

Please submit a final draft of this document.

Please note there may be additional comments in V2.

SOIL AND GEOLOGY STUDY

Hay Creek Road
Lots 1-6,
El Paso County, Colorado

PREPARED FOR:

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JOB NO. 195873

November XX, 2024

Respectfully Submitted,

RMG – Rocky Mountain Group

Reviewed by,

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Preliminary Use Only

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the SE¼ of Section 33, Township 11 South, Range 67 West of the 6th Principal Meridian in El Paso County, Colorado. The site is generally located west of the intersection of Baptist Road and Hay Creek Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.1 Existing and Proposed Land Use

The site currently consists of one parcel (per the El Paso County Assessor's website):

- EPC Schedule No. 7133007025, labeled as Hay Creek Rd, which consists of 35.05 acres and is zoned "RR-5" – Residential Rural.

The site is currently partially developed with a single-family residence, a well, and an on-site wastewater treatment system (OWTS) in the southern portion of the site. The site is to be subdivided into multiple lots, with the existing residence and infrastructure remaining on one of the lots. The zoning of the lots is to remain "RR-5" - Residential Rural, with new lot acreages ranging between 5.0 and 5.23 acres.

Hay Creek traverses the northern portion of the lot, which is included in a special flood hazard area.

Project Description

It is our understanding the 35.05-acre parcel is to be subdivided into 6 lots. The existing home, well, and on-site wastewater treatment system are to remain on an approximately 5.16-acre lot. The five additional lots are to range between 5.0 and 5.23 acres, and are each eventually to contain a single family residence, well, and OWTS. The lots are to be accessed from a new private access road extending south from a private drive off of Hay Creek Road, near the northeastern property corner. Four of the new lots are to be located south of Hay Creek. The existing residence will maintain its current access from the private access road extending south from Hay Creek Road. The Proposed Lot Layout is presented in Figure 2.

1.2 Previous Investigations

A Wastewater Study was performed in conjunction with this study and is listed below:

1. *Wastewater Study, Hay Creek Road, El Paso County, Colorado*, RMG – Rocky Mountain Group, Job No. 195873, dated July 2, 2024.

Additionally, previous investigations completed for the area by RMG are listed below:

1. *Soil and Geology Study, Center Ice View*, prepared by RMG – Rocky Mountain Group, Job No. 194552, last dated January 11, 2024.

The findings, conclusions and recommendations contained in these reports were considered during the preparation of this report.

1.3 Additional Documents

Additional documents reviewed during the performance of this study are included in Appendix A.

2.0 QUALIFICATIONS OF PREPARERS

This Soil and Geology Study was prepared by a professional geologist as defined by Colorado Revised Statutes section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42)

The principle investigators for this study are Kelli Zigler P.G., and Tony Munger, P.E. Ms. Zigler is a Professional Geologist as defined by State Statute (C.R.S 34-1-201) with over 23 years of experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Tony Munger, P.E. is a licensed professional engineer with over 23 years of experience in the construction engineering (residential) field. Mr. Munger holds a B.S. in Architectural Engineering from the University of Wyoming.

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3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical, geologic site conditions and present our opinions of the potential effect of these conditions on the proposed development within the town of Peyton, El Paso County, Colorado. As such, our services exclude evaluation of the environmental and/or human, health related work products or recommendations previously prepared, by others, for this project.

Revisions to the conclusions presented in this report may be issued based upon submission of the Development Plan. This study has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC) specifically Chapter 8, last updated August 27, 2019. Applicable sections include 8.4.8 and 8.4.9, and the El Paso County Engineering Criteria Manual (ECM), specifically Appendix C last updated July 9, 2019.

3.1 Scope and Objective

The scope of this study is to include a review of pertinent, publically available documents including, but not limited to, previous geologic and geotechnical reports, overhead and remote sensing imagery, published geology and/or hazard maps, design documents, etc.

The objectives of our study are to:

- Identify geologic conditions present on the site
- Analyze potential negative impacts of these conditions on the proposed site development
- Analyze potential negative impacts to surrounding properties and/or public services resulting from the proposed site development as it relates to existing geologic conditions
- Provide our opinion of suitable techniques that may be utilized to mitigate any potential negative impacts identified herein

This report presents the findings of the study performed by RMG-Rocky Mountain Group relating to the geologic conditions of the above-referenced site. Revisions and modifications to this report may be issued subsequently by RMG, based upon:

- Additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report
- Review of pertinent documents (development plans, plat maps, drainage reports/plans, etc.) not available at the time of this study
- Comments received from the governing jurisdiction and/or their consultants subsequent to submission of this document

3.2 Site Evaluation Techniques

The information included in this report has been compiled from several sources, including:

- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports
- Exploratory test borings and test pits
- Available aerial photographs
- Geologic research and analysis

Geophysical investigations were not considered necessary for characterization of the site geology. Monitoring programs, which typically include instrumentation and/or observations for changes in groundwater, surface water flows, slope stability, subsidence, and similar conditions, are not known to exist and were not considered to be required for the scope of this report.

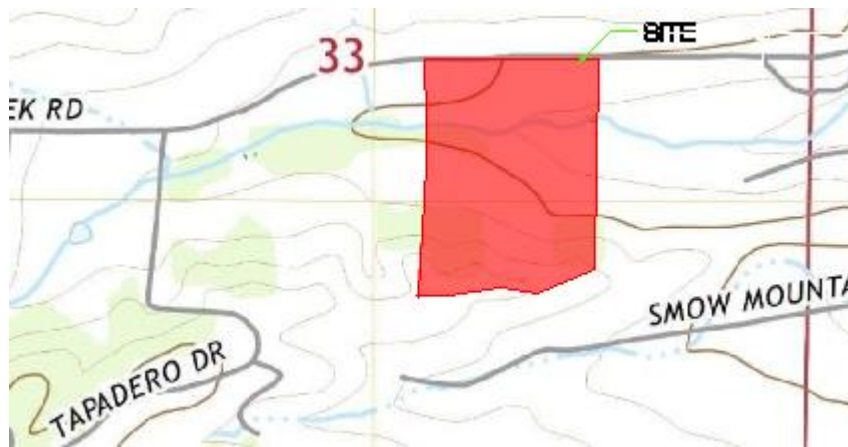
4.0 SITE CONDITIONS

4.1 Existing Site Conditions

The site is partially developed land, bound to the north by Hay Creek Road, to the east, west, and south by residential parcels ranging between 4.5 to 35 acres each. The creek traverses the northern portion of the property. The floodway encroaches on all the included lots and trends down from the west to the east off the site.

4.2 Topography and Vegetation

The site surface characteristics were observed to consist of rolling hills with low lying grasses and weeds across the entire site. Deciduous trees are scattered along the northern, southern property boundaries and along Hay Creek, with additional trees located sporadically across the proposed new lots. At the time of our site visit on April 17, 2024, the drainageway was moist, with a trace of "free" water with indications that surface water was recently present, mostly likely due to snow melt at the time. The topography from the Palmer Lake Quadrangle is presented below. The red indicates the approximate location of the site in reference to Hay Creek, the blue line.



4.3 Aerial Photographs and Remote-Sensing Imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1947, Colorado Geological Survey (CGS) surficial geologic mapping, and historical photos by historicaerials.com dating back to 1947. Prior to 1999, the area was open rolling hills with relatively little development. The creek has not been contained and continues to flow freely across the property. Since the construction of the residence (1994), the majority site has remained relatively undisturbed.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

The subsurface conditions were explored by drilling two (2) exploratory test borings on April 4, 2024, and observing two test pits on April 17, 2024.

5.1 Drilling

Two exploratory borings were performed to explore the subsurface soil conditions and provide preliminary recommendations for the design and construction of the proposed new foundations on the approved subdivided lots. The borings extended to depths of approximately 20 and 30 feet below the existing ground surface. The test borings were spaced to provide soil information for the lots. The approximate locations of the test borings are presented on the Test Boring/Test Pit Location Plan, Figure 3.

The number of borings is in excess of the minimum one test boring per 10 acres of development up to 100 acres and one additional boring for every 25 acres of development above 100 acres as required by the ECM, Section C.3.3.

The test borings were drilled with a power-driven, continuous-flight auger drill rig. Samples were obtained during drilling of the test boring in general accordance with ASTM D-1586 and D-3550, utilizing a 2-inch O.D. Split Barrel Sampler and a 2½-inch O.D. California sampler, respectively. An Explanation of Test Boring Logs is presented in Figure 4. The Test Boring Log is presented in Figure 5.

5.2 Laboratory Testing

The moisture content for the recovered samples was obtained in the laboratory. Grain-size analysis, Atterberg Limits, and in-situ density tests were performed for purposes of classification and to develop

pertinent engineering properties. Due to sample disturbance caused by gravel in the sample, a representative swell test could not be performed. However, given the depth of the expansive soils/bedrock in the test borings and available mitigation measures commonly utilized in this area, the expansive soils will not preclude development of the proposed lots. A Summary of Laboratory Test Results is presented in Figure 6. Soil Classification Data are presented in Figure 7.

5.3 Test Pits - OWTS Visual and Tactile Evaluation

Two test pits were observed by RMG to explore the subsurface soils anticipated in the general vicinity of proposed on-site wastewater treatment systems. The number of test pits is in accordance with Regulations of the El Paso County Board of Health, Chapter 8, On-site Wastewater Treatment Systems (OWTS) as required by 8.5.D.3.a.

The test pits were located by RMG, based on the preliminary concept plan provided by Vertex Consulting, showing the proposed new lot lines. The two test pits were excavated to approximately 8 feet below the ground surface by Munson Landscaping and observed by RMG at the time of excavation. The approximate locations of the test pits are presented on the Test Boring/Test Pit Location Plan, Figure 3.

5.4 OWTS Visual and Tactile Evaluation

The visual and tactile information obtained by RMG for the Wastewater Study was considered in the preparation of this investigation. Bedrock was not encountered in the 8-foot deep test pits. Neither restrictive layers nor seasonal high groundwater were encountered in the test pits.

Soil and groundwater conditions at the site are suitable for individual treatment systems. However, due to the soil having greater than 35% rock below the infiltrative layer (approximately 3 to 4 feet), the Long Term Acceptance Rate (LTAR) of the on-site material is greater than 0.8 which will require the use of an "engineered system". Additionally, the material encountered near the surface ranged between Type 1 to Type 4. It should be noted that the LTAR values stated here are for the test pit locations performed for the *Wastewater Study* only. The LTAR values will likely change throughout the site. If an LTAR value of less than 0.35 (soil types 3A to 5) or greater than 0.80 (soil type 0) is encountered at the time of the site specific OWTS evaluation, an "engineered system" will be required. For planning purposes, each lot should anticipate an engineered system to be designed by a qualified licensed Colorado Professional Engineer.

5.5 Groundwater

Groundwater was not encountered in the test borings that extended to depths of 20 to 30 feet below the ground surface. Groundwater was also not encountered in the two test pits that extended to 8-feet below the ground surface for the *Wastewater Study*, completed for the subdivision, included in Appendix B. No indications of increased moisture were observed in the test borings or test pits for this study at the time of drilling, nor were the moisture contents of the soil samples tested in the laboratory indicative of groundwater conditions within the depths explored.

It should be noted that in granular soils and bedrock (especially near a creek), perched water conditions may be encountered due to the variability of the soil profile. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can carry water in the subsurface. Groundwater may also flow atop the underlying bedrock. Groundwater was not encountered in the test borings, groundwater and is expected to be deeper than 30 feet across the site for the majority of the year. However, during the late

spring and early summer months the groundwater is expected to be much higher. Builders and planners should always be cognizant of the potential for the occurrence of subsurface water conditions during on-site construction, in order to evaluate and mitigate each individual problem as necessary.

Based on our knowledge of the area and engineering design and construction techniques commonly employed in the El Paso County area at this time, it is our opinion that groundwater beneath the site is suitably deep to allow basement construction on the proposed lots. If shallow groundwater conditions (less than 15 feet) are found to exist at the time of the site-specific subsurface soil investigations, the feasibility of basement construction and/or any recommended mitigation measures should be re-evaluated at that time.

Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

The site is located within the central portion of the Great Plains Physiographic Province. The site exists within the southern portion of a large structural feature known as the Denver Basin. In general, the geology at the site consists of alluvium and eolian composed of sand, silt, clay, gravel, and occasional boulders that overlie the Dawson Arkose sandstone.

6.1 Subsurface Soil Conditions

The subsurface materials encountered in the test borings performed for this investigation were classified visually in the field and within the laboratory using the Unified Soil Classification System (USCS). The materials were identified and classified as silty sand (SM) and sandy clay and claystone (CL) for this study. Additionally, clayey sand (SC) was observed in the upper 4 feet.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the visual classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

6.2 Bedrock Conditions

In general, the bedrock (as mapped by Colorado Geologic Survey - CGS) beneath the site is considered to be part of the Dawson Formation. Claystone bedrock was encountered in one of the test borings, TB-1 at a depth of 14 feet, bedrock was not encountered in the test pits. The Dawson formation is partially cemented and interbedded with seams of claystone. Claystone was not observed in TB-2. However, the Dawson Formation is known to contain a high degree of variation both vertically and laterally. Interbedded clay seams may occur even where none are shown on the boring logs. Excavations are likely to encounter sand with various amounts of silt, clayey, and gravel. The approximate boundary between subsurface materials, as noted on the test boring and test pit logs, may transition gradually and vary across the site. If bedrock were encountered, the Dawson can readily be excavated with standard construction equipment such as a front-end loader, skid loader, and/or (mini) excavator.

6.3 U.S. Soil Conservation Service

The United States Department of Agriculture (USDA) and the Natural Resources Conservation Services (NRCS) soil survey identified the following soil types on the property. The soil conditions as indicated by the USDS data are anticipated to consist of:

- 38 – Jarre-Tecolote complex with 8 to 65 percent slopes. The Jarre-Tecolote complex was mapped by the USDA to encompass the southern third of the property, south of the creek. Properties of the Jarre-Tecolote complex include well drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include alluvial fans.
- 68 – Peyton-Pring complex, 3 to 8 percent slopes. The Peyton-Pring complex was mapped by the USDA to encompass the remainder of the property. Properties of the Peyton-Pring complex include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms include hills.

The USDA map is included below. The bold orange line indicates the boundary between the soil conditions.



Insert from USDA, website <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

6.4 General Geologic Conditions

Based on review of relevant geologic maps, we identified the geologic conditions (listed below) affecting the development, these conditions are indicated on the Engineering and Geology Map, Figure 8.

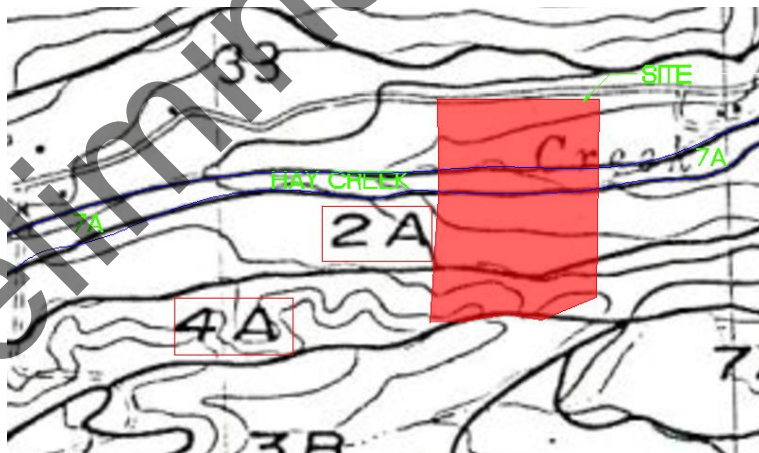
The site generally consists of alluvium deposits of the Holocene and Pleistocene overlying the Dawson Formation at depth. The following general geologic units were mapped/observed at the site:

- *Qg2: Gravel deposit two (early middle Pleistocene)* – light brown to tan, thin gravelly deposits on terraces, poorly sorted with varying amounts of clay contents. Thickness is estimated to vary across the site.
- *Qcs - Colluvium and sheetwash alluvium deposits*, undivided (Holocene and late Pleistocene)
- *TKda₁ – Dawson Formation, facies one (early to middle? Eocene)* – sandstone bedrock, interbedded with sandy claystone seams.
- *ss – steep slopes* – moderate to steep slopes with slopes ranging between 12-24 percent.
- *da – disturbed area* – areas that have been disturbed by man and are no longer in their native state, existing residence, structures, and dirt driveways.
- *fw – floodway* – Zone A per the Federal Emergency Management Agency (FEMA), area currently does not contain Base Flood Elevations. This area is to be considered a No Build Zone until further investigation is completed to determine feasibility of future development. At no point shall construction encroach the floodway.

6.5 Engineering Geology

The engineering geology units mapped by Charles S. Robinson (1977) at the site are shown below and on the Engineering and Geology Map, Figure 8.

- 2A – Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5%-12%).
- 4A – Potentially unstable colluvium and bedrock on moderate to steep slopes (12%-24%).
- 7A – Physiographic floodplain where erosion and deposition presently occur and is generally subject to recurrent flooding. Includes 100-year flood-plain along major streams where floodplain studies have been conducted.



Insert from Environmental & Engineering Geologic Map, Charles S. Robinson & Associates, 1977

6.6 Structural Features

Structural features such as schistosity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed by RMG on the site or in the surrounding area.

6.7 Surficial (Unconsolidated) Deposits

Lake and pond sediments, swamp accumulations, sand dunes, marine terrace deposits, talus accumulations, and creep were not observed on the site. Slump and slide debris were also not observed on the site. Sediment deposits are likely to be encountered within the creek and floodplain.

6.8 Features of Special Significance

Features of special significance such as accelerated erosion, (advancing gully head, badlands, or cliff reentrants) were not observed on the property. Features indicating settlement or subsidence such as fissures, scarplets, and offset reference features were not observed on the study site or surrounding areas.

Features indicating creep, slump, or slide masses in bedrock and surficial deposits were not observed on the property.

6.9 Groundwater and Drainage of Surface Water

The overall topography of the site slopes down to the south and east. Groundwater was not encountered in the test borings that extended to 20 to 30 feet, performed for this study. Indications of redox was not observed in the two 8-foot deep test pits. Redox (redoximorphic features) refers to features that indicate the fluctuation of groundwater.

It should be noted that in granular soils, some subsurface water conditions might be encountered due to the variability of the soil profile. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can convey subsurface water. Subsurface water may also flow atop the interface between the upper soils and the underlying bedrock. While not indicative of a "groundwater" condition, these occurrences of subsurface water migration can (especially in times of heavy rainfall or snowmelt) result in water migration into the excavation or (once construction is complete) the building envelope. Builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions during on-site construction, and be prepared to evaluate and mitigate each individual occurrence as necessary.

Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

6.10 Flooding and Surface Drainage

Based on our review of the FEMA Community Panel No. 08041C0267G and the online ArcGIS El Paso County Risk Map, a portion of the eastern site lies within a 100-year floodplain.

The majority of the site is zoned Zone X, which is defined as an area with 0.2% annual chance flood hard, area of 1% annual chance flood with average depth less than one foot or with drainage areas or less than one square mile. Zone A is defined by FEMA as an area without Base Flood Elevations (BFE). Zone A is limited to Hay Creek as shown on the FEMA Map below.



Insert from National Flood Hazard Layer FIRMette – USGS National Map 2023

7.0 ECONOMIC MINERAL RESOURCES

Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction, Map 1* indicates the site is identified as Granite. The granite deposits are composed of granite and granitic type rocks, such as quartz, monzonite, and Granodiorite underlying the mountains areas. The entire site is underlain primarily by a sedimentary formation of Tertiary age related to uplift and erosion of the Front Range.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands*, the site is not mapped within the Denver Basin Coal Region. Coal was not observed in the RMG test borings or test pits. This area is not prospective for metallic mineral resources. No oil and gas wells are drilled in the area. Alluvial deposits are commonly mined in the region for sand and gravel. The site has a limited sand and gravel source and is not considered commercially economical.

8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

The El Paso County Engineering Criteria Manual recognizes and delineates the difference between geologic hazards and constraints. A *geologic hazard* is one of several types of adverse geologic conditions capable of causing significant damage or loss of property and life. Geologic hazards are defined in Section C.2.2 Sub-section E.1 of the ECM. A *geologic constraint* is one of several types of adverse geologic conditions capable of limiting or restricting construction on a particular site. Geologic constraints are

defined in Section C.2.2 Sub-section E.2 of the ECM (1.15 Definitions of Specific Terms and Phrases). The following geologic hazards and constraints were considered in the preparation of this report and are not anticipated to pose a significant risk to the proposed development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Ground Subsidence and Abandoned Mining Activity
- Landslides
- Rockfall
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Valley Fill
- Downhill/Down-slope Creep
- Corrosive Minerals
- Uncontrolled/Undocumented Fill Placement and/or History of Landfill

The following sections present the geologic conditions that have been identified on (or anticipated to be on) the property:

8.1 Compressible Soils - *constraint*

Based on the soils encountered within the test borings and test pits observed for this investigation, sand with clay, and gravel underlies the entire site. It is anticipated that the on-site sand soils will be encountered within each building excavation. In some cases, the sands encountered in the excavations may be loose.

Mitigation

If loose soils are encountered beneath the proposed foundations, mitigation will be required. Mitigation is to consist of additional compaction to achieve suitable allowable bearing pressures. Fluctuations in material density may occur. In some cases, removal and recompaction of up to 2 to 3 feet of soil may be required. The removal and recompaction shall extend a minimum of the same distance beyond the building perimeter, and at least that same distance beyond the perimeter of counterfort and "T" wall footings. The use of track-mounted excavation equipment, or other low ground pressure equipment, is recommended on loose soils to reduce the likelihood of loss of stability during excavation.

The potential for settlement is directly related to saturation of the soils below the foundation areas. Therefore, good surface and subsurface drainage is critical in these areas in order to reduce the potential for saturation of the soils. Provided appropriate mitigations and/or foundation design adjustments are implemented as recommended in lot-specific soil reports, the presence of compressible soil is not considered to pose a risk to the proposed structures.

8.2 Potentially Expansive Soils and Bedrock – *constraint*

Based on our experience with the surficial soils in the vicinity, the upper alluvial soils generally possess low swell potential. However, seams of sandy clay and claystone may be present even where none are indicated on the test logs. The sandy clay and/or claystone (if encountered) are anticipated to possess low to moderate swell potential. Expansive claystone bedrock was encountered at approximately 14 feet in TB-1. If lenses or seams of expansive soils are encountered at the time of the site-specific subsurface soil investigations, additional mitigations will likely be required. These materials are readily mitigated with typical construction practices common to this region of El Paso County, Colorado.

Mitigation

Sporadic areas of expansive soils are anticipated within the overlying alluvial soils and underlying Dawson Formation. If expansive soils or bedrock are encountered beneath the foundations, mitigation will be required. Overexcavation and replacement with non-expansive (on-site or imported) soils is a suitable mitigation. Floor slabs bearing directly on expansive material should be expected to experience movement. Overexcavation and replacement has also been successful in reducing slab movement.

Provided the appropriate mitigations and/or foundation design adjustments are implemented as recommended in a lot-specific soil report, the presence of expansive soils or bedrock is not considered to pose a risk to the proposed structures.

8.3 Floodplain – Flood Prone Areas – *constraint*

Based on our review of the available FEMA and the online ArcGIS El Paso County Risk Map, the site lies within the 100-year floodway of Hay Creek. The proposed building locations have not yet been designated.

The site is not zoned "SS" – *Streamside* per the El Paso County Public Record Real Estate Property Search. However, a portion of the site lies within area designated by the 100-year floodplain and is zoned A. It is our understanding a Letter Of Map Revision (LOMR) has not been completed to revise the FEMA Map number 08011CO267F with the Base Flood Elevations (BFE) for Hay Creek. The area within the floodplain is to be considered a No Build Zone.

The proposed structures are to be located outside the floodplain, as consistent with other houses in the area. This presence of the floodplain is believed to pose a higher risk to the structures located directly adjacent to the drainageway. The flood risk dissipates as the distance from the drainageway is increased.

Mitigation

Construction shall not encroach within the identified floodplain/No Build Zone.

At no point shall construction encroach upon the floodplain.

Provided that the recommendations presented herein, as well as any requirements stipulated by the governing regulatory agencies, are adhered to, the presence of the floodplain is not anticipated to preclude basement construction.

8.4 Seasonally Fluctuating Surface Water and Groundwater – *constraint*

Based on the site observations, review of USGS topographic maps dating back to 1947, and review of Google Earth images dating back to 1999, springs do not appear to originate on the subject site. Groundwater was not encountered in the 8-foot deep test pits or the test borings performed by RMG. Isolated areas of seasonal shallow groundwater may exist. Fluctuating surface water within the drainageway should be anticipated during heavy rain storms and precipitation events.

Drilling occurred in April 2024, representing a seasonal groundwater level around early spring. We do understand that groundwater measurements are limited to the time of year measured and are considered snapshots only. Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Groundwater information obtained

at the time of the preliminary investigations performed prior to any future land development may or may not be representative of the conditions present at the time of construction. Furthermore, the development processes (reshaping of the ground surface, installation of buried utilities, etc.) can significantly alter the depth and flow paths of the subsurface water. The construction of surrounding lots can also alter the amount and depth of subsurface groundwater below a given lot.

Mitigation

The proposed development is to consist of five future single-family residential structures, wells, and OWTS's. Construction is anticipated to consist of wood-framed structures atop a full or partial basement/crawlspace foundations. Based on the depth of groundwater at the time of drilling and the surrounding topography, basement foundations are expected to have more than the generally accepted industry standard of 3 to 5 feet separation from the underlying seasonally fluctuating groundwater. It is our opinion that no special mitigations are required for groundwater at this time. It would be prudent for each owner (with guidance from their consultants) to consider planning the location of the residence and OWTS as far from the creek as feasibly possible, to reduce the risk of high flood waters.

Foundations must have a minimum 30-inch depth for frost protection. Perimeter drains are recommended around portions of the structures which will have habitable or storage space located below the finished ground surface. Perimeter drains help reduce the risk of the intrusion of water into areas below grade.

8.5 Potentially Unstable Slopes

The southern quarter of the property is topographically higher than the remainder of the site. The hills parallel the southern property boundary and contain a relatively steeper slope (up to approximately 24%), consisting of native sandstone bedrock, as mapped by the CGS. The underlying native bedrock of the Dawson Formation is generally considered stable.

Slopes greater than 25% to 30% are generally designated as "no-build" zones. However, due to the configuration of the site and the available buildable space between Hay Creek and the steeper southern slopes, the proposed structures should adequately be separated from the FEMA floodway and the slopes.

If the future proposed structures were to encroach upon the toe (bottom) of the slope, additional investigations may be required to verify the slope is stable prior to construction. It is our opinion that a slope stability analysis is currently not warranted and no portions of the lots require a "no-build" designation due to steep slopes.

Mitigation

Any new long-term cuts or fills should be no steeper than 3:1 without specific slope analysis. Sheetwash is expected during heavy precipitation events. Drainage should be directed away from the toe of the slopes and redirected and carried away from the proposed residences and OWTS in a non-erosive manner.

8.6 Scour, Erosion, Accelerated Erosion - *constraint*

Scour generally refers to a localized loss of soil, often around/near foundation elements, while erosion generally refers to lowering the ground surface over a wide area.

Visible evidence of ongoing accelerated erosion along the banks of the drainageway was not observed. Signs of significant and ongoing surface erosion were not observed across the remainder of the site.

The entire site is susceptible to the effects of water erosion. Water flowing across the surface of the site, in an uncontrolled manner, can result in rills and gullies. Disturbance of the natural vegetation cover and long-term exposure of the surface materials increases the potential for significant erosion.

Mitigation

A drainage plan was not reviewed in conjunction with this study. The proposed single-family residences should be located sufficiently away from Hay Creek such that they are not impacted by construction.

The home locations should be located outside the Floodplain/No Build area, as indicated on the Engineering and Geology Map. Silt fencing should be installed (as needed) along the top of the drainageway to reduce the potential for erosion during construction. It is also recommended that vegetative cover be maintained during and after construction, or replaced/reconstructed if damaged.

Significant care should be taken (both during construction and in the final grading of the lots) to divert surface drainage and downspout discharge water around the structures to locations that will not significantly alter the overall drainage of the development. Any landscaping in the immediate vicinity of the proposed structures should utilize xeriscape techniques in order to minimize needed irrigation to maintain landscaping.

8.7 Faults and Seismicity - hazard

Based on review of the Earthquake and Late Cenozoic Fault and Fold Map Server provided by CGS located at <http://dnrwebmapgdev.state.co.us/CGSOnline/> and the recorded information dating back to November of 1900, Colorado Springs has not experienced a recorded earthquake with a magnitude greater than 1.6 during that period. The nearest recorded earthquakes over 1.6 occurred in December of 1995 in Manitou Springs, which experienced magnitudes ranging between 2.8 to 3.5. Additional earthquakes over 1.6 occurred between 1926 and 2001 in Woodland Park, which experienced magnitudes ranging from 2.7 to 3.3. Both of these locations are located near the Ute Pass Fault, which is greater than 10 miles from the subject site. Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith, which includes pull from minor movements along faults found in the Denver basin. It is our opinion that ground motions resulting from minor earthquakes may affect structures (and the surrounding area) at this site if minor shifting were to occur.

Mitigation

The Pikes Peak Regional Building Code, 2017 Edition, indicates maximum considered earthquake spectral response accelerations of 0.218g for a short period (S_s) and 0.059g for a 1-second period (S_1). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class B, with average shear wave velocities ranging from 2,500 to 5,000 feet per second for the materials in the upper 100 feet.

8.8 Radon – constraint

Radon is a gas that can move freely within the soil and air that can become trapped in structures constructed on the soil. Radon is a byproduct of the natural decay of uranium and radium. Trace amounts of radioactive nuclides are common in the soils and bedrock that underlie this region and site.

"Radon Act 51 passed by Congress set the natural outdoor level of radon gas (0.4 pCi/L) as the target radon level for indoor radon levels".

Northern El Paso County, in which the site is located, has an EPA assigned Radon Zone of 1. A radon Zone of 1 predicts an average indoor radon screening level greater than 0.4 pCi/L (picocuries per liter), which is above the recommended levels assigned by the EPA. *The EPA recommends [corrective measures](#) to reduce exposure to radon gas.*

All of the State of Colorado is considered EPA Zone 1 based on the information provided at https://county-radon.info/CO/El_Paso.html. Elevated hazardous levels of radon from naturally occurring sources are not anticipated at this site.

Mitigation

Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards. Passive radon mitigation systems are also available.

Passive and active mitigation procedures are commonly employed in this region to effectively reduce the buildup of radon gas. Measures that can be taken after the residence is enclosed during construction include installing a blower connected to the foundation drain and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, it is recommended that the residence be tested after they are enclosed and commonly utilized techniques are in place to minimize the risk.

9.0 ON-SITE WASTEWATER TREATMENT SYSTEMS

It is our understanding that On-site Wastewater Treatment Systems (OWTS) are proposed for five of the six lots. The site was evaluated in general accordance with the El Paso Land Development Code, specifically sections 8.4.8. Two 8-foot deep test pits were performed across the site to obtain a general understanding of the soil and bedrock conditions. The Test Pit Logs are presented in the *Wastewater Study*, Appendix B.

The United States Department of Agriculture (USDA) soil types encountered in our test pits consisted of sandy clay loam and sand. Limiting layers were not encountered in the test pits. The long term acceptance rates (LTAR) associated with the soils observed in the test pits of the on-site material ranged between 0.30 (Soil Type 4) and 0.80 (Soils Type 1). Signs of seasonal groundwater were not observed in the test pits.

Contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to the El Paso County Board of Health Guidelines and property maintained.

Treatment areas, at a minimum, must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCDHE);

- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCDHE;
- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches;
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, cut banks and fill areas (from the crest);
- The new lots shall be laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways, No Build Zones). Based on the test pit observations, the parcel has a minimum of two locations for the OWTS.

The visual and tactile information obtained by RMG for the Wastewater Study was considered in the preparation of this investigation. Bedrock was not encountered in the two 8-foot deep test pits. Soil and groundwater conditions at the site are suitable for individual treatment systems. However, some of the observed on-site soils exhibited:

- a high clay content (an LTAR less than 0.35) and/or;
- excessive rock content (an LTAR greater than 0.80).

One or both of these soil conditions are expected for each lot within the subdivision. The treatment systems will likely require the use of "engineered systems". It should be noted that the LTAR values stated here are for the test pit locations performed for the *Wastewater Study* only. The LTAR values may change throughout the site. If an LTAR value of less than 0.35 (soil types 3A to 5) or greater than 0.80 (soil type 0) is encountered at the time of the site specific OWTS evaluation, an "engineered system" will be required.

It is recommended the areas labeled *fw - floodway*, indicating the FEMA Floodway, be avoided during the planning and placement of the OWTS. The lots have sufficient acreage to locate each OWTS (and alternate locations) within the EPCDHE physical setback requirements.

10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in section 8 of this report) found to be present at this site include faults and seismicity. Geologic conditions (as described in section 8 of this report) found to be present at this site include potentially compressible and expansive soils, FEMA floodplain, and potentially seasonally fluctuating water. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering, design, and construction practices.

11.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion any proposed future development is feasible. The geologic conditions identified are considered typical for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and suitable construction practices.

In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be considered for any future structures. Exterior, perimeter foundation drains should be installed

around below-grade habitable or storage spaces. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil.

We believe the sand with varying amounts clay and gravel will classify as Type B material as defined by OSHA. OSHA requires that temporary excavations made in Type B materials be laid back at ratios no steeper than 1:1 (horizontal to vertical), unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction, which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

It is important for the Owner(s) of each lot read and understand this report, and to carefully familiarize themselves with the geologic hazards associated with construction in this area. This report only addresses the geologic constraints contained within the boundaries of the site referenced above.

12.0 CLOSING

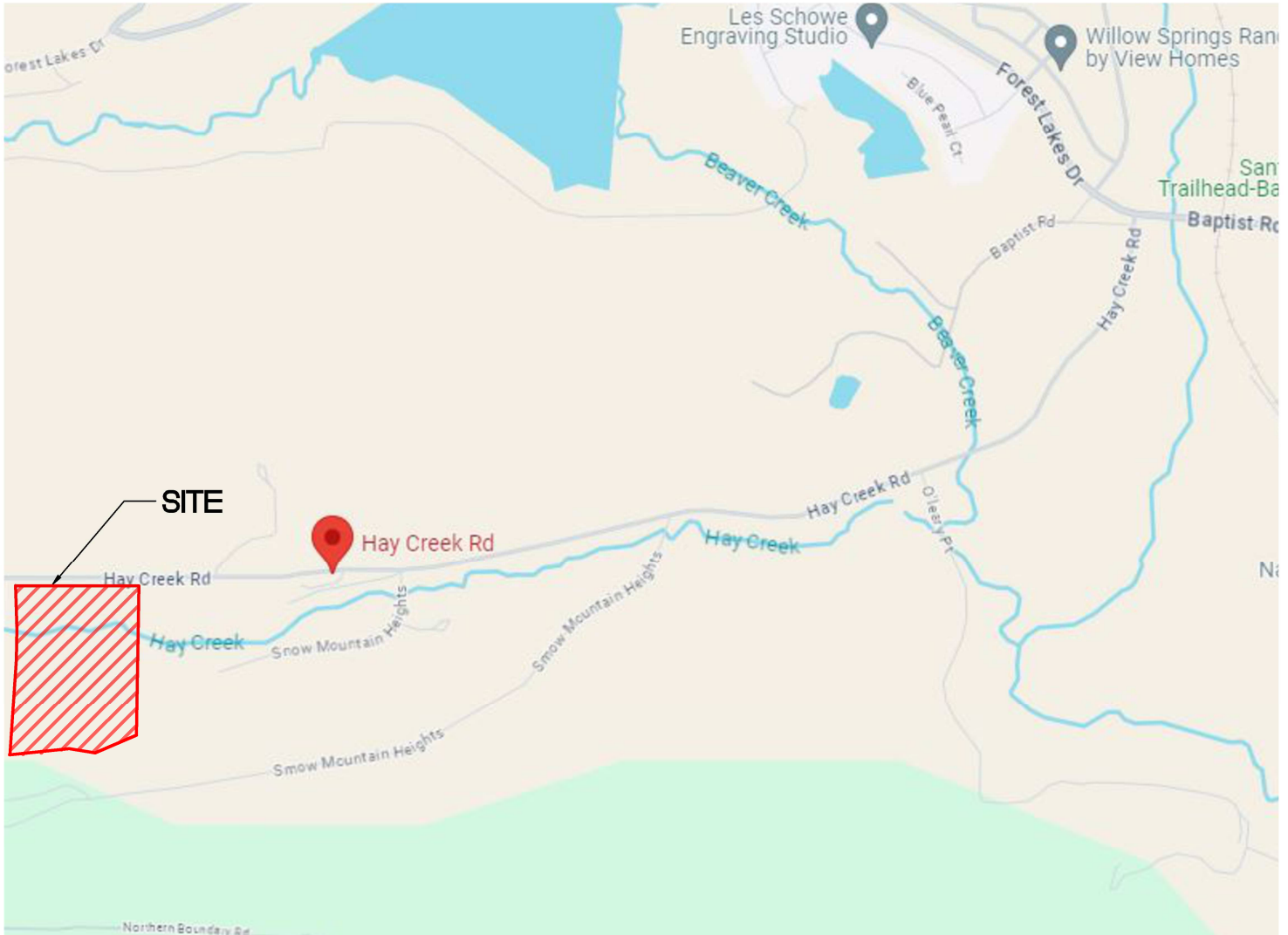
This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to, biological or toxicological issues, are beyond the scope of this report. If the owner is concerned about the potential for such contamination or conditions, other studies should be undertaken.

This report has been prepared for **James Hull** in accordance with generally accepted geotechnical engineering and engineering geology practices. The conclusions and recommendations in this report are based in part upon data obtained from review of available topographic and geologic maps, review of available reports of previous studies conducted in the site vicinity, a site reconnaissance, and research of available published information, soil test borings, soil laboratory testing, and engineering analyses. The nature and extent of variations may not become evident until construction activities begin. If variations then become evident, RMG should be retained to re-evaluate the recommendations of this report, if necessary.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers and engineering geologists practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied, is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

FIGURES

Preliminary Use Only



NOT TO SCALE

Architecture
Structural
Geotechnical



Engineers / Architects

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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

Materials Testing
Forensics
Civil / Planning

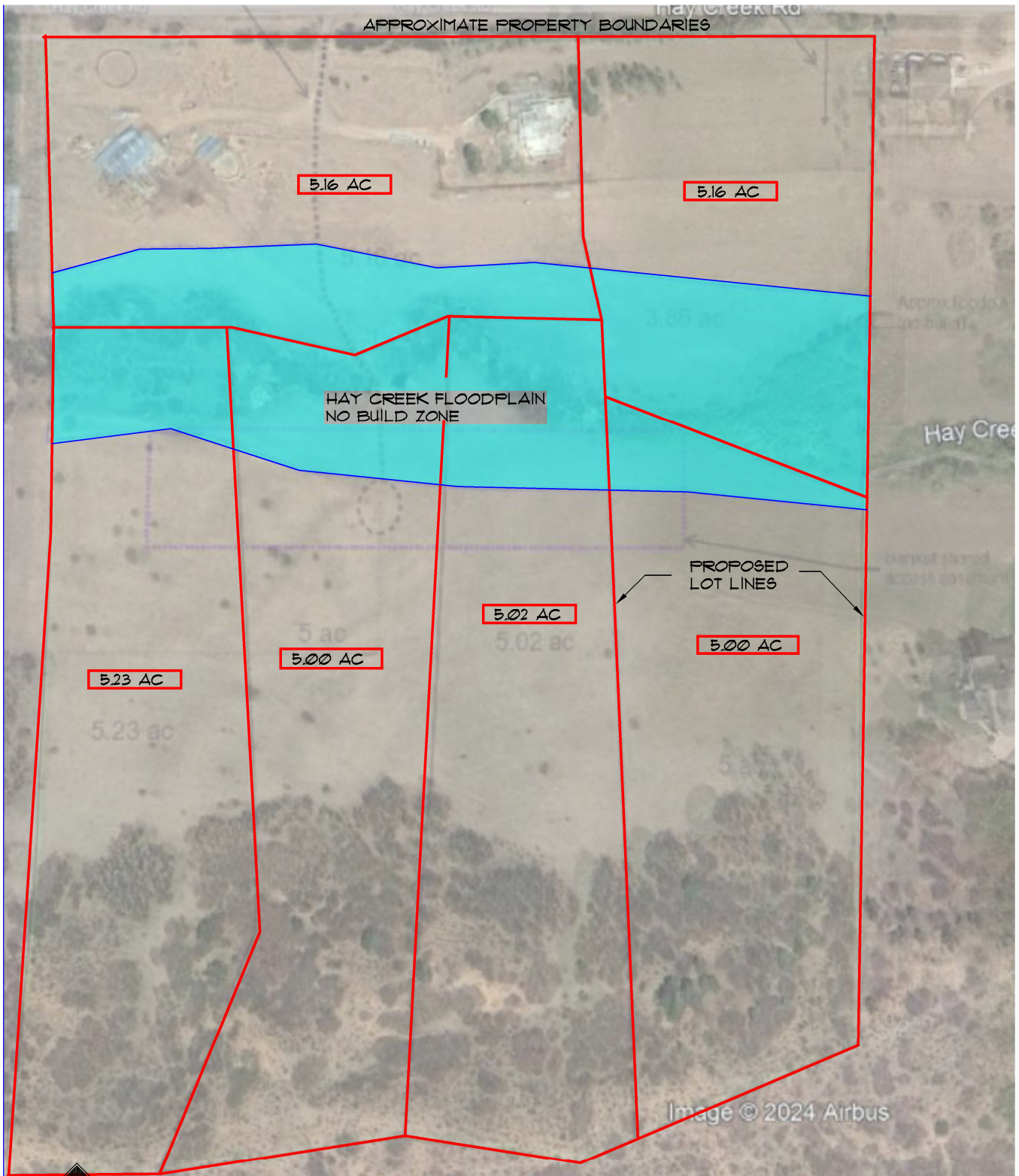
SITE VICINITY MAP

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

JOB No. 195873

FIG No. 1

DATE 7-2-2024



NOT TO SCALE

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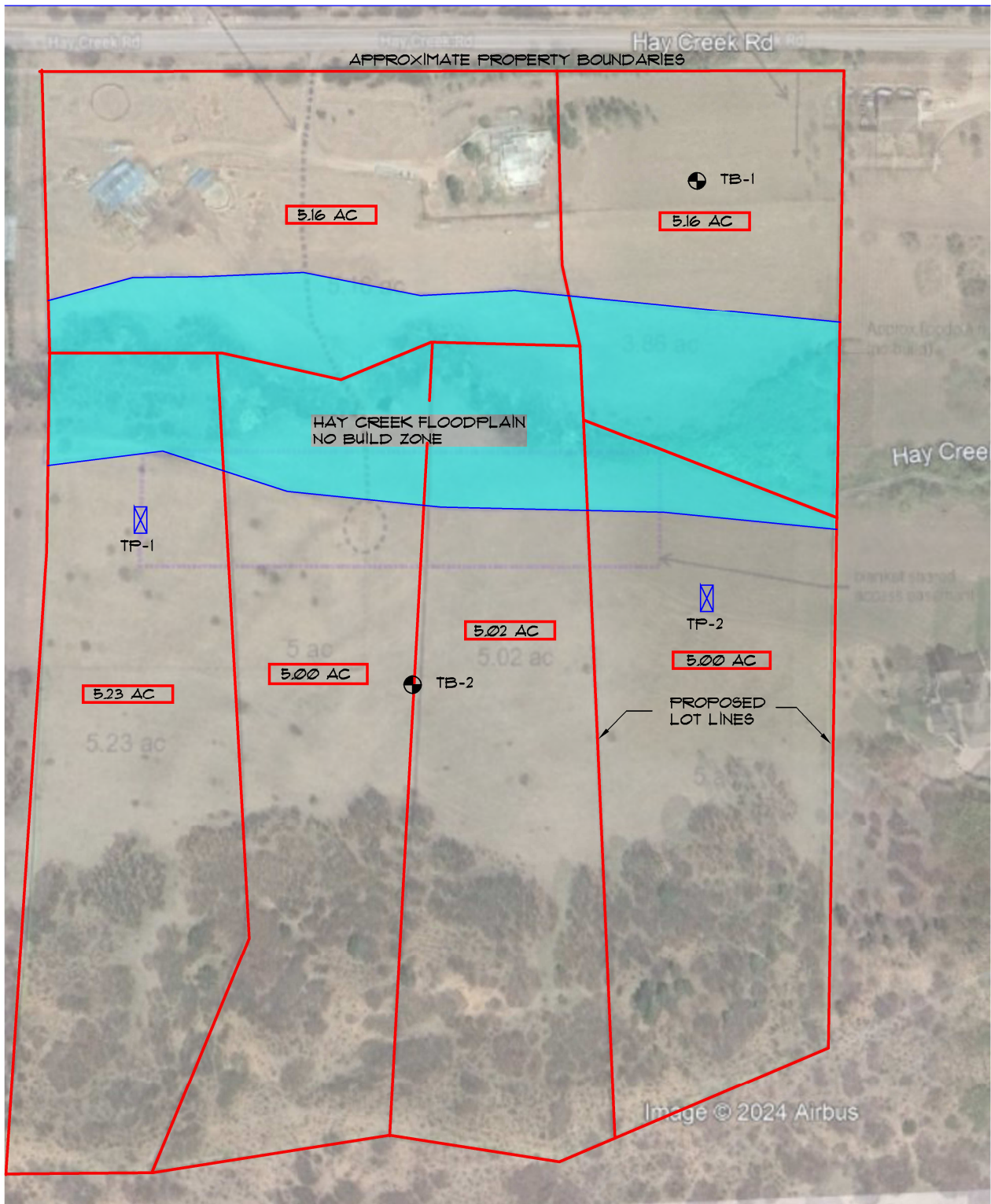
PROPOSED LOT LAYOUT

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

JOB No. 195873

FIG No. 2

DATE 7-2-2024



NOT TO SCALE



DENOTES APPROXIMATE LOCATION OF TEST PITS



DENOTES APPROXIMATE LOCATION OF TEST BORINGS

Architecture
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TEST BORING / TEST PIT LOCATION PLAN

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

JOB No. 195873

FIG No. 3

DATE 7-2-2024

SOILS DESCRIPTION



CLAYSTONE



SILTY TO CLAYEY SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY TESTS PRESENTED HEREIN WERE PERFORMED BY:
 RMG - ROCKY MOUNTAIN GROUP
 2910 AUSTIN BLUFFS PARKWAY
 COLORADO SPRINGS, COLORADO

SYMBOLS AND NOTES



XX

STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).



XX

UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).



FREE WATER TABLE



DEPTH AT WHICH BORING CAVED



BULK DISTURBED BULK SAMPLE



AUG AUGER "CUTTINGS"

4.5

WATER CONTENT (%)

ROCKY MOUNTAIN GROUP

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Structural
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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO









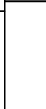



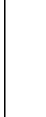






Geotechnical
Materials Testing
Civil, Planning

EXPLANATION OF TEST BORING LOGS

JOB No. 195873

FIGURE No. 4

DATE July/02/2024

TEST BORING: 1 DATE DRILLED: 4/4/24 NO GROUNDWATER ON 4/4/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %	TEST BORING: 2 DATE DRILLED: 4/4/24 NO GROUNDWATER ON 4/4/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY TO CLAYEY, with gravel, light brown to dark brown, loose to medium dense, moist	5			4	7.6	SAND, SILTY TO CLAYEY, with gravel, light brown to brown, loose to medium dense, moist	5			6	10.0
CLAYSTONE, SANDY, light brown, medium hard, moist	10			28	3.3		10			22	5.6
	15			23	16.2		15			20	5.3
	20			50/9"	10.2		20			10	4.9
							25				
							30			9	6.6

ROCKY MOUNTAIN GROUP

Architectural
Structural
Forensics



Engineers / Architects

Geotechnical
Materials Testing
Civil, Planning

TEST BORING LOG

JOB No. 195873

FIGURE No. 5

DATE Jul/02/2024

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
1	2.0	7.6								
1	7.0	3.3								
1	14.0	16.2		28	9	0.3	53.3			CL
1	19.0	10.2	127.7							
2	4.0	10.0		NP	NP	9.3	20.4			SM
2	9.0	5.6		NP	NP	11.5	15.9			SM
2	14.0	5.3								
2	19.0	4.9				4.6	17.2			
2	29.0	6.6								

ROCKY MOUNTAIN GROUP

Architectural
Structural
Forensics



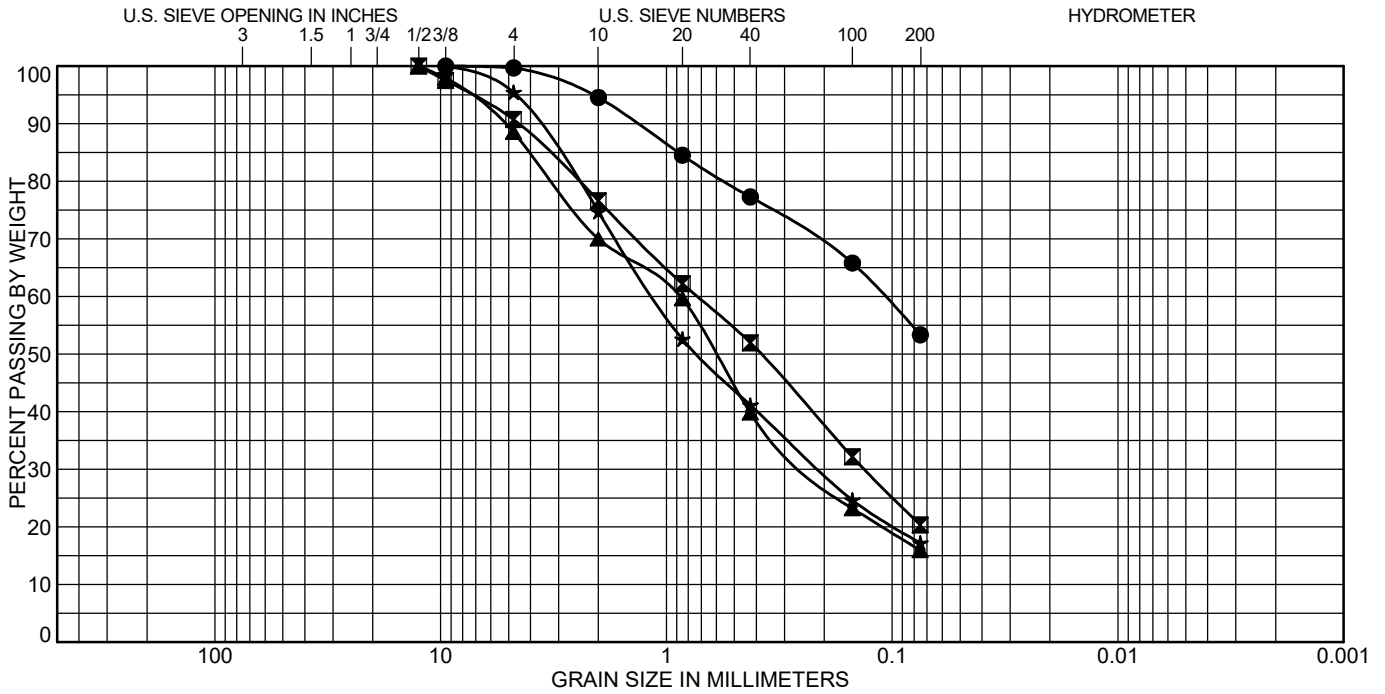
Engineers / Architects

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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

SUMMARY OF LABORATORY TEST RESULTS

JOB No. 195873
 FIGURE No. 6
 PAGE 1 OF 1
 DATE Jul/02/2024



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring	Depth (ft)	Classification	LL	PL	PI
● 1	14.0	SANDY LEAN CLAY(CL)	28	19	9
⊠ 2	4.0	SILTY SAND(SM)	NP	NP	NP
▲ 2	9.0	SILTY SAND(SM)	NP	NP	NP
★ 2	19.0				

Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
● 1	14.0	0.3	46.3	53.3	
⊠ 2	4.0	9.3	70.4	20.4	
▲ 2	9.0	11.5	72.6	15.9	
★ 2	19.0	4.6	78.2	17.2	

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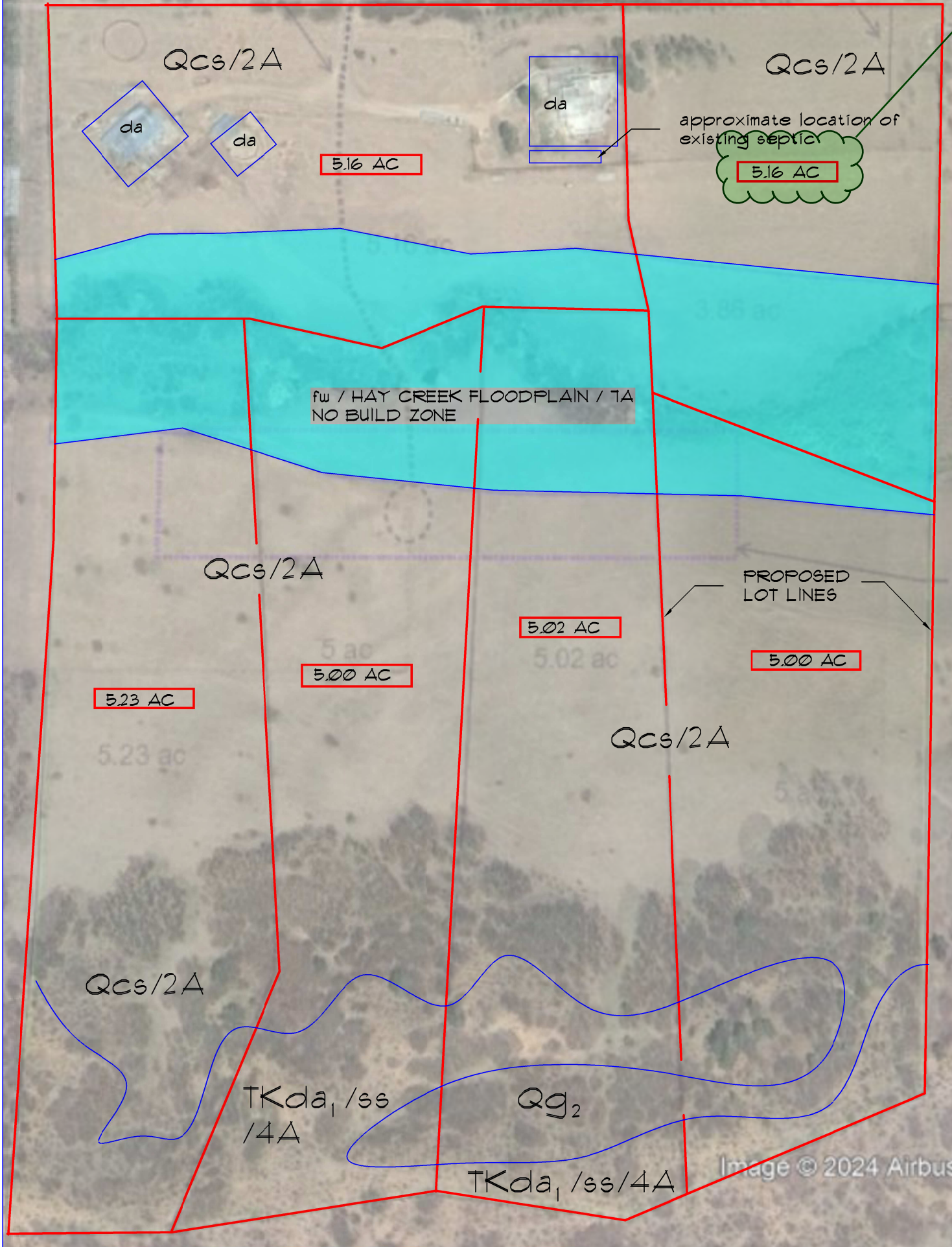
SOIL CLASSIFICATION DATA

JOB No. 195873

FIGURE No. 7

DATE July/02/2024

APPROXIMATE PROPERTY BOUNDARIES



Please use current lot size configuration.


LEGEND

GEOLOGIC CONDITIONS

- *Qg₂*: Gravel deposit two (early middle Pleistocene) - light brown to tan, thin gravelly deposits on terraces, poorly sorted with varying amounts of clay contents. Thickness is estimated to vary across the site.
- *Qcs* - Colluvium and sheetwash alluvium deposits, undivided (Holocene and late Pleistocene)
- *TKda₁* - Dawson Formation, facies one (early to middle? Eocene) - sandstone bedrock, interbedded with sandy claystone seams.
- *ss* - steep slopes - moderate to steep slopes with slopes ranging between 12-24 percent.
- *da* - disturbed area - areas that have been disturbed by man and are no longer in their native state, existing residence, structures, and dirt driveways.
- *fw* - floodway - Zone A per FEMA, area currently does not contain Base Flood Elevations. This area is to be considered a No Build Zone until further investigation is completed to determine feasibility of future development. At no point shall construction encroach the floodway.

ENGINEERING GEOLOGY

- *2A* - Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5%-12%).
- *4A* - Potentially unstable colluvium and bedrock on moderate to steep slopes (12%-24%).
- *7A* - Physiographic floodplain where erosion and deposition presently occur and is generally subject to recurrent flooding. Includes 100-year flood-plain along major streams where floodplain studies have been conducted.

 Area mapped within the FEMA Floodway

JOB No. 195873

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HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

ENGINEER: TM
DRAWN BY: KZ
CHECKED BY: TM
ISSUED: 1-02-2024

ENGINEERING AND
GEOLOGY MAP

SHEET No.
FIG-8



APPENDIX A

Additional Reference Documents

1. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 081041C0267G*, Federal Emergency Management Agency (FEMA), effective December 7, 2018. FEMA Flood Map Service Center: <https://msc.fema.gov/portal/home>.
2. *Geologic Map of the Palmer Lake Quadrangle, El Paso County, Colorado*, by Keller, John W. Morgan, Matthew L., Thorson, Jon P., Lindsay, Neil R., and Barkmann, P.E., 2006.
3. *Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
4. *Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
5. *El Paso County, Master Plan for Mineral Extraction*, dated February 8, 1996.
6. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board*, prepared by Colorado Geological Survey, dated February 19, 2003, Open-file Report OF-03-07.
7. USDA – Natural Resources Conservation Service, *Web Soil Survey* <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>
8. *Colorado Springs Landslide Susceptibility*, Colorado Geological Survey: <https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=5e7484a637c4432e84f4f16d0af306d3>
9. *Colorado Landslide Inventory*, Colorado Geological Survey: <https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=9dd73db7fbc34139abe51599396e2648>.
10. *Pikes Peak Regional Building Department*: <https://www.pprbd.org/>.
11. *City of Colorado Springs, Subdivision Document Viewer*: <http://www.springsgov.com/SubDivView/default.asp?cmdGoBack=New+Search...>
12. *El Paso County Assessor, El Paso County, Colorado*: <https://property.spatalest.com/co/elpaso/#/property/7323109006>
13. *Colorado Geological Survey, USGS Geologic Map Viewer*: <http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/>.
14. *Historical Aerials*: <https://www.historicaerials.com/viewer>, Images dated 1947, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, and 2024.
15. *USGS Historical Topographic Map Explorer*: <http://historicalmaps.arcgis.com/usgs/> Images dated 1950, 1951, 1957, 1963, 1966, 1970, 1974, 1977, 1994, 2001, 2013, 2019, 2022.

APPENDIX B

Individual Sewage Disposal System Permit, El Paso County Department of Health
and Environment

Preliminary Use Only

TAX # 17133007025
 EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT
 INDIVIDUAL SEWAGE DISPOSAL SYSTEM INSPECTION FORM

UN 003895
 Permit # 7121
 Date 7/29/94

APPROVED: YES NO

ENVIRONMENTALIST Randy Swepston

Address 3405 Hwy 63 West Baptist

Owner Richard Dudding
Cynthia Taylor

Legal Description Lot 1 Hwy 63 Heights
 Residence , # of bedrooms 3; Commercial ; System Installer Compant

SEPTIC TANK:

Commercial ; Noncommercial L , W , WD
 Construction Material Concrete, capacity 1250 gallons.

DISPOSAL FIELD:

Rock Systems:

Trench: depth , width , total length , sq. feet

Bed: depth , length , width , sq. feet

Rock type , depth , under PVC , over PVC

Seepage Pits: # of pits , total # of rings , working depth(s)

size of pit(s) L X W , lining material , total sq. feet

Rockless Systems:

Chamber: Type Perforator, number of chambers 16, bed , trench

sq. ft./section 18, reduction allowed 50%, sq. ft. required 357

total sq. ft. installed 576, depth of installation 31

Engineer Design Y or N , Designing Engineer

Approval letter provided? Y or N

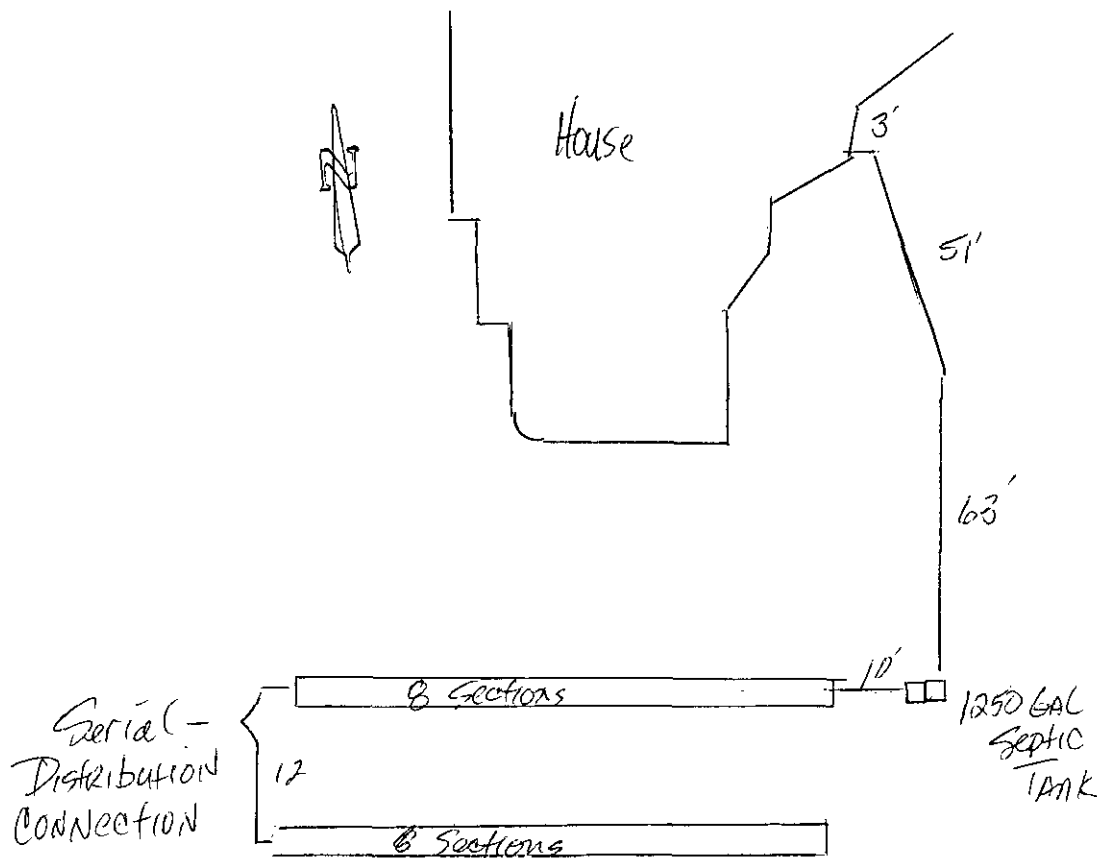
Well 50 feet from tank Y or N 100 feet from leach field Y or N

Well installed at time of septic system inspection Y or N Public Water

*Approval will be revoked if in the future the well is found to be within 50 feet of the septic tank and/or 100 feet of the disposal field.

NOTES:

Well



[Handwritten signature]

Acres 30

EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT

Permit 7121

Water Supply WELL

301 South Union Blvd. • Colorado Springs, Colorado • 578-3125

Receipt No. 10101

PERMIT

TO CONSTRUCT, ALTER, REPAIR OR MODIFY ANY INDIVIDUAL SEWAGE DISPOSAL SYSTEM

Issued to RICHARD DUDDING & CYNTHIA TAYLOR Date 5-11-93

Address of Property 3405 WEST BAPTIST ROAD, LOT 1, HAY CREEK HEIGHTS Phone 591-3616

(Permit valid at this address only)

Sewage-Disposal System work to be performed by _____ Phone _____

This Permit is issued in accordance with 25-10-106 Colorado Revised Statutes 1973, as amended. PERMIT EXPIRES upon completion- installation of sewage-disposal system or at the end of twelve (12) months from date of issue- whichever occurs first- (unless work is in progress). This permit is revokable if all stated requirements are not met.

- THIS PERMIT DOES NOT DENOTE APPROVAL OF ZONING AND ACREAGE REQUIREMENTS -

\$150.00

PERMIT FEE (NOT REFUNDABLE)

5-11-94

DATE OF EXPIRATION

John B. Daniel, MD
DIRECTOR, DEPARTMENT OF HEALTH AND ENVIRONMENT

Kendy Waxton
ENVIRONMENTALIST

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION. 48 HOUR ADVANCE NOTICE REQUIRED.

SEPTIC TANK: 1250 gallons	TRENCH SYSTEM: total square feet <u>357</u> ____ ft. of trench _____ inches wide ____ ft. of trench _____ inches wide	BED SYSTEM: total square feet _____	SEEPAGE PIT SYSTEM: total square feet _____ rings or _____ diam.x _____ w/d
------------------------------	--	--	---

NOTES: LOCATE IN AREA OF PERCOLATION TEST. RECOMMEND THAT REQUIRED ABSORPTION AREA BE INCREASED BY 60 PER CENT FOR GARBAGE GRINDER AND WASHING MACHINE.

The Health Office shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable time for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

301 S. Union
S. of Pikes Peak

501 North Foote Avenue
Colorado Springs, CO 80909-4593
(303) 578-3125

520-6600

APPLICATION FOR A PERMIT TO CONSTRUCT, REMODEL, OR INSTALL A SEWAGE DISPOSAL SYSTEM

NAME OF OWNER Richard DUDGING + Cynthia Taylor HOME PHONE 598-2235 WORK PHONE 591-3616

ADDRESS OF PROPERTY 3405 W. BAPTIST Rd DATE 20 April 1993

LEGAL DESCRIPTION OF PROPERTY LOT 1, HAY CREEK HEIGHTS

TAX SCHEDULE NUMBER 71330-07-009 SYSTEM CONTRACTOR _____ PHONE _____

OWNER'S ADDRESS IF DIFFERENT 1383 WINDMILL Colo. Springs Co. 80907

TYPE OF HOUSE CONSTRUCTION RANCHER SOURCE AND TYPE OF WATER SUPPLY WELL

SIZE OF LOT 30 ac. MAXIMUM POTENTIAL NUMBER OF BEDROOMS 3 BASEMENT (yes or no) NO

PERCOLATION TEST RESULTS ATTACHED (yes or no) YES

A plot plan and accompanying information are essential; it may be drawn on the back of this application or be attached. Please include by measured distance the location of wells including neighbors' wells, springs, water supply lines, cisterns, buildings, proposed structures, property lines, property dimensions, subsoil drains, lakes, ponds, water courses, streams, and dry gulches. Please show the location of the proposed septic system by directions and distances from actual and/or proposed dwellings, structures, or fixed reference objects. Give complete directions to the property from major highways. (ANSWER QUESTIONS ON BACK OF FORM).

Applicant acknowledges that the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the department to be made and furnished by the applicant for purposes of evaluation of the application; and issuance of the permit is subject to such terms and conditions as deemed necessary to ensure compliance with rules and regulations adopted under Article 10, Title 25, C.R.S. 1973 as amended. The undersigned hereby certifies that all statements made, information and reports submitted by the applicant are or will be represented to be true and correct to the best of my knowledge and belief and are designed to be relied on by the El Paso County Health Dept. in evaluating the same for purposes of issuing the permit applied for herein. I further understand that any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application and in legal action for perjury as provided by law.

SIGNATURE [Signature] 20 Apr. 93

HEALTH DEPARTMENT USE ONLY Need @ an hour's attached

PERMIT NUMBER 7121 RECEIPT NUMBER 61161 DATE TO LAND USE DEPARTMENT 4-21-93

ABSORPTION AREA 357 ft² TANK CAPACITY 1250 GAL DATE OF SITE INSPECTION 4-22-93

REMARKS: locate in area of perc test. Recommend that required absorption area be increased by 60% for garbage grinder and washing machine

APPLICATION IS APPROVED (X) DENIED () DATE 4-22-93 ENVIRONMENTALIST [Signature]

APPENDIX C
Wastewater Study - RMG

Preliminary Use Only

Job No. 195873

November XX, 2024

James Hull
3405 Hay Creek Road
Colorado Springs, CO 80921

Re: Wastewater Study
Hay Creek Rd
Lots 1-6
El Paso County, Colorado

Dear Mr. Hull:

As requested, personnel of RMG – Rocky Mountain Group has performed a preliminary investigation and site reconnaissance at the above referenced address. It is our understanding the parcel included in this study is:

- EPC Schedule No. 7133007025, labeled as Hay Creek Rd, which consists of 35.05 acres and is zoned "RR-5" – Residential Rural.

It is our understanding the 35.05-acre parcel is to be subdivided into 6 lots. The existing home, well, and On-site Wastewater Treatment System (OWTS) are to remain on an approximately 5.16-acre lot, zoned "RR-5". The five additional lots are to range between 3.86 to 5.23 acres, and are each eventually to contain a single family residence, well, and OWTS. The lots are to be accessed from a new private access road extending south from a private drive off of Hay Creek Road, near the northeastern property corner. Four of the new lots are to be located south of Hay Creek. The existing residence will maintain its current access from the private access road extending south from Hay Creek Road. The Proposed Lot Layout is presented in Figure 2.

This letter is to provide information for the on-site wastewater report per the On-Site Wastewater Treatment Systems (OWTS) Regulations of the El Paso County Board of Health pursuant to Chapter 8.

The following are also excluded from the scope of this report including (but not limited to) foundation recommendations, site grading/surface drainage recommendations, subsurface drainage recommendations, geologic, natural and environmental hazards such as landslides, unstable slopes, seismicity, snow avalanches, water flooding, corrosive soils, erosion, radon, wild fire protection, hazardous waste and natural resources.

Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site were available for our review and are listed below:

1. *Soil and Geology Study, Hay Creek, Lots 1-6, El Paso County, Colorado*, prepared by RMG – Rocky Mountain Group, Job No. 195873, dated November XX, 2024.

The findings, conclusions and recommendations contained in these reports were considered during the preparation of this report.

SITE CONDITIONS

Personnel of RMG performed a reconnaissance visit on April 17, 2024. The purpose of the reconnaissance visit was to evaluate the site surface characteristics including landscape position, topography, vegetation, natural and cultural features, and current and historic land uses. Two 8-foot deep test pits were performed across the site during our reconnaissance visit. The Test Boring/ Test Pit Location Plan is presented in Figure 3.

The site surface characteristics were observed to consist of low lying grasses and weeds across the entire site. No deciduous trees are located on the property. If this does not apply, enter the site surface characteristics observed

The following conditions were observed with regard to the 35.05-acre parcel:

- A well currently **does** exist on the existing 35.05-acre site;
- No runoff or irrigation features anticipated to cause deleterious effects to treatment systems on the site were observed;
- Hay Creek and its floodway exists on the property. A portion of the site lies within the designated floodway or floodplain;
- Slopes greater than 20 percent **do** exist on the site; and
- Significant man-made cuts **do not** exist on the site.

Treatment Areas

Treatment areas at a minimum must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCDHE);
- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCDHE;

- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches;
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, cut banks and fill areas (from the crest);
- The new lots shall be laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways, floodways). Based on the test pit observations, the parcel has a minimum of two locations for each OWTS.

Contamination of surface and subsurface water resources should not occur if the treatment areas are evaluated and installed according to El Paso County Health Department and State Guidelines in conjunction with proper maintenance.

DOCUMENT REVIEW

RMG has reviewed the above referenced site plan. We have identified the soil conditions anticipated to be encountered during construction of the proposed OWTS for each proposed lot. Our review included a review of documented Natural Resource Conservation Service (NRCS) data provided by websoilsurvey.nrcs.usda.gov. The Soil Survey Descriptions are presented below. A review of FEMA Map No. 08041C0267G, effective December 7, 2018 indicates that the proposed treatment areas are not located within an identified floodplain.

SOIL EVALUATION

Personnel of RMG performed a soil evaluation to include two 8-foot deep test pits, on April 17, 2024 (Test Pit TP-1 and TP-2), utilizing the visual and tactile method for the evaluation of the site soils. The test pits were excavated in areas that appeared most likely to be used for residential construction. The Test Pit Logs are presented in Figure 4.

The soil conditions as indicated by the USDS data are anticipated to consist of:

- 38 – Jarre-Tecolote complex with 8 to 65 percent slopes. The Jarre-Tecolote complex was mapped by the USDA to encompass the southern third of the property, south of the creek. Properties of the Jarre-Tecolote complex include well drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be medium, frequency of flooding and/or ponding is none, and landforms include alluvial fans.
- 68 – Peyton-Pring complex, 3 to 8 percent slopes. The Peyton-Pring complex was mapped by the USDA to encompass the remainder of the property. Properties of the Peyton-Pring complex include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms include hills.

The USDA map is included below. The bold orange line indicates the boundary between the soil conditions.



Groundwater was not encountered in the test pits observed by RMG April 17, 2024 or within the test borings performed April 4, 2024.

An OWTS is proposed for each lot and should conform to the recommendations of a future OWTS site evaluation, performed in accordance with the applicable health department codes prior to construction. This report may require additional test pits in the vicinity of the proposed treatment field. A minimum separation of 4 feet shall be maintained from groundwater and bedrock to the infiltrative surface.

Redoximorphic features indicating the fluctuation of groundwater or higher ground water levels were not observed in the test pits.

CONCLUSIONS

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. A Septic Suitability Map is presented in Figure 5. It is recommended the areas labeled *fw* - floodway, indicating the FEMA Floodway and *ss* - steep slopes be avoided during the planning and placement of the OWTS. The lots have sufficient acreage to locate each OWTS (and alternate locations) within the EPCDHE physical setback requirements.

Bedrock was not encountered in the two 8-foot deep test pits. Soil and groundwater conditions at the site are suitable for individual treatment systems. However, the on-site soils exhibited:

- a high clay content (an LTAR less than 0.35) and/or;
- excessive rock content (an LTAR greater than 0.80).

One or both of these soil conditions are expected for each lot within the subdivision. The treatment systems will likely require the use of "engineered systems". It should be noted that the LTAR values stated here are for the test pit locations performed for this *Wastewater Study* only. The LTAR values may change throughout the site. If an LTAR value of less than 0.35 (soil types 3A to 5) or greater than 0.80 (soil type 0) is encountered at the time of the site specific OWTS evaluation, an "engineered system" will be required.

LIMITATIONS

The information provided in this report is based upon the subsurface conditions observed in the profile pit excavations and accepted engineering procedures. The subsurface conditions encountered in the excavation for the treatment area may vary from those encountered in the test pit excavations. Therefore, depth to limiting or restrictive conditions, bedrock, and groundwater may be different from the results reported in this letter.

An OWTS site evaluation will need to be performed in accordance with the applicable health department codes prior to construction.

I hope this provides the information you have requested. Should you have questions, please feel free to contact our office.

Cordially,

Reviewed by,

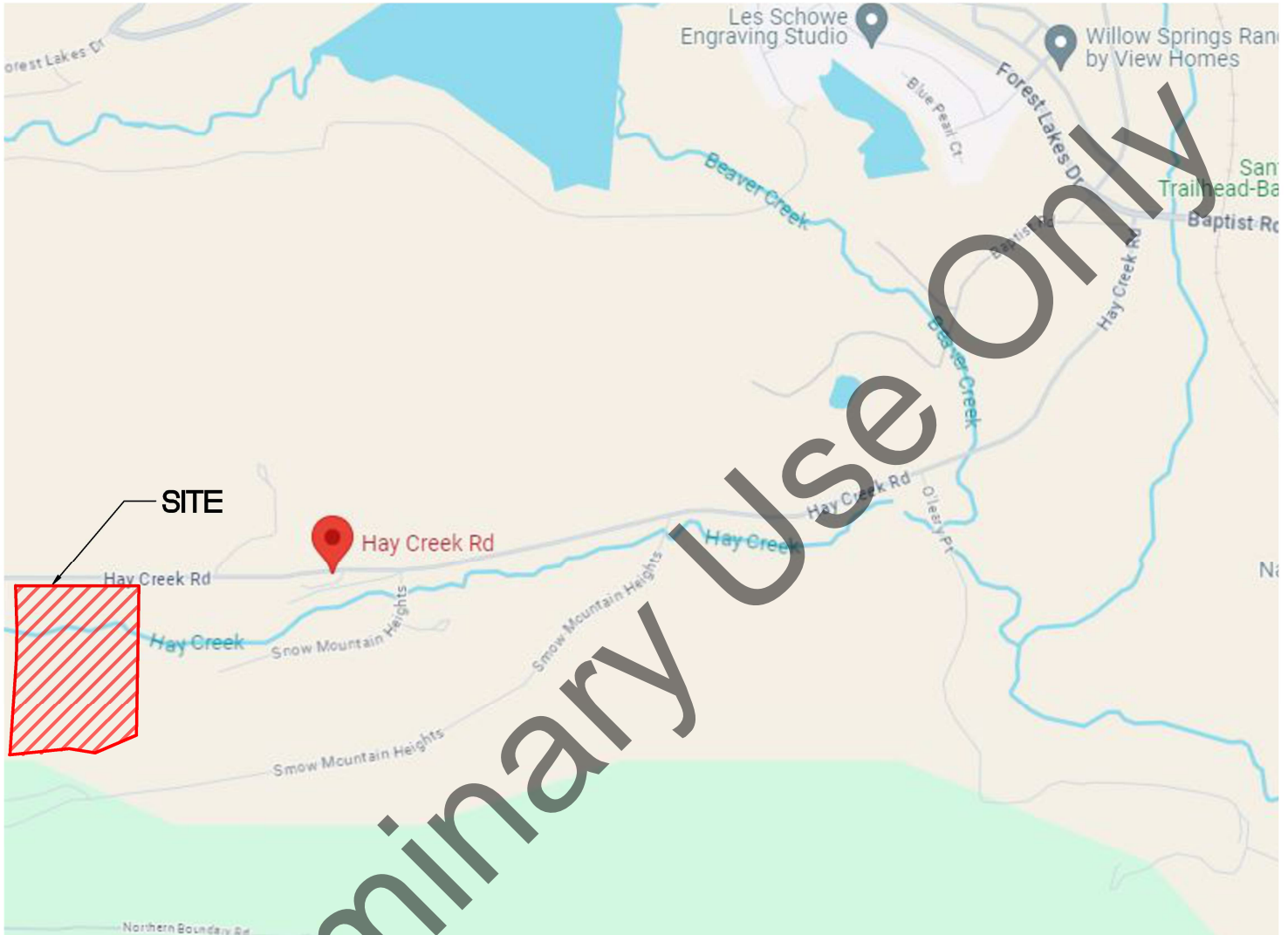
RMG – Rocky Mountain Group

RMG – Rocky Mountain Group

Kelli Zigler
Project Geologist

Tony Munger, P.E.
Sr. Geotechnical Project Manager





Preliminary Use Only



NOT TO SCALE

Architecture
Structural
Geotechnical



Engineers / Architects

SOUTHERN COLORADO OFFICE
2910 AUSTIN BLUFFS PKWY, SUITE 100,
COLORADO SPRINGS, CO 80918
(719) 548-0600 ~ WWW.RMGENGINEERS.COM

SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

Materials Testing
Forensics
Civil / Planning

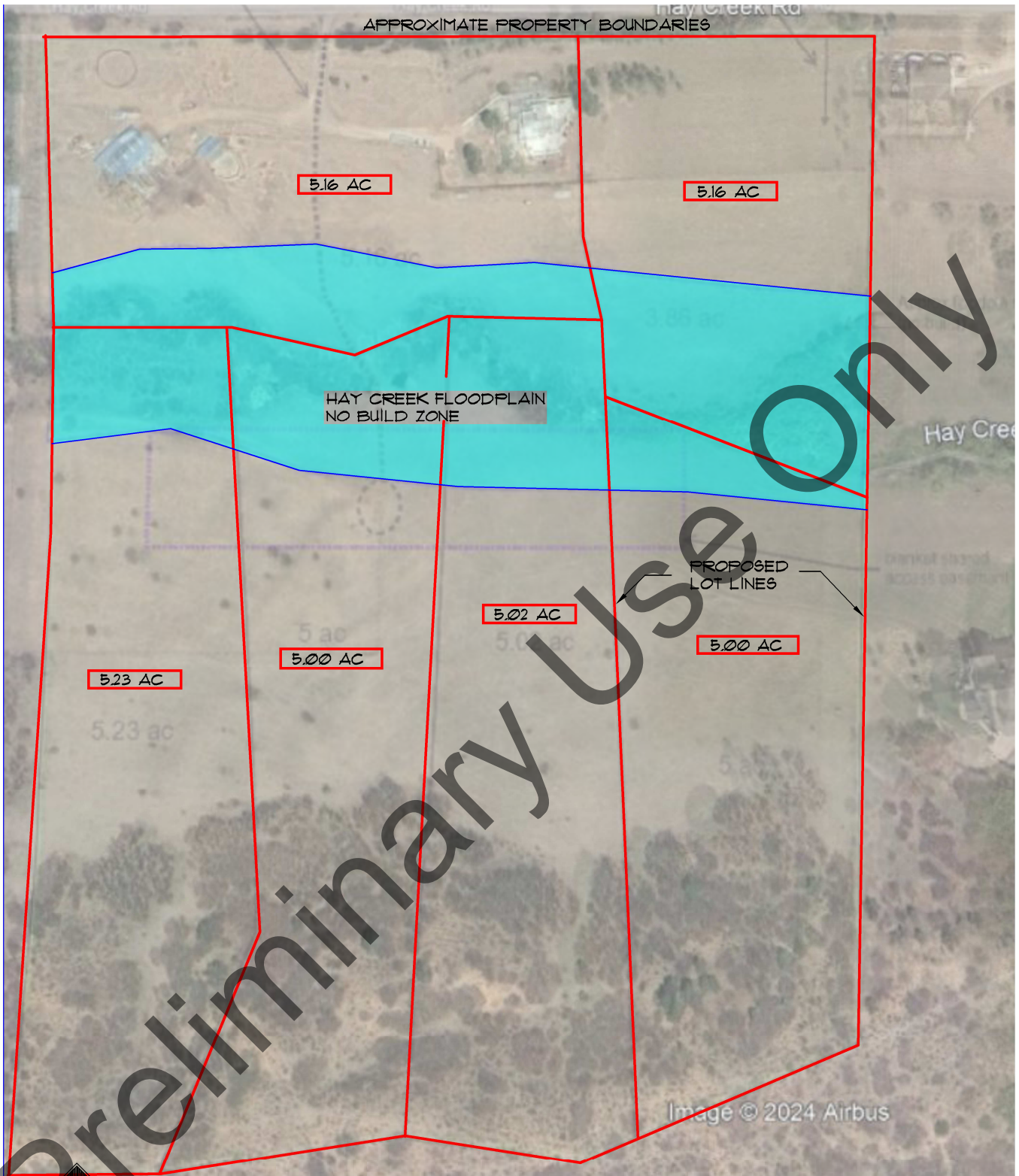
SITE VICINITY MAP

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

JOB No. 195873

FIG No. 1

DATE 7-2-2024



Preliminary Use Only

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Architecture
Structural
Geotechnical



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Materials Testing
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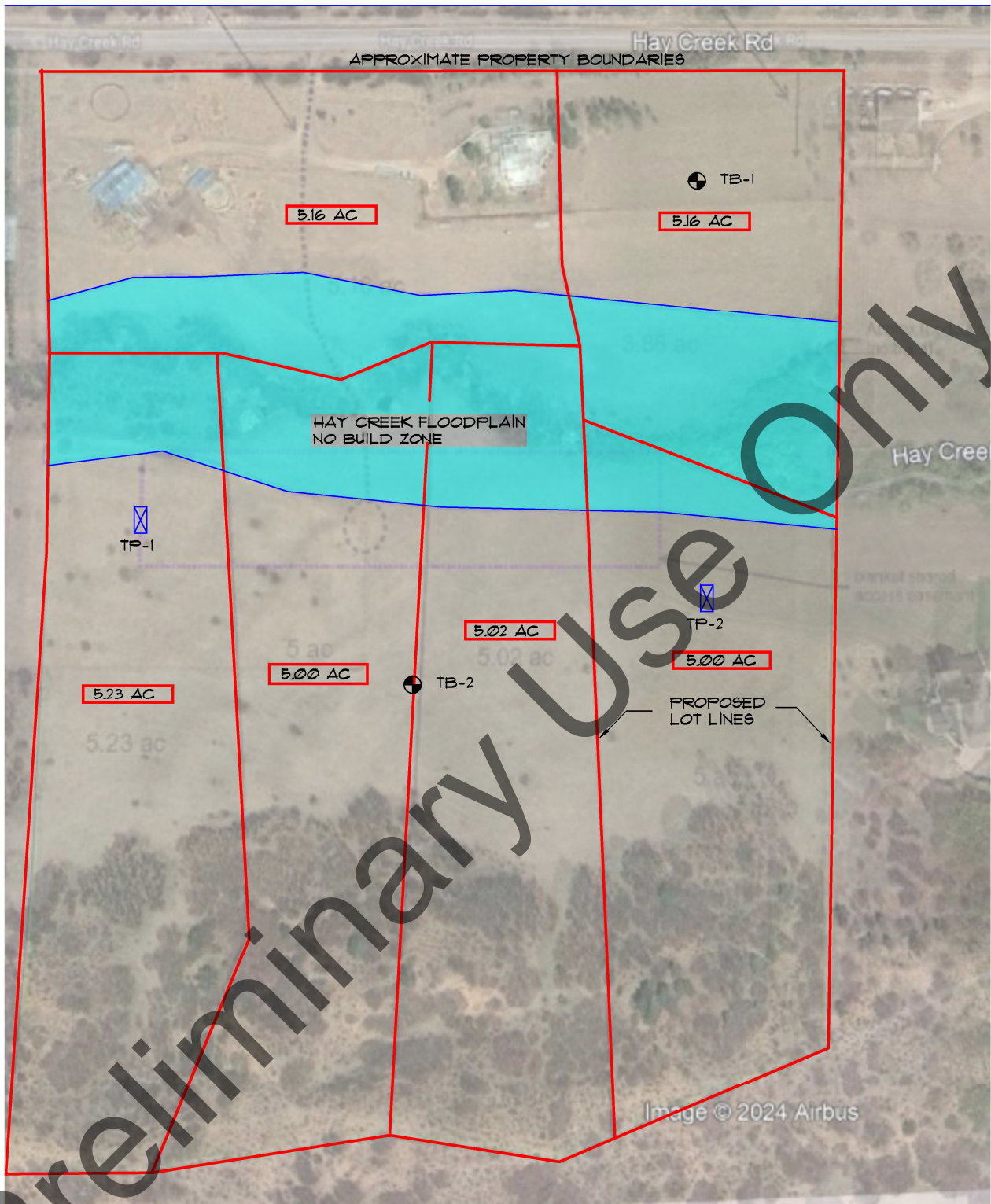
PROPOSED LOT LAYOUT

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

JOB No. 195873

FIG No. 2

DATE 7-2-2024




 NOT TO SCALE

 DENOTES APPROXIMATE LOCATION OF TEST PITS

 DENOTES APPROXIMATE LOCATION OF TEST BORINGS

Architecture
Structural
Geotechnical



Engineers / Architects

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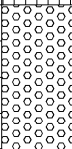

TEST BORING / TEST PIT LOCATION PLAN



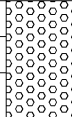
HAY CREEK ROAD
 MINOR SUBDIVISION
 EL PASO COUNTY, CO
 JAMES HULL

JOB No. 195873





FIG No. 3

DATE 7-2-2024

TEST PIT TP-1			
DATE OBSERVED: 4/17/24			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 2.0 FT LOAMY SAND (STRUCTURELESS, SINGLE-GRAINED)	2ft		1
2.0 TO 5.0 FT SANDY CLAY (MODERATE, BLOCKY)	4ft		4
5.0 - 8.0 FT (>35% ROCK >2mm)	6ft		R-0
	8ft		R-0

TEST PIT TP-2			
DATE OBSERVED: 4/17/24			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 2.0 FT LOAMY SAND (STRUCTURELESS, SINGLE-GRAINED)	2ft		1
1 - 7 FT SAND, SINGLE GRAIN (STRUCTURELESS)	4ft		3
7.0 - 8.0 FT (>35% ROCK >2mm)	8ft		R-0

SOIL DESCRIPTIONS

-  LOAMY SAND
-  SANDY CLAY
-  SAND
-  35% ROCK

TEST PIT LOGS

HAY CREEK ROAD
6-LOT MINOR SUBDIVISION
EL PASO COUNTY, COLORADO
JAMES HULL

JOB No. 195873

FIG No. 4

DATE 7-2-2024

SHEET 1 of 1

Architecture
Structural
Geotechnical



Engineers / Architects

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Forensics
Civil / Planning

APPROXIMATE PROPERTY BOUNDARIES

Access to be provided for additional lots

approximate location of existing septic (to remain)

5.16 AC

5.16 AC

fw / HAY CREEK FLOODPLAIN / 7A NO BUILD ZONE

PROPOSED LOT LINES

5.23 AC

5.00 AC

5.02 AC

5.00 AC

SS

SS




Image © 2024 Airbus

Is this septic site located in the access easement? Please review.

LEGEND

OWTS CONDITIONS

- *ss* - steep slopes - moderate to steep slopes with slopes ranging between 12-24 percent. Area to be avoided during the planning and placement of the individual OWTS.
- *fw* - floodway - Zone A per FEMA, area currently does not contain Base Flood Elevations. This area is to be considered a No Build Zone until further investigation is completed to determine feasibility of future development. At no point shall construction or the OWTS encroach the floodway.

-  Area mapped within the FEMA Floodway
-  Proposed locations for the OWTS
-  Proposed location for the house

Note: The chosen OWTS and home locations are for illustration only. If the El Paso County Health Department physical setback requirements are met for each lot, steep slopes and the floodway are avoided there are no restrictions on the OWTS placement.



NOT TO SCALE

JOB No. 195873

Materials Testing
Forensics
Civil / Planning



Engineers / Architects

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Architecture
Structural
Geotechnical

SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

HAY CREEK ROAD
MINOR SUBDIVISION
EL PASO COUNTY, CO
JAMES HULL

ENGINEER: TM
DRAWN BY: KZ
CHECKED BY: TM
ISSUED: 1-02-2024

SEPTIC
SUITABILITY MAP

SHEET No.
FIG-5