs (refer to Section 3.4.2).

Figure 4



VEGETATION COMMUNITY MAP

3.4 Wetland Habitat and Waters of the U.S.

3.4.1 Methodology

Ecos utilized the National Wetland Inventory (NWI) Wetlands Mapper (USFWS 2020a); Colorado Wetland Inventory Mapping Tool (CNHP, 2018); historic and current Google Earth aerial photography; USGS 7.5-minute topographic mapping; and detailed Project topographic mapping to screen the Site for potential wetland habitat and waters of the U.S. Additionally, ecos performed a jurisdictional delineation to identify the Waters of the United States (WOUS), including wetlands.

The mapping data above were proofed during the filed assessment and a wetland delineation was conducted to determine the presence/absence of potential WOUS, including wetland habitat. Once a feature was verified to be present, ecos determined whether it is a jurisdictional wetland/waters under the Clean Water Act. The USACE, wetland delineation methodology was employed to document the 3 field indicators (parameters) of wetland habitat (i.e., wetland hydrology, hydric soils and a predominance of hydrophytic vegetation as explained in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and supplemented by the Regional Supplement to the *Corps of Engineers Wetlands Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2)* (USACE, 2010). The wetland delineation was surveyed by the project team surveyor

Consistent with the NWI and Colorado Wetland Inventory Mapping Tool (Figure 5) and topographic mapping, the wetland/waters delineation revealed the presence of four drainages with the potential to support wetland habitat (Figure 6). Two of the drainages (i.e. northeast Drainage D and southwest Drainage A) were determined to be jurisdictional, and support predominantly palustrine emergent wetland (PEMC1) habitat with minor occurrences of palustrine scrub-shrub (PSS) and palustrine forested (PFO) species along their fringes. The central Drainage C and south-central Drainage B were investigated found to be discontinuous, prairie sloughs that are non-jurisdictional, "isolated" features, as verified by the USACE (Appendix B). Please refer to Figure 5 for a composite of the NWI and CNHP Wetland and Riparian Areas mapping, to Figure 6 for the ECOS Wetland and Waters Sketch Map, and to Appendix B for the USACE Non-Jurisdictional Verification email.

3.4.2 Field Assessment Findings

The results of the onsite assessment for each of the four onsite drainages is summarized below, with an explanation of the field indicators (parameters) of wetland habitat/waters that were observed, and an explanation as to whether ecos determined each feature was jurisdictional or non- jurisdictional under Section 404 of the Clean Water Act (as verified by the USACE). Jurisdictional features are mapped on Figure 6.

1) Jurisdictional wetland habitat and waters of the U.S.
    a. PEMC1 Wetland Habitat – Northeast Drainage D is classified as a Palustrine Emergent, Persistent, Seasonally Flooded wetland (PEMC1). Wetland Area A is tributary to Black Squirrel Creek off of the Site to the southeast. It is dominated by Nebraska sedge, redtop, clustered field sedge, three-square bulrush, swordleaf rush, soft-stem bulrush, poverty rush, Baltic rush, and watercress. Other species were present, including water mint, sporadic patches of sandbar willow, cutleaf evening primrose, fireweed, curly dock, and water milfoil, and snowberry, wild licorice and Wood's rose along the high banks. Soil samples indicate the presence of field indicators of hydric soils (organic horizon from 0-2 inches, 10YR4/2 clay loam from 2-9 inches, 10YR4/1 clay loam from 9-14 inches, and 10YR5/1 sandy clay from 14-18+ inches). Sustaining hydrology was evident as flowing water is present within a defined channel and saturated soils are present at the surface and throughout the floodplain, including groundwater driven side-slope seepage. This area meets all 3 parameters for jurisdictional wetland habitat.
    b. PEMC1 Wetland Habitat – Southwest Drainage A is classified as a Palustrine Emergent, Persistent, Seasonally Flooded wetlands (PEMC1 Wetland Area D is tributary to Black Squirrel Creek off of the Site to the southeast. It is dominated by Nebraska sedge, clustered field sedge, swordleaf rush, redtop, poverty rush, Baltic rush, and pussytoes. Other species were present, including soft-stem bulrush, three-square bulrush, smartweed, saltgrass, foxtail barley, water mint, scouring rush, wild geranium, watercress, narrowleaf cattail, and snowberry, wild licorice and Wood's rose along the high banks. Sporadic occurrences of sandbar willow, crack willow and plains cottonwood were present. Soil samples indicate the presence of field indicators of hydric soils (10YR2/2 loamy clay from 0-6 inches, 10YR4/2 sand from 6-12 inches, 10YR4/1 sand from 12-16 inches, and 10YR4/1 clayey sand from 16-18+ inches). Sustaining hydrology from groundwater seepage was evident as saturated soil is present at or within 8-12 inches of the ground surface. These areas meet all 3 parameters for jurisdictional wetland habitat.
2) Non-Jurisdictional, Isolated Wetlands - The central Drainage C and south-central Drainage B were investigated found to be discontinuous, prairie sloughs with reaches that are upland swales; they exhibited upland "breaks" in which they did not exhibit defined bed or bank (Figure 6); and they were also found to be "isolated" as they did not connect with downstream WOUS. Patches of PEMC1 Wetland exists in these drainages that exhibits the same characteristics of other wetlands on site and meets all 3 parameters for jurisdictional wetland habitat. However, they are clearly disconnected from Black Squirrel Creek by uplands that do not exhibit a defined bed or bank. Therefore, these drainages are isolated, non-jurisdictional features and as such were not delineated.

3.4.3 Summary of Jurisdictional and Non-Jurisdictional Wetlands and Waters

Jurisdictional Habitat – Northeast Drainage D and southwest Drainage A (refer to Figure 6) are jurisdictional wetland habitat and WOUS as they are tributary to the jurisdictional habitat in Black Squirrel Creek. These natural features meet the criteria that the USACE uses to assert jurisdiction, as they are:

- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and
- Wetlands that directly abut such tributaries.

Non-Jurisdictional Areas – The central Drainage C and south-central Drainage B are considered non-jurisdictional. They do not meet the criteria that the Corps uses to assert jurisdiction, as they are not:

- Traditional navigable waters;
- Wetlands adjacent to traditional navigable waters;
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and
- Wetlands that directly abut such tributaries.

Furthermore, Drainages B and C are not considered "tributaries", as "a tributary includes natural, man-altered, or man-made water bodies that carry flow directly or indirectly into a traditional navigable water." These drainages are ephemeral swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) over which the Corps does not assert jurisdiction.

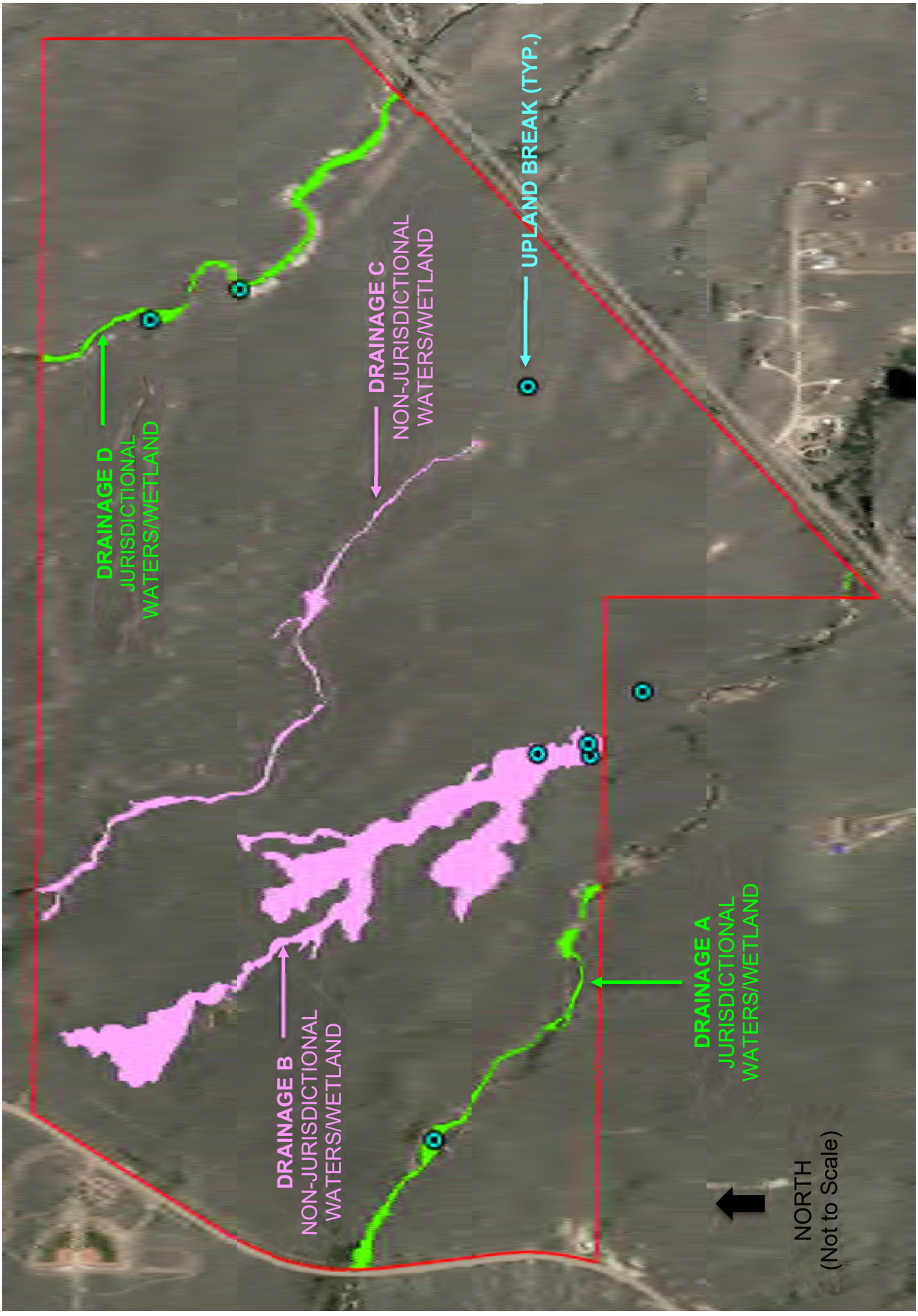
3.4.4 Verification by the U.S. Army Corps of Engineers

On July 5, 2019, the USACE provided an email to Ecos to confirm our findings of non-jurisdiction for Drainages B and C. Note that we did not request a jurisdictional determination of Drainages A and D as we have documented them to be jurisdictional. An excerpt of the USACE response from Tony Martinez, Regulatory Program Manager for the Albuquerque District, Southern Colorado Regulatory Branch of the USACE is copied below, and the original email is contained in Appendix B.

"Based on the information provided in the attached email and our site visit on June 21, 2019 our office concurs with your observations that central Drainage C and south-central Drainage B are isolated and are located entirely upland therefore, we conclude that No permit is required."

SOURCE: USFWS, National Wetland Inventory & CNHP, Colorado Wetland Inventory

Figure 5 NATIONAL WETLAND INVENTORY & CNHP WETLAND & RIPARIAN AREAS MAP



SOURCE: Ecosystem Services, LLC On-site Delineation, 10-11-18

Figure 6 ECOS WETLAND & WATERS SKETCH MAP

3.5 Weeds

3.5.1 Regulatory Background

The Colorado Department of Agriculture maintains a list of noxious weed species (CDA, 2020a) and works with counties to manage noxious weeds. Weed management on Site must follow County requirements, including the "El Paso County Noxious Weeds and Control Methods" report (El Paso County, 2015b).

There are four CDA categories of noxious weeds:

- List A: Rare noxious that are designated for eradication statewide.
- List B: Discretely distributed noxious weeds that must be eradicated, contained, or suppressed, depending on their location, to stop their continued spread.
- List C. These species are well-established in Colorado. Species management plans are designed to support the efforts of local governing bodies to facilitate more effective integrated weed management. The goal of such plans is not to stop the continued spread of these species, but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.
- Watch List Species are those may pose a potential threat to the agricultural productivity and environmental values. The Watch List is intended to serve advisory and educational purposes only. Its purpose is to encourage the identification and reporting of these species to the Commissioner in order to assist in determining which species should be designated as noxious weeds.

3.5.2 Noxious Weed Survey Results

Weed species on the Site were very limited, sporadic and dispersed; and as such, no large patches were identified or mapped by ecos.

No noxious weed species on the Colorado Department of Agriculture List A or the Watch List (CDA, 2020a) were observed on the Site.

Three List B noxious weed species (CDA, 2020a) were observed on the Site:

- Canada thistle (*Cirsium arvense*);
- Scotch thistle (*Onopordum acanthium*)
- yellow toadflax (*Linaria vulgaris*).

One List C noxious weed species (CDA, 2020a) were observed on Site:

- common mullein (*Verbascum thapsus*).

3.5.3 Noxious Weed Management Plan

All of the List B species on the Site are designated for suppression (CDA, 2018a). The Colorado Noxious Weed Act defines suppression as "*reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weed species*

to spread to surrounding lands, and mitigating the negative effects of noxious weed populations on infested lands." Suppression efforts may employ a wide variety of integrated management techniques. Per the El Paso County Noxious Weed and Control Methods document (El Paso County, 2018a): "*The most effective way to control noxious weeds is through Integrated Pest Management (IPM). IPM incorporates weed biology, environmental information, and available management techniques to create a management plan that prevents unacceptable damage from pests, such as weeds, and poses the least risk to people and the environment. IPM is a combination of treatment options that, when used together, provide optimum control for noxious weeds; however, IPM does not necessarily imply that multiple control techniques have to be used or that chemical control options should be avoided.*

- *Prevention: The most effective, economical, and ecologically sound management technique. The spread of noxious weeds can be prevented by cleaning equipment, vehicles, clothing, and shoes before moving to weed free areas; using weed-free sand, soil, and gravel; and using certified weed free seed and feed.*
- *Cultural: Promoting and maintaining healthy native or other desirable vegetation. Methods include proper grazing management (prevention of overgrazing), re-vegetating or re-seeding, fertilizing, and irrigation.*
- *Biological: The use of an organism such as insects, diseases, and grazing animals to control noxious weeds; useful for large, heavily infested areas. Not an effective method when eradication is the objective but can be used to reduce the impact and dominance of noxious weeds.*
- *Mechanical: Manual or mechanical means to remove, kill, injure, or alter growing conditions of unwanted plants. Methods include mowing, hand pulling, tilling, mulching, cutting, and clipping seed heads.*
- *Chemical: The use of herbicides to suppress or kill noxious weeds by disrupting biochemical processes unique to plants."*

The following information provides general measures to prevent introducing new weeds and spreading existing weeds during construction:

<u>Prior to Construction</u>:

1. Create a native habitat restoration and weed control plan for the Open Space areas. Since there is such dense knapweed mixed with other weeds along the Creek, total re-vegetation of some areas may be necessary. One option in the weediest areas would be to remove the top three to six inches of topsoil and replace it with topsoil from the non-weedy short grass prairie north of the Creek that will be developed. If topsoil can be transferred directly, or is only briefly stockpiled, then re-seeding may not be needed. Planning topsoil management ahead of construction may decrease costs for weed control, restoration, and grading.

2. Biological control is a low cost and non-invasive way to begin controlling weeds. Optimum results take 3-5 years. Contact the Colorado Department of Agriculture Request-A-Bug program at 970-464-7916 to reserve insects, determine the species/quantity needed, and discuss release schedules (CDA, 2020b). At a minimum, species should be introduced to control the knapweed. Biological control may also be available for yellow toadflax, musk thistle, and Canada thistle; with the dense patches of yellow toadflax in the northwest corner of the Site being the highest priority of these three.
3. Reduce grazing overall. Eliminate cattle grazing in knapweed-infested areas, unless using grazing for weed control. Cattle will eat young knapweed prior to bolting but avoid it once the plant matures and develops spines. Thus, targeted grazing can reduce knapweed, but prolonged heavy grazing increases it. Cattle grazing in areas of diffuse knapweed twice in spring may decrease seed by 50%. If cattle are being used for weed control, grazing should consist of two, 10-day intervals in the spring when diffuse knapweed is bolting and about 6 to 12 inches tall (see CSU, 2013). Grazing may reduce the efficacy of biological control.
4. Develop a mowing program to control weeds. This will be most effective for the large areas of common mullein, but may also be used for Canada thistle, musk thistle, and cheatgrass. Mowing in the knapweed areas may reduce the efficacy of biological control for this species.

<u>During construction staging</u>:

1. Fence off all the open space areas to prevent vehicles from driving through them and spreading knapweed, etc. to new areas (Note: fencing will also prevent unpermitted wetland impacts and likely be required by the stormwater management plan).
2. Designate a minimal number of vehicle crossings of the Open Space areas. Construct crossings with weed free soil so that noxious weed seeds are not tracked into new areas.

<u>During construction</u>:

1. Prior to any grading of the non-weedy areas on the slopes north of the Creek, salvage the top six inches of topsoil so that it can be used to construct vehicle crossings and for re-vegetation of natural areas. If possible, immediately move soil to re-vegetation areas. If soil must be stockpiled, minimize the time in order to maintain native seed viability. Excess topsoil may be used for development areas.
2. Do not move weedy soil to new areas within the Site or import weedy soil from other Sites.
3. Control weeds within staging areas and along construction access roads on an ongoing basis.

4. Noxious weeds are most likely to become established in areas where the native vegetation and soil have been disturbed by construction. Thus, maintaining and then quickly re-establishing desirable vegetation post-construction will minimize weed infestations. Desirable vegetation may consist of native plant communities or landscaped areas.

The Site development plan should include measures to prevent introducing new weeds and spreading existing weeds during construction (including prevention measures above). Following construction, the Homeowner's Association (HOA) will be responsible for weed control. Weed management recommendations for the species observed on the Site are summarized in Table 2. Refer to the El Paso County "Noxious Weed and Control Methods" booklet for additional detail (El Paso County, 2018a).

TABLE 2 – NOXIOUS WEED MANAGEMENT SUMMARY

Species	Occurrence	Management[1,2,3]
LIST B[4]		
Canada thistle (*Cirsium arvense*)	Uncommon and dispersed.	Mowing combined with herbicide treatment. Mow every 10 to 21 days during the growing season to prevent seeding. Spot treatment with herbicide will likely be needed in open space areas.
Scotch thistle (*Onopordum acanthium*)	Uncommon and dispersed.	No known biological control agents effective against Scotch thistle. Any physical method that severs the root below the soil surface prior to seed production will kill the plant. Properly dispose of flowering cut plants, as seeds can mature and become viable. Spot treatment with herbicide will likely be needed in open space areas.
Yellow toadflax (*Linaria vulgaris*)	Uncommon and dispersed.	Difficult to control; control when infestations are small. Biological control is available and recommended, particularly in the northwest corner where this species is most abundant. Spot treatment with herbicide will likely be needed in open space areas.
LIST C		

TABLE 2 – NOXIOUS WEED MANAGEMENT SUMMARY		
Species	**Occurrence**	**Management[1,2,3]**
Common mullein (*Verbascum thapsus*)	Uncommon and dispersed.	Reduce grazing to increase density of other vegetation. Mow in the bolting to early flowering stage to reduce seed production. Use herbicide to kill existing rosettes. Hand-pulling is effective, but likely not feasible for such large areas. Establish other vegetation and minimize disturbance to prevent existing seeds from sprouting in bare soil.

[1]Refer to the El Paso County "Noxious Weed and Control Methods" booklet for additional detail (El Paso County, 2018a).

[2]When using herbicides, always read and follow the product label to ensure proper use and application.

[3]If near water or wetlands, only use herbicides and formulations approved for use near water.

[4]All of the List B species on the Site are designated for suppression (Colorado Code of regulations, 2018).

3.6 Wildfire Hazard

The stated purpose and intent of the 2018 El Paso County Development Standards" for "Fire Protection and Wildfire Mitigation" is to ensure that proposed development is reviewed for wildfire risks and adequate fire protection. No permit or approval associated with development, construction or occupancy shall be approved or issued until the provisions of these standards are satisfied.

The El Paso County Wildfire Hazard Map is based on the existing vegetation and classifies the grassland areas that comprise the Site as "Low Hazard – Non Forested". [Note: the Vegetation Map required to be referenced in the current Land Development Code is not available, therefore we used the most current map (Figure 7).] "Wildland areas" include land shown as "High Hazard – Forested" or areas identified as such in the "Wildland Fire Risk and Hazard Mitigation Plan." Since the Site does not include forested (high hazard) areas, it is not subject to the wildland areas requirements and does not requires the preparation of a Wildland Fire and Hazard Mitigation Plan.

3.6.1 Fire Protection

Falcon Fire Protection District

A portion of the Site is located within the jurisdiction and boundaries of the Falcon Fire Protection District (FFPD). The portion of the Site within the boundaries of the Falcon Fire Protection District is that portion west of the North/South section line beginning at the intersection of Highway 24 and Curtis Road. The Falcon Fire Department (Fire Department) has provided a letter for the previous iteration of this Project dated October 15, 2018 (Appendix C) to confirm its commitment to provide fire suppression, fire prevention, emergency rescue, ambulance, hazardous materials and emergency medical services (collectively, "Emergency Services") to the applicable portion of the Site, subject to the following conditions:

- All new construction, renovations or developments within the Fire Department's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the FFPD's Board of Directors, as amended from time to time;
- All development, water and construction plans must be reviewed and approved by the Fire Department for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and,
- All development or construction projects shall meet the fire code and nationally recognized standards' pertaining to fire protection water. Please note that approved and inspected fire cisterns are permitted by the Fire Department in an attempt to help the property owner/developer meet these requirements.

Note: A new letter from FFPD will be obtained for the current iteration of this Project prior to Preliminary Plan submittal.

The three staffed FFPD stations are located as follows:

- Station 1, 12072 Royal County Down Road, Peyton (1.94 miles from Site)
- Station 3, 7030 Old Meridian Road, Peyton (4.21 miles from Site)
- Station 4, 2710 Capital Drive, Colorado Springs, CO (9.95 miles from Site)

One unstaffed station is located as follows:

- Station 2 located at 14450 Meridian Road (4.16 miles from the Site.

The closest station to the Site entrance is Station 1. Equipment at Station 1 includes an engine, a water tender (water truck), a brush truck, an AMR ambulance, a utility truck, and a command vehicle (FFPD, 2018). Equipment at the second closest station, Station 2, includes a 4-wheel drive engine, a water tender, and a brush truck.

Peyton Fire Protection District

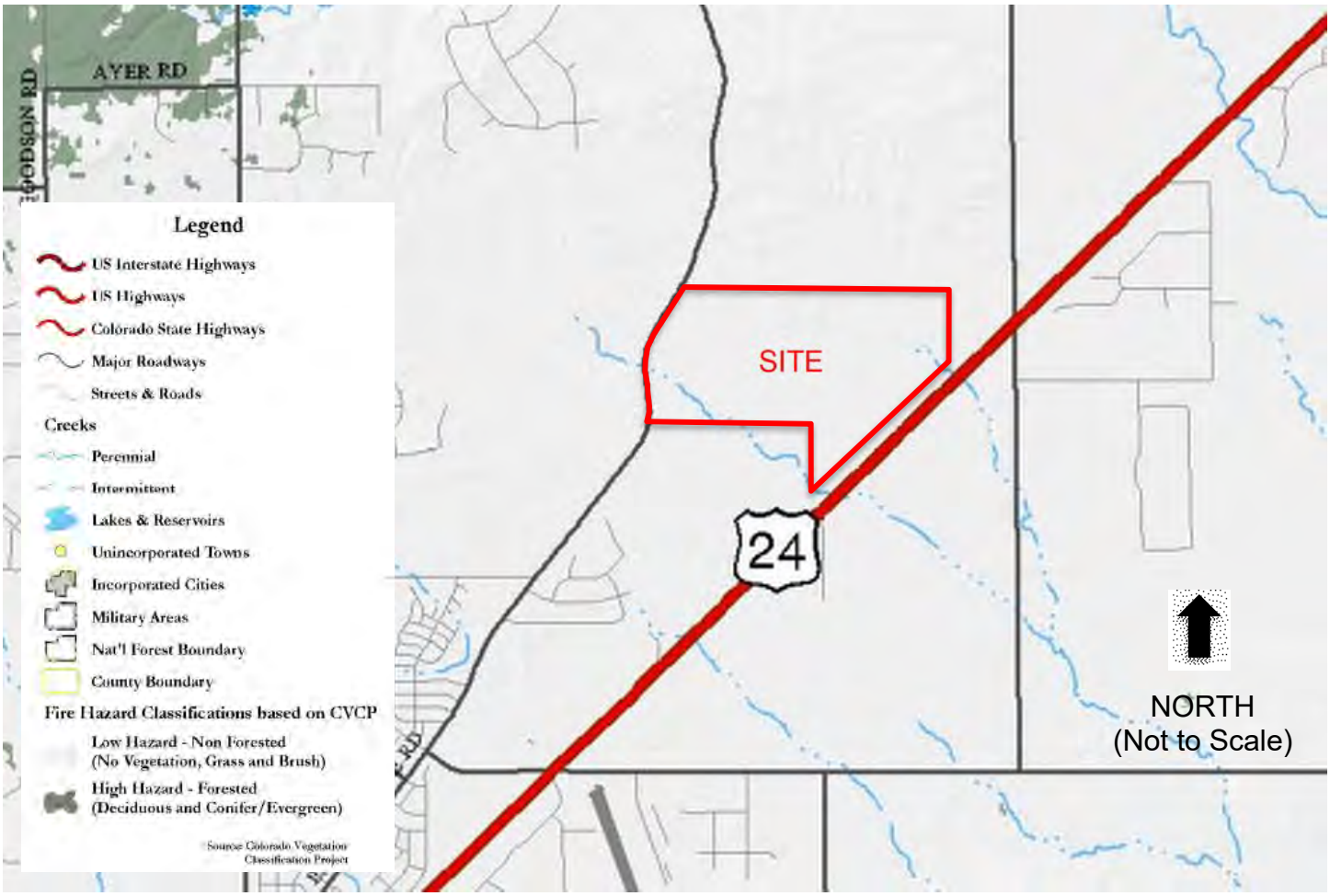
Peyton Fire Protection District (PFPD) will serve that potion of the Site east of the North/South section line beginning at the intersection of Highway 24 and Curtis Road.

The PFPD has provided a letter for the previous iteration of this Project dated October 30, 2018 (Appendix C) to confirm its commitment to provide fire prevention and suppression, emergency rescue, emergency medical and emergency hazardous materials response services (collectively, "Emergency Services") to the applicable portion of the Site, subject to the following conditions:

- All new construction, renovations or developments within the Fire Department's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the PFPD's Board of Directors, as amended from time to time;
- All development, water and construction plans must be reviewed and approved by the PFPD for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and,
- All development or construction projects shall meet the fire code and nationally recognized standards' pertaining to fire protection water. Approved and inspected fire cisterns are permitted by the PFPD in an attempt to help the property owner/developer meet these requirements .

Note: A new letter from PFPD will be obtained for the current iteration of this Project prior to Preliminary Plan submittal.

PFPD is a paid/volunteer fire department located at 13665 Railroad Street, Peyton, Colorado, which is 4.26 miles from the Site. PFPD covers 110 square miles and has an ISO rating of 8B.



SOURCE: El Paso County, Colorado Wildfire Hazards (Based on CVCP Indicators), Map, 2007

Colorado Vegetation Classification Project (CVCP) Indicator Groupings

Low Hazard - Non Forested

No Vegetation:	(1) Urban/Built Up (6) Barren Land (8) Riparian (9) Water (11) Residential (12) Commercial (61) Rock (6101) Talus Slopes & Rock Outcroppings (62) Soil
Grass:	(21) Dryland Agriculture (22) Irrigated Agriculture (3102) Grassland (3104) Grass/Forb Mix (3111) Sparse Grass/Blowouts (3304) Grass/Misc. Cactus Mix (3307) Grass/Yucca Mix (7102) Alpine Grass Dominated (7103) Alpine Grass/Forb Mix (7401) Subalpine Grass/Forb Mix (83) Herbaceous Riparian
Brush:	(3201) Sagebrush Community (3202) Slathrush Community (3203) Greasewood (33) Shrub/Grass/Forb Mix (3301) Sagebrush/Grass Mix (3302) Rabbitbrush/Grass Mix (4202) Xeric Mountain Shrub Mix (4203) Mesic Mountain Shrub Mix (4205) Upland Willow/Shrub Mix (72) Subalpine Shrub Community (82) Shrub Riparian (8201) Willow

High Hazard - Forested

Deciduous:	(4201) Gambel Oak (5101) Aspen (5102) Aspen/Mesic Mountain Shrub Mix (81) Forested Riparian (8101) Cottonwood
Conifer/Evergreen:	(4101) Pinyon Juniper (4102) Juniper (4301) PJ-Oak Mix (4303) PJ-MNT Shrub Mix (4304) Sparse PJ/Shrub/Rock Mix (4305) Sparse Juniper/Shrub/Rock Mix (5201) Ponderosa Pine (5202) Engelmann Spruce/Fir Mix (5203) Douglas Fir (5204) Lodgepole Pine (5207) Spruce/Lodgepole Pine Mix (5208) Bristlecone Pine (5209) Ponderosa Pine/Douglas Fir Mix (5211) Limber Pine (5213) Lodgepole/Spruce/Fir Mix (5214) Fir/Lodgepole Pine Mix (5215) Douglas Fir/Engelmann Spruce Mix (5301) Spruce/Fir/Aspen Mix (5302) P. Pine/Gambel Oak Mix (5303) Ponderosa Pine/Aspen Mix (5304) Douglas Fir/Aspen Mix (5306)Lodgepole Pine/Aspen Mix (5307) Spruce/Fir/Lodgepole/Aspen Mix (5308) P. Pine/Mountain Shrub Mix (5309) P. Pine/Aspen/Mesic Mountain Shrub Mix

3.7 Wildlife Communities

The stated purpose and intent of the "El Paso County Development Standards" section on wildlife is to ensure that proposed development is reviewed in consideration of the impacts on wildlife and wildlife habitat, and to implement the provisions of the Master Plan (El Paso County, 2018b). Ecos has determined that the wildlife impact potential for development of the Site is expected to be low.

The Site currently provides poor to moderate habitat for wildlife. There are two primary vegetation types on the Site, including shortgrass prairie and wetlands.

The project would develop most of the shortgrass prairie, however the drainages and adjacent short grass prairie would be preserved as Open Space. A noxious weed management plan will be implemented per State and County requirements to improve wildlife habitat; and a native plant re-vegetation plan for the Open Space is recommended to provide additional benefit to wildlife habitat.

The habitat preferences of the observed species are reflective of the habitat on Site. Two species of raptors were observed and appear to either be residents or frequent hunters to this Site: ferruginous hawk (*Buteo regalis*) and great horned owl (*Bubo virginianus*). Sandhill crane (*Grus canadensis*) were observed flying over during their migration, although they are not likely to utilize the Site. Prairie species such as jackrabbit (*Lepus townsendii*), pronghorn (*Antilocapra americana*), black-tailed prairie dog (*Cynomys ludovicianus*) and thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*) were present. The remaining species are considered generalists and included mourning doves (*Zenaida macroura*) and American crows (*Corvus brachyrhynchos*). The Site provides very limited tree nesting habitat for raptors; however, ferruginous hawks may also use ground nests. No existing nest sites for any raptors were noted during the Site visit.

The Site provides habitat for mammals including rodents, antelope, and carnivores. The site provides foraging and breeding habitat for predators such as coyote and fox. The Site also provides good habitat for reptiles but limited habitat for amphibians due to the lack of persistent standing and flowing water. No other species were observed by ecos during our field assessment.

The Site contains no Wildlife Refuges or Hatcheries according to the USFWS IPaC Trust Resources Report (USFWS, 2020b) (Appendix D).

4.0 FEDERAL LISTED SPECIES

A number of species that occur in El Paso County are listed as candidate, threatened or endangered by the USFWS (USFWS, 2020b) under the Endangered Species Act (ESA). Ecos compiled the Federally-listed species for the Site in Table 3 based on the Site-specific, USFWS IPaC Trust Resources Report we ran for the Project (Appendix D); and our onsite assessment. Ecos has provided our professional opinion regarding the

probability that these species may occur within the Site and their probability of being impacted by the Project.

The likelihood that the Project would impact any of the species listed below is very low to none. Most are not expected occur in the Project area or on the Site; nor will they be affected by the indirect effects of the project. The Preble's meadow jumping mouse is discussed in more detail below because there is USFWS designated Critical Habitat in the County.

TABLE 3 - FEDERAL LISTED SPECIES ASSESSED FOR THE PROJECT

Species	Status	Habitat Requirements and Presence	Probability of Impact by Project
FISH			
Greenback cutthroat trout (*Oncorhynchus clarki stomias*)	Threatened	Cold, clear, gravely headwater streams and mountain lakes that provide an abundant food supply of insects.	None. Suitable habitat does not exist on the Site.
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.	None. The proposed project is not in the watershed for any of the listed river basins.
BIRDS			
Least tern (*Sternula antillarum*)	Endangered	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.	None. The proposed project is not in the watershed for any of the listed river basins.
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened	Mature, old-growth forests of white pine, Douglas fir, and ponderosa pine; steep slopes and canyons with rocky cliffs. The closest USFWS designated Critical habitat is over 15 miles southwest of the Site in mountainous terrain.	None. Suitable habitat does not exist on the Site.

TABLE 3 - FEDERAL LISTED SPECIES ASSESSED FOR THE PROJECT			
Species	**Status**	**Habitat Requirements and Presence**	**Probability of Impact by Project**
Piping plover (*Charadrius melodus*)	Threatened	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.	None. The proposed project is not in the watershed for any of the listed river basins.
Whooping crane (*Grus americana*)	Endangered	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.	None. The proposed project is not in the watershed for any of the listed river basins.
MAMMALS			

TABLE 3 - FEDERAL LISTED SPECIES ASSESSED FOR THE PROJECT			
Species	**Status**	**Habitat Requirements and Presence**	**Probability of Impact by Project**
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	Threatened	Inhabits well-developed riparian habitat with adjacent, relatively undisturbed grassland communities, and a nearby water source. Well-developed riparian habitat includes a dense combination of grasses, forbs and shrubs; a taller shrub and tree canopy may be present. Has been found to regularly use uplands at least as far out as 100 meters beyond the 100-year floodplain.	None. Unlikely to occur on Site due to: 1) the absence of habitat required to support the life requisites of the species; 2) negative trapping results reported by USFWS adjacent to the Site; 3) 10.22-mile distance from closest CPW "Potential" Occupied Habitat (west/northwest of the Site in Colorado Springs); 4) 6.5-mile distance from closest USFWS Critical Habitat (southwest of the Site along Black Squirrel Creek in Colorado Springs); and 5) lack of habitat connection corridor from known habitat to the Site.
PLANTS			

TABLE 3 - FEDERAL LISTED SPECIES ASSESSED FOR THE PROJECT			
Species	**Status**	**Habitat Requirements and Presence**	**Probability of Impact by Project**
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Threatened	Primarily occurs along seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels or valleys, and lakeshores. May also occur along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside borrow pits, reservoirs, and other human-modified wetlands.	Very Low. Unlikely to occur as the Site is situated between 6,860 and 7,020 feet above mean sea level, which is higher than the 6,500-foot elevation limits documented for the species and recommended for conducting surveys by the USFWS.
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	Occurs in tallgrass prairie in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and Oklahoma. Upstream depletions to the Platte River system in Colorado and Wyoming may affect the species in Nebraska.	None. The proposed project will not alter or deplete flows to the South Platte.

4.1 Preble's meadow jumping mouse

4.1.1 Natural History

The Preble's meadow jumping mouse (PMJM) is a small mammal approximately 9-inches in length with large hind feet adapted for jumping, a long bicolor tail (which accounts for 60% of its length), and a distinct dark stripe down the middle of its back, bordered on either side by gray to orange-brown fur (USFWS, 2016). This largely nocturnal mouse lives primarily in the foothills of southeastern Wyoming, and south to Colorado Springs, along the eastern edge of the Front Range of Colorado. PMJM are true hibernators. They usually enter into hibernation in September or October and emerge in May of the following spring.

PMJM typically inhabits areas characterized by well-developed plains riparian vegetation with relatively undisturbed grassland and a water source in close proximity (Armstrong et al. 1997). PMJM regularly range into adjacent uplands to feed, hibernate, and avoid flooding. Radio-tracking studies conducted by CPW have documented PMJM using upland habitat adjacent to wetlands and riparian areas (Shenk and Sivert 1999).

4.1.2 Threats

Threats to PMJM and their habitat include habitat alteration, degradation, loss, and fragmentation resulting from human land uses including urban development, flood control, water development, and agriculture. Habitat destruction may impact individual PMJM directly or by destroying nest sites, food resources, and hibernation sites; by disrupting behavior; or by forming a barrier to movement. Invasive non-native and noxious weeds can alter habitat and decrease its value.

4.1.3 Critical Habitat

Critical habitat is specific areas identified by the USFWS as being essential to the conservation of PMJM (USFWS, 2016). In determining which areas to designate as critical habitat, the USFWS must use the best scientific and commercial data available and consider physical and biological features (primary, constituent elements) that are essential to conservation of the species, and that may require special management consideration and protection. The primary constituent elements for the PMJM include those habitat components essential for the biological needs of reproducing, rearing of young, foraging, sheltering, hibernation, dispersal, and genetic exchange. Thus, critical habitat includes riparian areas located within grassland, shrub land, forest, and mixed vegetation types where dense herbaceous or woody vegetation occurs near the ground level, where available open water exists during their active season, and where there are ample upland habitats of sufficient width and quality for foraging, hibernation, and refugia from catastrophic flooding events. Section 7 of the Endangered Species Act prohibits destruction or adverse modification of a critical habitat by any activity funded, authorized, or carried out by any Federal agency, and Federal Agencies proposing actions affecting areas designated as critical habitat must consult with the USFWS on the effects of their proposed actions, pursuant to Section 7(a)(2) of the Act.

4.1.4 Potentially Occupied Range

Colorado Parks and Wildlife (CPW) mapped areas of “potential” PMJM occupied range (CPW, 2005). The occupied range mapping is based on known occurrences of PMJM (i.e., trapping data) and mapped riparian vegetation (i.e., potential habitat that was not necessarily trapped or verified). For each known PMJM location, a one-mile buffer is applied to riparian areas both upstream and downstream. This includes both the main channel and side channels. Additionally, a 100-meter lateral buffer is applied which, in general, represents foraging and hibernaculum habitat. This buffer serves as a general guideline. Site specific topographic and vegetative features may increase or decrease the area considered locally as foraging and hibernaculum habitat. Where riparian vegetation maps don't exist, the stream centerline is buffered laterally by 100 meters.

4.1.5 Summary

PMJM are very unlikely to occur on the Site or be affected by the Project due to:

1) the absence of onsite habitat required to support the life requisites of the species;

2) negative trapping results reported by USFWS adjacent to the Site;

3) 10.22-mile distance from closest CPW "Potential" Occupied Range (west/northwest of the Site in Colorado Springs);

4) 6.5-mile distance from closest USFWS Critical Habitat (southwest of the Site along Black Squirrel Creek in Colorado Springs); and

5) lack of a habitat connection corridor from known habitat to the Site.

Refer to Figure 8 – USFWS PMJM Trapping Map and Figure 9 – PMJM Habitat Map.

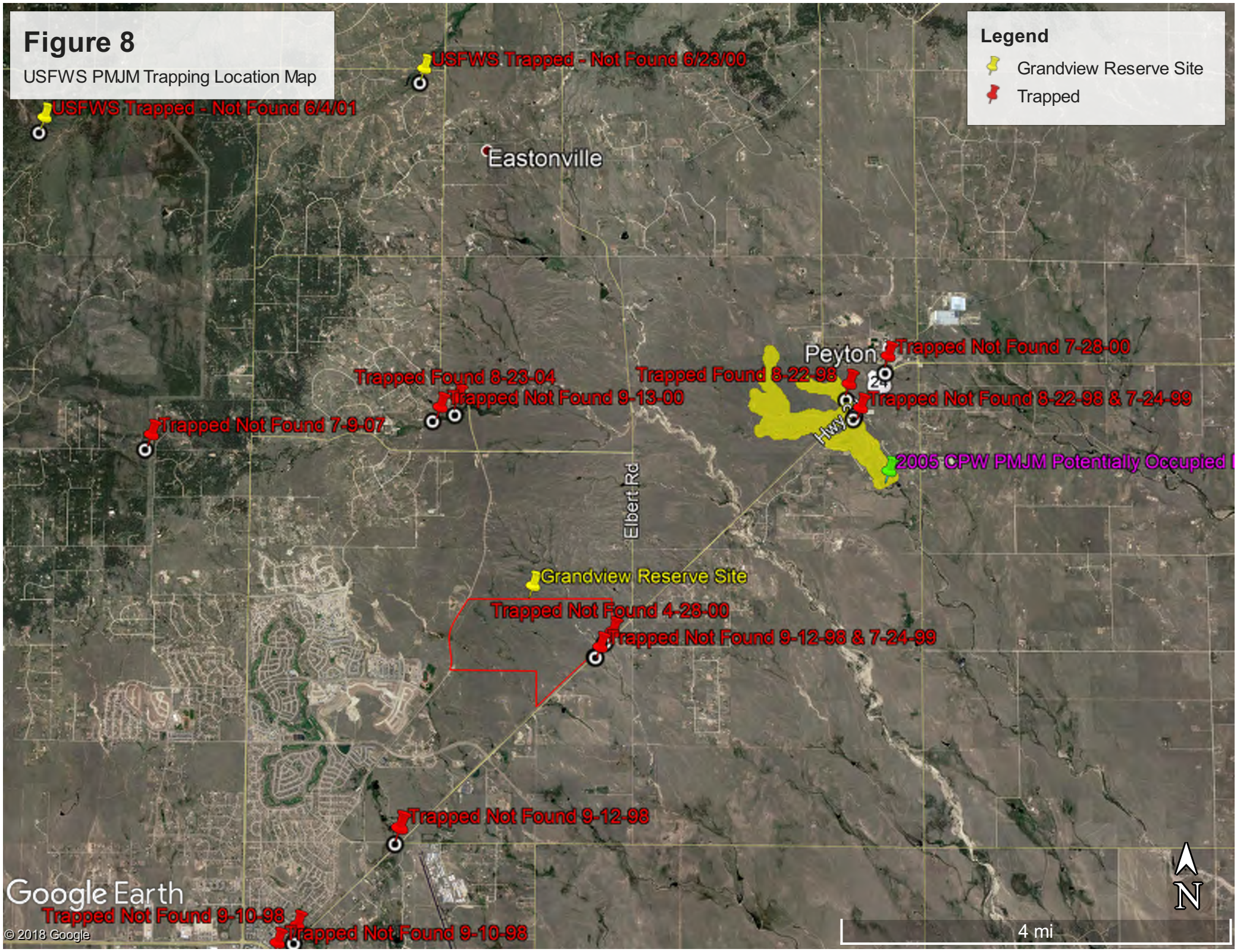


Figure 8
USFWS PMJM Trapping Location Map
Legend
Grandview Reserve Site
Trapped
USFWS Trapped - Not Found 6/23/00
USFWS Trapped - Not Found 6/4/01
Eastonville
Peyton
Trapped Not Found 7-28-00
Trapped Found 8-22-98
Trapped Found 8-23-04
Trapped Not Found 9-13-00
Trapped Not Found 8-22-98 & 7-24-99
Trapped Not Found 7-9-07
Hwy 24
2005 CPW PMJM Potentially Occupied
Elbert Rd
Grandview Reserve Site
Trapped Not Found 4-28-00
Trapped Not Found 9-12-98 & 7-24-99
Trapped Not Found 9-12-98
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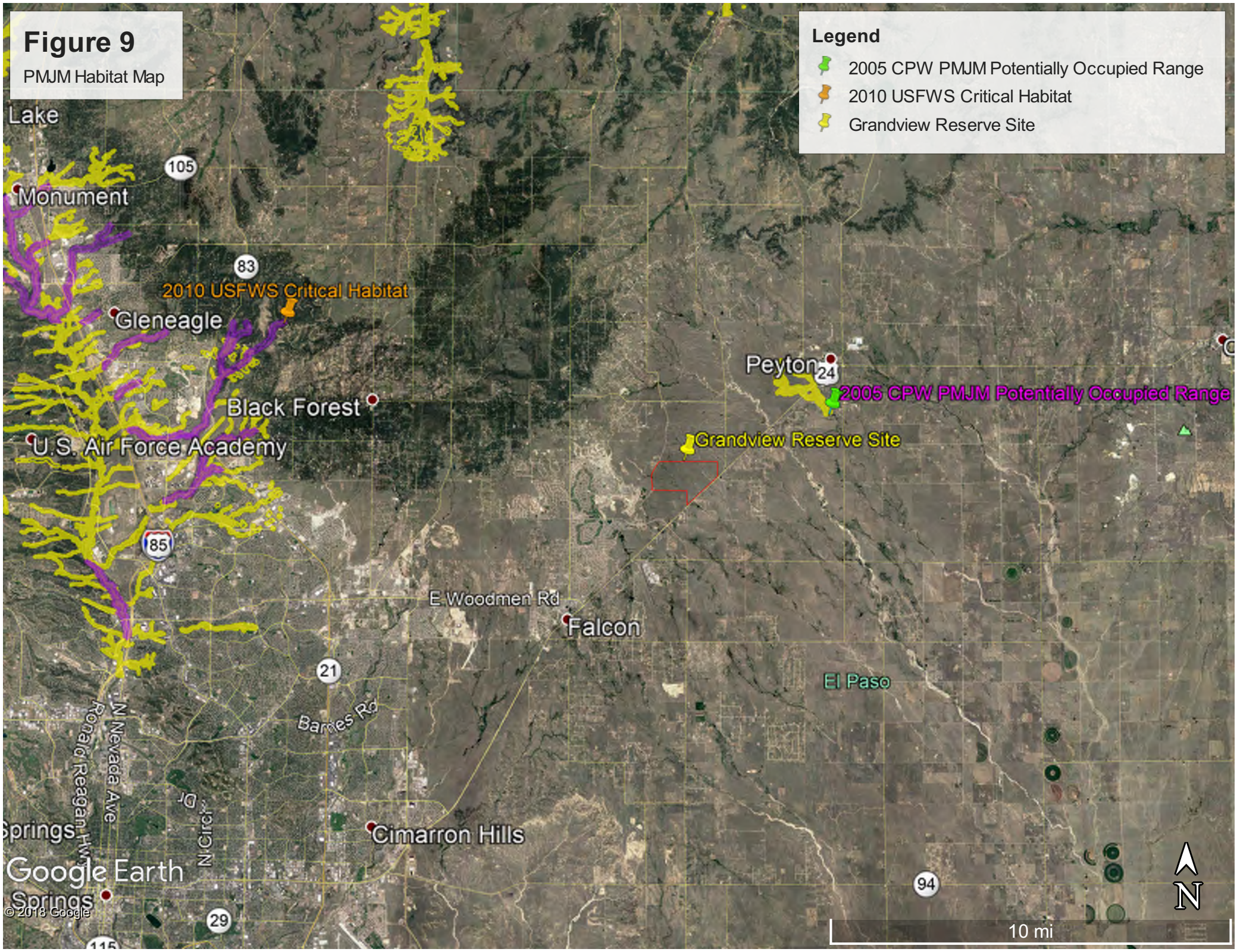
Figure 9
PMJM Habitat Map
Legend
2005 CPW PMJM Potentially Occupied Range
2010 USFWS Critical Habitat
Grandview Reserve Site
Lake
Monument
105
83
2010 USFWS Critical Habitat
Gleneagle
Black Forest
U.S. Air Force Academy
Peyton
24
2005 CPW PMJM Potentially Occupied Range
Grandview Reserve Site
85
E Woodmen Rd
Falcon
21
El Paso
Barnes Rd
Ronald Reagan Hwy
N Nevada Ave
N Circle
Springs
Cimarron Hills
Google Earth
Springs
© 2018 Google
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N
10 mi

5.0 RAPTORS AND MIGRATORY BIRDS

Raptors and most birds are protected by the Colorado Nongame Wildlife Regulations, as well as by the federal Migratory Bird Treaty Act and/or the Bald and Golden Eagle Protection Act. No raptor nests have been mapped within one mile of the Site (COGCC, 2020). No raptors nests were observed during the site visit. However, the short grass prairie and wetland habitats are valuable nesting and foraging habitat for birds.

6.0 SUMMARY OF POTENTIAL IMPACTS

6.1 Mineral and Natural Resource Extraction

The previous project engineer researched the records of the El Paso County Clerk and Recorder and established that there is not a mineral estate owner on the Site (Appendix E). This research will be replicated for this current iteration of the Project and provided prior to Preliminary Plan submittal. However, Mineral or Natural Resource Extraction will not occur as a part of this Project, and no associated impacts to habitat will occur.

6.2 Vegetation

There are two main types of vegetation on Site; wetlands and short-grass prairie. Long-term cattle grazing has degraded vegetation by increasing weeds (although mild) in many areas and severely reducing woody riparian vegetation along the drainages. Direct negative impacts to vegetation will result from the construction of roads, trails, and homes; and indirect negative impacts will result such as spreading weeds to new areas or alteration of wetland hydrology. Since the project will preserve the onsite drainages and an open space area, there is good potential to improve vegetation in these areas. The following recommendations are intended to minimize negative impacts and increase positive impacts:

1. Create a habitat restoration and management plan for the drainages and Open Space areas that begins as soon as possible, continues through construction, and is taken over and implemented by the Metropolitan District following construction.
2. Increase native vegetation in the disturbed shortgrass prairie areas by seeding with native species. Another option would be to spread ~1” of salvaged topsoil obtained/stockpiled from any non-weedy shortgrass prairie area that would be impacted by infrastructure construction, such as roads and associated disturbances, and use it in undisturbed areas.
3. Include requirements in the Codes, Covenants and Restrictions (CCRs) to preserve native vegetation and minimize non-native landscaping and irrigation.
4. Implement a stormwater management system that does not significantly increase flows into the drainages and prepare a natural channel stabilization plan for all drainages.

6.3 Wetland Habitat and Waters of the U.S.

Drainages A and D are both jurisdictional WOUS, including adjacent wetlands; therefore, potential regulatory impacts to these drainages are discussed below:

Drainage A is the western-most drainage located between Parcels E and F (Medium Density) along the west side; and Parcels C, D and G (Medium Density) along the east side. The Sketch Plan (Figure 2) illustrates an Open Space buffer along both sides of the drainage that will assist in ameliorating the effects of residential runoff. This buffer area should be planted with multi-story palette of native upland and riparian species to supplement the regrowth and regeneration of previous woody vegetation (now that grazing has been removed), provide shading to regulate pH and water quality, and assist in stabilizing the streambanks. Given that Parcels E and F are proposed to be accessed via Eastonville Road to the west and the Waterbury project to the south, it does not appear that a road crossing of Drainage A will be necessary. Utility lines will need to cross Drainage A to get service to all lots; however, this impact may be avoided by boring beneath the drainage. A Detention Pond is proposed along the downstream, west side of the drainage that will require an outfall into the drainage. However, with proper location and alignment, impacts for this outfall should be minimal and primarily restored in-place.

Drainage D is the eastern-most drainage located between Parcels M (Medium-High Density), R (Medium Density) and Q (Low Density) along the west side; and Parcels N (Medium Density) and P (Low Density) along the east side. The Sketch Plan (Figure 2) illustrates an Open Space buffer along both sides of the drainage that will assist in ameliorating the effects of residential runoff. This buffer area should be planted with multi-story palette of native upland and riparian species to supplement the regrowth and regeneration of previous woody vegetation (now that grazing has been removed), provide shading to regulate pH and water quality, and assist in stabilizing the streambanks. A road crossing is proposed over the upstream reach of Drainage D that may cause impacts to WOUS and wetlands; however, these impacts may be significantly reduced if a free-span bridge is used. Utility lines will need to cross Drainage D to get service to all lots; however, this impact may be avoided by boring beneath the drainage or minimized by including them in the road crossing ROW. Three Detention Ponds are proposed along the drainage, one upstream and two downstream, all of which will require outfalls into the drainage. However, with proper location and alignment, impacts for these outfalls should be minimal and primarily restored in-place.

All Drainages: Project phasing should be used to avoid Site-wide, over-lot grading and related impacts from runoff, erosion and pollutant discharge into the drainages. Given the proposed density of development, strategic stormwater control before, during and after construction will be required to avoid these impacts and the associated channel incision and streambank degradation. Stormwater runoff from streets and impervious surfaces should be treated via vegetated swales, separators, (e.g., “Stormceptors” or similar oil and sediment separators) and/or the proposed detention basins prior to discharge into the drainages.

6.4 Weeds

Weeds observed on Site included three List B noxious weed species and one List C noxious weed species (CDA, 2018a). Suppression is required for all List B species. Site development typically causes weeds to increase due to increased earth disturbance and new weeds being brought in (on vehicles and shoes, in soil and fill material, in landscaping supplies, etc.). The following recommendations are intended to minimize negative impacts and increase positive impacts:

1. Introduce biological control agents for weed control as soon as possible.
2. Implement an integrated noxious weed management plan that begins as soon as possible, continues through construction, and is taken over and implemented by the Metropolitan District following construction. Control of List B species should be the highest priority, particularly knapweed.
3. Include requirements in the CCRs that landowners manage weeds on their property per the Colorado Noxious Weed Act and El Paso County guidelines.
4. Prohibit importation of fill dirt and landscaping material from other locations unless it is certified as weed free.

6.5 Wildfire Hazard

The Site is comprised entirely of herbaceous prairie and wetland vegetation designated as "Low Hazard – Non Forested" and has no forested (high hazard) areas (Figure 7). Therefore, it is not subject to the wildland areas requirements and does not require the preparation of a Wildland Fire and Hazard Mitigation Plan.

6.6 Wildlife Communities

The impact to wildlife is similar to that for vegetation. Species that occur in wetland and riparian habitat are expected to benefit from Open Space protection. Implementation of the stormwater management plan will assist in protecting water quality in the drainages, to ameliorate development impacts on aquatic wildlife species. Many shortgrass prairie specialist species avoid areas with buildings, overhead powerlines, and trees; thus, the project is expected to have the most significant negative impact on these species. The following, additional recommendations are intended to reduce impacts to wildlife:

1. Limit the use of herbicides, pesticides, and fertilizers as they can negatively impact aquatic wildlife species.
2. Ecos has recommended that the Project minimize the installation of fencing to avoid injury to wildlife. When fencing is needed, we have specified the use of wildlife friendly fences or the inclusion of specific wildlife crossings along fence lines. Pronghorn are of particular concern because they do not jump over fences and can be injured by barbed-wire fences. The El Paso County, Community Services Department, Environmental Division has requested that fencing be installed to "avoid negative conflicts with pronghorn". Therefore, ecos will

discuss this with the County and if deemed to be in the best interest of pronghorn protection, work with the Applicant to prepare a fencing plan in accordance with Colorado Parks and Wildlife guidelines.

3. Road crossings over the drainages should be designed to enable wildlife underpass and allow use of the drainages as movement corridors to reduce collisions with vehicles.
4. Dogs should be kept in fenced pens and be leashed when on walks. At least one designated off-leash area for dogs should be provided, as this will increase compliance with leash rules in other areas.
5. Cats should no be allowed outdoors because they kill birds and native rodents. Cats may also be eaten by foxes and coyotes.

6.7 Federal Listed Species

The Site is not located within any USFWS designated critical habitat or known occupied habitat for federally designated threatened or endangered species, including the Preble's meadow jumping mouse. Therefore, no direct or indirect impacts to federally designated threatened or endangered species are expected to occur from the Project.

6.8 Raptors and Migratory Birds

The Project is expected to have minimal impacts on raptors and migratory birds. Preservation of Open Space along the drainages will likely have a positive impact on the birds that use this habitat. The project is expected to have slight negative impact on shortgrass prairie birds due to habitat alteration and increased disturbance by people, dogs, and cats. Negative impacts can be minimized by following the recommendations in the vegetation and wildlife sections.

7.0 REGULATIONS AND RECOMMENDATIONS

7.1 Clean Water Act

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the U.S. (including wetland habitat) without a valid permit. Ecos identified jurisdictional wetland habitat and WOUS along Drainages A and D. However, the majority of the WOUS and wetlands on the Site will be set aside and included in Open Space with buffers; and no jurisdictional wetlands or waters will occur within private lots. Therefore, it is evident that impact minimization has been incorporated since the early stages of the design process. Any proposed impacts to WOUS or wetlands resulting from road or utility crossings, stormwater outfalls, channel stabilization, grading operations or other associated development disturbances should be avoided or minimized to the extent feasible. 4 Site Investments will need to obtain Clean Water Act (CWA) Section 404 Permit authorization from the USACE prior to construction to authorize development-related impacts. At the Sketch Plan phase, detailed data are not available to assess cumulative impacts and assign the type of 404 Permit that may be

applicable. However, if feasible, the cost and timeframe associated with the Project may be minimized if cumulative impacts are avoided and minimized to the extent that they meet the requirements for Nationwide Permit 29 for Residential Developments.

7.2 Endangered Species Act

The Site is not located within any USFWS designated critical habitat or known occupied habitat for federally designated threatened or endangered species, including the Preble's meadow jumping mouse. Therefore, no direct or indirect impacts to federally designated threatened or endangered species are expected to occur from the Project. Therefore, 4 Site Investments is not required to initiate consultation with the USFWS under the ESA. A "Clearance Letter" dated May 25, 2019 was obtained from the USFWS for the previous iteration of this Project that concurred with ecos' findings and "cleared" the entire Site. Ecos requested an updated, 2020 Endangered Species Act (ESA) Clearance Letter from USFWS. The USFWS issued a Concurrence response to our 2020 ESA Clearance Request that states, ""Ute ladies-tresses orchid and Preble's mouse are not likely to occupy the project site. Project is still consistent with the section 7 conclusions from 2019." The Agency has indicated that they have "No Concern" with our findings under the ESA and therefore no further action is required under the ESA (refer to Appendix F)

7.3 Migratory Bird Treaty Act & Bald and Golden Eagle Protection Act

No raptor nests have been mapped within one mile of the Site (COGCC, 2020) and no migratory bird nests were observed within the Site during ecos' assessment. However, given the transitory nature of these species ecos recommends a nesting bird inventory immediately prior to construction to identify any new nests within the Site or within the CPW recommended buffers of the Site. Therefore, the Applicant will perform two surveys for migratory birds and their nests: 1) approximately one to two months prior to construction; and 2) one week prior to construction. If these species are found to be present, construction activities will be restricted during the breeding season near any newly identified nests to ensure the avoidance of take.

7.4 Colorado Noxious Weed Act

In order to ensure Project compliance with the Act, the Noxious Weed Management Plan referenced in Section 3.5.3 of this Report should be implemented, and further site-specific weed management should be implemented on an ongoing basis, starting as soon as feasible.

8.0 REFERENCES

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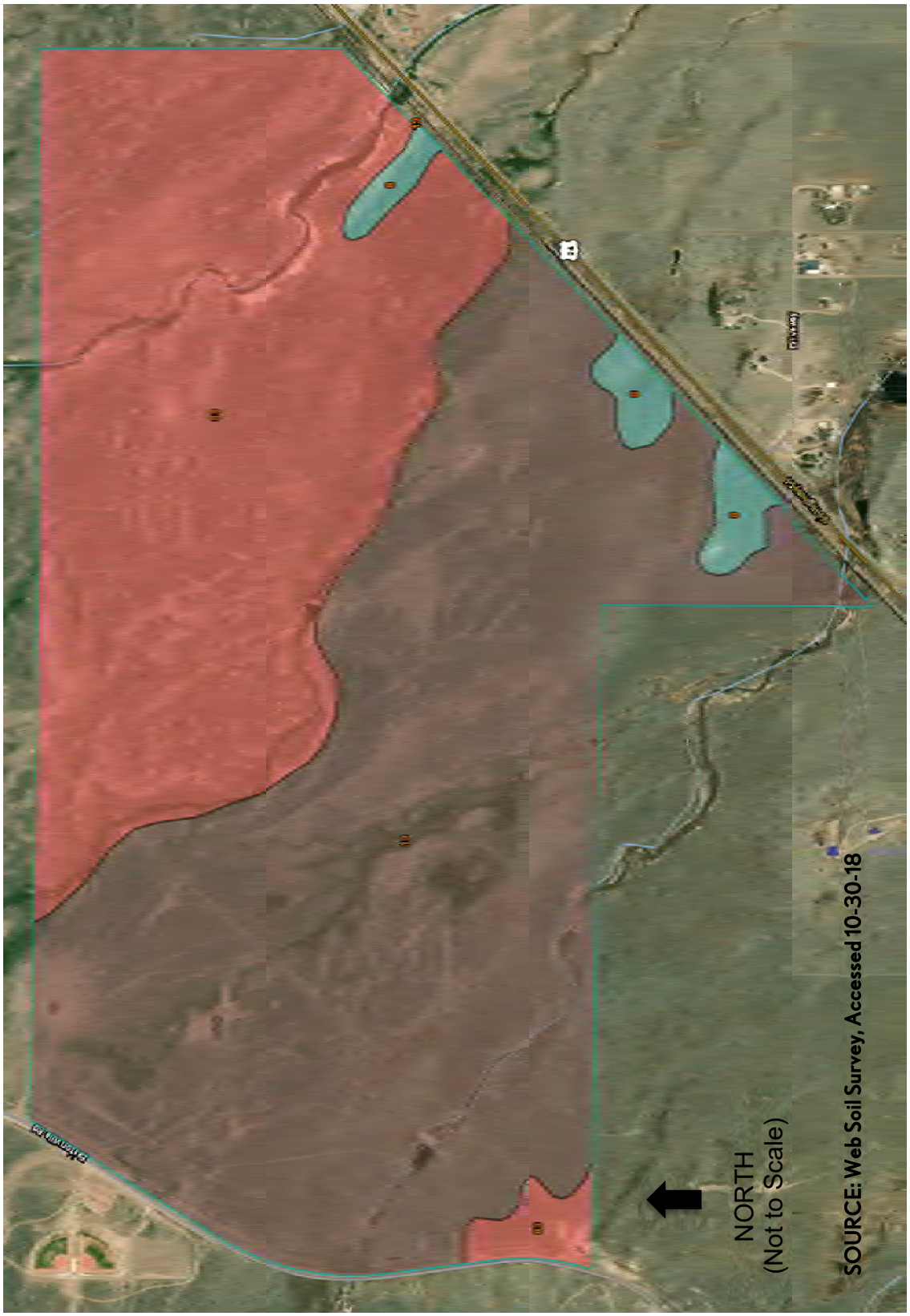
Appendix A

USDA Soil Data



Summary by Map Unit — El Paso County Area, Colorado (CO625)

Summary by Map Unit — El Paso County Area, Colorado (CO625)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
8	Blakeland loamy sand, 1 to 9 percent slopes	Blakeland loamy sand, 1 to 9 percent slopes	17.5	2.3%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	Columbine gravelly sandy loam, 0 to 3 percent slopes	428.6	55.8%
83	Stapleton sandy loam, 3 to 8 percent slopes	Stapleton sandy loam, 3 to 8 percent slopes	322.2	41.9%
Totals for Area of Interest			**768.3**	**100.0%**

Appendix B

USACE Verification Email

From:	Martinez, Joseph A CIV USARMY CESPA (US)
To:	Grant Gurnee
Subject:	RE: [Non-DoD Source] FW: Grandview Reserve Project - Request for Verification of Non-JD Drainages (UNCLASSIFIED)
Date:	Friday, July 5, 2019 1:58:43 PM

CLASSIFICATION: UNCLASSIFIED

Mr. Gurnee,

Based on the information provided in the attached email and our site visit on June 21, 2019 our office concurs with your observations that central Drainage C and south-central Drainage B are isolated and are located entirely upland therefore, we conclude that No permit is required.

If you should have any questions, please contact me at (719).600.8641.

Respectfully,

Tony Martinez, R.E.M.

Regulatory Program Manager| U.S. Army Corps Of Engineers | Office: (719) 600.8641 | Email: joseph.a.martinez@usace.army.mil|

Albuquerque District
Southern Colorado Regulatory Branch
201 West 8th Street, Suite 350, Pueblo Colorado 81003

Visit our Web Site at: http://www.spa.usace.army.mil/Missions/Regulatory-Program-and-Permits/

-----Original Message-----
From: Grant Gurnee [mailto:grant@ecologicalbenefits.com]
Sent: Tuesday, June 18, 2019 2:21 PM
To: Martinez, Joseph A CIV USARMY CESPA (US) <Joseph.A.Martinez@usace.army.mil>
Subject: [Non-DoD Source] FW: Grandview Reserve Project - Request for Verification of Non-JD Drainages

Hi Tony –

Here is the email I sent Van on May 20, 2019.

I hope you received my calendar invitation to meet at 10:30 this Friday (June 21) at the intersection of Stapleton Road and Hwy. 24.

Thank you,

Grant

From: Grant Gurnee <grant@ecologicalbenefits.com <mailto:grant@ecologicalbenefits.com> >
Sent: Monday, May 20, 2019 10:23 AM
To: Truan, Van A SPA <van.a.truan@usace.army.mil <mailto:van.a.truan@usace.army.mil> >
Cc: Peter Martz <pmartzlrg@comcast.net <mailto:pmartzlrg@comcast.net> >; Mike Bramlett <mbramlett@jrengineering.com <mailto:mbramlett@jrengineering.com> >; Jon Dauzvardis <jon@ecologicalbenefits.com <mailto:jon@ecologicalbenefits.com> >

Subject: Grandview Reserve Project - Request for Verification of Non-JD Drainages
Importance: High

Hello Van –

Ecos would like to request the Corps' formal concurrence regarding the non-jurisdictional status of Drainages B and C on the Grandview Reserve Site in El Paso County (refer to Section 3.4 and additional information in the attached report). Please let us know if you would like to schedule a site visit to review these drainages with us.

Summary:

The central Drainage C and south-central Drainage B were investigated found to be discontinuous, prairie sloughs with reaches that are upland swales; they exhibited upland "breaks" in which they did not exhibit defined bed or bank (Figure 6 in attached report); and they were also found to be "isolated" as they did not connect with downstream WOUS. Patches of PEMC1 Wetland exists in these drainages that exhibits the 3 parameters for jurisdictional wetland habitat. However, they are clearly disconnected from Black Squirrel Creek by uplands that do not exhibit a defined bed or bank. Therefore, ecos determined that these drainages are isolated, non-jurisdictional features – pending Corps verification.

Thank you,

Grant

Grant Gurnée, P.W.S.

Owner – Restoration Ecologist

ecosystem services LLC

(o): 970-812-ECOS (3267)

(c): 303-746-0091

(w): Blockedwww.ecologicalbenefits.com <Blockedhttp://www.ecologicalbenefits.com/>

(e): grant@ecologicalbenefits.com <mailto:grant@ecologicalbenefits.com>

P Life is like a river…we all must learn to adapt to the challenges of dynamic equilibrium

Appendix C

Commitment Letters to Provide Fire and Emergency Services

FALCON FIRE PROTECTION DISTRICT

Administration Office
7030 Old Meridian Road
Falcon, Colorado 80831
Business Number: 719-495-4050 Business Fax: 719-495-3112

October 15, 2018

4 Site Investments, LLC
1271 Kelly Johnson Blvd, Suite 100
Colorado Springs, CO 80920

Re: Conditional Commitment to Provide Emergency Services
Property: A portion of 4 Way Ranch- Phase 2

Based upon the information you have provided, a portion of the above-referenced real property is located within the jurisdiction and boundaries of the Falcon Fire Protection District ("Fire Department"). The portion within the boundaries of the Falcon Fire Protection District is that portion west of the North/South section line beginning at the intersection of Highway 24 and Curtis By this letter, the Fire Department confirms its commitment to provide fire suppression, fire prevention, emergency rescue, ambulance, hazardous materials and emergency medical services (collectively, "Emergency Services") to the property within the District boundaries, subject to the following conditions:

- ☒ All new construction, renovations or developments within the Fire Department's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the Fire Department's Board of Directors, as amended from time to time;
- ☒ All development, water and construction plans must be reviewed and approved by the Fire Department for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and,
- ☒ All development or construction projects shall meet the fire code and nationally recognized standards' pertaining to fire protection water. Please note that approved and inspected fire cisterns are permitted by the Fire Department in an attempt to help the property owner/developer meet these requirements.

Please do not hesitate to call the fire administration office or me for further information between 9:00 am and 4:00 pm, Monday through Friday.

Sincerely,
Trent Harwig
Fire Chief/Administrator

PEYTON FIRE PROTECTION DISTRICT
Administrative Offices
141 Union Boulevard, Suite 150
Lakewood, Colorado 80228-1898
Tel: 303-987-0835 800-741-3254
Fax: 303-987-2032

October 30, 2018

4 Site Investments, LLC
1274 Kelly Johnson Blvd., Suite 100
Colorado Springs, CO 80923

Re: A portion of 4 Way Ranch – Phase 2 (the "Project") – Fire Protection to Serve Letter

To Whom It May Concern:

Based upon the provided information, a portion of the above-referenced Project is located within the jurisdiction and boundaries of the Peyton Fire Protection District (the "District"). The portion within the boundaries of the District is that portion east of the North/South section line beginning at the intersection of Highway 24 and Curtis Road.

The District is able to provide fire prevention and suppression, emergency rescue, emergency medical, and emergency hazardous materials response to the portion of the Project that is within the District service area, subject to the following conditions:

- All new construction, renovations, or developments within the District's jurisdiction must comply with the applicable fire code and nationally recognized life-safety standards adopted by the El Paso County Board of County Commissioners and the District's Board of Directors, as amended from time to time;
- All development, water, and construction plans must be reviewed and approved by the District for compliance with the applicable fire code and nationally recognized life-safety standards prior to final plat or construction permit being issued; and
- All development or construction projects shall meet the fire code and nationally recognized standards pertaining to fire protection water. Approved and inspected fire cisterns are permitted by the District in an attempt to help the property owner/developer meet these requirements.

If additional information is required, please contact our administrative office at 303-987-0835. Thank you.

Sincerely,

Ashley B. Frisbie
District Manager

cc: Patrick Palacol, District President
Jeffery Turner, Fire Chief

Appendix D

USFWS IPaC Trust Resources Report

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

El Paso County, Colorado

Local office

Colorado Ecological Services Field Office

(303) 236-4773
(303) 236-4005

MAILING ADDRESS

Denver Federal Center
P.O. Box 25486
Denver, CO 80225-0486

PHYSICAL ADDRESS

134 Union Boulevard, Suite 670
Lakewood, CO 80228-1807

http://www.fws.gov/coloradoES
http://www.fws.gov/platteriver

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

NAME	STATUS
Preble's Meadow Jumping Mouse Zapus hudsonius preblei There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4090	Threatened

Birds

NAME	STATUS
Least Tern Sterna antillarum This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8505	Endangered
Mexican Spotted Owl Strix occidentalis lucida There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8196	Threatened
Piping Plover Charadrius melodus This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Whooping Crane Grus americana This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Fishes

NAME	STATUS
Greenback Cutthroat Trout Oncorhynchus clarkii stomias No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2775	Threatened

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7162	Endangered

Flowering Plants

NAME	STATUS
Ute Ladies'-tresses *Spiranthes diluvialis* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2159	Threatened
Western Prairie Fringed Orchid *Platanthera praeclara* This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

THERE ARE NO MIGRATORY BIRDS OF CONSERVATION CONCERN EXPECTED TO OCCUR AT THIS LOCATION.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds

guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or

minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER POND
Palustrine

RIVERINE
Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

El Paso County, Colorado

Local office

Colorado Ecological Services Field Office

(303) 236-4773
(303) 236-4005

MAILING ADDRESS

Denver Federal Center
P.O. Box 25486
Denver, CO 80225-0486

PHYSICAL ADDRESS

134 Union Boulevard, Suite 670
Lakewood, CO 80228-1807

http://www.fws.gov/coloradoES
http://www.fws.gov/platteriver

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

NAME	STATUS
Preble's Meadow Jumping Mouse Zapus hudsonius preblei There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4090	Threatened

Birds

NAME	STATUS
Least Tern Sterna antillarum This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8505	Endangered
Mexican Spotted Owl Strix occidentalis lucida There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8196	Threatened
Piping Plover Charadrius melodus This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Whooping Crane Grus americana This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Fishes

NAME	STATUS
Greenback Cutthroat Trout Oncorhynchus clarkii stomias No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2775	Threatened

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7162	Endangered

Flowering Plants

NAME	STATUS
Ute Ladies'-tresses *Spiranthes diluvialis* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2159	Threatened
Western Prairie Fringed Orchid *Platanthera praeclara* This species only needs to be considered if the following condition applies: • Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

THERE ARE NO MIGRATORY BIRDS OF CONSERVATION CONCERN EXPECTED TO OCCUR AT THIS LOCATION.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds

guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or

minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER POND
Palustrine

RIVERINE
Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix E

Mineral Estate Owner Certification

CERTIFICATION:

I Mike Bramlett on behalf of JR Engineering researched the records of the El Paso County Clerk and Recorder and established that there was/~~was not~~ a mineral estate owner(s) on the real property known as Grandview Reserve. An initial public hearing on Grandview Reserve Preliminary Plan which is the subject of the hearing, is schedules for to be determined, ~~2000~~ 2019.

~~Pursuant to §24-65.5-103(4), C.R.S., I certify that a Notice of an initial public hearing was mailed to the mineral estate owner(s) (if established above) and a copy was mailed to the El Paso County Planning Department on _____, 200____.~~

Dated this 8 day of January, 20~~0~~19.

Mike Bramlett

STATE OF COLORADO)
) s.s.
COUNTY OF EL PASO)

The foregoing certification was acknowledged before me this 8 day of January, 20~~0~~19, by Mike Bramlett.

Witness my hand and official seal.

My Commission Expires: 09-01-2020

LADONNA NELSON
Notary Public
State of Colorado
Notary ID # 20164033617
My Commission Expires 09-01-2020

LaDonna Nelson
Notary Public

Appendix F

ESA Clearance Letter from the USFWS

Informal Consultation Request

April 10, 2020

Mr. Drue DeBerry
Acting Colorado Field Supervisor
U.S. Fish and Wildlife Service
Colorado Ecological Services Field Office
134 Union Blvd., Suite 670
Lakewood, Colorado 80228

RE: Request for Technical Assistance Regarding the Likelihood of Take of Federally-listed Threatened and Endangered Species resulting from the proposed development of the Grandview Reserve Project in El Paso County, Colorado

Dear Mr. DeBerry:

Ecosystem Services, LLC (ecos) has prepared the enclosed habitat evaluation on behalf of 4 Site Investments to describe the physical/ecological characteristics of the Grandview Reserve site (Site) and evaluate the potential effects of the proposed development project (Project) on the Federally-listed threatened and endangered (T&E) species protected under the Endangered Species Act (ESA).

The El Paso County Environmental Division has completed its review of the Project and has requested that 4 Site Investments provide a "Clearance Letter" obtained from the U.S. Fish and Wildlife Service (USFWS) to the Planning and Community Development Department prior to project commencement "where the project will result in ground disturbing activity in habitat occupied or potentially occupied by threatened or endangered species and/or where development will occur within 300 feet of the centerline of a stream or within 300 feet of the 100 year floodplain, whichever is greater."

At this time there is no Federal action and no Federal agency is making a formal effects determination under Section 7 (a)(2) of the ESA. Therefore, ecos is requesting technical assistance from USFWS regarding 4 Site Investments' (i.e., the non-federal party) responsibilities under the ESA, and specifically the likelihood of the Project (described herein) resulting in take of listed species. If the USFWS concurs with the findings presented herein we request that you issue an informal letter of concurrence for use in the El Paso County Project review process.

1.0 SITE LOCATION and PROJECT DESCRIPTION

The Site is located in the Falcon/Peyton area of El Paso County and is bounded along the north by 4 Way Ranch Phase I, along the south by Waterbury, along the southeast by Highway 24, and along the west by Eastonville Road. There are no existing structures, roads, or other infrastructure on the Site. The Site is located approximately 4.14 miles southwest of Peyton, 4.16 miles northeast of Falcon and 4.66 miles south of Eastonville, in El Paso County, Colorado. The Site is generally located within the south ½ of Section 21, south ½ of Section 22, the north ½ of Section 27, and the north ½ of Section 28, Township 12 South, Range 64 West in El Paso County, Colorado. The center of the Site is situated at approximately Latitude 38.98541389 north, -104.55472222 east (refer to Figure 1).

Technical Assistance
Tracking Number: 2019-TA-0460

U.S. FISH AND WILDLIFE SERVICE

(•) NO CONCERNS

( ) CONCUR NOT LIKELY TO ADVERSELY AFFECT

( ) NO COMMENT

04/29/2020

Liisa Schmoele DATE

Colorado Assistant Field Supervisor

Remarks: Ute ladies'-tresses orchid and Preble's mouse are not likely to occupy the project site. Project is still consistent with the section 7 conclusions from 2019.

Appendix G

Professional Qualifications

ecos ecosystem services LLC

RESUME

Grant E. Gurnée, P.W.S.

Owner/Managing Partner
Senior Restoration Ecologist
Professional Wetland Scientist
Fisheries and Wildlife Biologist

AREAS OF EXPERTISE:

- Project Management for Complex, Environmental Regulatory and Restoration Projects
- Habitat Assessment, Surveys, Planning, Permitting, Restoration Design, Construction Oversight & Monitoring for:
  - Aquatic, Wetland and Riparian Habitat, and Wildlife Habitat
  - Threatened & Endangered Species, Special Status Species, and Species of Concern
  - Nesting Birds & Raptors
  - Natural Areas, Open Space, Trails and Environmental Education Facilities
  - Conservation and Resource Mitigation Banks
- Natural Resources/Environmental Regulatory Compliance
- Construction Oversight & Best Management Practices
- Grant Funding Support for Conservation and Restoration Projects
- Expert Witness Testimony

EDUCATION:

- MCRP, Environmental Planning and Law Program, Rutgers University, 1994
- Bachelor of Science, Biology, Richard Stockton College of N.J., 1984

EMPLOYMENT HISTORY:

- 2008-Present: Owner, Managing Partner and Senior Restoration Ecologist
  Ecosystem Services, LLC, Erie, Colorado
- 1999-2011: Ecological Restoration Group Manager
  Walsh Environmental Scientists and Engineers, LLC, Boulder, Colorado
- 1994-1999: Vice President and Consulting Division Manager
  Aquatic and Wetland Company, Boulder, Colorado
- 1987-1994: Ecological Assessment Group Manager
  Killam Associates, Millburn, New Jersey
- 1989 – 1994: Owner and Ecologist, Westhill Environmental, Colonia, NJ
- 1986-1987: Project Manager, Connolly Environmental, Denville, New Jersey
- 1985-1986: Biological Technician/Team Lead, EA Engineering Science and Technology, Forked River Field Station, New Jersey

CONTINUING EDUCATION:

- Navigable Waters Protection Rule (NWPR) USEPA Webcast - 2020
- Colorado Stream Restoration Network, Stream Restoration Body of Knowledge Seminar Series – 2014 to 2019
- Stream Functions Pyramid Workshop, Denver, CO - 2014
- Colorado Natural Heritage Program, Wetland Plant Identification - 2014
- Colorado Natural Heritage Program, Ecological Integrity Assessment for Colorado Wetlands - 2013
- FACWet – Functional Assessment of Colorado Wetlands - 2010, 2012 and 2013
- Natural Treatment System Design and Implementation, Southwest Wetlands, Phoenix, AZ - 1995
- Continuing Education in Coastal and Wetland Ecology, Rutgers University, 1985 – 1994

CERTIFICATIONS:

- Professional Wetland Scientist, Certification (#559), Society of Wetland Scientists Certification Program, 1995
- Certified Wetland Delineator, Army Corps of Engineers Wetland Delineator Certification Program, 1993
- Wetland Mitigation Planning and Design Certification, Environmental Concern, Sparks, MD, 1992
- Certified Ornithologist, Marine Biologist, Aquatic Biologist and Ecologist for the preparation and certification of Environmentally Sensitive Areas Protection Plans, N.J. Dept. of Environmental Protection and Energy, 1988
- Wetland Delineation and Regulatory Certification, National Wetland Science Training Institute, 1988

PROTECTED SPECIES SURVEYS AND HABITAT ASSESSMENTS:

- Ute-ladies' tresses orchid and Colorado butterfly plant
- Preble's meadow jumping mouse
- Nesting birds and raptors, including burrowing owls
- Swift fox and bobcat
- Boreal toad
- Pine Barrens and grey tree frogs
- Freshwater, estuarine and marine surveys for native fish
- Western Tiger Salamander
- Terrestrial and sea turtles

EXPERIENCE SUMMARY:

Mr. Gurnée is a founder and managing partner of Ecosystem Services, LLC (ecos), a design-build, ecological planning and design firm that is the culmination of his life's work and passion for restoring and conserving the natural world. Grant is a certified Professional Wetland Scientist with over 36 years of experience in wetland ecology, restoration ecology, wildlife and fisheries biology, environmental planning, and regulatory compliance. Prior to ecos Grant established the Ecological Restoration Group at Walsh Environmental and was the Vice President in charge of the Consulting & Design Division for Aquatic and Wetland Company, the first design-build-grow firm in Colorado. Mr. Gurnée utilizes his diverse field assessment and hands-on experience to bring a unique and pragmatic, big-picture perspective to projects from conceptual planning through implementation. Grant's environmental planning and law education combined with his regulatory compliance experience make him one of the leading experts in the Intermountain West in Clean Water Act and Endangered Species Act issues. He enjoys teaching and furthering the science and art that comprise the field of restoration ecology. As such, Grant has published and presented papers and technical manuals, and lectured nationally and internationally at educational programs that further the understanding of aquatic, wetland, riparian and Threatened and Endangered (T&E) species habitat assessment and restoration. Mr. Gurnée has also been called upon to provide expert reports, expert witness testimony and liaison representation in complex regulatory compliance matters.

RELEVANT PROJECT EXPERIENCE:

The following is a sampling of select projects and clientele that Grant has successfully completed or is currently involved in:

Habitat Assessment and Regulatory Compliance

- **Cinemark Preliminary Habitat Assessment and Jurisdictional Assessment, Colorado Springs, CO** – ecos was hired by Classic Consulting Engineers and Surveyors to perform a Preliminary Habitat Assessment (PHA) and Jurisdictional Assessment of waters of the U.S. (WOUS) under the Clean Water Act (CWA)for Cinemark property within Colorado Springs, Colorado. The PHA included an assessment and mapping of vegetation, noxious weeds, Federal and State Listed Candidate, T&E Species, Wildlife Species of Concern (including Raptors), Waters of the U.S. and Wetland Habitat, Floodplains, and Cultural, Archeological and Paleontological Resources. The PHA Report summarizes ecos' Site assessment findings and includes the mapping of all ecological constraints and cultural resources, a preliminary jurisdictional status determination of all potential wetland habitat and WOUS under the CWA, a summary of ecological opportunities and constraints, and provides regulatory guidance to assist in planning and implementing the future development of the site.

- **Morning Fresh Dairy Farm Clean Water Act Jurisdictional Assessment, Bellvue, CO** – ecos was retained by Otis, Bedingfield & Peters, LLC to assist the Morning Fresh Dairy Farm in determining the jurisdictional status of onsite drainages under the CWA, including the assessment of onsite and offsite, downstream connections to Waters of the United States.
- **4 Way Ranch Assessment & Regulatory Compliance Report, El Paso County, CO** - ecos was retained by 4 Way Ranch to perform a natural resource assessment for their Phase 2 development, and to prepare a Natural Features Wetland, Wildfire, Noxious Weeds & Wildlife Report (Report) pursuant to El Paso County environmental review regulations. The purpose of the project was to identify and document the natural resources, ecological characteristics and existing conditions of the Site; identify potential ecological impacts associated with Site development; and provide current regulatory guidance related to potential development-related impacts to natural resources, including: Mineral and Natural Resource Extraction; Vegetation; Wetland Habitat and WOUS; Noxious Weeds; Wildfire Hazard; Wildlife; Federal and State Listed Candidate, Threatened and Endangered Species; and Raptors and Migratory Birds.
- **Banning Lewis Ranch, Colorado Springs, CO** – ecos was hired by Norwood Homes to perform a PHA for the Banning Lewis Ranch (BLR), an 18,000-acre property within El Paso County, Colorado that will double the size of Colorado Springs once it is developed. The PHA included an assessment and mapping of vegetation, noxious weeds, Federal and State Listed Candidate, T&E Species, Wildlife Species of Concern (including Raptors), Waters of the U.S. and Wetland Habitat, Floodplains, and Cultural, Archeological and Paleontological Resources. The PHA Report summarizes ecos' Site assessment findings and includes the mapping of all ecological constraints and cultural resources, a preliminary jurisdictional status determination of all potential wetland habitat and WOUS under the CWA, a summary of ecological opportunities and constraints, and provides regulatory guidance to assist in planning and implementing the future development of the BLR. Norwood and their planning team, in association with ecos, are currently uploading and interpreting all of the ecos Site assessment mapping into their base GIS layers to inform future site planning and recommend proactive measures to conserve wildlife and wetland habitat, pristine prairie and ephemeral creeks, floodplains, and significant cultural resources.
- **Clean Water Act Jurisdictional Assessment of El Guique Mine in Estaca, New Mexico –** Ecos assisted Espanola Transit Mix, LLC (ETM) in their assessment at the El Guique Mine in Estaca, New Mexico (Site) by determining the potential jurisdictional status of onsite drainages and other waters under the CWA. We reviewed available background information and base mapping to gain a better understanding of the Site and the adjacent offsite area and prepared an overlay of potential WOUS on Google Earth aerial Imagery for mark-up and notation in the field. Ecos then conducted a field assessment to review Site conditions, and potential offsite, downstream connections to WOUS, and particularly the presence of a Significant Nexus to the Rio Grande, a TNW. We drafted a Technical Memorandum summarizing the methodology employed, the results of the field assessment, the rationale under the CWA for all areas deemed to be excluded or non-jurisdictional and illustrated the locations of potential jurisdictional and non-jurisdictional features identified in the field on Google Earth aerial imagery.
- **Bellvue Pipeline Project, BMP Facilitator, Larimer County, CO** – ecos was retained by the City of Greeley as Best Management Practices (BMP) Facilitators to provide pre-construction documentation post-construction oversight of pipeline reclamation processes. Essential responsibilities include meeting with landowners prior to construction to facilitate project understanding and post-construction outcomes; to document landowner needs and wants relative to project goals and land use; to document and monitor pre- and post-construction reclamation and maintenance requirements; and to ensure the contractors maintain compliance with all state and federal laws, county regulations, and Greeley construction and restoration specifications.
- **Encana Oil and Gas (USA), Denver Julesburg Basin, CO** – Encana hired ecos to assess their ecological constraints, recommend means and methods to avoid, minimize and permit unavoidable impacts; and to mitigate, restore and prepare ecological management plans for their drilling and pipeline operations in the Denver Julesburg basin. Grant's role on the team is to perform site assessments, research background data, and prepare assessment reports and mapping data that can be utilized by Encana's project managers to proactively track ecological resources before issues arise. In addition to client consultation, Ecos is responsible for tracking drill site schedules, constraints, restoration and management efforts in a data base and reporting said information to Encana's project manager on a regular basis.
- **Georgetown Lake, Georgetown, CO** –ecos was hired to perform an onsite assessment of ecological resources and prepare a summary report to describe the physical/ecological characteristics of the Project

area and evaluate the potential effects of the construction of a loop trail project on environmental issues and species of concern to support a GOCO grant application. Items evaluated and documented, include site location/ownership, general site characteristics, current land use, proposed impacts, possible effects on Federal– and State-listed T&E animal and plant species, unique or important wildlife, water quality, water bodies, wetlands, and floodplains, stormwater runoff, sedimentation, soil erosion, and invasive species. The assessment report also included mitigation measures, project benefits, and environmental compliance recommendations under applicable regulatory programs.

- **Site Assessments for General Vegetation Cover and T&E Species Presence/Absence** – ecos was retained by JADE Consulting, LLC to perform the assessment of two future development sites located in Lafayette and Yuma, Colorado. We performed a desk-top assessment to identify existing site characteristics and screen the potential presence/absence of federally-listed T&E species and followed up with onsite assessments to verify our preliminary findings. Our findings and recommendations were summarized in a Technical Memorandum in which we determined that no further assessment or regulatory compliance actions are required.
- **The Cove Assessment & Regulatory Compliance Report, El Paso County, CO** - ecos was retained by Lake Woodmoor Development, Inc.to perform a natural resource assessment for The Cove development, and to prepare a Natural Features Wetland, Wildfire, Noxious Weeds & Wildlife Report (Report) pursuant to El Paso County environmental review regulations. The purpose of the project was to identify and document the natural resources, ecological characteristics and existing conditions of the Site; identify potential ecological impacts associated with Site development; and provide current regulatory guidance related to potential development-related impacts to natural resources, including: Mineral and Natural Resource Extraction; Vegetation; Wetland Habitat and Waters of the U.S.; Noxious Weeds; Wildfire Hazard; Wildlife; Federal and State Listed Candidate, Threatened and Endangered Species; and Raptors and Migratory Birds.
- **Jurisdictional Determination Request for Banning Lewis Ranch, Villages 1 and 2 Residential Development, El Paso County, CO** - ecos was retained by Oakwood Homes, LLC to review a 2014 Jurisdictional Boundary Delineation and determine if a portion of the wetlands and waters within the site could be deemed non-jurisdictional under the Clean Water Act (CWA) based on their “isolated” status. Following data review, ecos arranged a field assessment with the U.S. Army Corps of Engineers (Corps) to review site conditions, and potential offsite, downstream connections to waters of the U.S. (WOUS), and particularly the presence of a Significant Nexus to Traditional Navigable Waters TNW). Ecos and the Corps agreed that several of the intermittent drainages on the suite are not jurisdictional under the CWA, as they are not: 1) a TNW or wetland adjacent to a TNW; 2) a Relatively Permanent Water (RPW) or a wetland directly abutting an RPW with perennial or seasonal flow; 3) a tributary to a TNW; or 4) a direct tributary to a downstream WOUS as the feature loses it bed and banks. The Corps submitted ecos’ findings to the U.S. Environmental Protection Agency (EPA) and they concurred and issued an Approved Jurisdictional Determination stating that the drainages were indeed “isolated” features exempt from the CWA.
- **Bellvue Pipeline Project, CWA and ESA Regulatory Negotiation, Larimer County, CO** – ecos assisted the City of Greeley from 2011 through 2014 in their negotiations with the Corps to facilitate review and verification of the Project under CWA, Nationwide Permit12 (NP12) in 2014. Grant aided the City during Corps meetings, field visits and teleconferences; in coordinating with the Corps and the technical experts on the Corps Common Technical Platform (CTP) team; and in utilizing the CTP Poudre watershed data to assess the probability of Project-specific impacts. Grant also provided regulatory and technical support to the City for the CWA, Pre-Construction Notification (PCN) Supplement for the Project from 2014 through the USACE’s 2017 issuance of the “removal of capacity conditions for the Northern and Fort Collins segments” placed on the 2014 NP12. His tasks included performing Impact Avoidance Evaluations, providing historical context and data from the initial work performed for the City on this Project, assisting a Team of multi-disciplinary professionals in the preparation of Impact Assessment Reports, meeting with the City to discuss overall regulatory strategy, assisting with the preparation of the cover letter to transmit the PCN Supplement to the USACE, and assisting with discussions and presentations to the USACE during their review and processing of a Minimal Effects Determination for the Project.
  Mr. Gurnée also assisted Greeley in their negotiations with the FWS to facilitate review and consultation for the Northern Segment of the Project under Section 7 of the ESA. Grant led the field assessment with FWS, identification and prioritization of potential PMJM habitat mitigation sites, development of a conceptual design for the selected PMJM habitat mitigation sites, and preparation of the Biological Assessment

Addendum and Habitat Mitigation Plan. Grant also aided the City during agency review and approval of the FWS Biological Opinion by utilizing his relationships with the FWS, and extensive experience of ESA regulations, policies and precedents.

- **Appraisal Support Documentation Report for the 1st Bank Parcel, Colorado Springs, CO** - ecos was retained by 1st Bank Holding Company to perform a Preble's meadow jumping mouse (PMJM) habitat assessment, mitigation cost analysis and conceptual lot layout for the approximate 9.4-acre 1st Bank Parcel (Site) situated south of the Gleneagle residential development and north of the current Northgate Open Space along Smith Creek in Colorado Springs, Colorado.
- **South Boulder Canon Ditch Maintenance, CWA Exemption Determination, Erie, CO** – ecos assisted the Town of Erie in exempting their proposed ditch maintenance project by performing an assessment of site conditions, submitting the assessment report to the Corps, and verifying that said project is exempt pursuant to Section 404(f) of the CWA.
- **Endangered Species Act (ESA) Compliance Documentation for the Pinon Lake tributary CLOMR Application, Forest Lakes Filing 2B in El Paso County, Colorado** – ecos performed an assessment to document the absence of federally-listed T&E species and their habitat and prepared a report for FEMA that documents that the proposed CLOMR action will not result in a "take" of T&E species.
- **Gleneagle Infill Development Assessment & Regulatory Compliance Report, El Paso County, CO** - ecos was retained by G & S Development, Inc. to perform a natural resource assessment for the proposed Gleneagle Infill Development at the former Gleneagle Golf Course, and to prepare a Natural Features and Wetland Report (Report) pursuant to El Paso County environmental review regulations. The purpose of the project was to identify and document the natural resources, ecological characteristics and existing conditions of the Site; identify potential ecological impacts associated with Site development; and provide current regulatory guidance related to potential development-related impacts to natural resources, including: Mineral and Natural Resource Extraction; Vegetation; Wetland Habitat and Waters of the U.S.; Weeds; Wildfire Hazard; Wildlife; Federal and State Listed Candidate, Threatened and Endangered Species; and Raptors and Migratory Birds. As part of the Project, ecos obtained an Approved Jurisdictional Determination from the Corps.
- **North Fork at Briargate Habitat Evaluation and ESA Compliance, Colorado Springs, CO** - ecos performed a habitat evaluation on behalf of High Valley Land Co., Inc. and La Plata Communities to support informal consultation with the U.S. Fish and Wildlife Service (FWS) under the ESA for potential effects to the Federally-listed, threatened PMJM from the proposed North Fork development, Filings 3 through 7 at Briargate.
- **C Lazy U Preserves Natural Resource Inventory and Conservation Easement Documentation, Grand County, CO** – ecos is assisting the C Lazy U Preserves in assessing and documenting the conservation values of the 980-acre site known as C Lazy U Preserves near Granby, CO such that the site may be protected under Conservation Easements (CE's) held by The Nature Conservancy. The purpose of the CE's is the long-term preservation of the scenic, open space, agricultural, significant natural habitat, native vegetation, rare plant communities, riparian, and wetland values of the Property. ecos staff completed the Easement Documentation Reports Phase 1 of the CE's in 2006, Phase 2 in 2007, and Phase 3 in 2015.
- **Seaman Water Management Project, Riparian-Wetland Technical Support -** Mr. Gurnée supported Greeley in the NEPA EIS process by reviewing riparian and wetland technical reports prepared by the Corps CTP team, and providing comments to assist the City in their formal review and response to the Corps. He also provided technical and regulatory support for CWA and ESA (PMJM habitat) assessment, consultation, and compensatory mitigation planning and design.
- **City of Louisville, City of Westminster, Jefferson County and Town of Monument** – ecos performed numerous wetland habitat, wildlife, MBTA and T&E species habitat ecological assessments, wetland delineations, and Clean Water Act Section 404 and Endangered Species Act Section 7 Permits and mitigation plans for counties, municipalities and quasi- municipalities, including Highway 42 and 96th Street realignment, Jim Baker Reservoir, Standley Lake Protection Project, Triview Metro District Preble's and wetland habitat mitigation planning.
- **ARCO Clark Fork River Basin Anaconda Smelter Superfund Site, Anaconda, MT** – Grant and his Team performed wetland delineation, functional assessments, and impact analysis over a 200 square mile area affected by historic mining practices and current remedial actions required by an EPA consent decree.

- **ARCO Clark Fork River Basin Milltown Reservoir Superfund Site, Missoula, MT** – Mr. Gurnée and his Team performed wetland delineation, functional assessments, and impact analysis of proposed remedial actions that will remove metal laden sediments from the site prior to dam removal.
- **C-Lazy-U and Horn Ranch Environmental Assessments, Granby, CO** – Mr. Gurnée and his Team performed an assessment of ecological opportunities and constraints in the aquatic, riparian, wetland and threatened and endangered species habitat along the Colorado River for the development and enhancement of fishing/resort ranch amenities.
- **Village at Avon, Avon, CO** – Grant and his Team performed a wetland delineation and prepared CWA Section 404 permitting for the town center expansion and low-density ranchette development.

Protected Species Surveys and Habitat Assessments

- **Golden Eagle Monitoring at Meadow Park in Lyons, CO** - ecos was retained by the Town of Lyons (Town) to perform the monthly monitoring of the Golden Eagle (*Aquila chrysaetos*) nest sites at Meadow Park, to prepare monthly Monitoring Summary Memorandum following each event, and to prepare and submit annual reporting to the U.S. Fish and Wildlife Service (USFWS) associated with the *Lyons Federal Fish and Wildlife Permit #MB82833B-0, Eagle Take Associated With But Not The Purpose Of An Activity* (Take Permit).
- **Nesting Birds, Raptors and Burrowing Owls** – Grant has completed over 100 pre-construction nesting surveys and numerous monitoring surveys for raptors and burrowing owls. His projects include pipeline rights-of-way, housing and commercial development projects, stream and river restoration projects, wind and solar farm projects, and oil and gas projects along the Front Range of Colorado, as well as projects in the Pine Barrens of southern New Jersey. His avian experience includes golden eagle nest monitoring; barred owl roost and nest monitoring, and call playback inventory; and multi-species raptor surveys.
- **Native Plants** - Grant has completed numerous pre-construction and monitoring surveys for Ute ladies' tresses orchid and Colorado butterfly plant since 1994. His projects include pipeline rights-of way, mined land reclamation projects, housing and commercial development projects, stream and river restoration projects, wind and solar farm projects, and oil and gas projects along the Front Range of Colorado.
- **Threatened, Endangered and Candidate Species** – Grant trained with the leading expert, Robert Stoecker, PhD, in 1994 and 1995 to gain an understanding of the soon to be listed, Preble's meadow jumping mouse, a threatened species; and since that time, he has completed numerous surveys, habitat assessments, and ESA consultations. He has also performed night-time Swift fox surveys at windfarm sites in southern CO and Boreal toad surveys in northern CO. Prior to relocating to CO Grant performed numerous surveys in N.J., including bobcat surveys to assist in protecting the Pyramid Rock Natural Area; Pine Barrens and gray tree frog surveys, and native Pine Barrens fish surveys with his mentor, Dr. Rudy Arndt; and Eastern box turtle surveys. He also assessed migration routes and alternative mitigation measures for sea turtles that were being impacted by the Garden State Parkway.

Wetland Mitigation and Habitat Restoration

- **Park Creek Mitigation Bank, Fort Collins, CO –** ecos was retained by Burns and McDonnell to assess, map, and prepare preliminary mitigation design of aquatic, wetland, riparian and terrestrial habitat in support of a mitigation banking prospectus. Upon completion and acceptance of the prospectus by the USACE, ecos has been tasked to manage the baseline assessment of the site, including groundwater testing, topographic surveys, and hydrology; prepare a detailed habitat design for inclusion in mitigation banking instrument; as well as coordinate design-build process with a selected nursery and contractor.
- **Front Range Mitigation and Habitat Conservation Bank –** ecos is assisting Restoration Systems, LLC (RS), the Bank Sponsor, with the assessment, planning and design of the Front Range Umbrella Bank for Aquatic Resource Mitigation & Habitat Conservation (Bank). This "umbrella" Bank is intended to provide habitat mitigation for projects along the entire Front Range of Colorado. The **ecos**/RS Team is in the process of securing viable sites in the major watersheds along the Front Range; and recently submitted the Draft Prospectus for the establishment of the Bank to the U.S. Army Corps of Engineers, Albuquerque District, Southern Colorado Regulatory Office and Omaha District, Denver Regulatory Office.
- **Lions Park Poudre River CWA and ESA Mitigation Site** - ecos assisted Greeley in developing and constructing an advance river and wetland mitigation site at Lions Park in LaPorte, Colorado that may be used for future CWA impacts in the Poudre River watershed. We also prepared a conceptual design for Preble's meadow jumping mouse habitat that will be used to support ESA consultation. ecos assessed the

site, prepared the designs, and coordinated review with Greeley, Colorado Department of Parks and Wildlife, Larimer County Parks and Open Lands and Larimer County Engineering Department. The mitigation site provides compensatory mitigation for impacts to wetland and waters of the U.S. under the CWA and will also provide compensation for PMJM habitat under the ESA. This mitigation project entails development of mitigation measures including bioengineered streambank stabilization, fishery habitat enhancement, riparian and wetland habitat restoration and PMJM habitat enhancement.

- **Bellvue Transmission Line Project, Preliminary Compensatory Mitigation Plan (PCMP) -** Mr. Gurnée was the Project Manager for the preparation of the Preliminary Compensatory Mitigation Plan (PCMP) for the Bellvue Transmission Line Project. Built upon preferred strategies in the 2008 Corps Compensatory Mitigation Rules, the PCMP leverages a broad strategy to ensure mitigation success and employs a watershed approach to select and prioritize compensatory mitigation (CM) measures that will best mitigate adverse environmental effects. It is intended to support a Corps determination of minimal adverse effect and allow verification of the Northern Segment of the Project under Nationwide Permit 12. Grant led the Team during the watershed assessment of the Poudre River, identification and prioritization of potential CM and preservation sites, development of a Pilot Watershed Plan, and conceptual design of priority CM sites. The PCMP has been submitted to the Corps for review and approval.
- **Flatirons Parcel Riparian and Wetland Habitat Restoration Project** – Grant assisted Greeley in developing a multiple use project at the Flatirons Parcel, a gravel quarry site in Greeley, Colorado. The site is being decommissioned over the next decade and offers great potential to create a system of ponds connected via a naturalized stream that discharges into the Poudre. The concept design incorporates recreation opportunities that are tied into the Poudre River Trail, a passive park, and the development of wetland, riparian and wildlife habitat.
- **Ruby Pipeline Wetland, Riparian and Waterbody Mitigation and Restoration Plan, WY, UT, NV AND OR -** Mr. Gurnée was the lead restoration ecologist and wetland scientist for the 675-mile, Ruby Pipeline; a natural gas pipeline traversing four states. He was the lead for the preparation of Wetland Mitigation, Riparian and Waterbody Restoration Plans under the CWA, BLM regulations and state equivalent programs. The plans included regulatory guidelines, requirements, and processes; and ecoregion specific restoration plans. The plans detailed specifications for the basis of design, construction, and revegetation; outlined performance criteria, maintenance and monitoring methods for the restoration of approximately 460 acres of temporary wetland impacts.
- **River Point, Sheridan, CO -** Mr. Gurnée was the project manager and lead restoration ecologist for the team that assessed, permitted and designed the natural and aesthetic features of this Brownfields project. The project included a naturalized water quality swale and riverfront improvements which complement the aesthetics and ecology of the South Platte River corridor. The swale was designed to mimic the form and function of a tributary stream, providing passive water treatment with native wetland and riparian vegetation, as well as flood attenuation with instream structures and grade control. The project utilized natural, “bio-engineering” and “bio-technical” techniques to repair and maintain channel and stream bank stability, and native vegetation to enhance and restore habitat. This project also addressed the interface of proposed restaurants, a regional greenway trail, and the river through planning and design of nature trails, interpretive nodes and overlooks/access features that will function to both stabilize banks and help connect people with the river.
- **Caribou Peat Bog Restoration, Nederland, CO –** Grant performed the impact assessment, prepared native plant community design, planting cost estimate, and on-the-ground oversight of restoration volunteers to restore a high-altitude peat bog disturbed by an illegal off-road-vehicle “mudfest”.
- **Opportunity Ponds Operational Unit, Anaconda, MT -** Mr. Gurnée was the project manager and lead restoration ecologist providing technical support to Atlantic Richfield/British Petroleum at a Superfund site in the Upper Clark Fork River basin in Montana between 1995 and 2008. Services included wetland delineation and functional assessment of over 3,000 acres of wetland, stream and pond habitat; design of stream and wetland habitat mitigation projects; and permitting/compliance services. The largest project within the Superfund site was the Opportunity Ponds, a 908-acre wetland, stream and wildlife habitat creation project. The project will result in the largest freshwater mitigation project in the U.S; and is intended to mitigate for historic wetland/waters impacts from Anaconda Mining Company operations and current impacts resulting from remedial actions associated with the Superfund cleanup process.
- **The Club at Flying Horse Golf Course, Colorado Springs, CO –** On behalf of Classic Communities, Grant and his Team assessed wetland habitat, recommended impact avoidance and minimization

measures, and prepared the Section 404, CWA permit for a 1500-acre mixed use development and Weiskopf golf course. The project aesthetic and mitigation measures included the design of native prairie roughs, meandering stream channels and native wetland meadows within the golf course. Extra wetland mitigation was created to serve as a private mitigation bank for the client.

- **Maloit Park, Minturn, CO -** Grant was the project manager and restoration ecologist for the Maloit Park Restoration Project, which was necessitated by the accidental release of mine slurry that contaminated the soils and vegetation of critical wetland habitat at the confluence of Cross Creek and the Eagle River. The project included the assessment of the site, the collection of native wetland seed (that was adapted to site conditions); the selection of appropriate replacement soil; the design of the restoration grading and planting plans; and oversight during the soil replacement, grading and planting phases. Mr. Gurnée also provided follow-up monitoring and reporting to ensure the successful establishment of the wetland habitat.
- **Department of Energy, Private Mitigation Bank, Westminster, CO -** Mr. Gurnée provided the project assessment, design, permitting, mitigation banking instrument negotiation with the Corps and EPA, and construction supervision of a 12-acre wetland mitigation bank for the Department of Energy in Westminster, CO. The project provides compensatory mitigation for impacts associated with the Rocky Flats clean-up and remediation project. It should be noted that this was the first private mitigation bank negotiated in Colorado, and as such it assisted in setting the precedent for future negotiations.
- **Saudi Arabia Coastal Wetland Restoration -** Mr. Gurnée assisted in the restoration planning for 67 square kilometers (41 square miles) of high salt marsh (sabhka) impacted by Gulf War oil spills.

Aquatic, Wetland, and Riparian Habitat Design

- **Saint Vrain Creek Reach 3 Phase 2 Flood Recovery and Restoration, Boulder County, CO** - ecos is part of the Design Team assisting Boulder County Parks & Open Space (BCPOS) with the restoration, repair and enhancement of the Phase 2 reach of the Saint Vrain Creek in rural Boulder County, which was damaged by the 2013 floods. Our role on the project includes: 1) desktop and field assessment to inventory and document the characteristics of the stream reach and riparian corridor (e.g. stream/in-stream features, vegetation, wildlife habitat); identifying and locating significant habitat features within the areas of proposed construction; identifying potential sources of native plant materials for restoration; and identifying areas of opportunity within the breach repair work areas for native vegetation, wetland, PMJM, and fishery habitat restoration; and delineate wetland habitat and waters of the U.S. in all areas of proposed/potential construction-related impact; 2) vegetation community and wildlife habitat restoration design and fish passage design parameters; 3) permitting and compliance under the CWA and ESA; 4) construction oversight for restoration construction; and 5) monitoring and reporting project success/establishment to BCPOS, stakeholders, the Corps, FWS and the State of Colorado Department of Local Affairs (DOLA) under the (the Grant funding agency under the Community Development Block Grant Disaster Recovery (CDBGDR) Resilience Planning Program grant.
- **Big Thompson River Flood Recovery and Restoration, Loveland, CO -** ecos is currently part of a multi-disciplinary team assisting the Big Thompson Watershed Coalition (BTWC) with assessment, design, and construction of the Big Thompson between Rossum and Wilson Drives which are majority-owned by the City of Loveland and Loveland Ready-mix. As with all the flood recovery projects ecos has worked on, we produced 30%, 60% and 100% design plans, construction cost estimates, and specifications guiding soil development/enrichment; upland, riparian, and wetland seeding and planting; and numerous bioengineering techniques aimed at restoring the river and making it more resilient to future flood events. This project is aimed at completion in the summer of 2019.
- **Saint Vrain Creek Reach 3 Flood Recovery and Restoration, Boulder County, CO** - ecos was part of the Design Team assisting BCPOS with the restoration, repair and enhancement of the reach of the Saint Vrain Creek from Highway 36 downstream to Hygiene Road in rural Boulder County, which was damaged by the 2013 floods. Our role on the project included: 1) desktop and field assessment to inventory and document the characteristics of the stream reach and riparian corridor (e.g. stream/in-stream features, vegetation, wildlife habitat); identifying and locating significant habitat features within the areas of proposed construction; identify potential sources of native plant materials for restoration; and identify areas of opportunity within the breach repair work areas for native vegetation, wetland, PMJM, leopard frog and fishery habitat restoration; and delineate wetland habitat and waters of the U.S. in all areas of proposed/potential construction-related impact; 2) vegetation community and wildlife habitat restoration design and fish passage design parameters; 3) permitting and compliance under the CWA, ESA and

NHPA; 4) construction oversight for restoration construction; and 5) monitoring and reporting project success/establishment to BCPOS, stakeholders, the Corps, FWS and the State of Colorado DOLA under the CDBGDR Resilience Planning Program grant.

- **Bohn Park Flood Recovery Design, Town of Lyons, CO** – ecos is part of the Design Team assisting the Town with the restoration, repair and enhancement of Bohn Park in Lyons, which was damaged by the 2013 floods. Ecos roles is to assess and design the natural restoration of the vegetation communities and habitat along St. Vrain Creek and riparian corridor; and to support the project design by acquiring permits/approvals and maintaining regulatory compliance under the CWA, ESA and National Historic Preservation Act (NHPA). The final design will address goals and priorities associated with the Parks Flood Recovery Planning Process, FEMA Project Worksheets and Project Scopes, the Lyons Recovery Action Plan (LRAP), associated Program Development Guides (PDG's), existing Town master plans, comprehensive plans and other relevant documentation and studies.
- **James Creek Post-Flood Restoration, Lefthand Watershed Oversight Group (LWOG), Jamestown, CO** – ecos was part of the LWOG and Boulder County Department of Transportation Team responsible for preparing the 30-60% design package for James Creek Reach 16 as identified in the Left Hand Creek Watershed Master Plan. ecos performed pre- and post-flood plant community assessment; developed revegetation goals and objectives, the basis of design, monitoring protocols, and revegetation plans in accordance with Colorado Department of Local Affairs (DOLA), Community Development Block Grant – Disaster Recovery (CDBG-DR) 30% Guidelines. Specific resources and issues of concern addressed by ecos, included federal and state listed candidate, threatened and endangered species, wildlife species of concern (including raptors), fisheries and fish passage, native plant communities, and management of noxious weeds, all in concert with geomorphic, hydrology and hydraulic analysis and design prepared by other team members.
- **Saint Vrain Creek Restoration and Floodplain Resiliency Plan, Lyons, CO** – ecos is part of the design-build team intent on restoring the St. Vrain Creek corridor in the Town of Lyons that was damaged during the September 2013 flood event. The goal of the project is to create a more resilient floodplain and natural channel condition that will alleviate future threats to the community, reestablish floodplain connectivity, stabilize banks, and restore aquatic, wetland and riparian habitat that was wiped out during the flood. Grant is responsible for CWA, ESA, Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act permitting; as well as developing the plant communities and revegetation strategies needed to restore aquatic and riparian structure and functions within the corridor that support fish, wildlife, recreation, and help the town regain the ecological benefits and economic value they receive from outdoor enthusiasts.
- **Bellvue Raw Water Ponds Riverbank Restoration, Bellvue, CO –** The 2013 flood on the Poudre River altered the course of the river and severely eroded a bank nearly causing a breach of the City of Greeley's raw water ponds – their main municipal water supply. The goal of the project was to stabilize the bank to protect the ponds and to create riparian habitat for the Preble's meadow jumping mouse, a federally listed threatened and endangered species. Jon was responsible for preparing bioengineering design plans and specifications that include soil/cobble encapsulated lifts, stream barbs to deflect flows away from the bank, and harder, biotechnical design of soil/riprap and stream bed scour protection measures to prevent erosion and further undermining and sloughing of the bank. Design plans included specification of native plant materials and various techniques to restore cottonwood forest and willow habitat to further stabilize the bank.
- **Poudre River Pipeline Crossing at Kodak, Windsor, CO –** ecos role on the project was to assess restoration potential, techniques, and prepare design plans and performance specifications to reclaim a pipeline corridor across the lower Poudre River where the City of Greely had to replace 3 major water supply lines. ecos also provided oversight during the construction of site and riverbank stabilization and restoration measures following installation of the pipelines.
- **Lions Park Poudre River Restoration Plan, Laporte, CO –** ecos role on the project was to assess habitat conditions; gather, compile and analyze field survey data; and to prepare the mapping and mitigation design plans for the Lions Park PMJM habitat and the Poudre River Bank Stabilization Plans. We designed and executed the technical drawings for the structural components of the habitat, ensuring that the proposed riparian plant community, habitat structures (brush piles), and bioengineered streambank stabilization measures will create the conditions that alleviate the current habitat fragmentation; support the life requisites of the PMJM; and enhance the overall health of the Poudre River fishery.

- **C Lazy U Ranch, Willow Creek Fishery Enhancement Plan, Granby, CO -** Mr. Gurnée was the lead fisheries biologist and wetland ecologist for the assessment and design of this project. The project entailed 2 miles of instream and riparian cover habitat aimed at enhancing water quality through increased bank stability, improving aquatic habitat and angling opportunities, and providing long-term stability to the reach given existing land-use constraints, and ongoing ranching activities. Bank-side improvements included wetland mitigation design to support ranch impacts, detailed seeding and planting plans indicating site-specific plant and seed locations, life zones, and species palettes according to hydrologic, soil, and aspect conditions. Grant was the regulatory lead, consulting with the Corps under Section 404 of the CWA.
- **Edwards Eagle River Restoration Project, Edwards, CO –** Grant was the senior wetland ecologist and fisheries biologist for the Edwards Eagle River Restoration Project (Project); which is roughly 1.5 miles long covering an area of 168 acres of floodplain along the Eagle River in the heart of the Edwards community. The project utilized indigenous materials and methods to naturally integrate habitat structure in the landscape context. He provided grant funding support; stream, riparian, wetland and fisheries habitat assessment, planning and design; and construction oversight services to the Eagle River Watershed Council for the Project. He assisted the ERWC in facilitating the public process associated with developing stakeholder support and gaining funding through the Eagle Mine Natural Resources Damage Fund. The Project was awarded over $2,000,000 in grant funding; $1,400,000 of which was from the Eagle Mine NRDF. The total project cost is projected at $4,300,000.
- **Gypsum Creek Fisheries Enhancement, Gypsum, CO -** Mr. Gurnée was the lead fisheries biologist and restoration ecologist for the instream and riparian habitat assessment, design, permitting and implementation of habitat improvements along Gypsum Creek. Project treatments included both instream and bankside treatments. Instream treatments served to improve deep-water habitat, create flow separation or concentration zones, increase low flow sinuosity, provide instream cover, improve adult fish habitat, create nursery areas, and enhance spawning opportunities. Bankside treatments for aquatic habitat improvements included creation or enhancement of overhead cover; provision of protective cover; and enhancing shading, cooling, and nutrient cycling functions. Bank protection treatments served to correct localized bank instabilities and reduce bank erosion and the potential for sediment deposition downstream. The Colorado Division of Wildlife (CDOW) commented that, “The Gypsum Creek project was implemented in such a low impact manner that you cannot tell that construction had occurred in the area.”
- **Cache La Poudre River Removal Action, Fort Collins, CO -** On behalf of the City of Fort Collins, Mr. Gurnée led negotiations between the EPA, stakeholders and the City regarding riverine, riparian and wetland regulatory and restoration design standards during the removal and remediation of a contaminated reach of the Poudre River. He also provided design review and revision, as well as construction oversight to ensure successful implementation of the instream and streambank restoration along the 0.50 mile, highly visible reach of the river near downtown Fort Collins.
- **TZ Ranch, Elk Hollow Creek Fishery Habitat Enhancement Plan, Saratoga, WY -** ecos performed the assessment and design of the Elk Hollow Creek Project, which included instream and riparian habitat improvements aimed at increasing bank stability, improving aquatic habitat and angling opportunities, and providing long-term stability to the reach. Instream improvements included drop structures, plunge pools, deep pools, riffles and spawning habitat. Bank improvements included seeding and planting plans for native wetland and riparian species. Grant was the regulatory lead, consulting with the Corps under Section 404 of the CWA and the Wyoming Department of Fish and Game. ecos also provided construction oversight and native plant installation services to ensure the successful implementation of the Project.
- **Brush Creek Fishery Enhancement Plans, Saratoga, WY –** Grant assisted in the preparation of access and staging plans, design plans and details, and performed on-site construction oversight of instream and riparian habitat enhancements and bioengineered bank stabilization for a 3-mile reach of Brush Creek. The purpose of the project is to enhance fish, bird and wildlife habitat and use these resources to facilitate education and improve the recreational experience of Ranch guests.
- **Brush Creek Ranch Pond Creation Plans, Saratoga, WY –** ecos provided design-build services including site optimization selection; excavation, grading, drainage and revegetation plans; and construction oversight for a 0.30-acre fishing pond. The pond design included an innovative undercut bank design incorporating a framework of trees supporting transplanted, native sod; which provided excellent fish habitat.
- **Boulder Creek Fishery Enhancement and Pond Creation Project, Boulder, CO -** Grant was the lead fisheries biologist and restoration ecologist for this project along a private reach of South Boulder Creek

adjacent to City of Boulder, Eldorado Canyon Open Space. His tasks included instream and riparian habitat assessment, design of instream and pond fishery habitat and riparian enhancement measures and permitting and consultation. Grant was also the regulatory lead, consulting with the FWS regarding PMJM habitat and with the Corps under Section 404 of the CWA.

- **Stream and Floodplain Restoration at A.T. Massey Coal Mining Facility, KY -** Grant was the Project Manager, fisheries biologist and restoration ecologist for the technical team tasked with assessment and restoration of 26 miles of stream corridor following the accidental release of 250 million gallons of coal slurry into two separate drainages in eastern Kentucky. He was the first ecologist to respond after the spill to ensure that fisheries, stream and riparian habitat restoration objectives were incorporated into the selected cleanup measures. As such, Grant devised a "triage" categorization and remediation system for all affected reaches that minimized impacts to sensitive aquatic and riparian habitat based on the site-specific level of cleanup and remediation required. In addition to instream and bank restoration and stabilization, comprehensive riparian corridor restoration was a major component of the project. Grant was the regulatory and permitting lead and coordinated permits and approval with EPA, Corps and State agencies.
- **Roaring Fork Golf and Fishing Club, Basalt, CO -** Mr. Gurnée was the lead fisheries biologist and restoration ecologist for the assessment, design, permitting and construction supervision of a native trout stream (1 mile) with associated wetland complexes (3 acres). The trout stream was created as an amenity and functional fly-fishing challenge for this fishing component of the Roaring Fork Club; and the associated wetland and riparian habitat were created to naturalize the stream and provide compensatory mitigation for impacts associated with the development of the club facilities. Grant was the regulatory and permitting lead and coordinated permits and approval with Corps and CDOW.
- **Spring Creek Wetland Mitigation, Colorado Springs, CO** – Grant and his team generated wetland and creek creation plans that integrated required mitigation into a high density, "new urban" development. The design emphasized re-utilization of urban storm water to sustain wetlands, use of indigenous plants, construction materials, and natural geomorphic relationships.
- **Tobacco Island Project, Kansas City, MO -** Grant was the lead fisheries biologist and restoration ecologist on a multi-disciplinary Team for the Corps, Tobacco Island Project - a portion of the Missouri River Bank Stabilization and Navigation, Fish and Wildlife Mitigation Project. Project tasks included assessment and conceptual design of measures aimed at reconnecting floodplain and riparian habitat to a reach of the Missouri River near Kansas City. He prepared preliminary designs of channel and backwater wetlands; provided regulatory analysis under Section 404 of the CWA; and assisted in the preparation of an Environmental Impact Statement.
- **San Miguel River Corridor Restoration Plan -** Mr. Gurnée was the lead restoration ecologist, planner and designer for phase 1 of the San Miguel River Corridor Restoration Plan, which included a 1-mile reach through Town. He and his team assisted the Town of Telluride in applying for and winning approximately $500,000 in Natural Resource Damage Assessment Fund money from the State of Colorado. The money, along with other funding, was utilized for final design and construction of the project which included instream habitat, streambank restoration, riparian and wetland restoration, trails and parks. Grant was responsible for leading all public meetings, regulatory negotiation and permitting; assisted the Town with grant funding; and provided construction oversight services.
- **High Altitude Stream Restoration at Copper Mountain Resort, CO -** Grant was the lead ecologist for the restoration of an alpine stream and enhancement of associated wetland and riparian habitat situated within tundra habitat atop Union Peak at Copper Mountain Resort. Grant performed the assessment, design, permitting, and construction oversight for one of the highest altitude stream restoration and wetland mitigation projects in Colorado (approximately 11,500 feet above sea level). Innovative bioengineering and construction techniques were designed and adapted to this sensitive environment to minimize construction-related impacts and maximize environmental benefits.

Threatened & Endangered Species Consultation & Habitat Restoration

- **Jackson Creek Land Company PMJM and Wetland Mitigation, Colorado Springs, CO –** ecos has been performing PMJM habitat biological assessments, conservation, mitigation planning and design throughout its range since 1994. Among numerous other private land developers in the Colorado Springs areas, ecos is currently assisting the Jackson Creek Land Company and Triview Metropolitan District with the implementation of physical habitat preservation and mitigation measures, including shortgrass prairie,

upland hibernaculum, and riparian habitat restoration. We are also assisting the client with construction oversight and maintaining regulatory compliance during the implementation of the phased mitigation plans.

- **The Farm (formerly Allison Valley Ranch), Colorado Springs, CO –** Mr. Gurnée performed the habitat assessment and mapping; and prepared ESA, Section 7 and CWA, Section 404 consultation documents as required by the FWS and Corps, including mitigation construction documents, specifications, on-site layout of plant communities and construction supervision aimed at restoring wetland and riparian habitat occupied by Preble's meadow jumping mouse. Ecos is currently assisting the owner with construction oversight for habitat restoration and native planting.
- **Advance Mitigation for PMJM Habitat** – ecos is assisting a private client in identifying, assessing, prioritizing and designing advance mitigation sites for PMJM habitat in the North Fork and main stem of the Cache la Poudre River.
- **TriView Metropolitan District ESA and CWA Permit Resolution, Monument, CO -** Mr. Gurnée represented the TriView Metropolitan District (TriView) and Phoenix Bell as the lead consultant to resolve outstanding compliance issues related to a joint ESA, Section 7 Consultation and CWA, Section 404 Permit. Grant lead negotiations amongst the various landowners, TriView and the Town to resolve compliance issues related to PMJM and wetland habitat, such that development may proceed in this core area of the town. Upon resolution and agreement of the stakeholders, he led the negotiations with the FWS and Corps to formally amend the Biological Opinion and 404 Permit. Once the approvals were amended, Grant lead the planning and design of PMJM and wetland habitat to meet mitigation requirements under the ESA and CWA.
- **Bernardi Residential Property, Eldorado Canyon, Boulder, CO –** ecos consulted with the Corps and FWS to document and fulfill regulatory requirements for a residential home construction project in PMJM, wetland and riparian habitat. Mr. Gurnée coordinated with the FWS and Corps and obtained approvals under ESA, Section 7 and CWA, Section 404. He prepared all consultation documents, including the Biological Assessment, mitigation plan, and construction documents and specifications. Grant is leading the on-site layout of plant communities and construction supervision, aimed at restoring wetland and riparian habitat occupied by the PMJM.
- **Northgate Boulevard Realignment, Colorado Springs, CO –** Mr. Gurnée performed the habitat assessment and mapping; and coordinated and prepared ESA, Section 7 and CWA, Section 404 consultation documents as required by the FWS and Corps, including mitigation construction documents, specifications, on-site layout of plant communities and construction supervision aimed at restoring wetland and riparian habitat occupied by Preble's meadow jumping mouse.
- **Jefferson County Highways and Transportation Department Gunbarrel Bridge Replacement, Oxyoke, CO -** ecos staff consulted with the Corps, FWS, CDOT, and the FHWA to document regulatory requirements for a bridge replacement project in PMJM, wetland and riparian habitat. He and his Team produced a CDOT Wetland Finding Report, Biological Assessment, acquired a Section 404 Permit and Biological Opinion (Section 7 of the ESA), and then implemented habitat mitigation improvements at the site.
- **Northgate Project, Colorado Springs, CO -** As project manager, Mr. Gurnée led the team in the assessment, permitting and regulatory negotiation (Section 404 of the CWA and Section 7 of the ESA) for the project which included the planning, design and construction supervision of a precedent setting, "joint" mitigation plan for 60 acres of wetland, riparian and PMJM habitat.

Ecological Master Planning

- **Sundance Trail Guest Ranch, Larimer County,** CO – ecos is currently assisting a local guest ranch in the assessment of natural resources and site features, and the development of site plans to balance natural habitat and aesthetic values with the expansion of guest facilities and services.
- **Sand Creek Channel Improvements Stability Analysis at Indigo Ranch, Colorado Springs, CO** - ecos was retained to perform an analysis of channel stability under proposed development conditions for a 1.17-mile reach of Sand Creek. Ecos utilized existing vegetation composition data, density and height within the Project reach as a basis; and compared the 10-year and 100-year storm event modelling data (specifically flow velocity, flow depth and shear stress) to reference literature to provide a professional opinion regarding the future stability of the channel under developed conditions. The analysis of channel stability for the proposed Project assumes a bioengineering and biotechnical approach that preserves and enhances the existing vegetation, as well as substrate cohesion and stability, within the channel and its

streambanks. The Stability Analysis will likely serve as a benchmark study for the City of Colorado Springs to use to preserve other naturally stable channels.

- **Uncompahgre River Corridor Master Plan, Montrose, CO –** Grant and his Team assessed the character, condition and quality of aquatic, wetland and riparian habitat along a 10-mile rural and urban corridor of the Uncompahgre River through the City of Montrose. Habitats were then rated, ranked, prioritized and master planned for their preservation potential and integration in to the parks, recreation and trail system. The master plans form the foundation for the City to focus environmental stewardship, tourism and generate riverfront economic development with a focus on the river – the major asset of the Community.
- **Brush Creek Stewardship and Enhancement Plan, Saratoga, WY –** Mr. Gurnée managed the assessment of a 12,000-acre, private ranch near Saratoga, Wyoming and the preparation of the Ranch Stewardship Plan (Plan). The Plan includes land and resource stewardship goals, objectives, and implementation action items; including ranch-wide master planning of the trail and recreational systems, design of the Brush Creek riparian corridor trail, and restoration/fisheries habitat enhancement of Brush Creek. Trail and recreation planning and design focused on universal access, habitat sensitivity, environmental education, and wildlife observation opportunities and unique landscape experiences.

Environmental Assessment and Impact Studies

- **NEPA EA for Eagle County Airport Runway Expansion, Eagle County, CO -** Grant was project manager and senior ecologist for an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) for a proposed 1000-foot runway expansion and ILS installation at the Eagle County Airport, west of Vail, Colorado. Critical issues addressed included noise, ecological, and public opinion considerations. Grant conducted the work under FAA guidance requirements for EAs.
- **NEPA EA for the Avon Interstate 70 Interchange -** Mr. Gurnée was project manager and senior ecologist for this NEPA EA. He performed environmental assessment and data compilation work for construction of a new CDOT interchange and associated development on Interstate 70. This included evaluating T&E Species; a wetlands inventory; a cultural/archeological resources survey; noise and air pollution modeling and studies; and reviewing soils, meteorology, geologic hazards, and other impacts.
- **Raritan River Wetland Inundation Impact Study, N.J. -** Grant's work on the preparation and processing of the first Individual Permit under the New Jersey Freshwater Wetlands Protection Act of 1987 included a precedent setting wetland inundation study. This study shaped the N.J. Department of Environmental Protection's policy regarding the need to assess hydrologic impacts during wetland permit reviews.

Construction Oversight and Plant Installation

- **St. Vrain Creek Reach 3 Flood Recovery and Restoration, Lyons, CO –** Ecos performed construction lay-out and observation during the implementation of the restoration and enhancement of 0.60-acre of riparian Preble's Meadow Jumping Mouse Habitat (PMJM) along the St. Vrain River.
- **2013 Flood and 2014 Runoff Events, Damage Restoration, Cache la Poudre River, CO** - ecos performed the construction oversight of 3 flood and runoff damage restoration projects along the Cache la Poudre River for the City of Greeley, including the Bellvue Treatment Plant Raw Water Ponds Restoration, the Kodak Pipeline Crossing Restoration and the Watson Lake Pipeline Crossing Restoration.
- **Lions Park CWA and ESA Mitigation Site** - ecos performed the construction oversight for an advance river and wetland mitigation site at Lions Park in LaPorte, Colorado.
- **TZ Ranch, Elk Hollow Creek Fishery Habitat Enhancement Plan, Saratoga, WY -** ecos performed the construction oversight for the Elk Hollow Creek Project.
- **Brush Creek Ranch Fishery Enhancement Plans, Saratoga, WY –** Mr. Gurnée assisted in the construction oversight for a 3-mile reach of Brush Creek to improve fisheries and outdoor recreation experiences for guests of the Ranch.
- **C Lazy U Ranch, Willow Creek Fishery Enhancement Plan, Granby, CO -** Grant assisted in the construction oversight for this fishery habitat, channel stabilization and streambank restoration project.
- **Standley Lake Protection Project, Westminster, CO –** Mr. Gurnée performed construction oversight of a 12-acre created emergent wetland that he and his Team designed to fulfill CWA mitigation requirements and bring closure to the City's drinking water protection project.

- **Caribou Peat Bog Restoration, Nederland, CO –** Grant prepared native plant community design, planting cost estimate, and on-the-ground oversight of volunteers to restore a high-altitude peat bog disturbed by an illegal four-wheel drive "mudfest".
- **Department of Energy Wetland Mitigation Bank, Westminster, CO –** Mr. Gurnée provided construction supervision of the grading and planting of a 12-acre wetland mitigation bank that he and his Team designed for the Department of Energy.
- **ARCO Lower Area One and Butte Reduction Works, Butte, MT –** Grant performed construction observation and supervision of temporary labor crews to plant a passive treatment wetland designed to absorb heavy metals from groundwater.

Natural Treatment System Design

- **Natural Treatment Wetlands, Butte, MT -** Mr. Gurnée and his Team performed the assessment and design of the ARCO Lower Area One and Butte Reduction Works passive treatment wetlands. These natural treatment systems were situated within two units of a reclaimed superfund site to treat heavy metals in surface and groundwater.
- **Natural Treatment Wetlands, Avondale, AZ –** Grant and his Team performed the assessment and design of a constructed wetland system to treat surface water and inject/recharge the municipal well system for the City of Avondale, AZ. This system successfully alleviated a well moratorium necessitated by a contaminated groundwater aquifer.

PUBLICATIONS:

Giordanengo, John H., Randy Mandel, William Spitz, Matthew Bossler, Michael Blazewicz, Steven Yochum, Katie Yagt, William LaBarre, Grant Gurnée, Robert Humphries and Kelly Uhing. 2016. Living Streambanks, A Manual of Bioengineering Treatments for Colorado Streams. Submitted to the State of Colorado, Colorado Water Conservation Board Denver, Colorado. Submitted by AloTerra Restoration Services, LLC, and Golder Associates, Inc.

Gurnée, Grant E. 1998. Wetland Revegetation Techniques chapter in Native Plant Revegetation Guide for Colorado, Caring for the Land Series, Volume III. A joint publication of the Colorado Natural Areas Program, Colorado State Parks, and Colorado Department of Natural Resources. Denver, Colorado.

Gurnée, Grant E. 1995. Optimizing Water Reclamation, Remediation and Reuse with Constructed Wetlands. Environmental Concern Wetland Journal, Summer 1995 Issue. Environmental Concern, Inc. St. Michaels, Maryland.

PRESENTATIONS & INSTRUCTION:

Gurnée, Grant E., 2016. Clean Water Act, Section 404 Permits for Flood Recovery Projects. Presented at the Colorado Stream Restoration Network (CSRN) conference in Longmont, CO on March 23, 2016.

Gurnée, Grant E., 2016. Endangered Species Act Consultation for Flood Recovery Projects. Presented at the Colorado Stream Restoration Network (CSRN) conference in Longmont, CO on March 23, 2016

Gurnée, Grant E., 2010. Stream Corridor/Bioengineering Round Table. Presented at the Colorado Riparian Association (CRA) Sustaining Colorado Watersheds Conference. October 5 - 7, 2010. Vail, Colorado.

Gurnée, Grant E. and Greg A. Fentchel, 2009. Stream Corridor/Bioengineering Workshop. Presented at the Colorado Riparian Association (CRA) Sustaining Colorado Watersheds Conference. October 7 - 9, 2009. Vail, Colorado.

Gurnée, Grant E. and Scott J. Franklin, 2008. Section 404 Individual Permits: Negotiating the Application and Follow-up Process. Presented at the CLE International, Colorado Wetlands Conference. May 8 – 9, 2008. Denver, Colorado.

Gurnée, Grant E. and Julie, E. Ash, P.E., 2007. Edwards Eagle River Restoration Project. Presented at the Colorado Riparian Association (CRA) Sustaining Colorado Watersheds Conference. October 5 - 7, 2009. Breckinridge, Colorado.

Gurnée, Grant E. 2000. Natural Treatment Alternatives for Surface Discharges, Surface Runoff, and Mined Land Reclamation. Presented at the International Mining Technology Seminar. September 13 – 15, 2000. Belo Horizonte, Minas Gerais, Brazil.

Gurnée, Grant E. 1999. Wetland Mitigation: Considering Mitigation Requirements in the Project Planning Process. Presented at the Continuing Legal Education (CLE) Wetlands & Mitigation Banking Conference. October 21 & 22, 1999. Denver, Colorado.

Hoag, Chris, Hollis Allen, Craig Fischenich and Grant Gurnée. Assistant instructor for a Bioengineering Workshop sponsored by the U.S. Army Corps of Engineers Waterways Experiment Station and the U.S. Department of Agriculture – Aberdeen Plant Materials Center. September 1998. Carson City, Nevada.

Hoag, Chris and Grant Gurnée. 1998 Glancy Riparian Demonstration Project. Assistant instructor for a hands-on bioengineering workshop on the Carson River. September 1998 near Dayton, Nevada.

Gurnée, Grant E. 1998. Stream and Wetland Restoration Successes and Failures: The Good, the Bad, and the Ugly. Presented at the Colorado Riparian Association (CRA) Restoring the Greenline Conference. October 16, 1998. Salida, Colorado.

Gurnée, Grant E. 1998. Save Our Streams, Wetland Conservation and Sustainability Workshop. Lead Instructor of wetland assessment and restoration course presented with the Izaak Walton League. April 21 & 22, 1998. Boulder, Colorado.

Windell, Jay, and Grant Gurnée. 1998. Creation of a Stream, Riparian and Wetland Ecosystem: Tributary to the Roaring Fork River, Basalt, Colorado. Presented at the American Society of Civil Engineers, Wetlands Engineering & River Restoration Conference. March 23 – 27, 1998. Denver, Colorado.

Gurnée, Grant E. 1998. A Case Study: Department of Energy's Wetland Mitigation Bank at Standley Lake. Presented at the Continuing Legal Education (CLE) International, Colorado Wetlands Conference. January 27 – 29, 1998. Denver, Colorado.

Gurnée, Grant E. 1997. Wetland Mitigation: Design and Implementation via the Design/Build/Grow Process. Presented at the International Erosion Control Association, Erosion & Sediment Control Workshop. November 19, 1997. Northglenn, Colorado.

Gurnée, Grant E. and Gary Bentrup. 1996. Wetland and Riparian Protection Strategies. Presented at the Sierra Club, Regional Growth Strategies Conference, "New Perspectives and Strategies to Preserve Mountain Communities." February 16 – 17, 1996. Glenwood Springs, Colorado.

Gurnée, Grant E. 1994. How to Recognize and Deal with Wetland Regulation Issues. Presented at the Continuing Legal Education (CLE) International, 3rd Annual Western Agricultural and Rural Law Roundup. June 23-25, 1994. Fort Collins, Colorado.

AWARDS:

- Colorado Landscape Contractors Award, Sand Creek Enhancement Project – 2000

PROFESSIONAL ASSOCIATIONS:

- Association of State Wetland Managers (ASWM)
- Society of Wetland Scientists (SWS)
- Environmental Concern (EC)

ecos ecosystem services LLC

RESUME

Jon Dauzvardis, M.L.A, P.W.S.

Owner/Managing Partner
Senior Restoration Ecologist
Landscape Architect
Wetland Ecologist

AREAS OF EXPERTISE:

- Vegetation Inventories and Mapping
- Habitat Assessment, Functional Assessment and Wetland Delineation
- Aquatic, Wetland, and Riparian Restoration Ecology, Planning and Design
- Landscape Ecology, Planning and Landscape Architecture
- Conservation and Resource Mitigation Bank Support Services
- Grant Funding Support for Conservation and Restoration Projects
- Open Space and Trail Planning, Design and Habitat Management
- Construction Oversight & Best Management Practices
- AutoCAD, Mapping, Presentation Graphics

EDUCATION:

- Master of Landscape Architecture, Texas A&M University, College Station, Texas, 1995
- Bachelor of Science, Environmental Design, University of Missouri, Columbia, 1991
- Architecture Study, Harvard University Graduate School of Design, Cambridge, Massachusetts, 1989

EMPLOYMENT HISTORY:

- 2008-Present, Owner/Manager and Senior Restoration Ecologist, Ecosystem Services, LLC, Erie Colorado
- 2000 – 2011, Senior Restoration Ecologist, Walsh Environmental Scientists and Engineers, LLC, Boulder, Colorado
- 1997 – 2000, Restoration Ecologist, Construction Supervisor, Aquatic and Wetland Company, Boulder, Colorado
- 1996-1997, Landscape Architect, Design Studios West, Denver, Colorado
- 1995-1996, Landscape Architect, Wenk Associates, Denver, Colorado
- 1994-1995, Graduate Researcher, ALCOA – Texas A&M University, College Station, Texas
- 1994, Johnson County Parks and Recreation Department, Shawnee Mission, Kansas
- 1992-1994, Grounds Maintenance Superintendent, Brazos County, Texas

CONTINUING EDUCATION:

- Stream Functions Pyramid Workshop, Denver, CO - 2014
- Colorado Natural Heritage Program, Wetland Plant Identification - 2014
- Colorado Natural Heritage Program, Ecological Integrity Assessment for Colorado Wetlands - 2013
- FACWet – Functional Assessment of Colorado Wetlands - 2010, 2012 and 2013
- ESRI, ARC View Geographic Information System (GIS) Training, 1996
- Bicycle Planning and Facilities Training, 1994
- AutoCAD Drafting and Design, Self-taught, 1991

CERTIFICATIONS:

- Professional Wetland Scientist Certification (# 1699), Society of Wetland Scientists Certification Program, 2004

EXPERIENCE SUMMARY:

Mr. Dauzvardis is a founder and managing partner of Ecosystem Services, LLC (**ecos**), an ecological planning and design business dedicated to the restoration, enhancement and creation of aquatic, wetland and riparian habitat. Jon is a certified Professional Wetland Scientist with over 25 years of experience working in the fields of landscape architecture and ecological restoration in Colorado, Wyoming, Texas, Kansas and the Intermountain West. Jon's academic and professional work history in housing design and construction, community planning, architecture, landscape architecture, ecological planning and restoration is unique and makes him a valuable and multi-faceted asset to his company, clients and their projects. His diverse knowledge and skills in landscape planning, habitat design, bioengineering, and hands-on experience demonstrate that he can easily negotiate between art and science, man-made and natural systems, generalities and detail, and from concept to construction. Jon takes a practical and realistic approach to problem solving, concentrating on broad scale ecological master planning simultaneously with fine scale design of aquatic, wetland, riparian and terrestrial habitats. As a restoration ecologist, Jon specializes in restoring and enriching habitat structure, stability and health and how to manage landscapes and natural systems so that they function, change, and respond positively over time. Jon's strengths are rooted in his understanding of natural and landscape processes; finding design solutions that integrate the needs of people, wildlife, and visual quality; sustaining ecosystem goods and services; and integration of nature-based recreation and environmental education programs and facilities.

RELEVANT PROJECT EXPERIENCE:

Mr. Dauzvardis has been an essential team lead and player in hundreds of habitat assessments; permitting efforts; master plans; and aquatic, wetland, and riparian habitat design and mitigation projects. The following is a sampling of select projects and clientele that Jon has successfully completed or is currently involved with:

Habitat Assessment and Regulatory Compliance

Mr. Dauzvardis routinely performs ecological site and resource impacts assessments, jurisdictional wetland determinations and functional assessments to assist clients in site planning, design, and permitting processes. Assessment methods established by the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and Colorado Department of Transportation among others are used to assess habitat elements and screen sites for threatened and endangered plants and animals, wetlands, migratory birds and other wildlife. Jon stresses habitat impact avoidance and minimization to preserve a site's ecological benefits and to minimize regulatory constraints, timing and permitting costs. Jon has performed a multitude of site assessments, delineations and prepared permits, including but not limited to the following notable projects as well as others listed throughout this resume:

- **Banning Lewis Ranch, Colorado Springs, CO –** ecos was hired by Norwood Homes to perform and ecological assessment of wetlands, Sand Creek, Jimmy Camp Creek and its tributaries; and provide regulatory guidance for the Banning Lewis Ranch (BLR), an 18,000-acre site that will double the size of Colorado Springs. Part of Jon's work on the project included mapping and buffer recommendations on how to best conserve pristine prairie and sandy creeks that are highly susceptible to degradation caused by urbanization.
- **Bellvue Pipeline Project, Larimer County, CO** – ecos was retained by the City of Greeley as Best Management Practices (BMP) Facilitators to provide pre-construction documentation post-construction oversight of pipeline reclamation processes. Essential responsibilities include meeting with landowners prior to construction to facilitate project understanding and post-construction outcomes; to document landowner needs and wants relative to project goals and land use; and to document and monitor pre- and post-construction reclamation and maintenance requirements.
- **Georgetown Lake, Georgetown, CO –**ecos was hired to prepare an office level assessment report of ecological resources to describe the physical/ecological characteristics of the Project area and evaluate the potential effects of the construction of a loop trail project on environmental issues and species of concern to support a GOCO grant application. Items evaluated and documented, include site location/ownership, general site characteristics, current land use, proposed impacts, possible effects on Federal– and State-listed T&E animal and plant species, unique or important wildlife, water quality, water bodies, wetlands, and floodplains, stormwater runoff, sedimentation, soil erosion, and invasive species. The assessment report also included mitigation measures, project benefits, and environmental compliance recommendations under applicable regulatory programs.

- **Appraisal Support Documentation Report for the 1st Bank Parcel, Colorado Springs, CO** - ecos was retained by 1st Bank Holding Company to perform a Preble's meadow jumping mouse (PMJM) habitat assessment, mitigation cost analysis, and conceptual lot layout for the approximate 9.4-acre Parcel located adjacent to the Northgate Open Space along Smith Creek. Jon was responsible for preparing the lot layout, existing habitat aerial photo interpretation/delineation, proposed conceptual mitigation, and quantification of impacts and associated mitigation to ascertain appraisal value of the site if it were to be developed.
- **Encana Oil and Gas (USA), Denver Julesburg Basin, CO** – Encana hired ecos to assess their ecological constraints, recommend means and methods to avoid, minimize and permit impacts; and to mitigate, restore and prepare ecological management plans for their drilling and pipeline operations in the Denver Julesburg basin. Jon's role on the team is to perform site assessments, research background data, and prepare assessment reports and mapping data that can be utilized by Encana's project managers and geographic information systems (GIS) department to proactively track ecological resources before issues arise. In addition to client consultation, Jon is responsible for tracking drill site schedules, constraints, restoration and management efforts in a data base and reporting said information to Encana's project manager on a regular basis.
- **Tollgate Creek Riparian and Wetland Habitat Assessment, Aurora, CO** – Jon performed high level aerial photo interpretation and delineation of riparian and wetland habitat along Toll Gate Creek and East Toll Gate Creek from confluence with Sand Creek upstream to East Hampden Avenue. The delineation was performed in Google Earth and imported into AutoCAD by digitizing riparian and wetland habitat zones. Once complete, the data was turned over to the project engineer to incorporate into a Drainage Master Plan for the Urban Drainage and Flood Control District (UDFCD).
- **Eagle River Meadows Ecological Inventory and Strategic Wetland Action Plan, Edwards, CO** – Mr. Dauzvardis delineated, assessed, and provided an analysis of potential adverse effects to wetlands within a complex site adjacent to the Eagle River. Jon also developed a strategic process and decision making tool to determine avoidance, minimization, low impact development (LID), and mitigation measures in support of a County Sketch Plan application for a Multi-use Health Care Community.
- **Mesa County Colorado Riverfront Trail, Grand Junction, CO** – Jon performed wetland delineation, jurisdictional determination, Section 404 Permitting; and prepared wetland mitigation plans to construct approximately two miles of regional trail along the north side of the Colorado River between the James M. Robb and the Colorado River State Park at Corn Lake.
- **ARCO Upper Clark Fork River Basin Superfund Site Functional Wetland Assessment, MT** – Between 2000 and 2008, Jon managed the assessment team and performed extensive wetland delineation, GPS surveying, functional assessments, and impact mapping and analysis covering a 200 square mile Superfund Site affected by historic mining practices. Assessments we done in preparation for soil remediation of heavy metals, capping of tailings ponds, sediment and dam removal, and implementation of compensatory wetland mitigation plans required under a consent decree. Assessment areas included the Anaconda Smelter, Old Works, Opportunity Ponds, and Milltown Reservoir.
- **Jefferson County Highways & Transportation Department Gunbarrel Bridge Replacement, Oxyoke, CO** – Jon consulted with the USACE, USFWS, CDOT, and the FHWA to document regulatory requirements. Produced a CDOT Wetland Finding Report, Biological Assessment, Preble's meadow jumping mouse and wetland mitigation plans, and helped acquire a Section 404 Permit and Biological Opinion.
- **Pole Canyon Wind Farm, Babcock and Brown, Huerfano County,** CO – Assessed and prepared critical issues analysis and County 1041 Permit application for a 125-megawatt wind farm and associated transmission lines located on a 5,800-acre site. The project included detailed site assessments to document the presence or absence of potential development constraints and site-specific ecological conditions as well as preparation of permit maps, plot plans, and environmental analyses, alternatives analysis, and mitigation measures.
- **Dalton Property Wetland Assessment, Longmont, CO** – Provided site assessment, regulatory analyses, and developed a restoration plan for critical riparian and wetland habitat along Left Hand Creek in Boulder County, CO.
- **Colowyo Coal Mine Wetland Delineation, Meeker,** CO – Delineated 1.5 miles of jurisdictional waters and wetlands in preparation for wetland mitigation design along West New Goodspring Creek.
- **Lafarge Northbank Resources Gravel Pit Wetland Assessment, Rifle, CO** – Delineated and acquired a jurisdictional determination from the USACE for complex tailwater and riparian wetlands along the

Colorado River. Prepared gravel pit reclamation plans aimed at providing suitable shallow-water lake edge wetlands to serve as compensatory wetland mitigation.

- **Jefferson County Highways & Transportation Department Highway 73 Expansion, Conifer,** CO – Performed presence/absence study, habitat assessment and documentation of wetlands, Migratory Birds, State Species of Concern, and federally listed T&E Species including Bald eagle, Preble's meadow jumping mouse, the Pawnee montane skipper butterfly and Colorado butterfly plant along a one-mile corridor of highway.
- **Flying Horse Ranch and the Club at Flying Horse Golf Course, Colorado Springs, CO** – Conducted an assessment of wetland habitat, impact avoidance and minimization and Section 404 of the Clean Water Act permitting for a 1500-acre mixed use development and Weiskopf golf course design being implemented by Neiber Golf.
- **C-Lazy-U and Horn Ranch Environmental Assessments, Granby, CO** – Performed site assessment of ecological opportunities and constraints of aquatic, riparian, wetland and threatened and endangered species habitat along the Colorado River for the development and enhancement of fishing/resort ranch amenities.
- **Village at Avon, Avon, CO** – Delineated wetlands and prepared a Section 404 Permit for the town center expansion and low-density ranchette development.
- **Residential Developers and Realtors** – Performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and prepared Clean Water Act Section 404 Permits and mitigation plans for residential developers and realtors, including: 4 Site Investments, Nor'wood, Proterra Properties, Denver Transit Oriented Development Fund, La Plata Communities, Windsor Ridge Homes, Clearwater Communities, Schuck Corporation, Equinox Land Group, DR Horton, Melody Homes, Standard Pacific Homes, Gateway American Properties, Zephyr Real Estate Company, Lowell Development Partners, and Palmer-McAlister, Classic Communities, Stoll Properties, Karen Bernardi, Colorado Commercial Builders, Terra Visions, Smith Creek Holdings, Picolan, Realty Development Services, Northgate Properties.
- **Commercial and Industrial Developers** - Performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and prepared Clean Water Act Section 404 Permits and mitigation plans for commercial and industrial developers, including: Atira Group, Leadership Circle, Ridgeway Valley Enterprises, Morley Companies, HF Holdings, Regency Centers, Miller-Weingarten, Gulf Coast Commercial Development, Traer Creek, Mountain Property Associates, Morley Golf, Executive Consulting, Inc.
- **Architectural and Engineering Companies** – Jon has performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and prepared Clean Water Act Section 404 Permits and mitigation plans for A&E firms, including: William Guman and Associates, JVA, Beyers Group, Engineering Analytics, Classic Consulting Engineers, J3 Engineering, DHM Design, Del-Mont Consultants, JW Nakai and Associates, Nolte and Associates, JR Engineering, Hyrdosphere, Executive Consulting Engineers, Muller Engineering, Farnsworth Group.
- **Counties, Municipalities, Metro Districts and Quasi-Public Institutions** – Mr. Dauzvardis has performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and prepared Clean Water Act Section 404 Permits and mitigation plans for counties, municipalities, and quasi-public institutions, including: City of Louisville Highway 42 and 96th Street realignment, City of Westminster Jim Baker Reservoir and Standley Lake Protection Projects, Jefferson County Highway 73 and 67 Improvement Projects, Todd Creek Village Metro District, Town of Monument/Triview Metro District, Boulder Community Hospital, and City of Fort Collins Regulatory Fact Sheets Preparation Project, Todd Creek Village Metro District on-call consultant, Three-lakes Water and Sanitation District, City of Greeley,
- **Educational Institutions** – Performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and prepared Clean Water Act Section 404 Permits and mitigation plans for educational institutions, including: Colorado Mountain College - Steamboat Springs, The Classical Academy – Colorado Springs, and Coal Ridge High School – Rifle.
- **Wind Energy Developers** – Performed numerous wetland and T&E species habitat ecological assessments, wetland delineations, and critical issues analyses for wind development projects, including: Cedar Creek Windfarm – Weld County, CO, Wheatland Windfarm – Platte County, WY, Silver Mountain Windfarm – Huerfano County, CO, Pole Canyon Windfarm, Huerfano Count, CO.

- **Mining Companies** – Performed wetland and T&E species habitat ecological assessments, wetland delineations, and critical issues analyses for mining companies, including: Brannan Sand and Gravel Company, Lafarge and Kennecott Coal.

Ecological Master Planning

- **Jackson Creek Land Company PMJM and Wetland Mitigation, Colorado Springs, CO** – ecos has been performing Preble's meadow jumping mouse (PMJM) habitat biological assessments, conservation, mitigation planning and design throughout its range since 1994. Among numerous other private land developers in the Colorado Springs areas, ecos is currently assisting the Jackson Creek Land Company and Triview Metropolitan District with the implementation of physical habitat conservation and mitigation measures, including shortgrass prairie, upland hibernaculum, and riparian habitat restoration. Jon is responsible for mapping, design assessment and restoration plan preparation.
- **Park Creek Mitigation Bank, Fort Collins, CO –** ecos was retained by Burns and McDonnell to assess, map, and prepare preliminary mitigation design of aquatic, wetland, riparian and terrestrial habitat in support of a mitigation banking prospectus. Upon completion and acceptance of the prospectus by the USACE, ecos has been tasked to manage the baseline assessment of the site, including groundwater testing, topographic surveys, and hydrology; prepare a detailed habitat design for inclusion in mitigation banking instrument; as well as coordinate design-build process with a selected nursery and contractor. Jon has been responsible for the mapping and preparation of design documents and will co-manage construction and long-term monitoring to help our client meet their performance criteria and sell bank credits.
- **Front Range Umbrella Mitigation Bank, CO –** ecos was retained by Restoration Systems, a nationally renowned wetland mitigation banking firm, to help identify and prepare conceptual design plans for mitigation banking sites to establish the Front Range Umbrella Mitigation Bank (Bank). The purpose of the Bank is to provide compensatory mitigation credits for unavoidable, permitted impacts to aquatic, wetland, riparian, upland, wildlife, and threatened and endangered (T&E) species habitat regulated under the Clean Water and Endangered Species Acts; and to restore, enhance and preserve valuable natural resource functions at degraded mitigation sites within multiple watersheds along Colorado's Front Range. Currently, the Bank is developing banks sites that serve the Cache la Poudre, St. Vrain, Upper South Platte, Fountain and Upper Arkansas watersheds. Jon's primary role on the team is to perform functional habitat assessments; prepare mapping and graphics of baseline and future conditions; grading and plant community design based on hydrologic, hydraulic, and geomorphic modelling and engineering; and communicate with landowners and stakeholders regarding the process, technicalities, and outcomes.
- **Sand Creek Channel Improvements Stability Analysis at Indigo Ranch, Colorado Springs, CO** - ecos was retained to perform an analysis of channel stability under proposed development conditions for a 1.17 mile reach of Sand Creek. Ecos utilized existing vegetation composition data, density and height within the Project reach as a basis; and compared the 10-year and 100-year storm event modelling data (specifically flow velocity, flow depth and shear stress) to reference literature to provide a professional opinion regarding the future stability of the channel under developed conditions. The analysis of channel stability for the proposed Project assumes a bioengineering and biotechnical approach that preserves and enhances the existing vegetation, as well as substrate cohesion and stability, within the channel and its streambanks. The Stability Analysis will likely serve as a benchmark study for the City of Colorado Springs to use to preserve other naturally stable channels.
- **Brush Creek Ranch Stewardship Plan, Saratoga, WY** – Brush Creek Ranch Stewardship Plan, Fishery Enhancement and Bank Stabilization, Saratoga, WY – Mr. Dauzvardis managed the organization, generation and graphic design of the Ranch Stewardship Plan. Jon assessed and prepared stewardship goals, objectives, and implementation action items, including ranch-wide master planning of the trail and recreational systems and design of the Brush Creek riparian corridor trail. Trail and recreation planning and design focused on universal access, habitat sensitivity, environmental education, wildlife observation opportunities and unique landscape experiences. Simultaneously with the master plan, Jon developed revegetation plans to support geomorphic stream alterations and bank stabilization to enhance the creek fishery. Jon was responsible for the design and supervised construction of a cold-water pond to be used by novice anglers to learn the art and experience the pleasure of catching trout.
- **Town of Erie, Comprehensive Plan, Parks Recreation Open Space and Trails Master Plan, and Natural Areas Inventory, Erie, CO -** As a former 8-year Member, Chair, and Vice Chair of the Town Erie

Open Space and Trails Advisory Board (OSTAB) and an Erie resident and small business owner, Jon has an intimate knowledge of Erie's political and physical landscape and public processes. During his tenure on OSTAB, Jon actively participated in the writing and development of the Town's guiding documents. Jon authored the Open Space Chapter of the Comprehensive Plan which eventually was codified in the Town's Unified Development Code (UDC). Jon was the key commenter on the content, analysis and synthesis of the of the Open Space and Trail Chapters and Mapping that was adopted with the Town's first Parks Recreation Open Space and Trails Master Plan (PROST). Jon guided the process used in the development of the Erie Natural Areas Inventory (ENAI) to identify and design a habitat condition, quality and restoration rating and ranking system of significant natural areas throughout the Town's 49-square mile planning area.

- **Uncompahgre River Corridor Master Plan, Montrose, CO** – Jon was responsible for the development of an ecological master plan focusing on the Uncompahgre River as a natural asset for eco-tourism and the generation of riverfront economic development. Mr. Dauzvardis was responsible for assessing the character, condition and quality of aquatic, wetland and riparian habitat; and developing a rating, ranking, land acquisition prioritization system, and associated mapping aimed at the preservation and integration of open space and habitat within the City's parks, recreation and trail system.
- **Ruby Pipeline Wetland, Riparian and Waterbody Mitigation and Restoration Plan, WY, UT, NV and OR** – Jon was responsible for assisting with the generation of a Comprehensive Wetland Mitigation Plan outlining Clean Water Act regulatory guidelines, requirements, and processes. Jon developed an eco-region specific restoration plan for a 675-mile natural gas pipeline specifying the basis of design, construction, revegetation, maintenance, performance criteria, and monitoring means and methods for restoring approximately 460 acres of temporarily impacted riparian and wetland habitat.
- **Dry Creek Regional Urbanization Area, Weld County, CO** – Mr. Dauzvardis performed an ecological inventory and prepared the assessment report for a 6,000-acre Regional Urbanization Area (RUA); and a1000-acre multi-use site development in un-incorporated Weld County. Subsequent phases included establishing ecological policy, goals, and objectives for the study area that will assist the County in the refining their first ever Comprehensive Plan.
- **City of Broomfield I-25 Subarea Environmental Guidelines, Broomfield, CO** – Jon drafted development sensitivity design and ecological sustainability standards.
- **McStain Development Corporation, Mountain Village III Master Plan, Loveland, CO** – Conducted concept planning for recreational and environmental interpretation facilities focusing on lake and wetland habitat features of the community.
- **Estes Park Comprehensive Land Use Plan, Estes Park, Larimer County, CO** – Teamed with town planning staff in producing a county-wide land use plan using GIS as a public involvement/participation tool.
- **San Miguel River Park Corridor Master Plan, Telluride, CO** – Prepared park, trail, wetland and riparian corridor master plan and design for the San Miguel River Park Corridor. Jon prepared illustrative plan graphics that assisted the Town in applying for and winning approximately $500,000 in Natural Resource Damage Assessment Fund money from the State of Colorado, which was used for final design and implementation.
- **South Platte River Wildlife and Recreation Corridor Plan, Denver, CO** – Designed the Zuni Riverfront Park and planned the wildlife and recreation corridor between I-25 and 8th Street near Mile High Stadium. Prepared, steered and presented graphics that the City and County of Denver Mayor's Commission (Wellington Webb) and the Urban Drainage and Flood Control District used to help sell the project to the public and federal funding sources in Washington D.C.
- **Historic Arkansas River Walk, Pueblo, CO** – Coordinated and steered the design and presentation of riparian, aquatic, and palustrine wetlands in the HARP Natural Area. Designed environmental Education Park to include outdoor classroom, access, and multi-thematic interpretive nodes.
- **Pueblo Natural Resources and Environmental Education Council Plan, Pueblo, CO** – Designed the identity and jointly produced strategic natural resource based environmental education plan for Pueblo County (PNREEC). The plan helped build consensus among multiple private and governmental agencies and stakeholders on funding, conservation, restoration, and enhancement priorities throughout the County.
- **Aluminum Company of America (ALCOA) Huisache Cove Master and Design Plan Master of Landscape Architecture Thesis, Port Lavaca, TX** – Served as environmental consultant in researching and generating wildlife habitat restoration plan and multi-functional landfill cap redesign incorporating

coastal prairie, lacustrine, palustrine, estuarine wetlands, passive recreation, bird watching and ecological interpretation facilities on an industrial superfund clean-up site.

Aquatic, Wetland, and Riparian Habitat and Mitigation Design:

- **Big Thompson River Flood Recovery and Restoration, Loveland, CO -** ecos is currently part of a multi-disciplinary team assisting the Big Thompson Watershed Coalition (BTWC) with assessment, design, and construction of the Big Thompson between Rossum and Wilson Drives which are majority-owned by the City of Loveland and Loveland Ready-mix. As with all the flood recovery projects ecos has worked on, Jon produced 30%, 60% and 100% design plans, construction cost estimates, and specifications guiding soil development/enrichment; upland, riparian, and wetland seeding and planting; and numerous bioengineering techniques aimed at restoring the river and making it more resilient to future flood events. This project is aimed at completion in the summer of 2019.
- **Saint Vrain Creek Reach 3 Flood Recovery and Restoration, Boulder County, CO** - ecos is part of the multi-disciplinary team assisting Boulder County Parks & Open Space (BCPOS) with resilient design for the restoration of Reach 3 of the Saint Vrain Creek (from Highway 36 downstream to Hygiene Road) that was damaged by the 2013 floods. Jon's role in the project includes: 1) desktop and field assessment to inventory and document the characteristics of the stream reach and riparian corridor (e.g. in-stream features, vegetation, wildlife habitat); identify and locate significant habitat features within the areas of proposed construction; identify potential sources of native plant materials for restoration; and identify areas of opportunity within the reach that require native vegetation, wetland, PMJM, leopard frog and fishery habitat restoration; and delineate wetland habitat and waters of the U.S. in all areas of proposed/potential construction-related impact; 2) vegetation community and wildlife habitat restoration design; 3) permitting and compliance under the CWA, ESA and NHPA; and 4) construction oversight of restoration construction activities. This project was completed in the summer of 2018.
- **Bohn Park Flood Recovery and Restoration, Town of Lyons, CO** – ecos is part of the Design Team assisting the Town with the restoration, enhancement and stabilization of Bohn Park which was damaged by the 2013 floods. Ecos role is to assess, design, and prepare design-bid-build specifications for the natural restoration of the vegetation communities and habitat along South St. Vrain Creek that have been incorporated in to the landscape architecture of Bohn Park, the Towns largest and most used recreational asset. This project was completed in the spring of 2018.
- **Fourmile Creek Flood Recovery and Restoration, Boulder County, CO** – ecos was part of the Fourmile Watershed Coalition design-build team tasked with restoring flood-damaged properties that were prioritized in the watershed master plan. Jon generated seeding and planting plans, performance notes, cost estimates, and co-managed construction oversight in collaboration with the executive director of the Watershed Coalition. This project was completed in the summer of 2017.
- **James Creek Post-flood Restoration, Lefthand Watershed Oversight Group (LWOG), Jamestown, CO –** ecos was part of the LWOG Team responsible for preparing the 30-60% design package for James Creek Reach 16 as identified in the Lefthand Creek Watershed Master Plan. ecos performed pre- and post-flood plant community assessment; developed revegetation goals and objectives, the basis of design, monitoring protocols, and revegetation plans according to Colorado Department of Local Affairs, Community Development Block Grant – Disaster Recovery 30% Guidelines. Specific resources and issues of concern addressed by ecos, included federal and state listed candidate, threatened and endangered species, wildlife species of concern (including raptors), fisheries and fish passage, native plant communities, and management of noxious weeds.
- **Saint Vrain Creek Flood Recovery and Restoration, Town of Lyons, CO –** ecos is part of a design-build team tasked with restoring the St. Vrain Creek corridor in the Town of Lyons that was damaged during the September 2013 flood event. The goal of the project is to work with the Town and affected land-owners to create a more resilient floodplain and natural channel condition that will help alleviate future threats to the community, reestablish floodplain connectivity, stabilize banks, and restore aquatic, wetland and riparian habitat that was wiped out during the flood. Mr. Dauzvardis is responsible for developing the plant communities and revegetation strategies needed to restore aquatic and riparian structure and functions within the corridor that support fish, wildlife, recreation, and help the Town regain the ecological benefits and economic value they receive from outdoor enthusiasts. This project was completed in the summer of 2016.

- **Plum Creek Mitigation Bank, Sedalia, CO –** ecos was retained by Restoration Systems to prepare conceptual design plans for the Plum Creek Mitigation Bank Site that is currently under consideration by the Chatfield Reservoir Mitigation Company (CRMC). The purpose of the Site is to provide compensatory mitigation credits for unavoidable, permitted impacts to wetland, PMJM and bird (target resources) habitat regulated under the CWA and ESA; and to restore, enhance and preserve natural resource functions. Jon has guided agency and CRMC staff on tours of the Site; performed plant community mapping, baseline EFU assessment for PMJM, and FACWet assessment of wetlands. Jon was responsible for mapping, interpretation, and quantification of historic and existing habitat on the site. Jon prepared Conceptual Design Plans for resource mitigation including channel geomorphology, PMJM and wetland habitat setting the stage for post-mitigation calculations of EFU's.
- **Bellvue Raw Water Ponds Riverbank Restoration, Bellvue, CO –** The 2013 flood on the Poudre River altered the course of the river and severely eroded a bank nearly causing a breach of the City of Greeley's raw water ponds – their main municipal water supply. The goal of the project was to stabilize the bank to protect the ponds and to create riparian habitat for the Preble's meadow jumping mouse, a federally listed threatened and endangered species. Jon was responsible for preparing bioengineering design plans and specifications that include soil/cobble encapsulated lifts, stream barbs to deflect flows away from the bank, and harder, biotechnical design of soil/riprap and stream bed scour protection measures to prevent erosion and further undermining and sloughing of the bank. Design plans included specification of native plant materials and various techniques to restore cottonwood forest and willow habitat to further stabilize the bank.
- **Poudre River Pipeline Crossing at Kodak, Windsor, CO –** Jon's role on the ecos team was to assess restoration potential, techniques, and prepare design plans and performance specifications to reclaim a pipeline corridor across the lower Poudre River where the City of Greely had to replace 3 major water supply lines. Flooding on the Poudre River in 2013 and 2014 temporarily suspended construction of the pipeline. Jon will oversee site stabilization and restoration measures once all 3 pipelines have been installed.
- **Lions Park Poudre River Restoration Plan, Laporte, CO –** Jon's role on the ecos team was to assess habitat conditions; gather, compile and analyze field survey data; and to prepare the mapping and mitigation design plans for the Lions Park PMJM habitat and the Poudre River Bank Stabilization Plans. Jon simultaneously designed and executed the technical drawings for the structural components of the habitat, ensuring that the proposed riparian plant community, habitat structures (brush piles), and bioengineered streambank stabilization measures will create the conditions that alleviate the current habitat fragmentation; support the life requisites of the PMJM; and enhance the overall health of the Poudre River fishery.
- **St. Vrain River Riparian Corridor Enhancement, Lyons, CO –** Jon designed, managed and led the construction of the Preble's Meadow Jumping Mouse Habitat (PMJM) enhancement project along the St. Vrain River. Jon worked in coordination with the project sponsor and Director of the Town of Lyons, Parks, Recreation and Cultural Events Department to implement required mitigation within a passive greenway park along the St. Vrain. Jon's role included riparian/PMJM mitigation site identification and habitat assessment; and design; and implementation of riverbank stabilization and riparian habitat enhancement measures.
- **Brush Creek Fishery Enhancement Plan, Saratoga, WY** – Prepared access, staging and design plans, details and performed on-site construction oversight of instream and riparian habitat enhancements and bioengineered bank stabilization along a 3-mile reach of Brush Creek. The purpose of the project is to enhance fish, bird and wildlife habitat and use these resources to facilitate education and improve the recreational experience of Ranch guests. Access routes were planned so that they can be easily converted to trails to avoid repetitive impacts to high quality habitat and productive pastures.
- **St. Vrain River Riparian Corridor Enhancement, Lyons, CO** – Jon is the lead Landscape Architect for the restoration and enhancement of Preble's Meadow Jumping Mouse Habitat (PMJM) along the St. Vrain River. Jon and ecos are working in coordination with the Town of Lyons, Parks, Recreation and Cultural Events team to implement this restoration project within a passive park area along the St. Vrain. Jon's tasks include riparian/PMJM habitat assessment; PMJM site location and habitat design; and implementation of riverbank stabilization and riparian habitat enhancement measures.
- **TZ Ranch, Elk Hollow Creek Fishery Habitat Enhancement Plan, Saratoga, WY -** ecos performed the assessment and design of the Elk Hollow Creek Project, which included instream and riparian habitat

improvements aimed at increasing bank stability, improving aquatic habitat and angling opportunities, and providing long-term stability to the reach. Instream improvements included drop structures, plunge pools, deep pools, riffles and spawning habitat. Bank improvements included seeding and planting plans for native wetland and riparian species. Jon was the lead on the generation of design-build plans and provided construction oversight of instream structure and native plant installation.

- **Brush Creek Ranch Pond Creation Plan, Saratoga, WY** – Prepared below grade pond excavation, grading, drainage and revegetation plan for a 0.30-acre fishing pond, followed by on-site field layout and surveying, wetland sod transplanting, submerged aquatic habitat and construction support of heavy equipment operators. The pond was designed to be a self-sustaining, cold water fishery that supports all components of the aquatic food-chain and incorporates all necessary life requisites for trout; and provide fishing opportunities during high water in Brush Creek.
- **Edwards Eagle River Restoration Project, Edwards, CO** – Assessment, planning, native plant community design and construction oversight of aquatic, wetland, riparian habitat along 1.5 mile reach and 168-acres of floodplain along the Eagle River utilizing indigenous materials and methods that naturally integrate habitat structure in the landscape context. Planning and design included trails, boat launch, boardwalks, overlooks, and interpretive sign systems and thematic content.
- **Boone Property, Boulder Creek Fishery Enhancement Project, Boulder, CO** – Performed site assessment and identified instream and overhead cover habitat to enhance fish habitat along a short reach of Boulder Creek adjacent to City of Boulder, Eldorado Canyon Open Space.
- **C-Lazy-U Ranch Willow Creek Fishery Enhancement Plan, Granby, CO** – Assessed and prepared design plans for 2 miles of instream and overhead cover habitat aimed at enhancing water quality through increased bank stability, improving aquatic habitat and angling opportunities, and providing long-term stability to the reach influenced ongoing ranching activities. Bank-side improvements include detailed seeding and planting plans indicating site-specific plant and seed locations, life zones, and species palettes according to hydrologic, soil, and aspect conditions.
- **Colowyo Coal Mine Wetland Creation Plan, Meeker, CO** – Performed wetland mitigation site feasibility assessment and design of 2.2-acres of created wetland benches along a 1.5-mile reach of the West New Goodspring Creek.
- **Uncompahgre River Wetland Creation and Streambank Stabilization, Montrose, CO** – Mr. Dauzvardis developed a Clean Water Act Individual Section 404, alternatives analysis and mitigation plans that successfully defrayed public descent and offset unavoidable impacts related to the River Landing Retail Development Project. Once approved by the USACE, the project turned a degraded, gravel-mined portion of the floodplain into functional and aesthetic riparian habitat that is now enjoyed by the public via a segment of trail that Mr. Dauzvardis designed. Two acres of riparian and "backwater" wetland habitat were strategically created along the Uncompahgre River to ensure reliable hydrologic connectivity and support of the designed wetland plant community. Nearly 350 lineal feet of severely degraded stream bank was stabilized using a naturalized bio-engineering approach that incorporated soil, native seed, erosion control blanket, shrubs, trees, and strategically located river boulders and logs to restore the riparian habitat, create fish habitat and redirect scouring flows away from the once barren bank.
- **River Point at Sheridan Brownfield Redevelopment, Sheridan, CO** – Designed and oversaw the construction of a "bio-engineered" and "bio-technical" vegetative landfill cap system and water quality swale that drains to the South Platte River. Jon was responsible for integrating the swale in to the River Point at Sheridan commercial redevelopment and the City of Englewood Golf Course renewal – renamed to the Broken Tee Golf Course.
- **Broken Tee Golf Course Flood Protection, City of Englewood, CO –** Oversaw the construction of a biotechnical subsurface stabilization and flood protection system (under-armor) designed to ensure that the woodland golf course tees, fairways and greens in the South Platte River floodplain are not compromised by flood scour. Designed and implemented bioengineered bank stabilization and under-armor on Bear Creek that was essential for protecting tees and greens. Jon was responsible for disproving the jurisdictional status of artificially supported wetlands via a groundwater monitoring system.
- **Lafarge Northbank Resources Gravel Pit Wetland Design, Rifle, CO** – Jon asses DMG requirements and prepared gravel pit reclamation plans aimed at providing suitable shallow-water wetlands and islands within the pit closure area to serve as compensatory mitigation for wetland impacts associated with mine operations adjacent to the Colorado River.

- **Leach Creek Stream Enhancement, Grand Junction, CO** – Designed stream corridor enhancements for a ½-mile section of Leach Creek that was channelized and used as an irrigation canal. Enhancements were designed to restore natural channel form and function, improve the aquatic environment, and provide mitigation for jurisdictional impacts permitted under the Nationwide Permit program. This project is being used as a model and replicated along other reaches of Leach Creek
- **Castro Property Wetlands and Wildlife Ponds, Beulah, CO** – Performed the site assessment, feasibility analysis, water resource and minor dam design, native plant design, landscape architecture, and supported the water rights application needed to create shallow water wetland habitat for amphibians, waterfowl, migrating bird and ungulates, and deep water habitat for trout at a sub-alpine elevation of 9000 feet. Project included development of a spring, creation of a creek and a mechanical water circulation and aeration system to support the aquatic, wetland, and riparian ecosystem. Organized, supervised and participated in a volunteer planting effort.
- **Jefferson County Gunbarrel Bridge Replacement, Oxyoke, CO** – Developed construction plans and specifications and oversaw construction of wetland and Preble's mouse habitat mitigation to enhance weedy and degraded wetland and Preble's mouse habitat along Gunbarrel Creek, a tributary to the upper South Platte River near Deckers, CO.
- **Coal Creek Bank Stabilization, Erie, CO** – Assessed, permitted, designed and performed construction oversight of bio-engineered/bio-technical bank stabilization and wetland creation associated with the Vista Parkway bridge crossing over Coal Creek in Erie, CO. The project involved pulling back vertical banks and restoring native wetland, riparian, and short grass prairie habitat.
- **Spring Creek Wetland Mitigation, Colorado Springs, CO** – Generated wetland and creek creation plans that integrated required mitigation into a high density, "new urban" development. The design emphasized re-utilization of urban storm water to sustain wetlands, use of indigenous plants, construction materials, and natural geomorphic relationships.
- **Sulphur Gulch, Parker, CO** – Developed a naturalized sculpted concrete drop structure design, planting and bio-engineering plans for a highly visible, urbanizing reach of a sandy creek through the center of the Town of Parker.
- **Skylark Creek Restoration Plan, Kremmling, CO** – Designed and performed construction oversight of aquatic, wetland and riparian plant community, and trail system along a historic side channel of the Upper Colorado River on a private fishing ranch.
- **ARCO Opportunity Ponds Wetland Mitigation Design, Anaconda, MT –** Jon generated the design of a 908-acre complex of wetlands and terrestrial habitat required to meet the Consent Decree and the functional assessment criteria established during the wetland assessment process mentioned previously. The design is currently being implemented. Once complete, the grading, drainage, hydrology, and revegetation strategy used to create wetlands from massive soil borrow pits will potentially be the largest inland, freshwater wetland mitigation project in the United States.
- **Northgate Boulevard Realignment, Colorado Springs, CO** – Coordinated and prepared ESA Section 7 and CWA Section 404 consultation documents as required by the USFWS and USACE, including mitigation construction documents, specifications, on-site layout of plant communities and construction supervision aimed at restoring wetland and riparian habitat occupied by Preble's meadow jumping mouse.
- **Northgate PMJM and Wetland Mitigation Plan, Colorado Springs, CO** – Mr. Dauzvardis was an instrumental member of multidisciplinary team responsible for delineating wetlands, preparing ESA Section 7 and CWA Section 404 assessment, impact analysis and consultation documents as required by the USFWS and USACE. As the lead designer, Jon was responsible for the design of over 80 acres of wetland, riparian, and grassland habitat utilized as primary and secondary habitat for Preble's Meadow Jumping Mouse, a Federally-listed threatened species. Jon prepared mitigation construction documents, specifications, onsite layout of plant communities and supervised construction for this precedent setting mitigation plan designed to offset impacts to critical habitat over a 1200-acre site.
- **Martin County Coal Corporation, Inez, KY** – Mr. Dauzvardis bioengineered and performed on-the-ground triage of two stream corridors, consisting of 26 miles, impacted by a coal slurry spill that originated from a mountaintop mine reservoir used to hold liquefied coal dust. Jon identified and documented critically imperiled stream banks and human settlements, and then designed, coordinated, led and supervised local crews during the implementation of specified floodplain, bioengineered bank stabilization, and reforestation efforts.

- **Uncompahgre River Restoration and Park Corridor, Ouray, CO** – Jon designed and performed construction oversight of the restoration and reclamation of one mile of upland, riparian and wetland habitat left barren by historic placer mining. The major challenge presented by this project was a lack of soil, organic matter and nutrients to sustain vegetation. This constraint was addressed by amending the soil with humate and planting and seeding riparian vegetation to initiate natural succession and bioaccumulation of matter, assisted by an irrigation system that injected organic fertilizer and microbes (mycorrhizea) in to the substrate.
- **Burlington Mine Remediation, Jamestown, CO** – Preparation and management of specification package, best management practices (BMPs), and revegetation design for mine waste capping and closure.
- **Powder River Coal Company – Porcupine Creek Restoration, Douglas, WY** – Designed and supervised the construction of this post mine wetland/creek restoration project. Following the pit closure, reclamation specialists reestablished the original location and geomorphic relationships of the creek using historic aerial photography using a trapezoidal channel cross-section design. Jon adapted the design creating grading and wetland planting plans that mimic the landform, natural lateral and longitudinal channel tilt, and plant communities that are indigenous to ephemeral creeks in the shortgrass prairie landscapes of eastern Wyoming.
- **Sand Creek Corridor Habitat Enhancement at Bluff Lake, Denver, CO** – Prepared plant community, bioengineering and bank stabilization design. Prepared visualization graphics to present and receive design approval.
- **Intrawest Resort Development, West Ten Mile Creek, Copper Mountain Village, CO** – Prepared vegetation community and concept design of village base streamside recreational amenities.

Construction and Plant Installation:

- **St. Vrain River Riparian Corridor Enhancement, Lyons, CO –** Jon managed construction and implementation of the restoration and enhancement of 0.60-acre of riparian Preble's Meadow Jumping Mouse Habitat (PMJM) along the St. Vrain River.
- **Standley Lake Protection Project, Westminster, CO** – Designed and supervised construction of a 0.50-acre created emergent wetland to fulfill final mitigation requirements of the USACE and bring closure to the City's drinking water protection project.
- **Caribou Peat Bog Restoration, Nederland, CO** –Prepared native plant community design, planting cost estimate, and on-the-ground oversight of volunteers to restore a high-altitude peat bog disturbed by an illegal four-wheel drive "mudfest".
- **Department of Energy (DOE) Wetland Mitigation Bank, Westminster, CO** – Construction supervision of grading and planting plans of a 12-acre wetland mitigation bank design for the Department of Energy.
- **ARCO Lower Area One and Butte Reduction Works, Butte, MT** – Performed construction observation and supervision of temporary labor crews to plant a passive treatment wetland designed to absorb heavy metals from groundwater.
- **Colorado Department of Transportation Mitigation Bank, Limon, CO** – Performed in-field planting design and supervised local labor to complete a 10-acre wetland mitigation bank designed by CDOT to offset future wetland impacts in the transportation region.
- **Irvine Ranch Water District – San Joaquin Wetland Treatment System, Irvine, CA** – Planting superintendent of a wetland designed to be a used as tertiary wastewater treatment facility and waterfowl refuge.

PRESENTATIONS & INSTRUCTION:

Dauzvardis, Jonathan B. 2008. Preserving the Ecological Services of Willow Cuttings. Research presented at the Colorado Riparian Association (CRA) Sustaining Colorado Watersheds Conference. October 2, 2008. Vail, Colorado.

Dauzvardis, Jonathan B. 2006. Water Pollution and Wetland Plant Tolerance to Various Ph Levels. Classroom instruction with Elementary Students. Flagstaff Academy Charter School. February 2, 2006. Longmont, Colorado.

Dauzvardis, Jonathan B. 2006. Soil Erosion and Habitat Destruction. Classroom instruction with Elementary Students. Flagstaff Academy Charter School. January 26, 2006. Longmont, Colorado.

Dauzvardis, Jonathan B. 2004. Wetland and Wildlife Habitat Restoration, Opportunity Ponds, Anaconda, Montana. Poster Presentation at Ecological Restoration Conference. October, 2003. Orlando, Florida.

Dauzvardis, Jonathan B. 2003. Application of Landscape Ecology Principles to Mine Remediation and Wetland Creation: An Ecological Restoration Seminar using a Case Study of the Opportunity Ponds Wetlands Plan, Anaconda, Montana. Presented at the University of Colorado, Denver. November, 2003. Denver, Colorado.

Dauzvardis, Jonathan B. 2000. Endangered Species Act Issues: Incorporating the ESA into Mitigation Projects. Presented at the Continuing Legal Education (CLE, International) Colorado Wetlands Conference. September 18, 2000. Denver, Colorado.

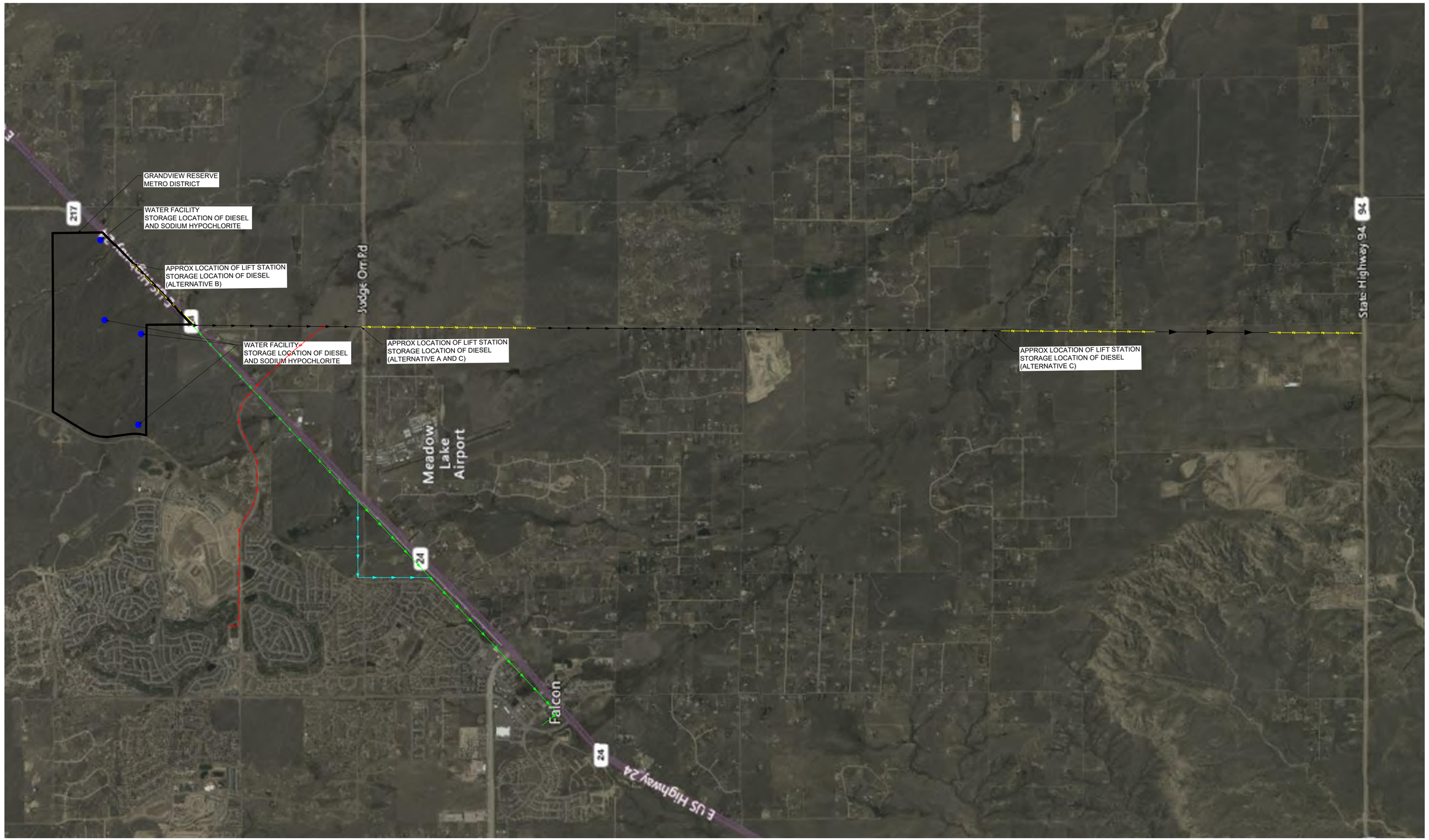
AWARDS:

- Colorado Landscape Contractors Award, Sand Creek Enhancement Project – 2000
- Colorado Landscape Contractors Award, Skylark Creek Restoration Project – 1998
- Colorado American Society of Landscape Architects, Research, and Communications – 1997
- Texas American Society of Landscape Architects Honor Award – 1995
- Texas A&M Landscape Architecture Faculty Award – 1995

PROFESSIONAL ASSOCIATIONS:

- Town of Erie, Colorado Open Space and Trails Advisory Board (OSTAB) - As a former member and chair of the Town of Erie Open Space and Trails Advisory Board (OSTAB), Mr. Dauzvardis routinely collaborated with Town Administrator, Community Planning, Public Works, and Parks and Recreation Directors and Staff, and advised the Board of Trustees on all matters related to the goals, objectives, prioritization, acquisition, conservation, and the management of open space and trails throughout a 49-square mile planning area. Jon's 8-year experience on the OSTAB translates to an intimate knowledge of public processes.
- Society of Wetland Scientists (SWS)

EXHIBIT P: HAZARDOUS MATERIAL LOCATION EXHIBIT



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HRGreen

Job No.:	201662
Prepared By:	SJF
Date:	12/21/2021

HAZARDOUS MATERIALS

FIG.A

EXHIBIT Q: NOISE STUDY

TRANSPORTATION
CONSULTANTS, INC.

lsc@lsctrans.com

July 9, 2020

Mr. Peter Martz
4 Site Investments, LLC
P.O. Box 50223
Colorado Springs, CO 80949

RE: Grandview Reserve
Noise Impact Study
El Paso County, Colorado
LSC #184841

Dear Mr. Martz:

In response to your request, LSC Transportation Consultants, Inc. has completed a detailed analysis of the noise impacts of US Highway (US) 24 on the residential areas within the proposed Grandview Reserve development. The site is located west of US 24 in the vicinity of the future intersection of Rex Road in El Paso County, Colorado. LSC has completed an evaluation of the noise exposure for submittal to El Paso County and the Colorado Department of Transportation in accordance with the Federal Highway Administration (FHWA) requirements.

LSC used the software program Traffic Noise Model Version 2.5, developed by FHWA, to predict the noise levels at nine key locations on the east side of the development adjacent to US 24. An elevation of five feet was assumed for the height of each receiver. The receiver locations are shown in Figure 1.

The input data for the noise predictions included traffic volumes, roadway geometry, topographic elevations, and the locations of the receivers. The analysis was completed using the projected 2040 afternoon peak-hour traffic volumes taken from the *Grandview Reserve Master Traffic Impact Analysis* by LSC dated April 17, 2020. The roadway geometry assumes the future condition of US 24 with two through lanes in each direction as identified in the *Colorado Department of Transportation US 24 Planning and Environmental Linkages Study Final Corridor Conditions Report* dated December 2016. The noise analysis inputs and outputs are attached.

The results of the noise prediction were compared to the noise abatement criteria contained in Exhibit 1 of the *Colorado Department of Transportation Noise Analysis and Abatement Guidelines* dated January 15, 2015. The proposed residential areas would be considered Category "B" land uses. The threshold for exterior noise level for Category B is 66 decibels Leq(h). The results of the

noise prediction show that in the year 2040, receivers 1, 2, and 3 located on the east boundary of Parcel K would have predicted noise levels which would exceed this threshold. If a six-and-a-half-foot high noise barrier were constructed at the location shown on Figure 1, these noise receiver locations are predicted to be below the threshold. This noise barrier could be a wall, a berm, or a combination of the two. If a wall is constructed, it should be made of a rigid material with a density of at least 4 pounds per square foot and should have no gaps.

Receivers 4 through 9 located on the east boundary of Parcels L, M, and N have predicted noise levels that would **not** exceed 66 decibels Leq(h) and therefore noise mitigation would not be required adjacent to these parcels.

* * * * * *

Please contact me if you have any questions or need further assistance.

Respectfully submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Kirstin D. Ferrin, P.E.
Senior Transportation Engineer

COLORADO REGISTERED KIRSTIN DAY FERRIN 38417 PROFESSIONAL ENGINEER

KDF:jas

Enclosures: Figure 1
Noise Analysis Inputs/Outputs

Figure 1

TRANSPORTATION
CONSULTANTS, INC.

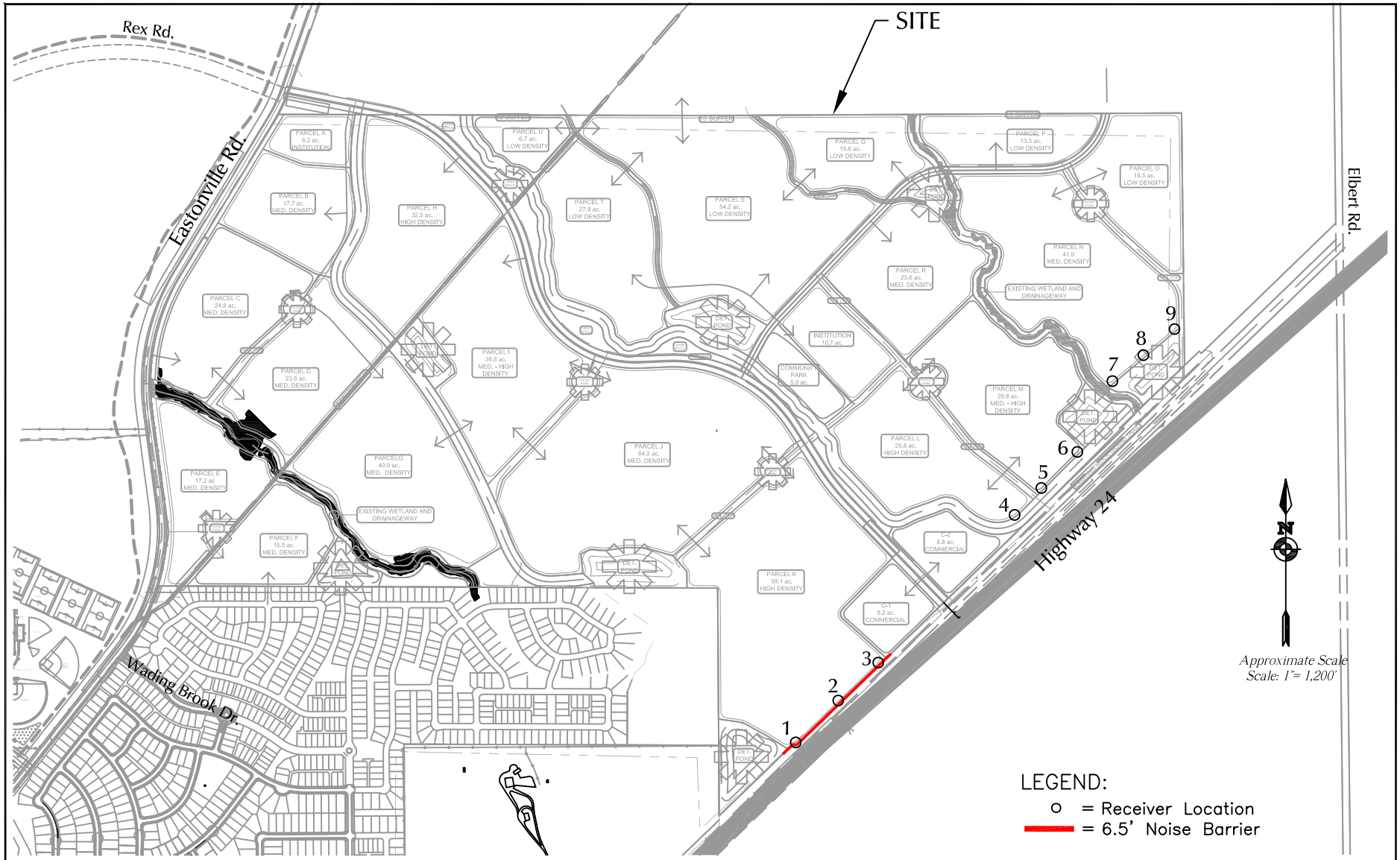

Figure 1

Noise Analysis Data

Grandview Reserve Noise Analysis (LSC #184841)

LSC TRANSPORTATION CONSULTANTS, INC.

Noise Analysis Inputs/Outputs

TRANSPORTATION
CONSULTANTS, INC.

LSC Transportation Consultants, Inc
KDF

12 May 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Grandview Reserve
RUN: 2040 PM Peak Hour
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	68.2	66	68.2	10	Snd Lvl	66.0	2.2	8	-5.8
Receiver2	2	1	0.0	68.9	66	68.9	10	Snd Lvl	64.6	4.3	8	-3.7
Receiver3	3	1	0.0	69.2	66	69.2	10	Snd Lvl	65.5	3.7	8	-4.3
Receiver4	4	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
Receiver5	5	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
Receiver6	6	1	0.0	61.5	66	61.5	10	----	61.5	0.0	8	-8.0
Receiver7	7	1	0.0	56.9	66	56.9	10	----	56.9	0.0	8	-8.0
Receiver8	8	1	0.0	57.1	66	57.1	10	----	57.1	0.0	8	-8.0
Receiver9	9	1	0.0	57.3	66	57.3	10	----	57.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	9	0.0	1.1	4.3
All Impacted	3	2.2	3.4	4.3
All that meet NR Goal	0	0.0	0.0	0.0

LSC Transportation Consultants, Inc 12 May 2020
KDF TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Grandview Reserve
RUN: 2040 PM Peak Hour

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
US 24 EB Southwest of Rex Rd	point1	1	2119	65	42	65	62	65	0	0	0	0
	point3	3	2119	65	42	65	62	65	0	0	0	0
	point4	4	2119	65	42	65	62	65	0	0	0	0
	point5	5	2119	65	42	65	62	65	0	0	0	0
	point6	6	2119	65	42	65	62	65	0	0	0	0
	point7	7	2119	65	42	65	62	65	0	0	0	0
	point8	8	2119	65	42	65	62	65	0	0	0	0
	point9	9	2119	65	42	65	62	65	0	0	0	0
	point10	10	2119	65	42	65	62	65	0	0	0	0
	point11	11	2119	65	42	65	62	65	0	0	0	0
	point12	12	2119	65	42	65	62	65	0	0	0	0
	point13	13	2119	65	42	65	62	65	0	0	0	0
	point14	14	2119	65	42	65	62	65	0	0	0	0
	point15	15	2119	65	42	65	62	65	0	0	0	0
	point16	16	2119	65	42	65	62	65	0	0	0	0
	point17	17	2119	65	42	65	62	65	0	0	0	0
	point2	2										
US 24 EB Northeast of Rex Rd	point18	18	1136	65	23	65	33	65	0	0	0	0
	point20	20	1136	65	23	65	33	65	0	0	0	0
	point21	21	1136	65	23	65	33	65	0	0	0	0
	point22	22	1136	65	23	65	33	65	0	0	0	0
	point23	23	1136	65	23	65	33	65	0	0	0	0
	point24	24	1136	65	23	65	33	65	0	0	0	0

	point25	25	1136	65	23	65	33	65	0	0	0	0
	point26	26	1136	65	23	65	33	65	0	0	0	0
	point27	27	1136	65	23	65	33	65	0	0	0	0
	point28	28	1136	65	23	65	33	65	0	0	0	0
	point29	29	1136	65	23	65	33	65	0	0	0	0
	point30	30	1136	65	23	65	33	65	0	0	0	0
	point19	19										
US 24 WB Northeast of Rex Rd	point31	31	1086	65	22	65	32	65	0	0	0	0
	point33	33	1086	65	22	65	32	65	0	0	0	0
	point34	34	1086	65	22	65	32	65	0	0	0	0
	point35	35	1086	65	22	65	32	65	0	0	0	0
	point36	36	1086	65	22	65	32	65	0	0	0	0
	point37	37	1086	65	22	65	32	65	0	0	0	0
	point38	38	1086	65	22	65	32	65	0	0	0	0
	point39	39	1086	65	22	65	32	65	0	0	0	0
	point40	40	1086	65	22	65	32	65	0	0	0	0
	point41	41	1086	65	22	65	32	65	0	0	0	0
	point42	42	1086	65	22	65	32	65	0	0	0	0
	point43	43	1086	65	22	65	32	65	0	0	0	0
	point32	32										
US 24 WB Southwest of Rex Rd	point44	44	1665	65	33	65	49	65	0	0	0	0
	point47	47	1665	65	33	65	49	65	0	0	0	0
	point48	48	1665	65	33	65	49	65	0	0	0	0
	point49	49	1665	65	33	65	49	65	0	0	0	0
	point50	50	1665	65	33	65	49	65	0	0	0	0
	point51	51	1665	65	33	65	49	65	0	0	0	0
	point52	52	1665	65	33	65	49	65	0	0	0	0
	point53	53	1665	65	33	65	49	65	0	0	0	0
	point54	54	1665	65	33	65	49	65	0	0	0	0
	point55	55	1665	65	33	65	49	65	0	0	0	0
	point56	56	1665	65	33	65	49	65	0	0	0	0
	point57	57	1665	65	33	65	49	65	0	0	0	0
	point58	58	1665	65	33	0	49	65	0	0	0	0
	point59	59	1665	65	33	65	49	65	0	0	0	0
	point60	60	1665	65	33	65	49	65	0	0	0	0
	point61	61	1665	65	33	65	49	65	0	0	0	0

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INPUT: ROADWAYS
PROJECT/CONTRACT: Grandview Reserve
RUN: 2040 PM Peak Hour

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
US 24 EB Southwest of Rex Rd	24.0	point1	1	3,269,332.5	1,416,773.2	6,876.00				Average	
		point3	3	3,269,607.2	1,417,039.1	6,876.00				Average	
		point4	4	3,269,944.2	1,417,365.2	6,875.00				Average	
		point5	5	3,269,994.5	1,417,414.1	6,875.00				Average	
		point6	6	3,270,271.0	1,417,681.6	6,876.00				Average	
		point7	7	3,270,446.2	1,417,851.2	6,877.00				Average	
		point8	8	3,270,553.0	1,417,954.8	6,877.00				Average	
		point9	9	3,270,682.5	1,418,080.2	6,876.00				Average	
		point10	10	3,270,766.2	1,418,161.1	6,875.00				Average	
		point11	11	3,270,845.5	1,418,237.9	6,874.00				Average	
		point12	12	3,270,854.0	1,418,246.2	6,874.00				Average	
		point13	13	3,270,921.2	1,418,311.2	6,873.00				Average	
		point14	14	3,271,058.2	1,418,443.8	6,872.00				Average	
		point15	15	3,271,156.5	1,418,539.0	6,871.00				Average	
		point16	16	3,271,254.5	1,418,633.8	6,870.00				Average	
		point17	17	3,271,353.2	1,418,729.2	6,869.00				Average	
		point2	2	3,271,538.2	1,418,907.9	6,869.00					
US 24 EB Northeast of Rex Rd	24.0	point18	18	3,271,546.5	1,418,916.5	6,869.00	Signal	0.00	50	Average	
		point20	20	3,271,782.0	1,419,144.2	6,869.00				Average	
		point21	21	3,271,914.0	1,419,272.1	6,870.00				Average	
		point22	22	3,271,953.0	1,419,310.0	6,870.00				Average	
		point23	23	3,272,050.5	1,419,404.2	6,869.00				Average	
		point24	24	3,272,112.0	1,419,463.9	6,868.00				Average	
		point25	25	3,272,159.5	1,419,509.9	6,867.00				Average	
		point26	26	3,272,226.8	1,419,574.8	6,866.00				Average	

		point27	27	3,272,296.8	1,419,642.6	6,865.00				Average	
		point28	28	3,272,393.0	1,419,735.8	6,864.00				Average	
		point29	29	3,272,914.8	1,420,241.0	6,864.00				Average	
		point30	30	3,273,166.5	1,420,484.6	6,865.00				Average	
		point19	19	3,274,763.8	1,422,030.8	6,871.00					
US 24 WB Northeast of Rex Rd	24.0	point31	31	3,274,722.0	1,422,073.9	6,871.00				Average	
		point33	33	3,273,171.8	1,420,573.2	6,865.00				Average	
		point34	34	3,272,886.5	1,420,297.0	6,864.00				Average	
		point35	35	3,272,349.8	1,419,777.6	6,864.00				Average	
		point36	36	3,272,255.5	1,419,686.1	6,865.00				Average	
		point37	37	3,272,183.0	1,419,616.0	6,866.00				Average	
		point38	38	3,272,118.5	1,419,553.6	6,867.00				Average	
		point39	39	3,272,069.5	1,419,506.2	6,868.00				Average	
		point40	40	3,272,007.8	1,419,446.4	6,869.00				Average	
		point41	41	3,271,915.2	1,419,356.8	6,870.00				Average	
		point42	42	3,271,872.0	1,419,315.0	6,870.00				Average	
		point43	43	3,271,739.5	1,419,186.6	6,869.00				Average	
		point32	32	3,271,505.2	1,418,960.0	6,869.00					
US 24 WB Southwest of Rex Rd	24.0	point44	44	3,271,496.8	1,418,951.8	6,869.00	Signal	0.00	50	Average	
		point47	47	3,271,313.2	1,418,774.1	6,869.00				Average	
		point48	48	3,271,214.2	1,418,678.2	6,870.00				Average	
		point49	49	3,271,118.0	1,418,585.1	6,871.00				Average	
		point50	50	3,271,017.5	1,418,487.8	6,872.00				Average	
		point51	51	3,270,883.8	1,418,358.2	6,873.00				Average	
		point52	52	3,270,814.5	1,418,291.4	6,874.00				Average	
		point53	53	3,270,806.5	1,418,283.4	6,874.00				Average	
		point54	54	3,270,727.2	1,418,207.1	6,875.00				Average	
		point55	55	3,270,642.0	1,418,124.1	6,876.00				Average	
		point56	56	3,270,513.0	1,417,999.5	6,877.00				Average	
		point57	57	3,270,406.0	1,417,895.9	6,877.00				Average	
		point58	58	3,270,226.5	1,417,722.1	6,876.00				Average	
		point59	59	3,269,950.8	1,417,455.1	6,875.00				Average	
		point60	60	3,269,900.2	1,417,406.2	6,875.00				Average	
		point61	61	3,269,492.8	1,417,011.8	6,876.00				Average	
		point45	45	3,269,333.0	1,416,857.1	6,876.00					

LSC Transportation Consultants, Inc 12 May 2020
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INPUT: RECEIVERS
PROJECT/CONTRACT: Grandview Reserve
RUN: 2040 PM Peak Hour

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Receiver1	1	1	3,270,152.0	1,417,886.6	6,878.00	4.92	0.00	66	10.0	8.0	Y
Receiver2	2	1	3,270,529.2	1,418,216.6	6,876.00	4.92	0.00	66	10.0	8.0	Y
Receiver3	3	1	3,270,865.0	1,418,535.0	6,872.00	4.92	0.00	66	10.0	8.0	Y
Receiver4	4	1	3,272,008.2	1,419,773.9	6,867.00	4.92	0.00	66	10.0	8.0	Y
Receiver5	5	1	3,272,232.8	1,420,000.0	6,867.00	4.92	0.00	66	10.0	8.0	Y
Receiver6	6	1	3,272,534.5	1,420,302.9	6,865.50	4.92	0.00	66	10.0	8.0	Y
Receiver7	7	1	3,272,828.5	1,420,896.4	6,865.00	4.92	0.00	66	10.0	8.0	Y
Receiver8	8	1	3,273,089.0	1,421,114.8	6,869.50	4.92	0.00	66	10.0	8.0	Y
Receiver9	9	1	3,273,349.2	1,421,333.2	6,868.00	4.92	0.00	66	10.0	8.0	Y

LSC Transportation Consultants, Inc 12 May 2020
KDF TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: Grandview Reserve
RUN: 2040 PM Peak Hour

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per	$ per	Top	Run:Rise	$ per			X	Y	Z	at	Seg Ht Perturbs			On	Important
				Unit	Unit	Width		Unit						Point	Incre-	#Up	#Dn	Struct?	Reflec-
				Area	Vol.			Length							ment				tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	3,270,064.2	1,417,766.8	6,875.00	6.50	6.50	1	1		
									point3	3	3,270,085.0	1,417,787.0	6,876.00	6.50	6.50	1	1		
									point4	4	3,270,145.0	1,417,845.1	6,876.00	6.50	6.50	1	1		
									point5	5	3,270,181.2	1,417,845.1	6,876.00	6.50	6.50	1	1		
									point6	6	3,270,243.8	1,417,905.9	6,876.00	6.50	6.50	1	1		
									point7	7	3,270,328.2	1,417,987.8	6,876.00	6.50	6.50	1	1		
									point8	8	3,270,424.5	1,418,080.8	6,876.00	6.50	6.50	1	1		
									point9	9	3,270,473.0	1,418,127.8	6,875.00	6.50	6.50	1	1		
									point10	10	3,270,533.0	1,418,185.9	6,875.00	6.50	6.50	1	1		
									point11	11	3,270,555.5	1,418,207.4	6,876.00	6.50	6.50	1	1		
									point12	12	3,270,634.0	1,418,283.8	6,876.00	6.50	6.50	1	1		
									point13	13	3,270,664.5	1,418,313.0	6,875.00	6.50	6.50	1	1		
									point14	14	3,270,700.8	1,418,348.2	6,874.00	6.50	6.50	1	1		
									point15	15	3,270,753.2	1,418,399.0	6,873.00	6.50	6.50	1	1		
									point16	16	3,270,807.2	1,418,451.4	6,872.00	6.50	6.50	1	1		
									point17	17	3,270,844.5	1,418,487.2	6,871.00	6.50	6.50	1	1		
									point18	18	3,270,892.8	1,418,534.1	6,871.00	6.50	6.50	1	1		
									point19	19	3,270,915.2	1,418,555.8	6,872.00	6.50	6.50	1	1		
									point2	2	3,270,971.0	1,418,609.8	6,873.00	6.50					

EXHIBIT R: AREAS OF PALEOTOLOGICAL IMPORTANCE

HISTORY COLORADO
Office of Archaeology and Historic Preservation
1200 Broadway, Denver, Colorado 80203

Greg Panza
HR Green
5619 DTC Pkwy #1150
Greenwood Village, CO 80111

Provide the maps that pertain to Grandview identifying the locations. if within Grandview

July 8, 2021

Re: Grandview Reserve
File Search No. 23835

At your request, the Office of Archaeology and Historic Preservation has conducted a search of the Colorado Inventory of Cultural Resources within the area shown in the provided maps, located in the following areas:

PM	T	R	S
6th	12S	64W	21, 22, 27, 28

1 sites and 2 surveys were located in the designated area(s).

If information on any district, site, building, structure, or object in the project area was found, detailed information follows the summary. If no properties were found, but surveys are known to have been conducted in the project area, survey information follows the summary. We do not have complete information on surveys conducted in Colorado, and our site files cannot be considered complete because most of the state has not been surveyed for cultural resources. There is the possibility that as yet unidentified cultural resources exist within the proposed impact area.

Our letter should not be interpreted as formal consultation under Section 106 of the National Historic Preservation Act (36 CFR 800) or the Colorado Register of Historic Places (CRS 24-80.1). In the event that there is federal or state agency involvement, please note that it is the responsibility of the agencies to meet the requirements of these regulations.

We look forward to consulting with you regarding the effect of the proposed project on significant cultural resources in accordance with the Advisory Council on Historic Preservation regulations titled "Protection of Historic Properties" or the Colorado Register of Historic Places, as applicable (http://www.historycolorado.org/oahp/consultation-guidance).

If you have any questions, please contact the Office of Archaeology and Historic Preservation at (303) 866-3392. Thank you for your interest in Colorado's cultural heritage.

Steve Turner, AIA
State Historic Preservation Officer

*Information regarding significant archaeological resources is excluded from the Freedom of Information Act. Therefore, legal locations of these resources must not be included in documents for public distribution.

23835_s_sy

EASTONVILLE RD.

REX RD.

REX RD.

HWY 24

Per the Office of Archaeology and Historic Preservation:

- 80.8 AC SURVEYED
- AN INTENSIVE ARCHAEOLOGICAL RESOURCE SURVEY AT SEVERAL INTERSECTIONS ALONG US HIGHWAY 24 BETWEEN FALCON & CALHAN, EL PASO COUNTY, COLORADO. (NH 0243-060)

Area of Historical Significance: Existing America the Beautiful Trail - Rock Island Trail - constructed alongside the former Chicago and Rock Island Railroad Line.

Per the Office of Archaeology and Historic Preservation:

- HISTORIC SITE ID: 5EP.1815.1
- 508.10 AC SURVEYED
- AN INTENSIVE ARCHAEOLOGICAL RESOURCE INVENTORY ALONG US HIGHWAY 24 BETWEEN POWERS BOULEVARD & CALHAN, EL PASO COUNTY, COLORADO. (NH 0243-00058 AND NH 0243-059)

NORTH

0 400

200

Xrefs: 01-DV-SURF; 01-XL-CONCEPT; xgt-1-dh01

DRAWN BY:	SJF	JOB DATE:	08/05/2021
APPROVED:	CMM	JOB NUMBER:	201662.05
CAD DATE:	8/12/2021 5:32:30 PM		
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BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen HRGreen.com

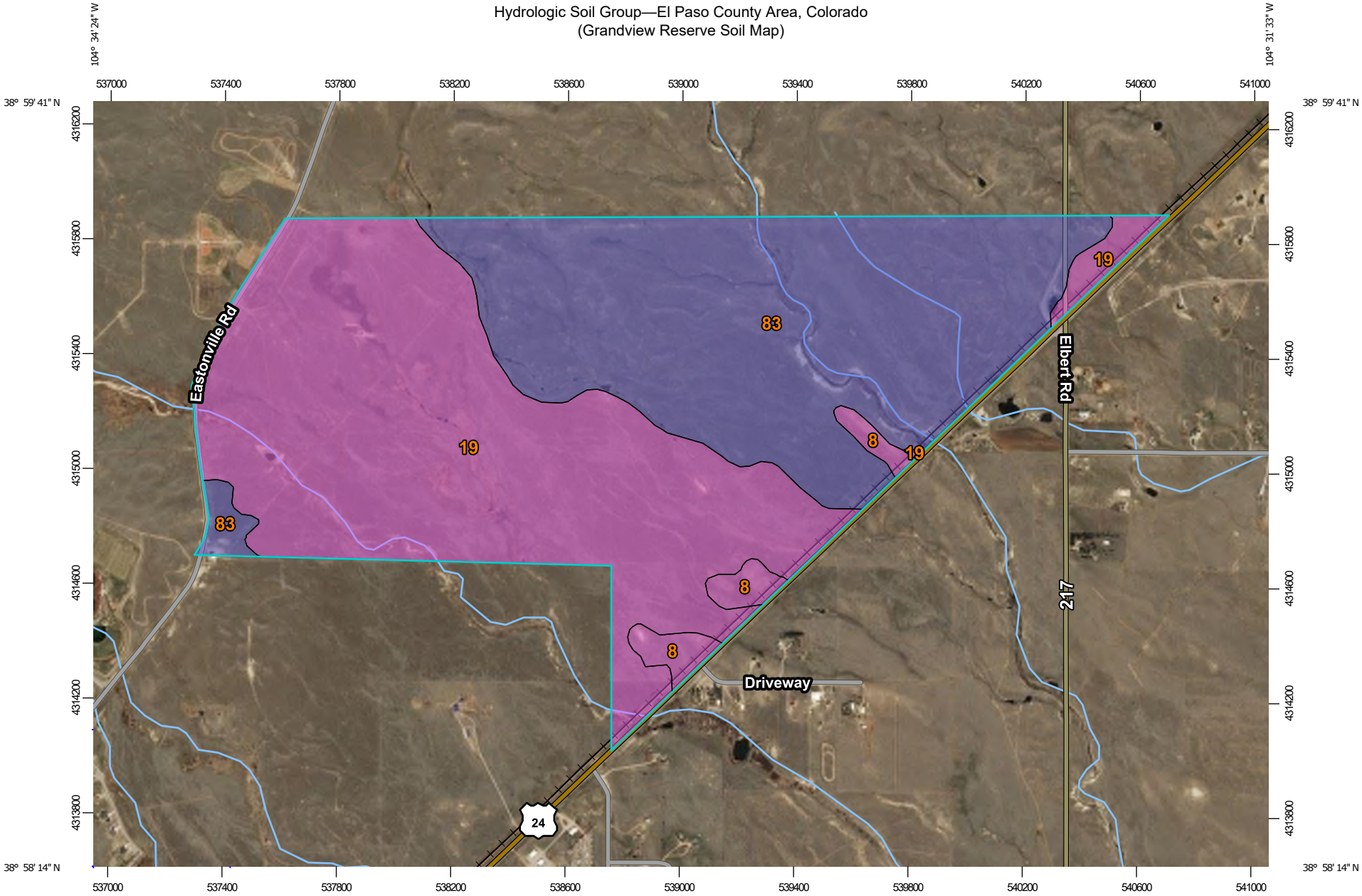
GRANDVIEW 1041 PERMIT
EL PASO COUNTY
FALCON, COLORADO

GRANDVIEW RESERVE METROPOLITAN DISTRICT
AREAS OF HISTORIC OR ARCHEOLOGICAL SIGNIFICANCE EXHIBIT

SHEET NO.
01

EXHIBIT S: SOIL MAP

Hydrologic Soil Group—El Paso County Area, Colorado
(Grandview Reserve Soil Map)



Map Scale: 1:18,800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

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.

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 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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	22.4	2.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	450.7	52.5%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	385.4	44.9%
Totals for Area of Interest			**858.5**	**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.

EXHIBIT T: WATER RIGHT DETERMINATIONS

COLORADO GROUND WATER COMMISSION
FINDINGS AND ORDER

IN THE MATTER OF AN APPLICATION FOR A CHANGE OF TYPE OF USE OF A DETERMINATION OF WATER RIGHT

DETERMINATION NO.: 510-BD, AMENDMENT NO. 2

AQUIFER: LARAMIE-FOX HILLS

APPLICANT: GRANDVIEW RESERVE METROPOLITAN DISTRICT AND 4SITE INVESTMENTS, LLC

FINDINGS

In compliance with section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, Grandview Reserve Metropolitan District and 4Site Investments, LLC (together as "Applicant") submitted an application to the Colorado Ground Water Commission ("Commission") for a change of water right to change the allowed type of use of groundwater allocated under Determination of Water Right No. 510-BD. Based upon information provided by the Applicant and the records of the Division of Water Resources, the Commission finds as follows.

1. Pursuant to section 37-90-107(7) in a Findings and Order dated July 22, 2004, the Commission issued Determination of Water Right No. 510-BD to Four Way Ranch Partnership / Spring Creek LLC, which determined a right to an allocation of designated groundwater from the Laramie-Fox Hills Aquifer ("Aquifer"), summarized as follows.

    a. The determination quantified an amount of groundwater from beneath 8,095 acres of overlying land, generally described as the W ½ of Section 1; Sections 2 and 3; the E ½, the SE ¼ of the NW ¼, the SW ¼ of the SW 1/4, and the E ½ of the SW ¼ of Section 4; the E ½, a portion of the E ½ of the W ½, and the NW ¼ of the NW ¼ of Section 9, Sections 10 and 11; that part of Sections 12, 13, and 14, located northwest of the Highway 24 right-of-way; the NW ¼ and the W ½ of the SW ¼ of Section 15; most of the E ½ of Section 16; the E ½, a portion of the E ½ of the NW ¼, and a portion of the SW ¼ of Section 21; that part of Sections 22, 23, and 27 located northwest of the Highway 24 right-of-way; the NE ¼ and a portion of the W ½ of Section 28; a portion of the SE ¼ of Section 29; the N ½ of the NE ¼ and a portion of the NE ¼ of the NW ¼ of Section 32; and that part of the N ½ of the NW ¼ of Section 33 located northwest of the Highway 24 right-of-way; all in Township 12 South, Range 64 West of the 6th P.M., in El Paso County, and more completely described in Exhibit A of that Findings and Order.

    b. The allowed average annual amount of withdrawal shall not exceed 2,429 acre-feet per year, which based on an aquifer life of one hundred years results in an amount of groundwater allocated of 242,900 acre-feet (subject to adjustment by the Commission to conform to actual local aquifer characteristics).

    c. The allowed types of beneficial uses of the groundwater are domestic, livestock watering, lawn irrigation, commercial, industrial, and replacement supply.

    d. The allowed place of use of the groundwater is the 8,095 acres of overlying land as described in the Findings and Order dated July 22, 2004.

2. Pursuant to section 37-90-107(7) in a Findings and Order dated December 3, 2008, the Commission approved a change of type and place of use for Determination of Water Right No. 510-BD to Spring Creek LLC and Four Way Ranch General Partnership, summarized as follows.

    a. The allowed types of beneficial uses of the groundwater are domestic, livestock watering, lawn irrigation, commercial, industrial, replacement, augmentation and municipal use by the Four-Way Ranch Metropolitan District and the Woodman Hills Metropolitan District.

    b. The allowed place of use of the groundwater is the 8,095 acres of overlying land and the service area of the Woodman Hills Metropolitan District within the Upper Black Squirrel Creek Designated Groundwater Basin.

3. The subject groundwater is designated groundwater within the boundaries of the Upper Black Squirrel Creek Designated Groundwater Basin, and within the Upper Black Squirrel Creek Ground Water Management District. The Commission has jurisdiction.

4. By an application for change of determination of water right received by the Commission on February 3, 2022, the Applicant has requested to change the allowed type of use of 1,312.5 acre-feet per year based on a 100-year aquifer life, or 131,250 acre-feet of water total, consisting of a portion of the groundwater allocated in the determination, to add the following use: all municipal purposes by the Grandview Reserve Metropolitan District No. 1 including: domestic, agricultural, stock watering, irrigation, commercial, industrial, manufacturing, fire protection, power generation, wetlands, piscatorial, and wildlife, either directly or after storage.

    a. The currently allowed uses would remain as allowed uses.

    b. The Grandview Reserve Metropolitan District No. 1 is within the currently allowed place of use of the 8,095 acres of overlying land of Determination of Water Right no. 510-BD, and so the application does not request a change in the allowed place of use.

5. The Applicant has provided evidence of ownership of 1,312.5 acre-feet per year based on a 100-year aquifer-life, or 131,250 acre-feet total, of Determination of Water Right no. 510-BD, Exhibit A of this Findings and Order.

6. In accordance with section 37-90-107(8), C.R.S., and the Designated Basin Rules, on July 21, 2022 the application was referred to the Upper Black Squirrel Creek Ground Water Management District for written recommendations. No written recommendations were received from the District.

7. In accordance with section 37-90-107(7)(c)(II) and section 37-90-112(1), C.R.S., the requested change was published in the Ranchland News newspaper on July 28, 2022 and August 4, 2022. No objections to the proposed change were received within the time limit set by statute.

8. No material injury to the vested water rights of other appropriators would result from the approval of the requested change in water right subject to the conditions in the following Order.

ORDER

In accordance with section 37-90-107(7), C.R.S. and the Designated Basin Rules the Commission orders that the allowed type of use of 1,312.5 acre-feet per year based on a 100-year aquifer life, or 131,250 acre-feet of water total, consisting of a portion of the groundwater allocated in Determination of Water Right No. 510-BD, is hereby changed subject to the following conditions.

9. The type of use of the groundwater is limited to the following:

    a. domestic, livestock watering, lawn irrigation, commercial, industrial, replacement, augmentation and municipal use by the Four-Way Ranch Metropolitan District and the Woodman Hills Metropolitan District; and

    b. all municipal purposes by the Grandview Reserve Metropolitan District No. 1 including: domestic, agricultural, stock watering, irrigation, commercial, industrial, manufacturing, fire protection, power generation, wetlands, piscatorial, and wildlife, either directly or after storage.

10. The Commission's Findings and Orders dated July 22, 2004 and December 3, 2008 for Determination of Water Right No. 510-BD are hereby amended to incorporate the above change. All other terms and conditions in those Findings and Order shall remain in full force and effect.

11. A copy of this Findings and Order shall be recorded by the Applicant in the public records of the county in which the 8,095 acres of overlying land of the determination is located to that a title examination of that overlying land, or any part thereof, shall reveal the existence of this Findings and Order.

12. Any existing wells with well permits issued pursuant to this determination for which the permitted type or place of use does not conform to the currently allowed type and place of use of the determination must apply for and obtain new permits for uses that are in conformance with the determination.

Dated this 26th day of September, 2022

Kevin G. Rein, P.E
Executive Director
Colorado Ground Water Commission

By:_____
Joanna Williams, P.E.
Chief of Water Supply, Designated Basins

Prepared by: wad
F&O510-BD_Amendment No. 2.docx

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PGS 4 $28.00 DF $0.00
Electronically Recorded Official Records El Paso County CO
Chuck Broerman, Clerk and Recorder
TD1000 Y

SPECIAL WARRANTY DEED

Water Rights

THIS SPECIAL WARRANTY DEED dated March 31, 2022 between JMJK Holdings, LLC, a Colorado Limited Liability Company, whose address is 3855 Ambrosia Street, Suite 304, Castle Rock, CO 80109 ("Grantor"), and, 4Site Investments, LLC, a Colorado limited liability company ("Grantee").

WITNESS, that the Grantor, for and in consideration of good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents do grant, bargain, sell convey and confirm unto the Grantee, its heirs, successors and assigns forever, the Grantor's water and water rights as specifically described in the attached **Exhibit A**, lying and being in the County of El Paso and State of Colorado ("Water Rights"), and underlying Grantor's real property described in **Exhibit A**. Grantor, for itself, its heirs, successors and assigns, grants and conveys to Grantee, its heirs, successors and assigns, the right to withdraw the Water Rights herein conveyed, and consents to such withdrawal. Grantor expressly retains any and all water rights not specifically described in the attached **Exhibit A**, including as may be associated with or appurtenant to property of the Grantor.

TOGETHER, with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, the reversion and reversions, remainder and remainders, rents, issues and profits thereof, and all the estate, right, title, interest, claim and demand whatsoever of the Grantor, either in law or equity, of, in and to the above-described water rights, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said Water Rights above bargained and described, with the appurtenances, unto the Grantee, its heirs and assigns forever. The Grantor, for itself, its heirs, personal representatives, successors and assigns does covenant and agree that it shall and will WARRANT AND FOREVER DEFEND the above bargained Water Rights in the quiet and peaceable possession of the Grantee, its heirs and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under the Grantor, but not otherwise.

IN WITNESS WHEREOF, the Grantor has executed this Special Warranty Deed on the date set forth above.

(remainder of page intentionally blank, signature follows)

GRANTOR, JMJK Holdings, LLC:

Michael Slattery, Manager

TERESA GALLEGOS
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20184004387
MY COMMISSION EXPIRES JANUARY 29, 2026

STATE OF Colorado)
) ss.
COUNTY OF Douglas)

Acknowledged before me this 31 day of March, 2022 by Michael Slattery, as Manager of JMJK Holdings, LLC, a Colorado limited liability company.

Witness my hand and official seal.

My Commission expires: 01/29/2026

Notary Public

EXHIBIT A
WATER RIGHTS and OVERLYING LAND

All following described water and water rights, groundwater and ground water rights, and rights to withdraw, extract and use ground water within the Laramie-Fox Hills aquifer of the Denver Basin and as related to, used upon, underlying or appurtenant to the real property more specifically described below ("Overlying Land"), as quantified and determined by the July 22, 2004 Colorado Ground Water Commission Findings and Orders in Determination No. 510-BD, recorded at Reception No. 204153947 and, as amended December 3, 2008, recorded at Reception No. 208130576 of the El Paso County Clerk and Recorder's Office ("Ground Water Determination"). Said water and water rights expressly include the following Laramie-Fox Hills aquifer groundwater rights:

> Nontributary Groundwater in the Laramie-Fox Hills aquifer as quantified and determined by the Colorado Ground Water Commission ("GWC") in Determination No. 510-BD, as amended, totaling 131,250 acre feet, or 1,312.5 annual acre-feet based upon a 100-year aquifer life.

This conveyance is subject to the terms and provisions of the above-described Groundwater Determination and there is no warranty or guaranty of the quantity or quality of the groundwater to be produced from the respective aquifers. All other water and groundwater rights, including but not limited to that of other Denver Basin aquifers, underlying, associated with, or appurtenant to the following described real property, is expressly reserved by Grantor. Said Overlying Land is more specifically described as follows:

Township 12 South, Range 64 West of the 6th P.M., El Paso County, State of Colorado

Section 1: W½;
Section 2: ALL;
Section 3: ALL; excepting those portions conveyed to El Paso County in Deeds recorded in Book 2116 at Page 991 and in Book 2749 at Page 686;
Section 4: SE¼ , NE¼, SE¼ NW¼, E½ SW¼, SW¼ SW¼;
Section 9: N½ NW¼, that portion of the S½ NW¼ and the SW¼ lying East of the County Road adjoining the Right-of-Way of the Colorado and Southern Railway on the West, E½;
Section 10: ALL;
Section 11: ALL;
Section 12: N½, SW¼, N½ SE¼, SW¼ SE¼, that portion of the SE¼ SE¼ lying North and West of the Chicago, Rock Island, and Pacific Railroad Right-of-Way;
Section 13: All that portion lying North and West of the Chicago, Rock Island, and Pacific Railroad Right-of-Way;
Section 14: SW¼, SW¼ SE¼, N½ SE¼, N½, that portion of the SE ¼ SE ¼ lying North and West of the Chicago, Rock Island, and Pacific Railroad Right-of-Way;
Section 15: NW¼, W½ SW¼;
Section 16: All that portion lying East of said County Road, excepting therefrom that portion thereof conveyed to Mountain View Electric Association, Inc. by Deed recorded June 27, 2003 at Reception No. 203145788;

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07/20/2022

Section 21: NE¼, that portion of the NW¼ lying East of said County Road;
Section 22: N½, that portion of the E½ SE¼ lying Northwest of the Right-of-Way of the Chicago, Rock Island, and Pacific Railroad;
Section 23: N½ , N½ S½ except that portion conveyed in Warranty Deed recorded in Book 2579 at Page 861, and except that portion conveyed to El Paso County in Deed recorded in Book 842 at Page 356, and except any portion found to be lying within the Right-of-Way of the Chicago, Rock Island, and Pacific Railroad.

COLORADO GROUND WATER COMMISSION
FINDINGS AND ORDER

IN THE MATTER OF AN APPLICATION FOR A CHANGE OF TYPE OF USE OF A DETERMINATION OF WATER RIGHT

DETERMINATION NO.: 511-BD, AMENDMENT NO. 2

AQUIFER: ARAPAHOE

APPLICANT: GRANDVIEW RESERVE METROPOLITAN DISTRICT

FINDINGS

In compliance with section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, Grandview Reserve Metropolitan District ("Applicant") submitted an application to the Colorado Ground Water Commission ("Commission") for a change of water right to change the allowed type of use of groundwater allocated under Determination of Water Right No. 511-BD. Based upon information provided by the Applicant and the records of the Division of Water Resources, the Commission finds as follows.

1. Pursuant to section 37-90-107(7) in a Findings and Order dated July 22, 2004, the Commission issued Determination of Water Right No. 511-BD to Four Way Ranch Partnership / Spring Creek LLC, which determined a right to an allocation of designated groundwater from the Arapahoe Aquifer ("Aquifer"), summarized as follows.

    a. The determination quantified an amount of groundwater from beneath 8,095 acres of overlying land, generally described as the W ½ of Section 1; Sections 2 and 3; the E ½, the SE ¼ of the NW ¼, the SW ¼ of the SW 1/4, and the E ½ of the SW ¼ of Section 4; the E ½, a portion of the E ½ of the W ½, and the NW ¼ of the NW ¼ of Section 9, Sections 10 and 11; that part of Sections 12, 13, and 14, located northwest of the Highway 24 right-of-way; the NW ¼ and the W ½ of the SW ¼ of Section 15; most of the E ½ of Section 16; the E ½, a portion of the E ½ of the NW ¼, and a portion of the SW ¼ of Section 21; that part of Sections 22, 23, and 27 located northwest of the Highway 24 right-of-way; the NE ¼ and a portion of the W ½ of Section 28; a portion of the SE ¼ of Section 29; the N ½ of the NE ¼ and a portion of the NE ¼ of the NW ¼ of Section 32; and that part of the N ½ of the NW ¼ of Section 33 located northwest of the Highway 24 right-of-way; all in Township 12 South, Range 64 West of the 6th P.M., in El Paso County, and more completely described in Exhibit A of that Findings and Order.

    b. The allowed average annual amount of withdrawal shall not exceed 2,615 acre-feet per year, which based on an aquifer life of one hundred years results in an amount of groundwater allocated of 261,500 acre-feet (subject to adjustment by the Commission to conform to actual local aquifer characteristics).

    c. The allowed types of beneficial uses of the groundwater are domestic, livestock watering, lawn irrigation, commercial, industrial, and replacement supply.

    d. The allowed place of use of the groundwater is the 8,095 acres of overlying land as described in the Findings and Order dated July 22, 2004.

2. Pursuant to section 37-90-107(7) in a Findings and Order dated December 3, 2008, the Commission approved a change of type and place of use for Determination of Water Right No. 511-BD to Spring Creek LLC and Four Way Ranch General Partnership, summarized as follows.

    a. The allowed types of beneficial uses of the groundwater are domestic, livestock watering, lawn irrigation, commercial, industrial, replacement, augmentation and municipal use by the Four-Way Ranch Metropolitan District and the Woodman Hills Metropolitan District.

    b. The allowed place of use of the groundwater is the 8,095 acres of overlying land and the service area of the Woodman Hills Metropolitan District within the Upper Black Squirrel Creek Designated Groundwater Basin.

3. The subject groundwater is designated groundwater within the boundaries of the Upper Black Squirrel Creek Designated Groundwater Basin, and within the Upper Black Squirrel Creek Ground Water Management District. The Commission has jurisdiction.

4. By an application for change of determination of water right received by the Commission on February 3, 2022, the Applicant has requested to change the allowed type of use of 1,400 acre-feet per year based on a 100-year aquifer life, or 140,000 acre-feet of water total, consisting of a portion of the groundwater allocated in the determination, to add the following use: all municipal purposes by the Grandview Reserve Metropolitan District No. 1 including: domestic, agricultural, stock watering, irrigation, commercial, industrial, manufacturing, fire protection, power generation, wetlands, piscatorial, and wildlife, either directly or after storage.

    a. The currently allowed uses would remain as allowed uses.

    b. The Grandview Reserve Metropolitan District No. 1 is within the currently allowed place of use of the 8,095 acres of overlying land of Determination of Water Right no. 511-BD, and so the application does not request a change in the allowed place of use.

5. The Applicant has provided evidence of ownership of 1,400 acre-feet per year based on a 100-year aquifer-life, or 140,000 acre-feet total, of Determination of Water Right no. 511-BD, Exhibit A of this Findings and Order.

6. In accordance with section 37-90-107(8), C.R.S., and the Designated Basin Rules, on July 21, 2022 the application was referred to the Upper Black Squirrel Creek Ground Water Management District for written recommendations. No written recommendations were received from the District.

7. In accordance with section 37-90-107(7)(c)(II) and section 37-90-112(1), C.R.S., the requested change was published in the Ranchland News newspaper on July 28, 2022 and August 4, 2022. No objections to the proposed change were received within the time limit set by statute.

8. No material injury to the vested water rights of other appropriators would result from the approval of the requested change in water right subject to the conditions in the following Order.

ORDER

In accordance with section 37-90-107(7), C.R.S. and the Designated Basin Rules the Commission orders that the allowed type of use of 1,400 acre-feet per year based on a 100-year aquifer life, or 140,000 acre-feet of water total, consisting of a portion of the groundwater allocated in Determination of Water Right No. 511-BD, is hereby changed subject to the following conditions.

9. The type of use of the groundwater is limited to the following:

    a. domestic, livestock watering, lawn irrigation, commercial, industrial, replacement, augmentation and municipal use by Four-Way Ranch Metropolitan District and the Woodman Hills Metropolitan District; and

    b. all municipal purposes by the Grandview Reserve Metropolitan District No. 1 including: domestic, agricultural, stock watering, irrigation, commercial, industrial, manufacturing, fire protection, power generation, wetlands, piscatorial, and wildlife, either directly or after storage.

10. The Commission's Findings and Orders dated July 22, 2004 and December 3, 2008 for Determination of Water Right No. 511-BD are hereby amended to incorporate the above change. All other terms and conditions in those Findings and Order shall remain in full force and effect.

11. A copy of this Findings and Order shall be recorded by the Applicant in the public records of the county in which the 8,095 acres of overlying land of the determination is located to that a title examination of that overlying land, or any part thereof, shall reveal the existence of this Findings and Order.

12. Any existing wells with well permits issued pursuant to this determination for which the permitted type or place of use does not conform to the currently allowed type and place of use of the determination must apply for and obtain new permits for uses that are in conformance with the determination.

Dated this 26th day of September, 2022

Kevin G. Rein, P.E
Executive Director
Colorado Ground Water Commission

By:_____
Joanna Williams, P.E.
Chief of Water Supply, Designated Basins

Prepared by: wad
F&O511-BD_Amendment No. 2.docx

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PGS 6 $38.00 DF $0.00
Electronically Recorded Official Records El Paso County CO
Chuck Broerman, Clerk and Recorder
TD1000 N

This is the corrected Deed and replaces the prior Special Warranty Deed recorded on December 10, 2021 under Reception No. 221225486.

RCVD DWR
07/01/2022

SPECIAL WARRANTY DEED
Water Rights

THIS SPECIAL WARRANTY DEED dated **February 9th, 2022** between 4 SITE INVESTMENTTS, LLC, a Colorado limited liability company ("Grantor"), and GRANDVIEW RESERVE METROPOLITAN DISTRICT 1, a quasi-municipal corporation and political subdivision of the State of Colorado, whose address is 1271 Kelly Johnson Boulevard, Ste. 100, Colorado Springs, CO 80920 ("Grantee").

WITNESS, that the Grantor, for and in consideration of good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey, and confirm unto the Grantee, its heirs and assigns forever, the ground water, rights to extract ground water, and ground water rights, being in the County of El Paso, State of Colorado, described as follows:

> 140,000 acre-feet of groundwater based on a 100-year supply, or an average of 1,400 acre-feet annually, of nontributary groundwater in the Arapahoe aquifer underlying the land described in **Exhibit A**, and as determined by the Colorado Ground Water Commission in the Findings and Order of Determination No. 511-BD dated July 22, 2004, and recorded with the El Paso County Clerk and Recorder's Office on September 10, 2004, Reception No. 204153948, all as quantified in and subject to the terms and provisions of said Groundwater Determination No. 511-BD.

TOGETHER, with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, the reversion and reversions, remainder and remainders, rents, issues and profits thereof, and all the estate, right, title, interest, claim and demand whatsoever of the Grantor, either in law or equity, of, in and to the above-described water rights, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said Water Rights above bargained and described, with the appurtenances, unto the Grantee, its heirs and assigns forever. The Grantor, for itself, its heirs, personal representatives, successors and assigns do covenant and agree that it shall and will WARRANT AND FOREVER DEFEND the above bargained Water Rights in the quiet and peaceable possession of the Grantee, its heirs and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under the Grantor, but not otherwise.

IN WITNESS WHEREOF, the Grantors have executed this Special Warranty Deed on the date set forth above.

(Signatures to follow)

RCVD DWR
07/01/2022

GRANTOR:

Paul Howard as Manager of 4 Site Investments LLC

STATE OF COLORADO)
) ss.
COUNTY OF EL PASO)

The foregoing instrument was acknowledged before me this 9th day of Feburary, 2022, by Paul Howard as Manager of 4 Site Investments LLC.

Witness my hand and official seal.

CALEB GOERKE
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20204027082
MY COMMISSION EXPIRES AUGUST 07, 2024

Notary Public

RCVD DWR
07/01/2022

Exhibit A

PARCEL A:

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21, THE SOUTH HALF OF SECTION 22, THE NORTH HALF OF SECTION 28 AND SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5280.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 21; THENCE NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST ON THE EAST LINE OF SAID SECTION, A DISTANCE OF 2645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21, SAID POINT BEING THE POINT OF BEGINNING; THENCE NORTH 89 DEGREES 41 MINUTES 03 SECONDS EAST ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 22, A DISTANCE OF 3938.18 FEET; THENCE SOUTH 00 DEGREES 41 MINUTES 58 SECONDS EAST ON THE EAST LINE OF THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 22, A DISTANCE OF 2117.68 FEET TO A POINT ON THE NORTHWESTERLY RIGHT OF WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THAT WARRANTY DEED RECORDED OCTOBER 21, 1994 IN BOOK 6548 AT PAGE 892, RECORDS OF EL PASO COUNTY, COLORADO; THENCE ON SAID NORTHWESTERLY RIGHT OF WAY, THE FOLLOWING FIVE (5) COURSES:

(1) SOUTH 45 DEGREES 55 MINUTES 49 SECONDS WEST, A DISTANCE OF 758.36 FEET TO A POINT ON THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 22;
(2) NORTH 89 DEGREES 38 MINUTES 06 SECONDS EAST ON SAID SOUTH LINE, A DISTANCE OF 36.18 FEET;
(3) SOUTH 45 DEGREES 55 MINUTES 49 SECONDS WEST, A DISTANCE OF 3818.92 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 27;
(4) SOUTH 89 DEGREES 39 MINUTES 01 SECONDS WEST ON SAID NORTH LINE, A DISTANCE OF 36.17 FEET;
(5) SOUTH 45 DEGREES 55 MINUTES 49 SECONDS WEST, A DISTANCE OF 855.35 FEET TO A POINT ON THE EASTERLY LINE OF SAID SECTION 28;

THENCE NORTH 00 DEGREES 21 MINUTES 45 SECONDS WEST ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 591.16 FEET TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER; THENCE NORTH 00 DEGREES 21 MINUTES 38 SECONDS WEST ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE NORTH 89 DEGREES 47 MINUTES 08 SECONDS WEST ON SAID SOUTH LINE, A DISTANCE OF 4692.55 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF EXISTING EASTONVILLE ROAD (60.00 FOOT WIDE); THENCE ON SAID EASTERLY RIGHT OF WAY AS DEFINED BY CERTIFIED BOUNDARY SURVEY, AS RECORDED JULY 18, 2001 UNDER RECEPTION NO. 201900098, THE FOLLOWING FIVE (5) COURSES:

(1) ON THE ARC OF A CURVE TO THE LEFT, WHOSE CENTER BEARS NORTH 04 DEGREES 31 MINUTES 28 SECONDS EAST, HAVING A DELTA OF 24 DEGREES 31 MINUTES 32 SECONDS, A RADIUS OF 1630.00 FEET, A DISTANCE OF 697.73 FEET TO A POINT OF TANGENT;
(2) NORTH 07 DEGREES 40 MINUTES 18 SECONDS WEST, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;
(3) ON THE ARC OF A CURVE TO THE RIGHT, HAVING A DELTA OF 39 DEGREES 01 MINUTES 10 SECONDS, A RADIUS OF 1770.00 FEET, A DISTANCE OF 1205.40 FEET TO A POINT OF TANGENT;
(4) NORTH 31 DEGREES 20 MINUTES 52 SECONDS EAST, A DISTANCE OF 1517.37 FEET TO A POINT OF CURVE;
(5) ON THE ARC OF A CURVE TO THE LEFT, HAVING A DELTA OF 02 DEGREES 07 MINUTES 03 SECONDS, A RADIUS OF 1330.00 FEET, A DISTANCE OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;

THENCE SOUTH 89 DEGREES 50 MINUTES 58 SECONDS EAST ON SAID NORTH LINE, A DISTANCE OF 3635.53 FEET TO THE POINT OF BEGINNING;

EXCEPT THAT PORTION CONVEYED IN DEED RECORDED AUGUST 24, 2005 AT RECEPTION NO. 205132124;

AND EXCEPT A PORTION OF THE NORTHWEST QUARTER OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF EL PASO, STATE OF COLORADO, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE NORTHERLY LINE OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, BEING MONUMENTED AT THE NORTHWEST CORNER AND THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM CAP STAMPED "PS INC 1996 PLS 30087", BEING ASSUMED TO BEAR SOUTH 89 DEGREES 47 MINUTES 04 SECONDS EAST A DISTANCE OF 5265.07 FEET.

COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 28; THENCE SOUTH 29 DEGREES 17 MINUTES 14 SECONDS

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EAST, A 1315.12 FEET TO THE POINT OF BEGINNING; THENCE NORTH 89 DEGREES 58 MINUTES 12 SECONDS EAST, A DISTANCE OF 288.62 FEET; THENCE SOUTH 41 DEGREES 03 MINUTES 22 SECONDS WEST, A DISTANCE OF 139.03 FEET; THENCE SOUTH 41 DEGREES 52 MINUTES 38 SECONDS WEST, A DISTANCE OF 21.11 FEET; THENCE SOUTH 44 DEGREES 47 MINUTES 01 SECONDS WEST, A DISTANCE OF 42.37 FEET; THENCE SOUTH 89 DEGREES 47 MINUTES 08 SECONDS EAST, A DISTANCE OF 679.35 FEET; THENCE SOUTH 00 DEGREES 12 MINUTES 52 SECONDS WEST, A DISTANCE OF 25.00 FEET TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28; THENCE NORTH 89 DEGREES 47 MINUTES 08 SECONDS WEST AND ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28, A DISTANCE OF 934.84 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF EASTONVILLE ROAD AS RECORDED IN THE EL PASO COUNTY RECORDS JULY 18, 2001 UNDER RECEPTION NO. 201900096, SAID POINT BEING A POINT ON CURVE; THENCE ON THE ARC OF A CURVE TO THE LEFT WHOSE CENTER BEARS NORTH 73 DEGREES 08 MINUTES 46 SECONDS WEST HAVING A DELTA OF 06 DEGREES 19 MINUTES 02 SECONDS, A RADIUS OF 1630.00 FEET, A DISTANCE OF 179.72 FEET TO THE POINT OF BEGINNING.

PARCEL B:

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 21 AND A PORTION OF THE NORTH HALF OF SECTION 28, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SUVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO;

THENCE N00°52'26"W, A DISTANCE OF 2645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21;

THENCE N89°50'58"W ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21, A DISTANCE OF 1109.51 FEET TO THE POINT OF BEGINNING;

THENCE S00°09'02"W, A DISTANCE OF 3962.55 FEET TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SECTION 28;

THENCE N89°47'08"W ON SAID SOUTH LINE, A DISTANCE OF 2589.15 FEET;

THENCE N00°12'52"E, A DISTANCE OF 25.00 FEET;

THENCE N89°47'08"W ON A LINE THAT IS 25.00 FEET NORTHERLY OF AND PARALLEL TO SAID SOUTH LINE, A DISTANCE OF 679.35 FEET;

THENCE N44°47'01"W, A DISTANCE OF 42.37 FEET;

THENCE N41°52'38"E, A DISTANCE OF 21.11 FEET;

THENCE N41°03'22"E, A DISTANCE OF 139.03 FEET;

THENCE S89°58'12"W, A DISTANCE OF 288.62 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF EXISTING EASTONVILLE ROAD (60.00 FEET WIDE);

THENCE ALONG THE EASTERLY RIGHT OF WAY LINE OF EASTONVILLE ROAD AS DEFINED BY CERTIFIED BOUNDARY SURVEY AS RECORDED JULY 18, 2001 UNER RECEPTION NO. 201900096 OF THE RECORDS OF EL PASO COUNTY, COLORADO THE FOLLOWING FIVE (5) COURSES:

1. ALONG THE ARC OF A NON-TANGENT CURVE TO THE LEFT, HAVING A CENTRAL ANGLE OF 18°12'30", A RADIUS OF 1630.00 FEET, A LENGTH OF 518.00 FEET, WHOSE CHORD BEARS N31°25'57"E WITH A DISTANCE OF 515.83 FEET TO A POINT OF TANGENT;
2. N07°40'18"W, A DISTANCE OF 777.34 FEET TO A POINT OF CURVE;
3. ALONG THE ARC OF A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 39°01'10", A RADIUS OF 1770.00 FEET FOR A LENGTH OF 1205.40 FEET TO A POINT OF TANGENT;
4. N31°20'52"E, A DISTANCE OF 1517.37 FEET TO A POINT OF CURVE;
5. ALONG THE ARC OF A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 02°07'03", A RADIUS OF 1330.00 FEET FOR A LENGTH OF 49.15 FEET TO A POINT ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 21;

THENCE S89°50'58"E ON SAID NORTH LINE, A DISTANCE OF 2526.02 FEET TO THE POINT OF BEGINNING.

PARCEL C:

A TRACT OF LAND BEING A PORTION OF THE SOUTH HALF OF SECTION 22 AND A PORTION OF SECTION 27, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SUVEYORS CAP STAMPED ACCORDINGLY, PLS 30087, BEING ASSUMED TO BEAR N00°52'26"W, A DISTANCE OF 5290.17 FEET.

COMMENCING AT THE SOUTHEAST CORNER OF SECTION 21, TOWNSHIP 12 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO;

THENCE N00°52'26"W, A DISTANCE OF 2645.09 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 21;

THENCE N89°41'03" ON THE NORTH LINE OF THE SOUTH HALF OF SAID SECTION 22, A DISTANCE OF 701.60 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUE N89°41'03"E ON SAID NORTH LINE, A DISTANCE OF 3235.58 FEET;

THENCE S00°41'58"E ON THE EAST LINE OF THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 22, A DISTANCE OF 2117.66 FEET TO A POINT ON THE NORTHWESTERLY RIGHT OF WAY LINE OF THE ROCK ISLAND REGIONAL TRAIL AS GRANTED TO EL PASO COUNTY IN THAT WARRANTY DEED RECORDED OCTOBER 21, 1994 IN BOOK 6548 AT PAGE 692 OF THE RECORDS OF EL PASO COUNTY, COLORADO;

THENCE ON SAID NORTHWESTERLY RIGHT OF WAY THE FOLLOWING FIVE (5) COURSES:

1. S45°55'49"W, A DISTANCE OF 758.36 FEET TO A POINT ON THE SOUTH LINE OF THE SOUTEAST QUARTER OF SAID SECTION 22;
2. N89°38'08"E, A DISTANCE OF 36.18 FEET;
3. S45°55'49"W, A DISTANCE OF 3618.92 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 27;
4. S89°39'01"W ON SAID NORTH LINE, A DISTANCE OF 36.17 FEET;
5. S45°55'49"W, A DISTANCE OF 344.92 FEET TO THE NORTHEASTERLY CORNER OF A PARCEL OF LAND AS RECORDED UNDER RECEPTION NO. 205132124 OF SAID RECORDS;

THENCE N72°01'49"W ON THE NORTH LINE OF SAID PARCEL, A DISTANCE OF 389.16 TO THE NORTHWESTERLY CORNER OF SAID PARCEL AND BEING A POINT ON THE EASTERLY LINE OF SAID SECTION 28;

THENCE N00°21'45"W ON THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 115.65 FEET TO THE NORTHEAST CORNER OF SAID SOUTHEAST QUARTER;

THENCE N00°21'38"W ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 28, A DISTANCE OF 1319.24 TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTH HALF OF SAID SECTION 28;

THENCE S89°47'08"E, A DISTANCE OF 642.53 FEET;

THENCE N00°09'02"E, A DISTANCE OF 3970.28 FEET TO THE POINT OF BEGINNING.

EXHIBIT U: GEOTECHNICAL REPORT

CTL | THOMPSON INCORPORATED

PRELIMINARY GEOTECHNICAL INVESTIGATION
GRANDVIEW RESERVE
EASTONVILLE ROAD AND U.S. HIGHWAY 24
FALCON, COLORADO

Prepared For:

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9555 S. Kingston Court
Englewood, Colorado

Attention: Michael Bird

Project No. CS19345-115

December 23, 2020

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