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**WASTEWATER (OWTS) STUDY
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, COLORADO**

Prepared for

TimberRidge Development Group, LLC
2138 Flying Horse Club Drive
Colorado Springs, Colorado 80921

Attn: Loren Moreland

June 10, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.



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Geologist

LLL/am

Encl.

Entech Job No. 221106
AAprojects/2022/221106 county ww(owts)



Reviewed by:



Joseph C. Goode, Jr., P.E.
President

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1.0 SUMMARY

Project Location

The project lies in portions of the SE¼ of Section 21, SW¼ of Section 22, NW¼ of Section 27, and NE¼ of Section 28, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately three miles northeast of Colorado Springs, Colorado.

Project Description

Total acreage involved for the Retreat at TimberRidge Filing 3 consists of 44.5 acres. Filing 3 consists of thirty-three single-family residential lots. Three 2.5+ acres rural residential lots (Lots 1 – 3), and thirty conventional residential lots (Lots 4 – 33) are proposed. Six tracts area also included in Filing 3 for open space, trails, and drainage areas. Large Lots 1 – 3 will be serviced by individual water wells and on-site wastewater treatment systems; Sterling Ranch Metropolitan District will provide sewer and water for Lots 4 – 33.

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of shallow bedrock, expansive soils, artificial fill, downslope creep, erosion, floodplain, ponded water, shallow groundwater, seasonal shallow groundwater and potentially seasonally shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the SE $\frac{1}{4}$ of Section 21, SW $\frac{1}{4}$ of Section 22, NW $\frac{1}{4}$ of Section 27, and NE $\frac{1}{4}$ of Section 28, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately three miles northeast of Colorado Springs, Colorado, at Vollmer Road and Arroya Lane. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually to moderately sloping to the south, with moderate to steep slopes along Sand Creek. The drainages on site flow in a southerly direction through the central portion of the site. Ponds are located on the site, overall TimberRidge, one north of Arroya Lane outside of the proposed residential development, and one located along the eastern side of Parcel C. Water was observed in Sand Creek and the ponds, other drainages on the site were dry at the time of the original investigation. The pond along the eastern side of Filing 3 was currently dry at the time of our recent site observations. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses, weeds, cacti, and yuccas, with areas of scattered trees along Sand Creek, and ponderosa pine trees located across the northwest portion of the site. Site photographs, taken May 6 and 9, 2022, are included in Appendix A.

Total acreage involved in Filing 3 is approximately 44.5 acres. Thirty-three single-family residential lots are proposed. The development will consist of three larger 2.5+ acre sized lots in the northwestern portion of the development and thirty $\frac{1}{2}$ acre to 2.5 acre sized lots in the northeastern portions of the development to the east of Sand Creek. The $\frac{1}{2}$ to 2.5 acre lots will be serviced by municipal sewer and water. The 2.5+ acre lots will have individual water wells and on-site wastewater treatment systems. Open space is proposed along Sand Creek. Overlot grading is anticipated to develop the smaller lots. Grading should be limited to the road areas on the larger 2.5 acre lots. The Development Plan is presented in Figure 3. At the time of our site observations the roadways had been cut, part of the utilities were installed, and some minor areas of grading started on the eastern side of Sand Creek. Additional grading is anticipated for the site.

3.0 SCOPE OF THE REPORT

The scope of the report will include the following:

- OWTS Tactile test pits to evaluate the site for onsite wastewater systems. Test borings to evaluate general soil conditions were also completed.

4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on May 6 and 9, 2022.

Three additional test borings were drilled on the site to determine general soil and bedrock characteristics. The locations of the test borings are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Test Boring Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

Previous site investigation performed by Entech consisted of thirteen test borings, and six test pits to evaluate the use of individual on-site wastewater treatment systems. Test Pit Nos 1 and 2 are located within Filing 3. The locations of the test borings and test pits are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Laboratory Testing Summary, Test Boring and Test Pit Logs are presented in Appendix D (Reference 1). Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis ASTM D-422, Atterberg Limits ASTM D-4318, volume change testing using FHA Swell and Swell/Consolidation test. Sulfate testing was performed on select samples to evaluate potential

for below grade concrete degradation due to sulfate attack. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately twelve miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northeasterly direction (Reference 2). The rocks in the area of the site are sedimentary in nature and typically Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of man-made, and alluvial soils of Quaternary Age. The alluvial soils were deposited by water on site and as stream terraces along Sand Creek and the drainages located on the site. Man-made soils exist as fill piles located in the southern portion of the site. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped three soil types on the site (Figure 4). In general, the soils classify as coarse sandy loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
71	Pring Coarse Sandy Loam, 3 to 8% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to have moderate to moderately rapid permeabilities. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards.

5.3 Site Stratigraphy

The Falcon NW Quadrangle Geology Map showing the site is presented in Figure 6 (Reference 5). The Geology Map prepared for the site is presented in Figure 6. Four mappable units were identified in Filing 3 on this site which are described as follows:

- Qaf Artificial Fill of Holocene Age:** These are recent deposits of man-made fill. They are associated with the three man-made dams located across the site.
- Qal Recent alluvium of Holocene Age:** These are recent deposits that have been deposited along Sand Creek and the other drainages on-site.
- Qam Middle alluvium of Holocene to Pleistocene Age:** These materials consist of lower stream terrace deposits. The alluvium typically consists of silty to clayey gravelly sands.
- Tkd Dawson Formation of Tertiary to Cretaceous Age:** The Dawson Formation typically consisted of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands and sandy clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon NW Quadrangle* distributed by the Colorado Geological Survey in 2003 (Reference 5), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6), and the *Geologic Map of the Denver 1^o x 2^o Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 7). The Test Borings and Test Pits used in evaluating the site and are included in Appendices B and D. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

The soils encountered in the Test Borings can be grouped into four general soil types. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 silty to slightly silty sand and very clayey sand (SM-SW, SM, SC), encountered in all of Test Borings at the existing ground surface and extending to depths ranging from 1 foot to 17 feet bgs. These soils were encountered at loose to dense states and at moist conditions. The majority of the soils were encountered at medium dense states. Samples tested had 9 to 41 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sand being non-plastic. Sulfate testing resulted in less than 0.01 to 0.01 percent sulfate by weight indicating the sand exhibits negligible potential for below grade concrete degradation.

Soil Type 2 sandy clay (CL), encountered in Test Boring Nos. 1, 2 and 7 at depths ranging from 2 to 14 feet bgs, and extending to depths ranging from 4 to 19 feet. These soils were encountered at very soft to stiff consistencies. Samples tested had 78 to 90 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 47 and a plastic index of 21. FHA Swell testing on samples of the sandy clay resulted in expansion pressures of 1520 to 1550 psf, indicating a moderate to high expansion potential. Sulfate testing resulted in less than 0.01 to 0.01 percent sulfate by weight indicating the clay exhibits negligible potential for below grade concrete degradation.

Soil Type 3 silty to slightly silty sandstone and clayey-silty sandstone (SM, SM-SW, SC-SM), encountered in all of Test Borings at depths ranging from 1 foot to 19 feet bgs and extending to the termination of the test borings (20 feet). The sandstone was encountered at dense to very dense states and at moist conditions. Samples tested had 9 to 24 percent passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sandstone being non-plastic. Sulfate testing resulted in less than 0.01 percent sulfate by weight indicating the sandstone exhibits negligible potential for below grade concrete degradation.

Soil Type 4 sandy to very sandy claystone (CL), encountered in Test Boring Nos. 4 and 5 at depths ranging from 7 to 9 feet bgs and extending to depths ranging from 16 to 19 feet bgs. The claystone was encountered at hard consistencies and at moist conditions. Samples tested had 56 to 64 percent passing the No. 200 Sieve. Swell/Consolidation Testing resulted in expansions of 1 to 3.3 percent, which indicates the claystone exhibits a low to high expansion potential. Atterberg Limits Testing resulted in a liquid limit of 44 and a plastic index of 20.

The Test Boring Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

6.0 GROUNDWATER/DRAINAGE AREAS

Groundwater was encountered in one of the test borings located within Filing 3 at an approximate depth 14.5 feet, water was not encountered in the remaining borings which were drilled to depths of 16 to 20 feet. Areas of water, seasonal shallow groundwater water, and potential seasonal shallow groundwater have been mapped along the drainages on-site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time.

Groundwater and Floodplain Areas - constraint

Areas within the drainages on-site have been identified as areas of seasonally wet and/or seasonally high groundwater areas. Water was observed in the three ponds on-site, and flowing in Sand Creek. The majority of the drainages across the site were dry. The site is mapped within floodplain zones according to the FEMA Map No. 08041CO535G, Figure 7 (Reference 8). The floodplain area is to consist of open space/ park for the development. These areas are discussed as follows:

Seasonal Shallow Groundwater Area - constraint

In these areas, we would anticipate periodic high subsurface moisture conditions and frost heave potential on a seasonal basis. Additional, highly organic soils could be encountered in these areas. These areas lie within defined drainages, and it is anticipated they will be avoided by development and OWTS locations. Any structures in or adjacent to these areas should follow the mitigation discussed below.

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Structures should not block drainages. All organic material should be completely removed prior to any fill placement. Finished floor levels must be located a minimum of one foot above floodplain levels.

Potentially Seasonal Shallow Groundwater Area - constraint

In these areas, we would anticipate the potential for periodically high subsurface moisture conditions, frost heave potential and highly organic soils. The majority of these areas lie within defined drainages which can likely be avoided by the proposed development. The same mitigation recommendations for the seasonal shallow groundwater areas apply to the potentially seasonal shallow groundwater areas.

Areas of Ponded Water - constraint

These are areas of standing water behind earthen dams on site. We would not expect development or OWTS systems in these areas. Either the dams can be avoided by construction or the areas may be completely regraded. Should complete regrading of the site be considered, all organic matter and soft, wet soils should be completely removed before filling. Any drainage into these areas should be rerouted in a non-erosive manner off of the site where it does not create areas of ponded water around proposed structures.

7.0 ON-SITE WASTEWATER TREATMENT

The site was evaluated for on-site wastewater treatment systems for the proposed lots in accordance with El Paso Land Development Code. Six (6) tactile test pits were performed across the larger lots, Test Pit Nos. 1 and 2 are located within Filing No. 3. Test pits were located in anticipated locations of proposed on-site wastewater treatment system (OWTS) for the rural lots. The locations were chosen to determine a general understanding of the soil and bedrock conditions across the site. The results of the test pits are presented in Table 2, and Test Pit Logs are included in Appendix D. The approximate locations of the test pits are indicated on Figure 3 and 6, and on the Septic Suitability Map, Figure 8.

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has been mapped with three soil descriptions. The Soil Survey Map (Reference 3) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix E. The soils are described as having moderate to moderately rapid percolation rates.

Soils encountered in the tactile test pits consisted of loamy sand to gravelly loamy sand, sandy loam to gravelly sandy loam, sandy clay and silty clay with underlying clayey to silty sandstone. The limiting layers encountered in the test pits are the sandy loam, silty clay and silty to clayey

sandstone, which corresponds to an LTAR values of 0.10 to 0.50 gallons per day per square foot. The bedrock was encountered at 5 feet in Test Pit No. 2. The conditions encountered in the majority of the test pits will require a designed system. Absorption fields must be maintained a minimum of 4 feet above groundwater or bedrock.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County Guidelines and properly maintained. Based on the testing performed as part of this investigation and the type of project designed systems will likely be required for the majority of the lots. A Septic Suitability Map is presented in Figure 8. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any ponded areas and 25 feet from dry gulches. It should be noted that additional testing will be required for the individual lots prior to construction.

8.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions are suitable for onsite wastewater systems. The proposed development and use are consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites and absorption fields will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for TimberRidge Development Group, LLC. for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

BIBLIOGRAPHY

1. Entech Engineering, Inc. April 26, 2021. *Soil, Geology, and Geologic Hazard Study, The Retreat at TimberRidge, Filing No. 2, Vollmer Road and Arroya Lane. El Paso County, Colorado.* Entech Job No. 211066.
2. Bryant, Bruce; McGrew, Laura W, and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado.* Sheet 2. U.S. Geologic Survey. Map I-1163.
3. Natural Resource Conservation Service, September 22, 2015. *Web Soil Survey.* United States Department Agriculture, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
4. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*
5. Madole, Richard F., 2003. *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado.* Colorado Geological Survey. Open-File Report 03-8.
6. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado.* USGS, Map I-857-F.
7. Bryant, Bruce; McGrew, Laura W. and Wobus, Reinhard A. 1981. *Geologic Map of the Denver 1° x 2° Quadrangle, North-Central Colorado.* U.S. Geologic Survey. Map 1-1163.
8. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas.* Map Number 08041CO535G
9. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps.*
10. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties.* Colorado Geological Survey. Special Publication 5-B.
11. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board.* Colorado Geological Survey. Open-File Report 03-07.

TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TIMBERRIDGE
PROJECT TIMBERRIDGE, FILING 3
JOB NO. 221106

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			11.4	NV	NP	<0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY
1	2	10			9.3						SM-SW	SANDSTONE, SLIGHTLY SILTY
1	3	5			22.6						SM	SANDSTONE, SILTY

Table 2: Summary of Percolation Test and Tactile Test Pit Results

Test Pit No.	USDA Soil Type Limiting Layer	LTAR Value	Depth to Bedrock (ft.)	Depth to Seasonal Groundwater (ft.)
1	2A	0.50	N/A	N/A
2	4A*	0.15	5	N/A
3	5*	0.10	7.5	7
4	2A	0.50	N/A	N/A
5	5*	0.10	7	7
6	4A*	0.15	7	N/A

*- Conditions that will require an engineered OWTS

FIGURES

SITE



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VICINITY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

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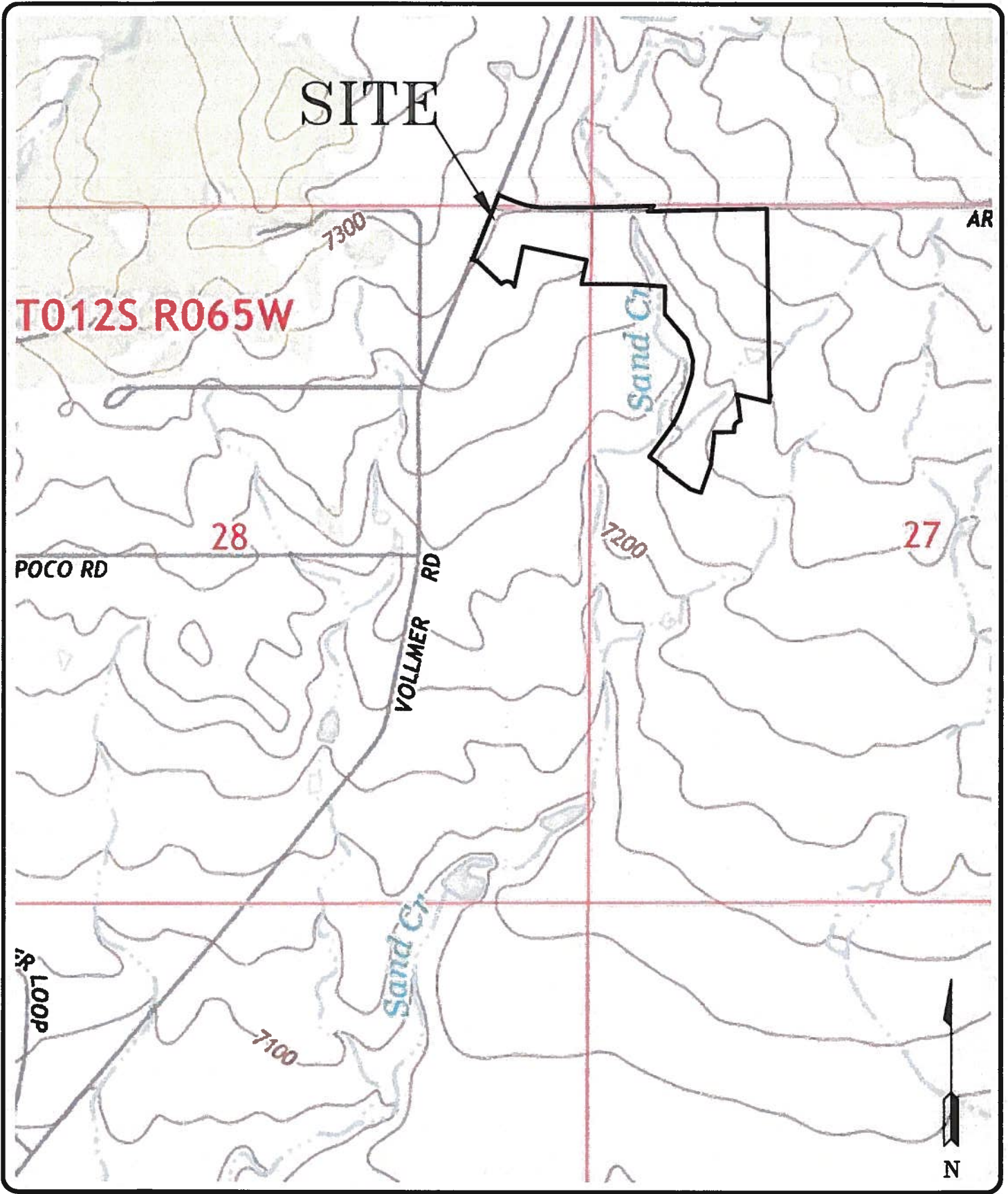
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JOB NO.:
221106

FIG NO.:
1



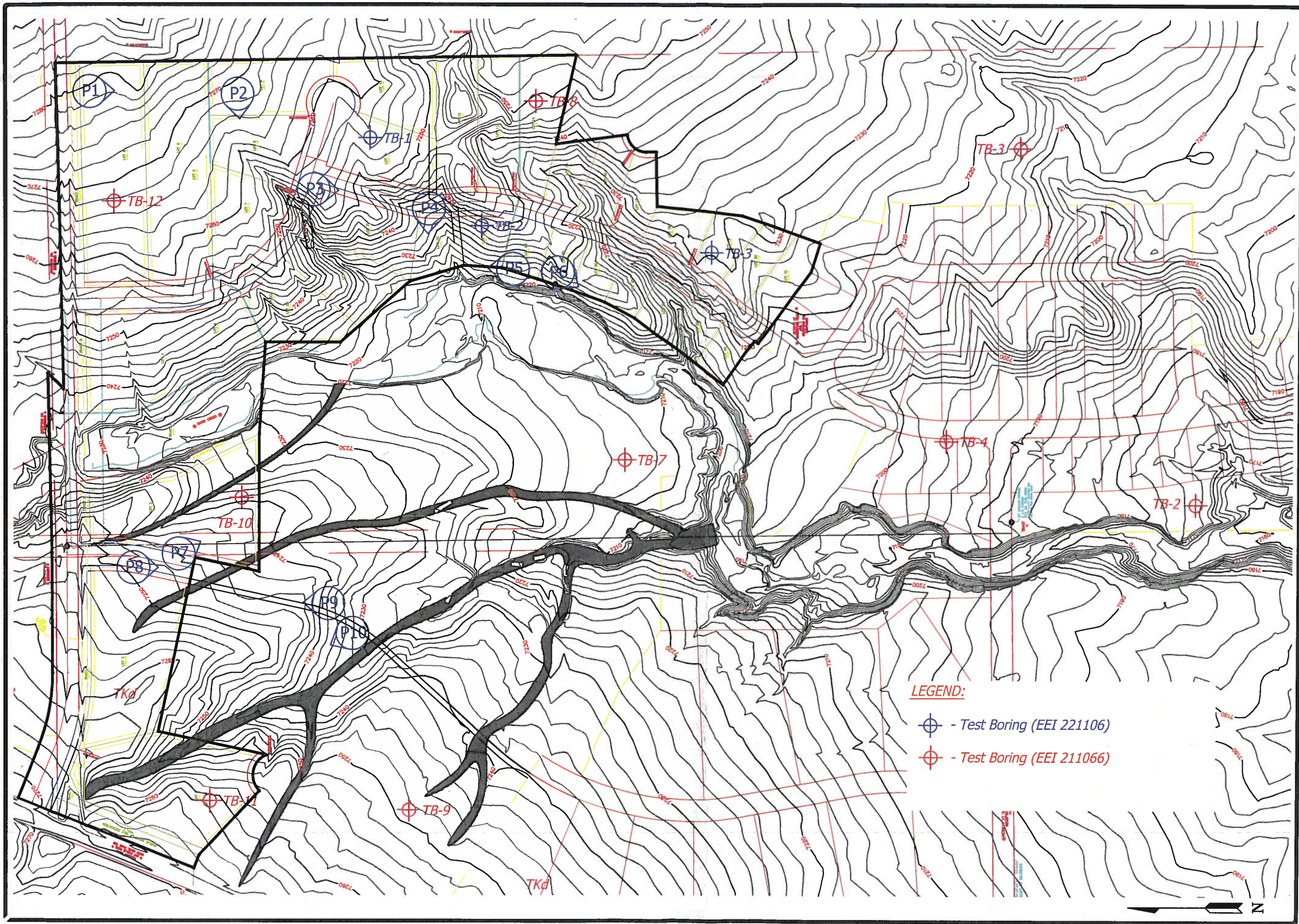
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USGS MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

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JOB NO.:
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FIG NO.:
2

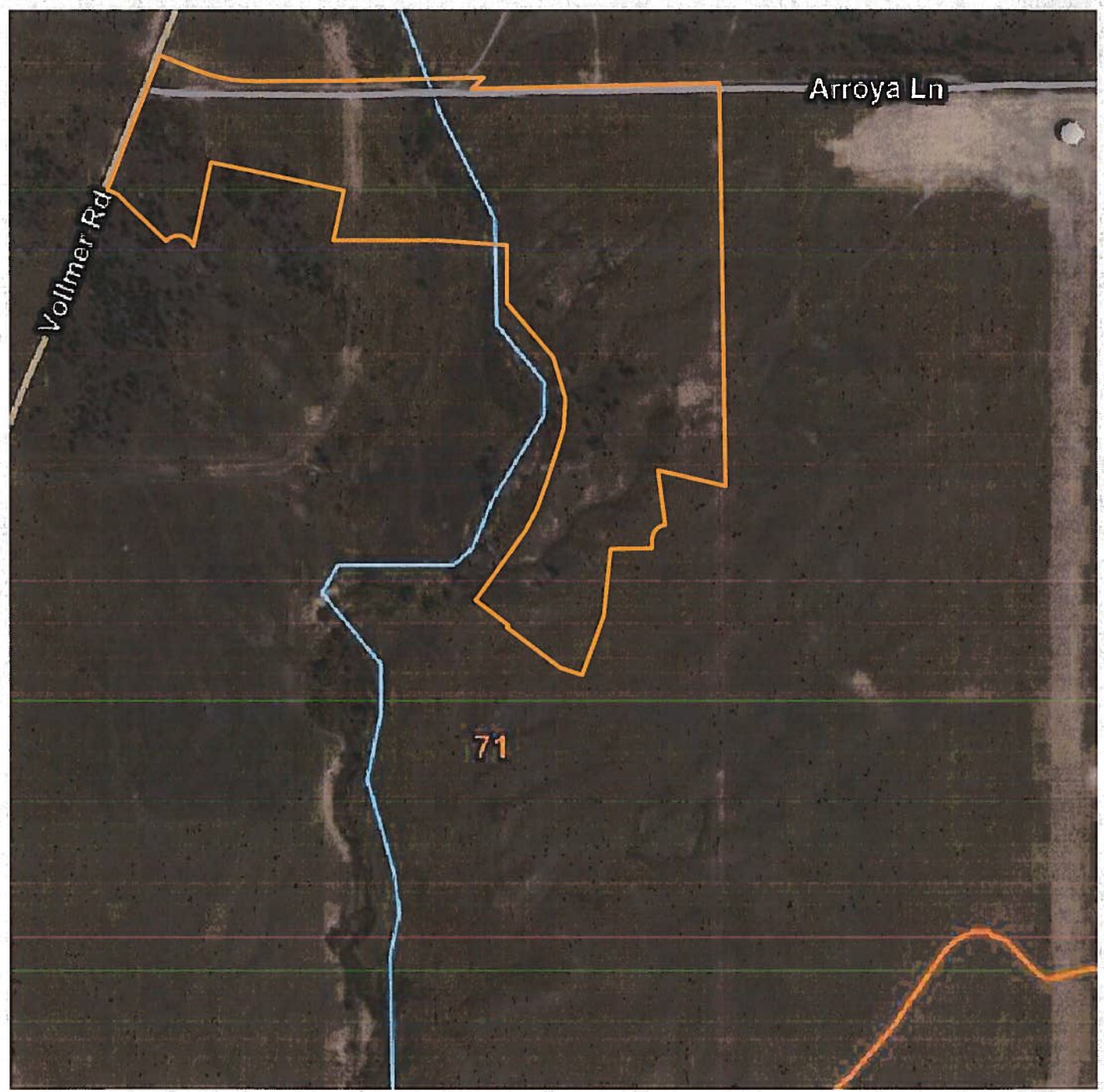


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SITE PLAN
RETREAT AT TIMBERIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERIDGE DEVELOPMENT GROUP, LLC

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JOB NO.	221106
FIGURE NO.	3

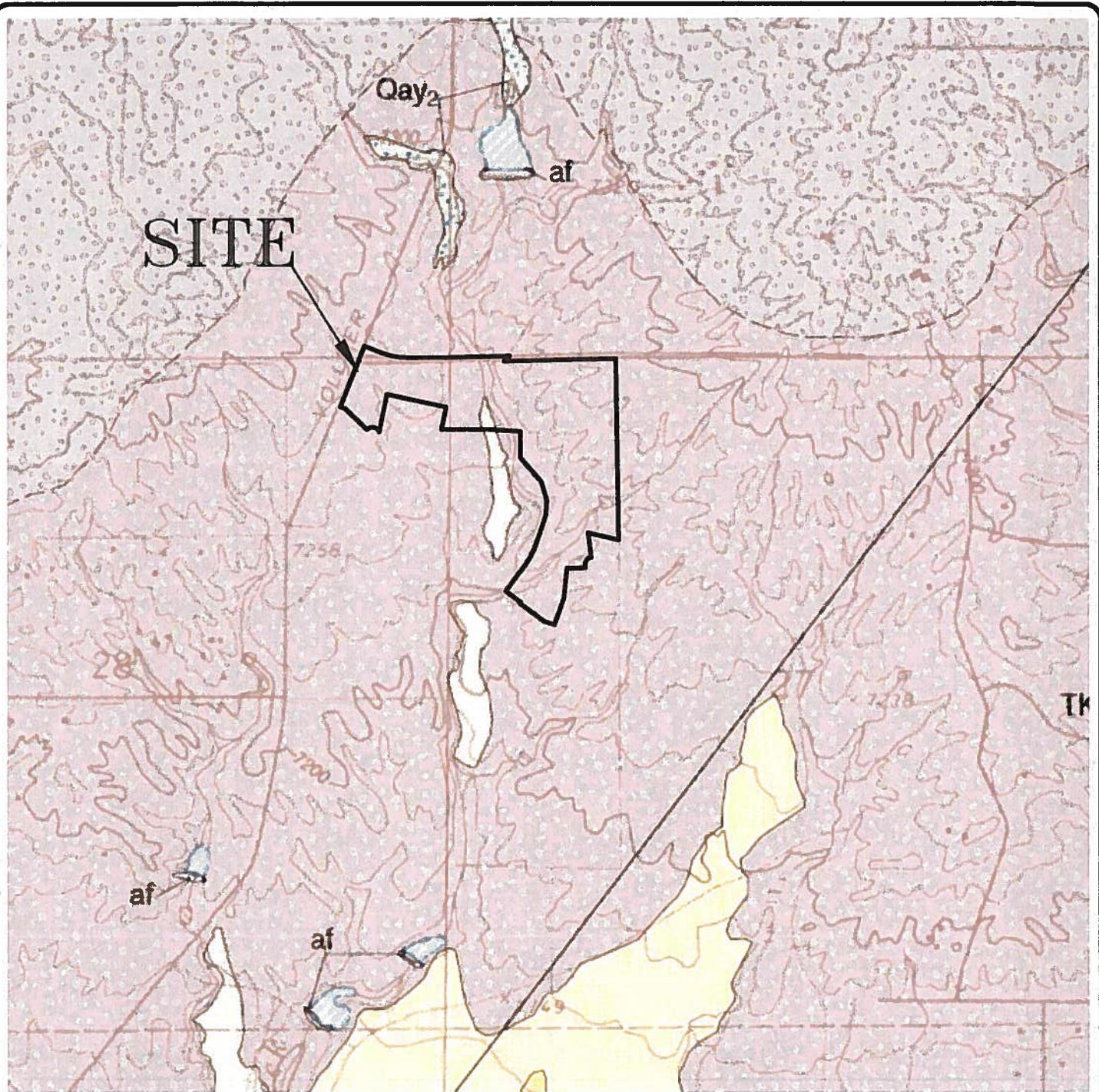


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SOIL SURVEY MAP
RETREAT AT TIMBERRIDGE, FILING 3
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EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

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JOB NO.:
221106
FIG NO.:
4



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FALCON NW QUADRANGLE GEOLOGY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:
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DATE:
 6/7/22

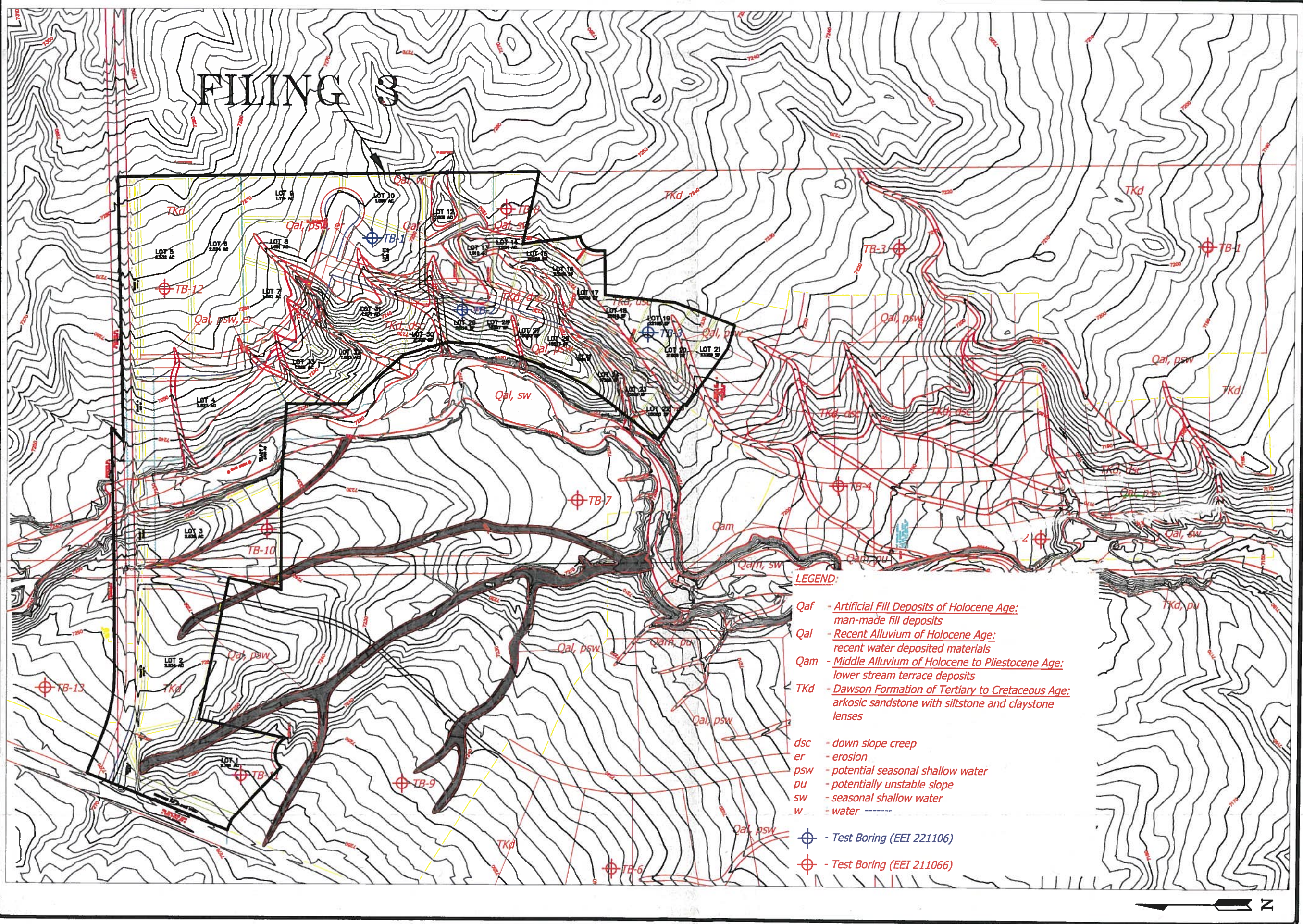
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DATE:

JOB NO.:
 221106

FIG NO.:
 5

FILING 3



- LEGEND:**
- Qaf - Artificial Fill Deposits of Holocene Age: man-made fill deposits
 - Qal - Recent Alluvium of Holocene Age: recent water deposited materials
 - Qam - Middle Alluvium of Holocene to Pliocene Age: lower stream terrace deposits
 - TKd - Dawson Formation of Tertiary to Cretaceous Age: arkosic sandstone with siltstone and claystone lenses
 - dsc - down slope creep
 - er - erosion
 - psw - potential seasonal shallow water
 - pu - potentially unstable slope
 - sw - seasonal shallow water
 - w - water

- Test Boring (EEI 221106)
- Test Boring (EEI 211066)

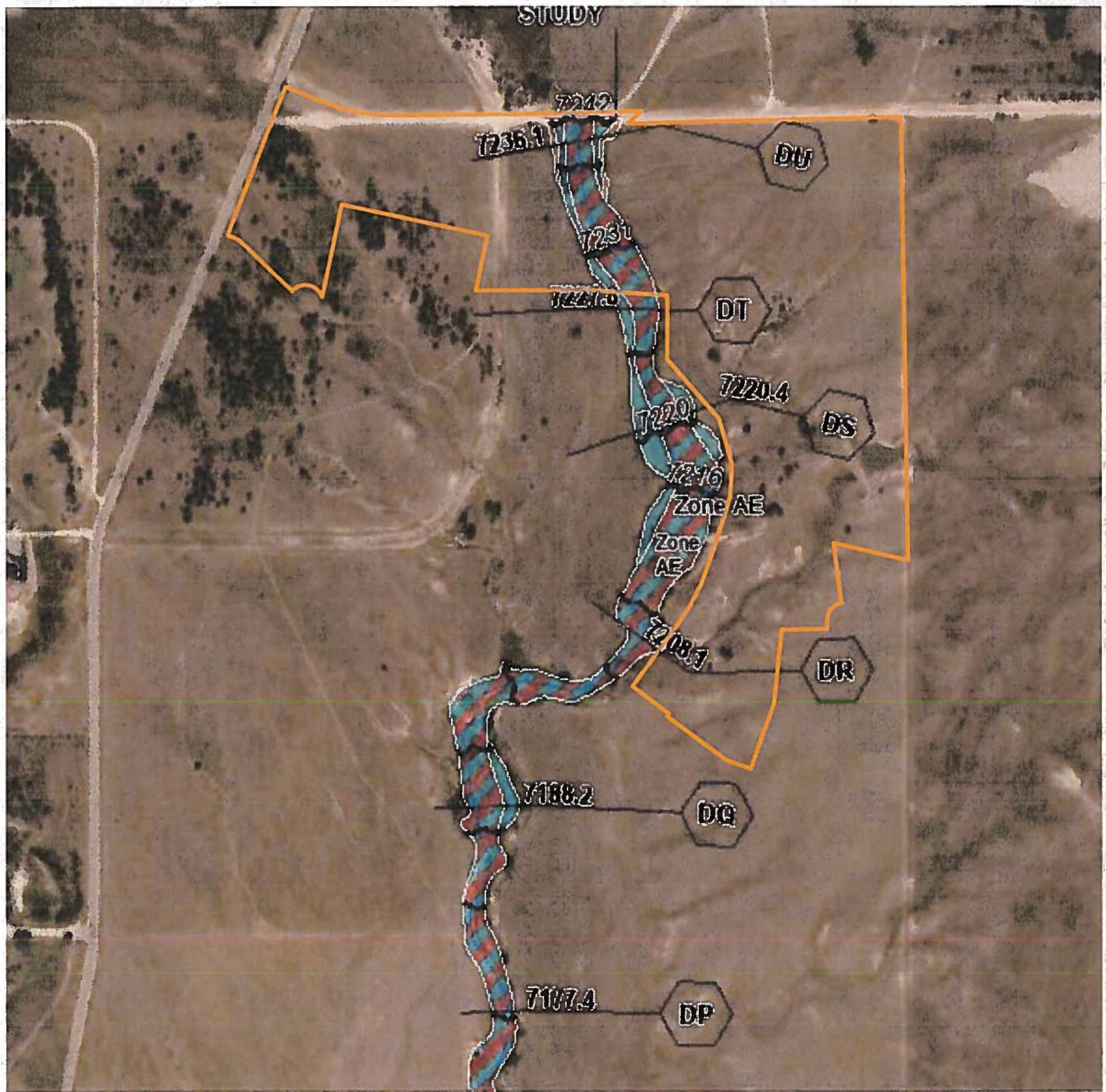


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GEOLOGY MAP/ENGINEERING GEOLOGY
 RETREAT AT TIMBRIDGE, FILING 3
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 EL PASO COUNTY, CO.
 FOR: TIMBRIDGE DEVELOPMENT GROUP, LLC

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SCALE	AS SHOWN
PROJECT NO.	221106
FIGURE NO.	6



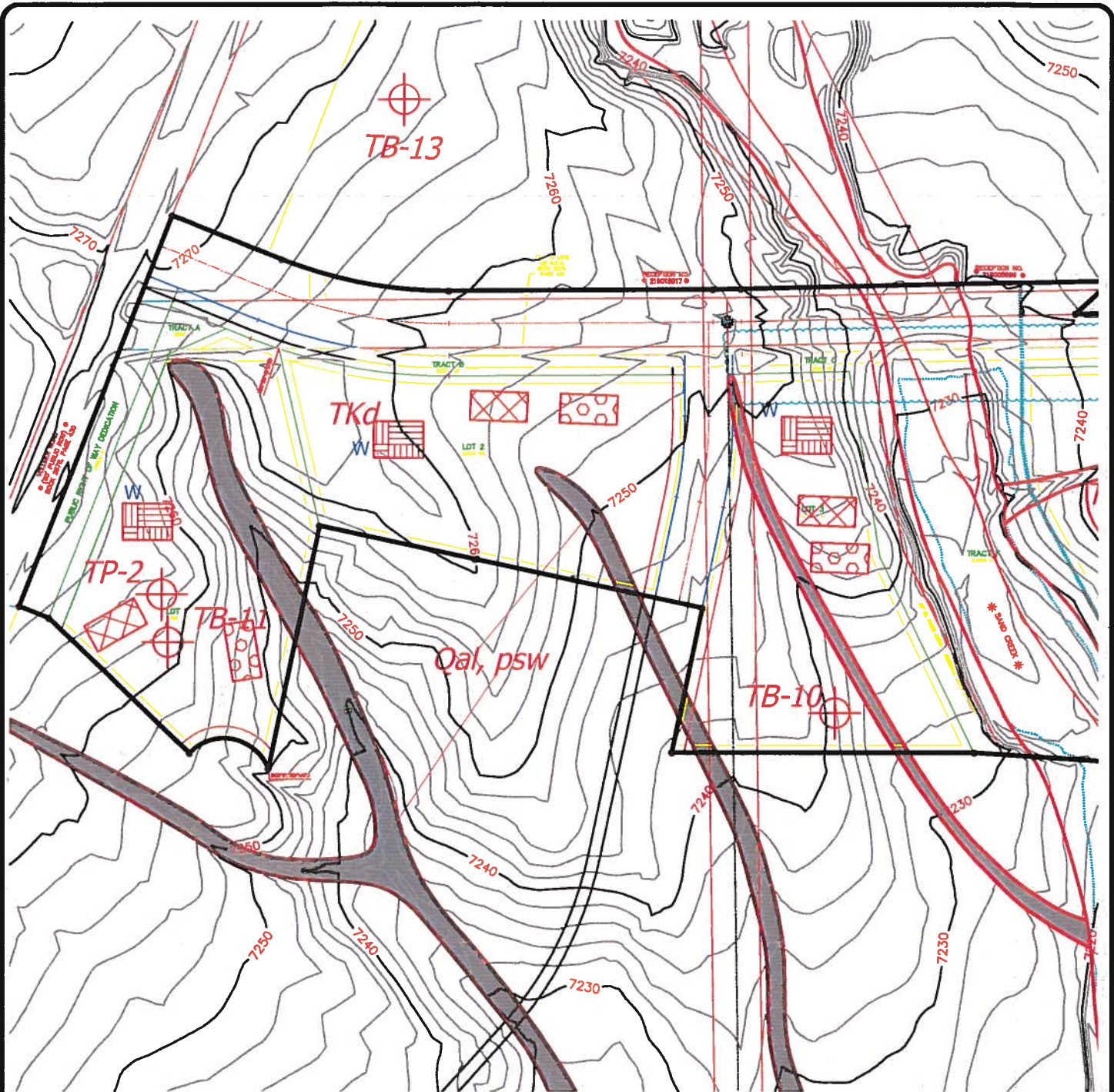
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FLOODPLAIN MAP
RETREAT AT TIMBERRIDGE, FILING 3
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JOB NO.:
221106

FIG NO.:
7



LEGEND:

-  - POSSIBLE OWTS LOCATIONS
-  - POSSIBLE OWTS ALTERNATE LOCATIONS
-  - POSSIBLE HOUSE LOCATIONS

W

*- WATER WELLS MUST BE A MINIMUM OF 100 FT FROM OWTS ABSORPTION FIELDS



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OWTS SUITABILITY MAP
RETREAT AT TIMBERRIDGE, FILING 3
VOLLMER ROAD AND ARROYA LANE
EL PASO COUNTY, CO.
FOR: TIMBERRIDGE DEVELOPMENT GROUP, LLC

DRAWN:
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DATE:
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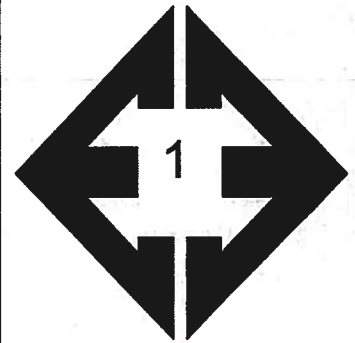
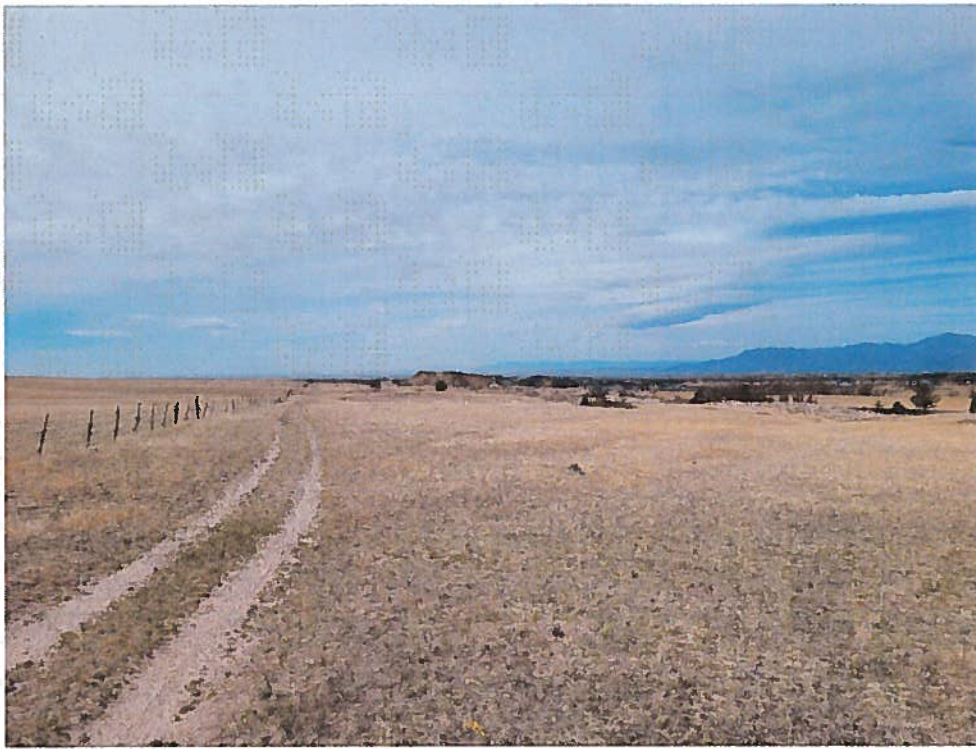
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JOB NO:
 221106

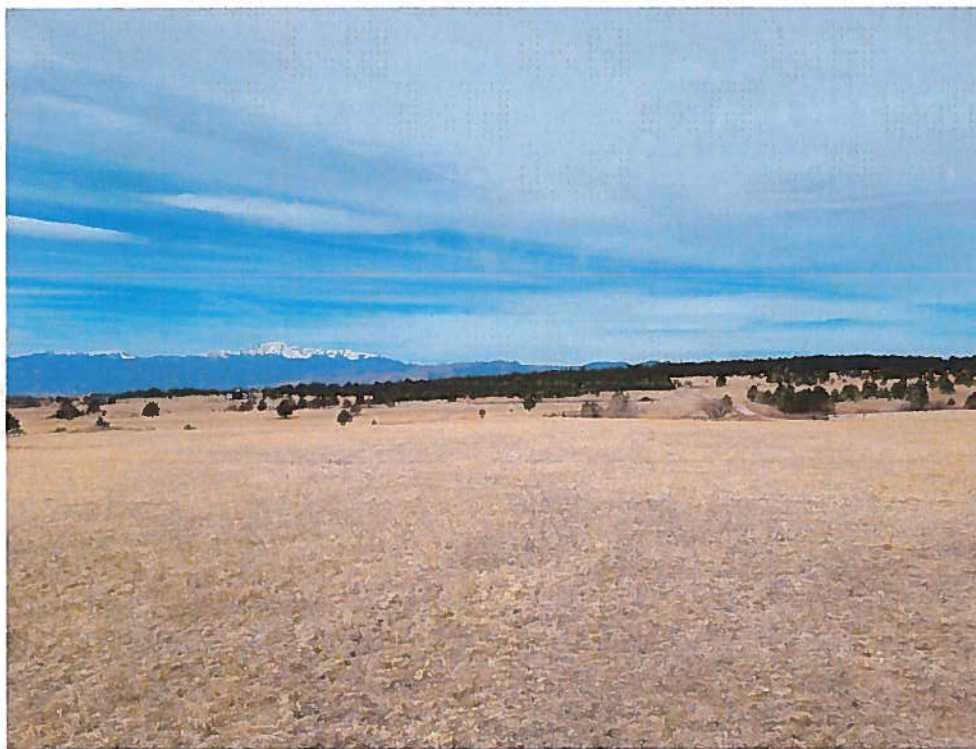
FIG NO:
 8

APPENDIX A: Site Photographs



**Looking south from
the northeastern
corner of the site.**

May 6, 2022



**Looking west from the
northeastern portion of
the site.**

May 6, 2022



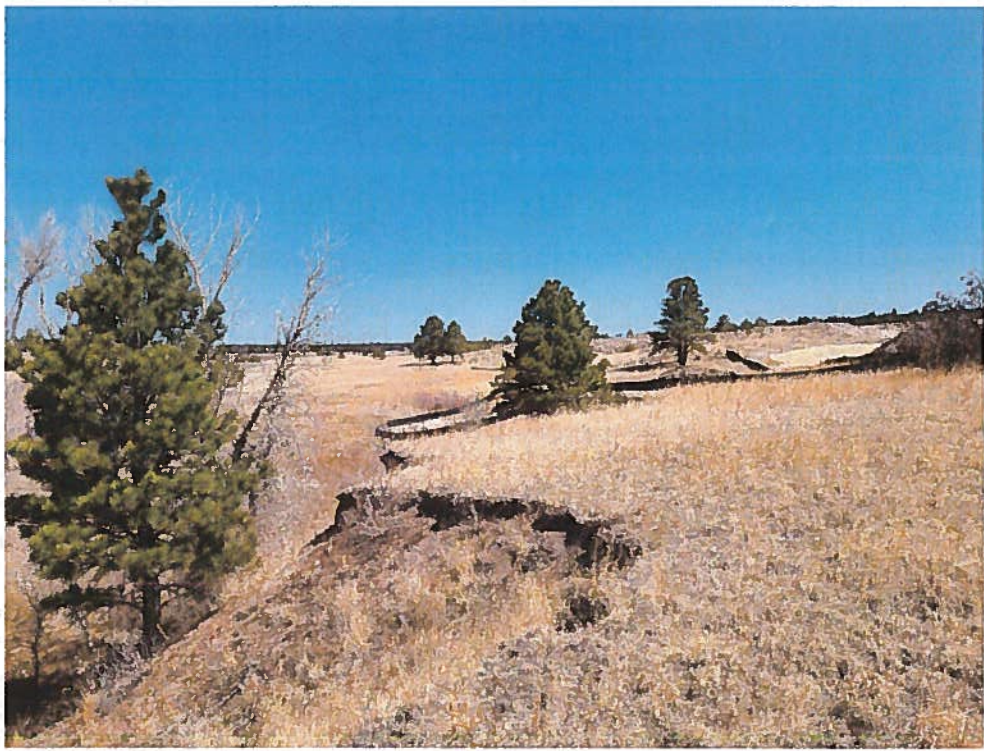
**Looking south along
Hawks Hill Court in the
northeastern portion of
the site.**

May 6, 2022



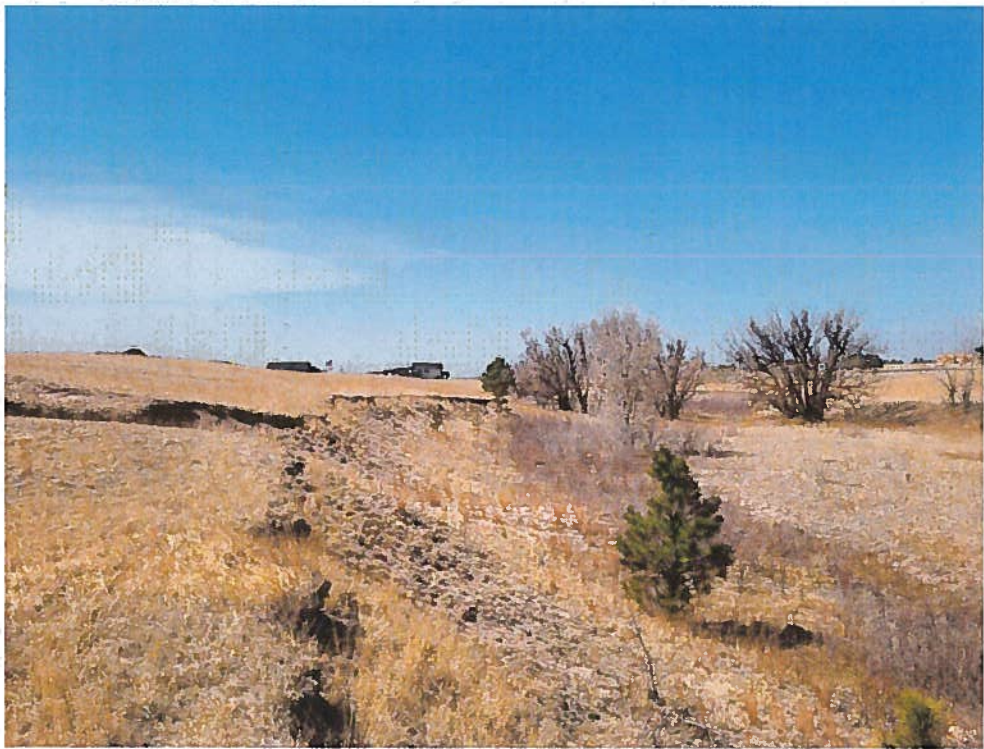
**Looking west from
Hawks Hill Court in the
north-central portion
of the site.**

May 6, 2022



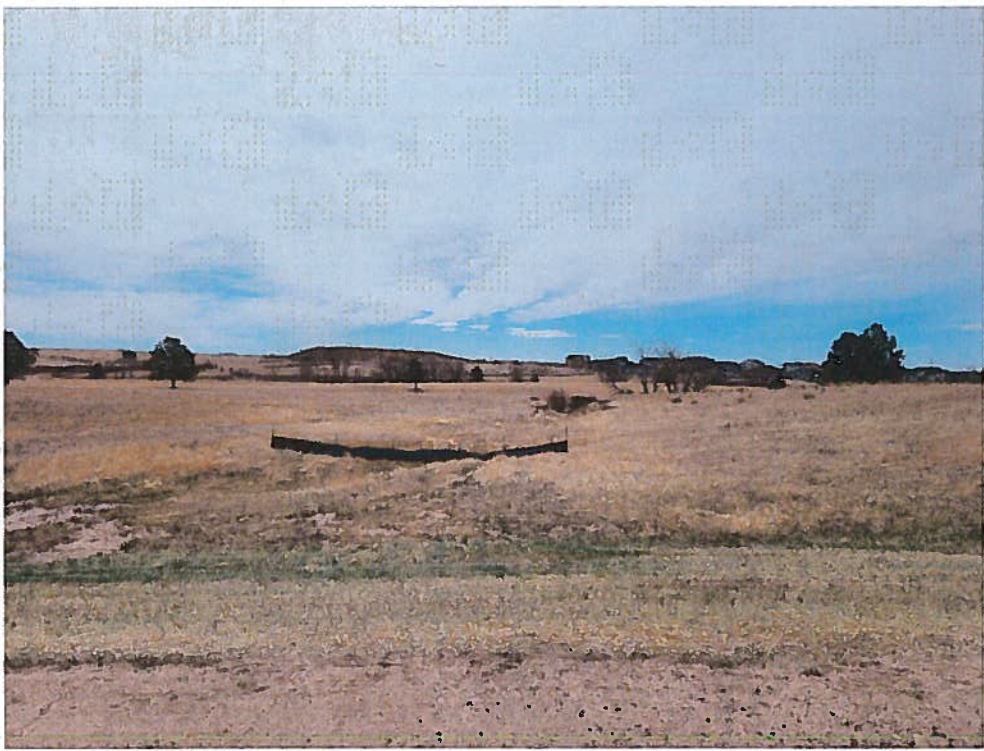
**Looking north along
the eastern side of
Sand Creek.**

May 9, 2022



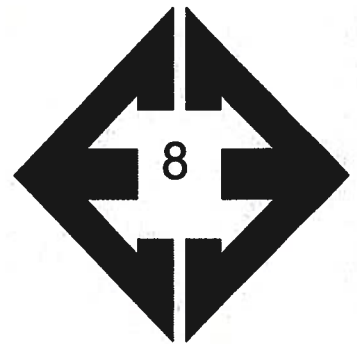
**Looking south along
the eastern side of
Sand Creek.**

May 9, 2022



**Looking southeast
from Aspen Valley
Road in the
northwestern portion
of the site.**

May 6, 2022



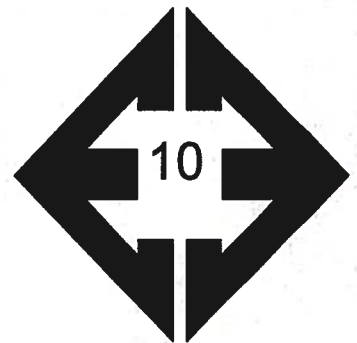
**Looking south along
Aspen Valley Road in
the northwestern
portion of the site.**

May 6, 2022



**Looking north along
Aspen Valley Road in
the western portion of
the site.**

May 6, 2022



**Looking northwest
along minor drainage
in the northwestern
portion of the site.**

May 6, 2022

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
 DATE DRILLED 5/13/2022
 Job # 221106

TEST BORING NO. 2
 DATE DRILLED 5/13/2022
 CLIENT TIMBERRIDGE
 LOCATION TIMBERRIDGE, FILING 3

REMARKS

DRY TO 16', 5/13/22
 SAND, SLIGHTLY SILTY, FINE TO
 COARSE GRAINED, TAN, VERY
 DENSE, DRY TO MOIST

AUGER REFUSAL AT 16'

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			50 11"	2.7	1
5			50 6"	4.7	1
10			50 5"	6.0	1
15			50 3"	8.8	1

REMARKS

DRY TO 20', 5/13/22
 SAND, SLIGHTLY SILTY, FINE TO
 COARSE GRAINED, TAN, VERY
 DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			50 9"	7.5	1
5			50 9"	9.0	1
10			50 7"	7.6	1
15			50 8"	8.5	1
20			50 8"	12.1	1



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TEST BORING LOG

DRAWN:

DATE:

CHECKED:
 LLL

DATE:
 6/6/22

JOB NO.:
 221106

FIG NO.:

B-1

TEST BORING NO. 3
 DATE DRILLED 5/13/2022
 Job # 221106

TEST BORING NO.
 DATE DRILLED
 CLIENT TIMBERRIDGE
 LOCATION TIMBERRIDGE, FILING 3

REMARKS

REMARKS

DRY TO 17', 5/13/22

SAND, SILTY TO SLIGHTLY
 SILTY, FINE TO COARSE GRAINED,
 TAN, VERY DENSE, MOIST

AUGER REFUSAL AT 17'

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			50 11"	6.3	1
			50 6"	7.2	1
10			50 5"	7.2	1
15			50 3"	9.4	1

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5					
10					
15					
20					



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TEST BORING LOG

DRAWN:

DATE:

CHECKED:
 LLL

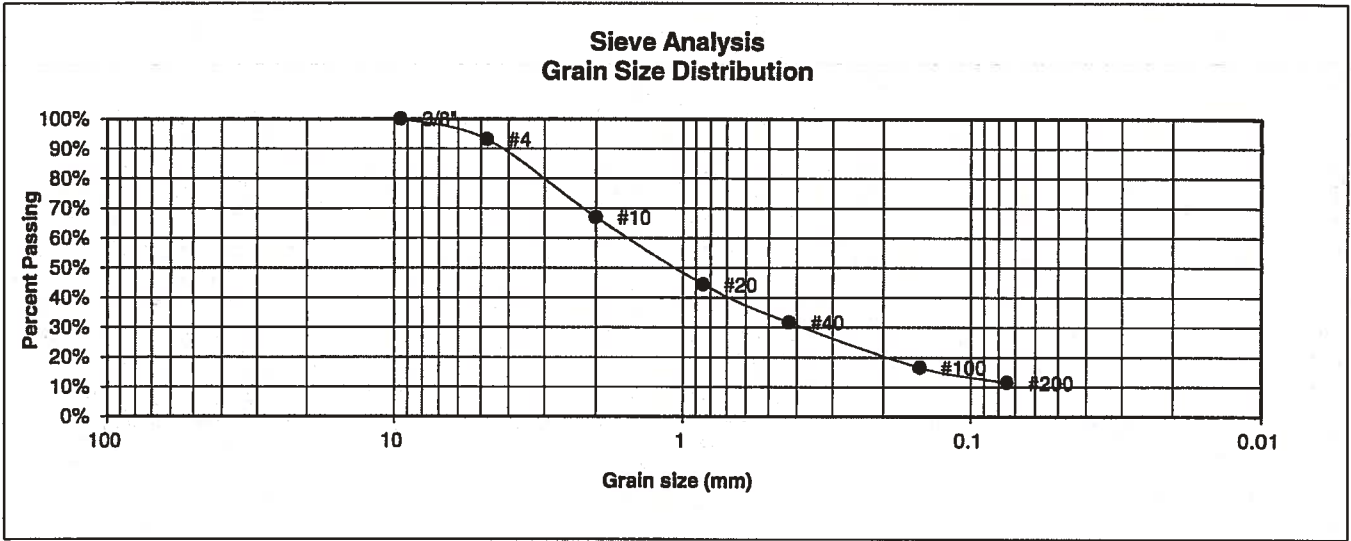
DATE:
 6/6/22

JOB NO:
 221106

FIG NO:
 B-2

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SM-SW	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	1	JOB NO.	221106
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.1%
10	67.0%
20	44.4%
40	31.7%
100	16.6%
200	11.4%

Atterberg Limits	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

- Swell**
- Moisture at start
 - Moisture at finish
 - Moisture increase
 - Initial dry density (pcf)
 - Swell (psf)



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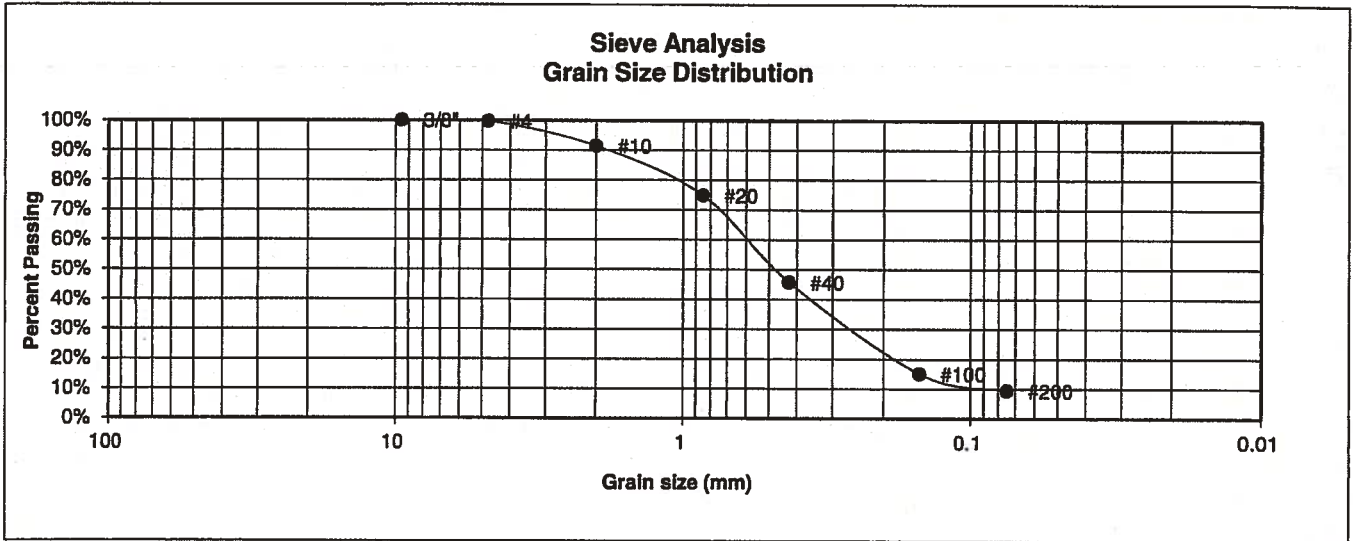
**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO.:
221106

FIG NO.:
C-1

UNIFIED CLASSIFICATION	SM-SW	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	2	JOB NO.	221106
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	91.4%
20	74.8%
40	45.7%
100	15.1%
200	9.3%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

Swell
 Moisture at start
 Moisture at finish
 Moisture increase
 Initial dry density (pcf)
 Swell (psf)



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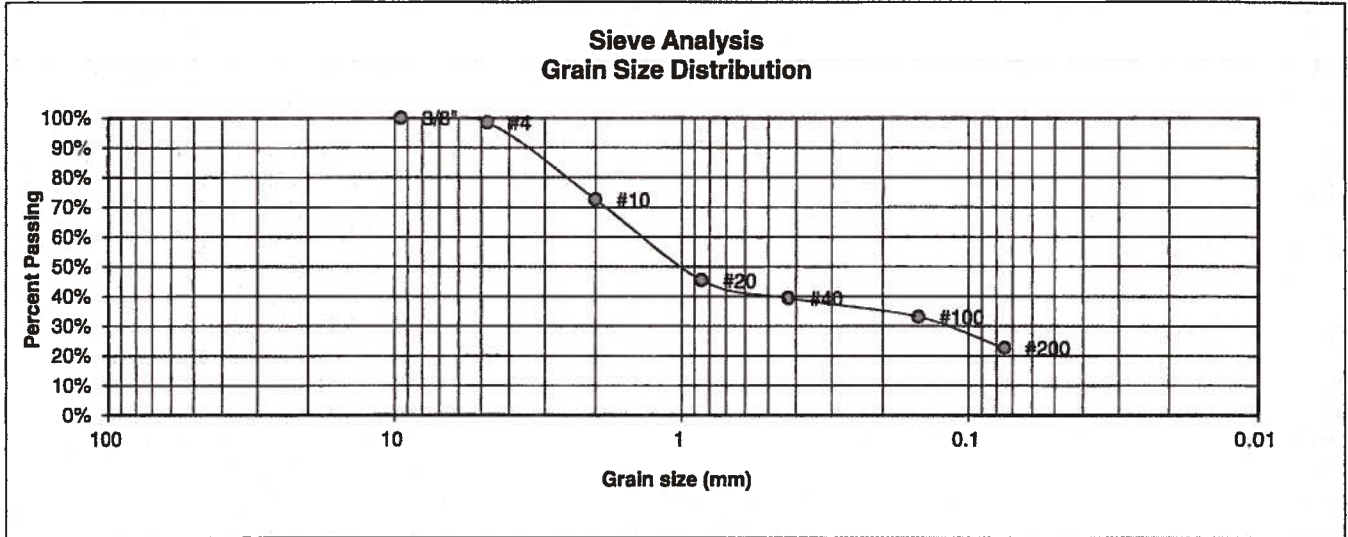
**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED: LL	DATE: 6/6/22
--------	-------	----------------	-----------------

JOB NO.:
221106

FIG NO.:
C-2

UNIFIED CLASSIFICATION	SM	CLIENT	TIMBERRIDGE
SOIL TYPE #	1	PROJECT	TIMBERRIDGE, FILING 3
TEST BORING #	3	JOB NO.	221106
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.4%
10	72.5%
20	45.4%
40	39.4%
100	33.1%
200	22.6%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

Swell
 Moisture at start
 Moisture at finish
 Moisture increase
 Initial dry density (pcf)
 Swell (psf)



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**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 6/6/22
--------	-------	-----------------	-----------------

JOB NO.:
221106

FIG NO.:
C-3

CLIENT	TIMBERRIDGE	JOB NO.	221106
PROJECT	TIMBERRIDGE, FILING 3	DATE	5/18/2022
LOCATION	TIMBERRIDGE, FILING 3	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	1	SM-SW	<0.01

QC BLANK PASS

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**LABORATORY TEST
SULFATE RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	6/6/22

JOB NO:
221106

FIG NO:
C-4

**APPENDIX D: Laboratory Testing Summary and Test Boring and
Test Pit Logs from Entech Job No. 211066**

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT TIMBERRIDGE DEVELOPMENT GROUP, LLC
PROJECT THE RETREAT AT TIMBERRIDGE, FILING 2
JOB NO. 211066

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	5	2-3			10.5						SM-SW	SAND, SLIGHTLY SILTY
1	6	5			41.3			0.01			SC	SAND, VERY CLAYEY
1	11	5			16.5						SM	SAND, SILTY
1	13	2-3			17.8						SM	SAND, SILTY
1	9	2-3			14.6	NV	NP				SM	SAND, SILTY
1	10	5			17.4			<0.01			SM	SAND, SILTY
1	2	10			9.2	NV	NP	<0.01			SM-SW	SAND, SLIGHTLY SILTY
2	1	2-3			77.5				1550		CL	CLAY, SANDY
2	2	4			86.1			0.01	1520		CL	CLAY, SANDY
3	1	10			9.3	NV	NP	<0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY
3	3	5			24.0						SM	SANDSTONE, SILTY
3	7	20			16.6						SM	SANDSTONE, SILTY
3	8	5			14.9						SM	SANDSTONE, SILTY
3	12	10			24.4						SC	SANDSTONE, CLAYEY
3	9	15			9.9	NV	NP				SM-SW	SANDSTONE, SILTY
4	4	15	19.9	109.5	63.9	44	20	<0.01		3.3	CL	CLAYSTONE, SANDY
4	5	10	17.8	111.3	55.7					1.0	CL	CLAYSTONE, VERY SANDY
4	7	15			89.5	47	21	<0.01			CL	CLAYSTONE, SANDY

Table 2: Summary of Percolation Test and Tactile Test Pit Results

Test Pit No.	USDA Soil Type Limiting Layer	LTAR Value	Depth to Bedrock (ft.)	Depth to Seasonal Groundwater (ft.)
1	2A	0.50	N/A	N/A
2	4A*	0.15	5	N/A
3	5*	0.10	7.5	7
4	2A	0.50	N/A	N/A
5	5*	0.10	7	7
6	4A*	0.15	7	N/A

*- Conditions that will require an engineered OWTS

TEST BORING NO. 7
 DATE DRILLED 1/12/2017
 Job # 211066

TEST BORING NO. 8
 DATE DRILLED 1/12/2017
 CLIENT TIMBERRIDGE DEV. GROUP, LLC
 LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
STAKE 3506						
WATER @ 14.5', 1/23/17						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE, MOIST	5			5	4.5	1
	6.0			5	6.0	1
	10			9	5.9	1
CLAY, SANDY, DARK BROWN, VERY SOFT, VERY MOIST	15			2	22.9	2
SANDSTONE, SILTY, FINE GRAINED, DARK BROWN, VERY DENSE, MOIST	20			50 9"	11.8	3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
STAKE 3507						
DRY TO 18', 1/23/17						
SAND, SILTY, TAN SANDSTONE, SILTY, FINE TO COARSE GRAINED, GREEN BROWN, VERY DENSE, MOIST	1					1
	5			50 10"	6.2	3
	9"			50 9"	6.1	3
	10			50 6"	6.5	3
	15			50 7"	11.8	3
	20			50 7"	6.0	3



TEST BORING LOG			
DRAWN	DATE	CHECKED	DATE
		LLL	3/28/17

JOB NO:
170020
 FIG NO:
B-4

TEST BORING NO. 9
 DATE DRILLED 1/12/2017
 Job # 211066

TEST BORING NO. 10
 DATE DRILLED 1/12/2017
 CLIENT TIMBERRIDGE DEV. GROUP, LLC
 LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
STAKE 3508						
DRY TO 20', 1/23/17						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST						
	5			32	8.8	1
				50	4.9	3
				11"		
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST						
	10			50	9.6	3
	15			50	7.6	3
				8"		
	20			50	10.5	3
				6"		

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
STAKE 3509						
WATER @ 14.5', 1/23/17						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, MOIST						
	5			44	8.4	1
				50	9.4	3
				10"		
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST						
	10			50	10.5	3
	15			50	11.8	3
				11"		
	20			50	12.0	3
				9"		



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TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

3/28/17

JOB NO.
211066

FIG NO.
B-5

TEST BORING NO. 11
 DATE DRILLED 1/12/2017
 Job # 211066

TEST BORING NO. 12
 DATE DRILLED 1/12/2017
 CLIENT TIMBERRIDGE DEV. GROUP, LLC
 LOCATION RETREAT AT TIMBERRIDGE, FIL. 2

REMARKS

STAKE 3510

DRY TO 19.5',
 1/23/17

SAND, SILTY, FINE TO COARSE
 GRAINED, TAN, MEDIUM
 DENSE, DRY TO MOIST

SANDSTONE, SILTY, FINE
 TO COARSE GRAINED, TAN,
 VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			11	3.4	1
5			24	11.8	1
10			50	11.4	3
			8"		
15			50	8.2	3
			6"		
20			50	8.6	3
			6"		

REMARKS

STAKE 3511

DRY TO 19',
 1/23/17

SAND, SILTY, FINE TO COARSE
 GRAINED, TAN, MEDIUM
 DENSE, DRY TO MOIST

SANDSTONE, CLAYEY FINE
 TO COARSE GRAINED, TAN,
 VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	3.0	1
5			19	7.8	1
10			50	14.4	3
			10"		
15			50	8.9	3
			6"		
20			50	9.1	3
			6"		



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TEST BORING LOG

DRAWN

DATE

CHECKED:

DATE

LLL

3/28/17

JOB NO.
 211066

FIG NO
 B-6

TEST PIT NO. 1
 DATE EXCAVATED 11/13/2017
 Job # 211066

TEST PIT NO. 2
 DATE EXCAVATED 11/13/2017
 CLIENT TIMBERRIDGE DEV. GROUP, LLC
 LOCATION RETREAT AT TIMBERRIDGE, FILING 2

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1	[Symbol]		gr	w	2A	topsoil, sandy loam, brown	1	[Symbol]		gr	l	2A
sandy loam, fine to coarse grained, light brown to tan	2	[Symbol]		gr	w	2A	interbedded sandy clay and loamy sand, tan to olive	2	[Symbol]		gr	w	4A
loamy sand, fine to coarse grained, tan	3	[Symbol]		sg		1		3	[Symbol]				
	4	[Symbol]						4	[Symbol]				
	5	[Symbol]						5	[Symbol]				
	6	[Symbol]					formational silty sandstone, tan	6	[Symbol]		ma		4A
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape
 granular - gr
 platy - pl
 blocky - bl
 prismatic - pr
 single grain - sg
 massive - ma

Soil Structure Grade
 weak - w
 moderate - m
 strong - s
 loose - l



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TEST PIT LOG

DRAWN:

DATE

CHECKED:
LL

DATE
 11/20/17

JOB NO:
 211066
 FIG NO:
 B-8

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent

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

Description of Pring

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam

C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High
(2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: R048AY222CO - Loamy Park

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 19, Aug 31, 2021