

WASTEWATER DISPOSAL REPORT

for

***SMH Consultants
Owl Ridge Subdivision***

EPC Parcel #: 5100000447

February 2022

Prepared By:



OWL RIDGE SUBDIVISION
EPC Parcel # 5100000447

WASTEWATER DISPOSAL REPORT

February 2022

Prepared for:

SMH Consultants
411 South Tejon Street
Colorado Springs, CO 80903

Prepared by:

JDS-Hydro a Division of RESPEC
5540 Tech Center Drive, Suite 100
Colorado Springs, CO 80919

Table of Contents

1.0	INTRODUCTION AND EXECUTIVE SUMMARY.....	2
2.0	PROJECTED LAND USES.....	2
2.1	<i>Projected Land Uses</i>	2
3.0	WASTEWATER REPORT.....	2
3.1	<i>Wastewater Loads</i>	2
3.2	<i>On-Site Wastewater Treatment Systems (OWTS)</i>	3

APPENDICES

Appendix A – Land Use Exhibit

Appendix B – OWTS Report

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

The purpose of this report is to address the specific wastewater loads for the proposed commercial property located at Parcel # 5100000447 in El Paso County, CO.

EXECUTIVE SUMMARY: The proposed subdivision has adequate water rights, water quality, area, and soils to support the proposed three (3) lot subdivision on a 300-year basis.

2.0 PROJECTED LAND USES

2.1 Projected Land Uses

This report pertains to the existing 61.55-acre parcel that is proposed to be divided into three (3) lots. Please refer to the *Land Use Exhibit* in **Appendix A** depicting the proposed subdivision.

3.0 WASTEWATER REPORT

3.1 Wastewater Loads

There are three (3) residential units proposed on the subdivided property. There is a total of 6.35 AF/year of projected water demand for the entire three (3) lot development, 1.80 AF/year of which is projected for total household use (estimated at 0.30 AF/year/residence with six [6] total residences at full buildout). At an assumed 90% of household demand being sent to septic through a non-evaporative system, this equates to a total of 0.27 AF/year/SFE, or 1.62 AF/year total, to be sent to septic for treatment. This equates to a total of 1,446 gallons per day being sent to septic at full buildout. A breakdown of projected wastewater loads is summarized in Table 3-1.

Of the proposed lots included in the subdivision, one lot (Lot #3) already has an existing septic system, which is proposed to remain. The other two lots (Lot #1 with a proposed two [2] residences and then Lot #2 with a maximum of three [3] residences will have new septic systems constructed for each residence).

Table 3-1: Summary of Expected Water Demands & Wastewater Loads

Water (under Case Number 2021CW3126) for 2 lot augmentation plan						Wastewater
# of SFE's	Annual Indoor Use 0.3 (AF/YR/SFE)	Average Daily Indoor Use (GPD)	Irrigation 0.0566 (AF/1,000 SF)	Domestic Watering 0.0125 (AF/Horse/Year)	Total Indoor, Watering, & Irrigation (AF)	ADF (@ 90% Indoor Use) (GPD)
3	Note 1 0.900	803	Note 2 1.250	Note 3 0.200	2.35	723

Water (under Case Number 2021CW3126 - set aside for future exempt well uses) for future 35-acre lot						Wastewater
# of SFE's	Annual Indoor Use 0.30 (AF/YR/SFE)	Average Daily Indoor Use (GPD)	Irrigation 0.0566 (AF/1,000 SF)	Domestic Watering 0.0125 (AF/Horse/Year)	Total Indoor, Watering, & Irrigation (AF)	ADF (@ 90% Indoor Use) (GPD)
3	Note 4 0.900	803	Note 5 2.465	Note 6 0.638	4.00	723

Note 1: Per Section 8.3.1. and 8.3.2. of Case No. 2021CW3126

Note 2: Per 8.4.7(B)(7)(d) of the EPC-LDC, assuming a total of 22,084 ft² irrigatable land for lots #1 and #3

Note 3: Assuming 16 horses total for lots #1 and #3 per sections 8.3.1 and 8.3.2. of Case No. 2021CW3126

Note 4: Minimum residential demand per Colorado Division of Water Resources

Note 5: Assume 1 acre (43,560 ft²) of lawn and garden irrigation per exempt domestic and livestock well

Note 6: Assuming 51 horses for lot #2 per Section 8.3.1. and 8.3.2. of Case No. 2021CW3126

3.2 On-Site Wastewater Treatment Systems (OWTS)

3.2 On-Site Wastewater Treatment System

The proposed single-family homes will be served by individual on-site wastewater treatment systems. The site was evaluated for *on-site wastewater treatment systems* (OWTS) by RMG Architects and Engineers in November 2021. Four (4) test pits were excavated on September 21, 2021, to a depth of 8' on the site to determine general suitability for the use of OWTS. No groundwater, bedrock, or restrictive layers were encountered in the test pits.

Laboratory testing was also performed to classify and determine the soils engineering characteristics. Long term acceptance rates (LTAR) associated with the most restrictive soils observed in the profile pits were observed to range from 0.20 to 0.80 gallons per day per square foot. This LTAR range is indicative of soil types ranging from R-1 to 4. There were no indications of seasonally shallow groundwater observed in the profile pit excavations.

Soils in the area were also classified according to four types: silty clay, sandy clay, sandy loam, and clay loam. US Soil Conservation Service identifies the site soils as follows:

15 – Brussett loam with 3 to 5 percent slopes

67 – Peyton sandy loam with 5 to 9 percent slopes

69 - Peyton-Pring coupled with 8 to 15 percent slopes

Encountered soil and groundwater conditions for the site are suitable for individual treatment systems. If El Paso County Board of Health setback requirements are met for each lot, there are no restrictions on the placement of the individual OWTS systems.

According to RMG's report, must achieve the following prior to the construction of any proposed OWTS system:

- 1) All wastewater treatment must be achieved 4' above groundwater or bedrock.
- 2) Each lot will require an OWTS report prepared according to the Regulations of the El Paso County Board of Health. As part of these regulations two (2) 8' deep test pits must be excavated in the vicinity of the proposed OWTS location.
- 3) The proposed OWTS site must comply with any physical setback requirements established by the El Paso County Department of Health and Environment (EPCHDE)
- 4) All OWTS locations must be located a minimum of any existing or proposed potable well as described in the Water Resources Report.
- 5) Each lot must be designed to ensure that a minimum of two (2) sites are appropriate for an OWTS and do not fall into any restricted areas.

The *Soil, Geology, and Wastewater Study* by RMG Architects and Engineers, for 18885 Brown Road, Lots 1-3 of the Owl Ridge Subdivision, dated November 15, 2021, is included in **Appendix B**.

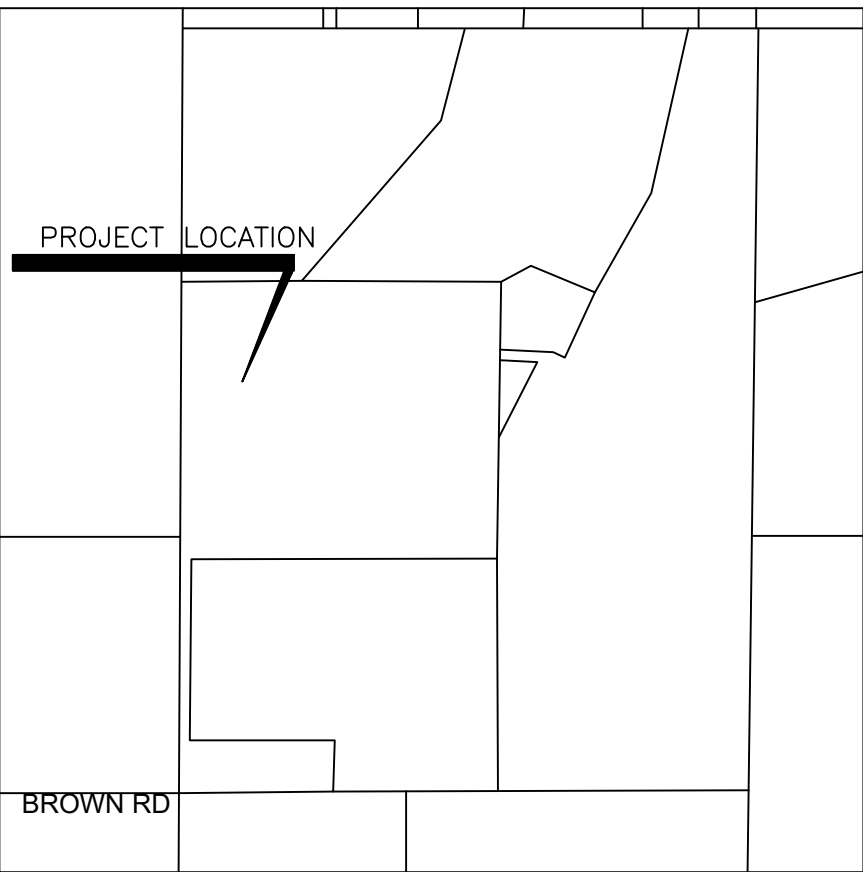
Appendix A

PROGRESS DOCUMENT
FOR REFERENCE ONLY

Final Plat

OWL RIDGE SUBDIVISION

PART OF THE NORTH ONE HALF OF LOT 2 OF THE SOUTHWEST QUARTER OF SECTION 7,
TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN
COUNTY OF EL PASO, STATE OF COLORADO



VICINITY MAP
(NOT TO SCALE)

ENVIRONMENTAL:
DEVELOPER SHALL COMPLY WITH FEDERAL AND STATE LAWS, REGULATIONS, ORDINANCES, REVIEW AND PERMIT REQUIREMENTS, AND OTHER AGENCY REQUIREMENTS, IF ANY, OF APPLICABLE AGENCIES, INCLUDING, BUT NOT LIMITED TO, THE COLORADO DEPARTMENT OF WILDLIFE, COLORADO DEPARTMENT OF TRANSPORTATION, U.S. ARMY CORPS OF ENGINEERS, THE U.S. FISH & WILDLIFE SERVICE REGARDING THE ENDANGERED SPECIES ACT, PARTICULARLY AS IT RELATES TO THE PREBLE'S MEADOW JUMPING MOUSE AS A LISTED THREATENED SPECIES.

FLOODPLAIN NOTE:
FLOOD INSURANCE RATE MAP, MAP NUMBER 084041C0305G EFFECTIVE DATE DECEMBER 7, 2018, INDICATES THAT THE AREA WITHIN THE SURVEYED PROPERTY TO BE LOCATED IN ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOOD PLAIN).

EASEMENTS:
UNLESS OTHERWISE INDICATED, ALL SIDE, FRONT, AND REAR LOT LINES ARE HEREBY PLATTED ON EITHER SIDE WITH A 10-FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT. ALL EXTERIOR SUBDIVISION BOUNDARIES ARE HEREBY PLATTED WITH A 20-FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT. THE SOLE RESPONSIBILITY FOR THE MAINTENANCE OF THESE EASEMENTS IS HEREBY VESTED WITH THE INDIVIDUAL PROPERTY OWNERS.

UTILITY NOTES:
ANY UTILITY COMPANY THAT LOCATES FACILITIES IN ANY EASEMENT SHALL HAVE THE RIGHT TO PRUNE, REMOVE, ERADICATE, CUT AND CLEAR AWAY ANY TREES, LIMBS, VINES, AND BRUSH ON THE UTILITY EASEMENT NOW OR AT ANY FUTURE TIME AND PRUNE AND CLEAR AWAY ANY TREE LIMBS, VINES, AND BRUSH ON LANDS ADJACENT TO THE UTILITY EASEMENT WHENEVER, IN THE UTILITY COMPANIES JUDGMENT, SUCH MAY INTERFERE WITH OR ENDANGER THE CONSTRUCTION, OPERATION, OR MAINTENANCE OF ITS FACILITIES, TOGETHER WITH THE RIGHT OF INGRESS TO AND EGRESS FROM THE UTILITY EASEMENT AND CONTIGUOUS LAND SUBJECT TO THIS PLAT FOR THE PURPOSE OF SURVEYING, ERECTING, CONSTRUCTING, MAINTAINING, INSPECTING, REBUILDING, REPLACING, AND WITH OR ENDANGERING THE CONSTRUCTION, OPERATION OR MAINTENANCE OF SAID FACILITIES.

NOTICE:
ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF CERTIFICATION SHOWN HEREON.

DENSITY AND DIMENSIONAL STANDARDS FOR RESIDENTIAL DISTRICT RR-5						
ZONING DISTRICT	AREA	WIDTH (AT FRONT SETBACK LINE)	FRONT	REAR	SIDE	MAXIMUM LOT COVERAGE
RR-5	5 ACRES (1.2)	200 Ft	25 Ft	25 Ft	25 Ft	25%

OWNER:
COLT H. HAUGEN
18685 BROWN ROAD
COLORADO SPRINGS, CO 80908
719-440-8808

TOTAL ACREAGE:
LOT 1 = 20.3 ACRES
LOT 2 = 35.0 ACRES
LOT 3 = 5.0 ACRES
DEDICATION ACRES
TOTAL= 60.3 ACRES

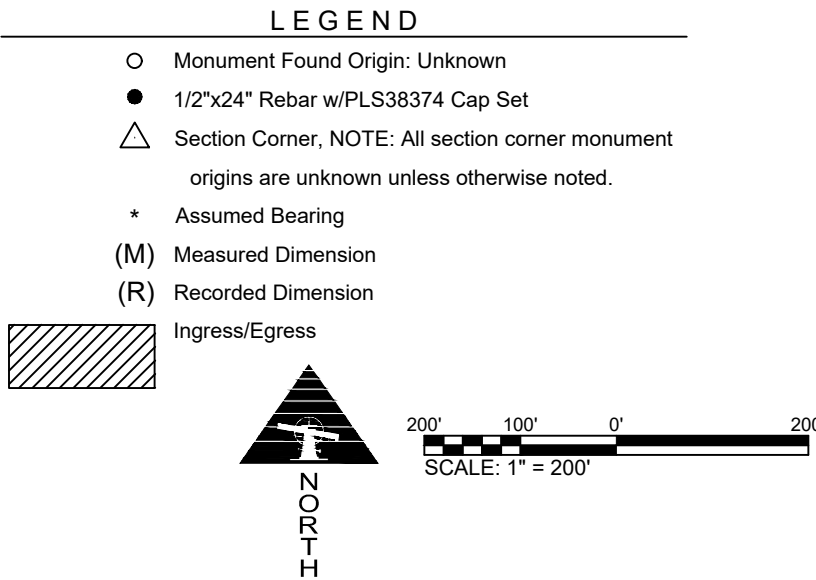
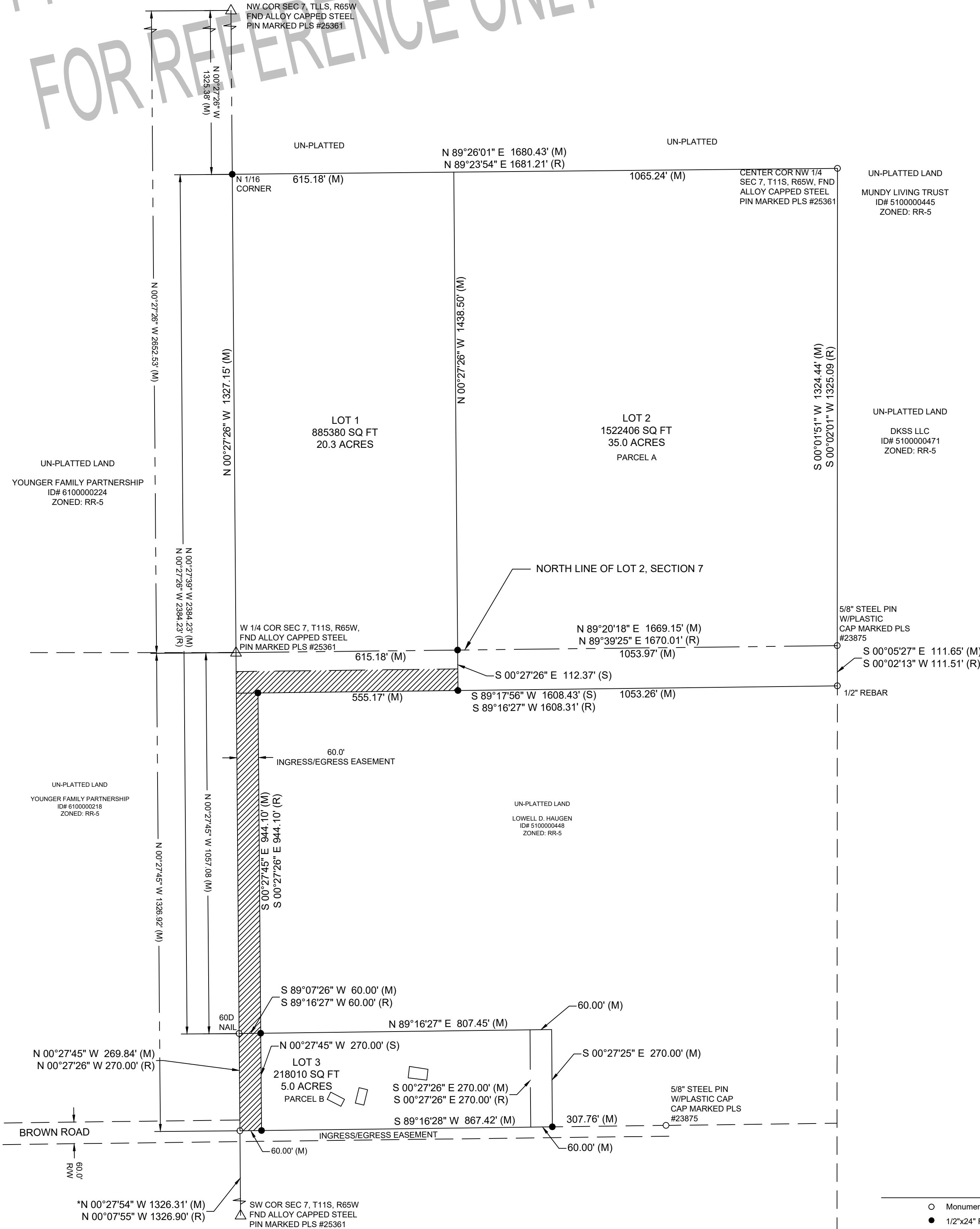
SURVEYOR:
TIM SLOAN, VICE-PRESIDENT
SMH CONSULTANTS, P.A.
411 SOUTH TEJON STREET, SUITE 1
COLORADO SPRINGS, CO 80903
785-776-0541

SERVICE PROVIDERS:
TRI-LAKES MONUMENT FIRE DEPARTMENT
MOUNTAIN VIEW ELECTRIC ASSOC.
CENTURYLINK
INDIVIDUAL SEWAGE DISPOSAL SYSTEMS
DOMESTIC WELLS
PROPANE SERVICE

ENGINEER:
BRETT LOUK
SMH CONSULTANTS, P.A.
411 SOUTH TEJON STREET, SUITE 1
COLORADO SPRINGS, CO 80903
719-455-2145

FEES:
Park Fee: _____
School Fee: _____
Road Impact Fee: _____

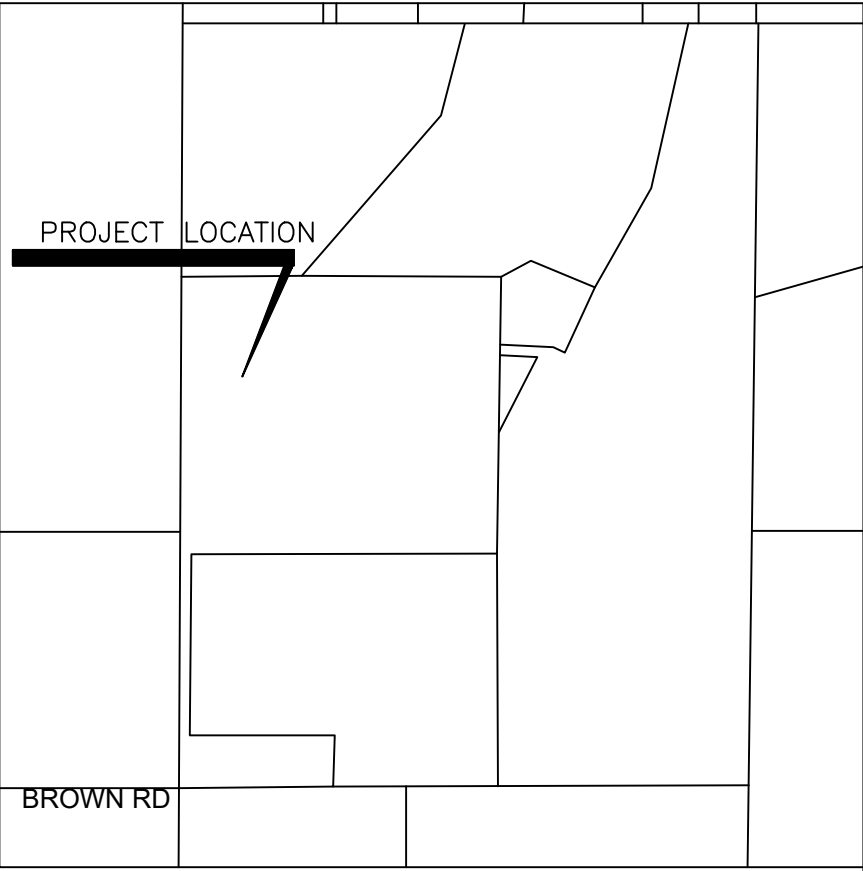
- NOTES:
- 1.NO GAPS OR OVERLAPS EXIST.
 - 2.THERE ARE NO LINES OF POSSESSION THAT AFFECT THIS SURVEY.
 - 3.PARENT TRACT IS RECORDED IN BOOK INSTRUMENT #219120728, REGISTER OF DEEDS OFFICE, EL PASO COUNTY, COLORADO.
 4. ALL BUILDING SETBACK REQUIREMENTS SHALL BE DETERMINED BY THE ZONING DISTRICT, UNLESS OTHERWISE NOTED.
 5. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SMH CONSULTANTS, TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR INFORMATION REGARDING EASEMENTS, AND RIGHT OF WAY, SMH CONSULTANTS RELIED UPON THE TITLE POLICY PREPARED BY [TITLE COMPANY], [FILE #], DATED [TITLE DATE].
 6. BASIS OF BEARINGS IS THE SOUTH LINE OF THE PROPERTY, MONUMENTED AS SHOWN AND ASSUMED TO BEAR SOUTH 89 DEGREES 16 MINUTES 28 SECONDS WEST, 867.42 FEET.
 7. SEWAGE TREATMENT IS THE RESPONSIBILITY OF EACH INDIVIDUAL PROPERTY OWNER. THE EL PASO COUNTY PUBLIS HEALTH DEPARTMENT MUST APPROVE EACH SYSTEM AND, IN SOME CASES, THE DEPARTMENT MAY REQUIRE AN ENGINEER-DESIGNED SYSTEM PRIOR TO PERMITTING APPROVAL.
 8. INDIVIDUAL WELLS ARE THE RESPONSIBILITY OF EACH PROPERTY OWNER. PERMITS FOR INDIVIDUAL WELLS MUST BE OBTAINED FROM THE STATE ENGINEER WHO BY LAW HAS THE AUTHORITY TO SET CONDITIONS FOR THE ISSUANCE OF THESE PERMITS.
 9. WATER IN THE DENVER WATER BASIN AQUIFERS IS ALLOCATED BASED ON A 100-YEAR AQUIFER LIFE; HOWEVER, FOR EL PASO COUNTY PLANNING PURPOSES, WATER IN THE DENVER BASIN AQUIFERS IS ELLEVATED BASED ON A 300-YEAR AQUIFER LIFE. APPLICANTS, THE HOME OWNERS ASSOCIATION, AND ALL FUTURE OWNERS IN THE SUBDIVISION SHOULD BE AWARE THAT THE ECONOMIC LIFE OF A WATER SUPPLY BASED ON WELLS IN A GIVEN DENVER BASIN AQUIFER MAY BE LESS THAN EITHER THE 100 YEARS OR 300 YEARS INDICATED DUE TO ANTICIPATED WATER LEVEL DECLINES. FURTHERMORE, THE WATER SUPPLY PLAN SHOULD NOT RELY SOLELY UPON NON-RENEWABLE AQUIFERS. ALTERNATIVE RENEWABLE WATER RESOURCES SHOULD BE ACQUIRED AND INCORPORATED IN A PERMANENT WATER SUPPLY PLAN THAT PROVIDES FUTURE GENERATIONS WITH A WATER SUPPLY.
 10. THE PROPERTY OWNER, ITS SUCCESSORS AND ASSIGNS, AND ALL FUTURE LOT OWNERS IN THIS DEVELOPMENT ARE HEREBY ON NOTICE THAT THEY MAY BE REQUIRED TO COMPLY WITH APPLICABLE RULES, IF ANY, OF THE COLORADO GROUND WATER COMMISSION AND/OR THE UPPER BLACK SQUIRREL CREEK GROUND WATER MANAGEMENT DISTRICT, WHICH COMPLIANCE MAY RESULT IN A REDUCTION OF WELL WITHDRAWAL LIMITS, AND THUS A REDUCTION IN WATER AVAILABILITY.
 11. ALL PROPERTY OWNERS ARE RESPONSIBLE FOR MAINTAINING PROPER STORMWATER DRAINAGE IN AND THROUGH THEIR PROPERTY. PUBLIC DRAINAGE EASEMENTS AS SPECIFICALLY NOTED ON THE PLAT SHALL BE MAINTAINED BY THE INDIVIDUAL LOT OWNERS UNLESS OTHERWISE INDICATED. STRUCTURES, FENCES, MATERIALS OR LANDSCAPING THAT COULD IMPEDE THE FLOW OF RUNOFF SHALL NOT BE PLACED IN DRAINAGE EASEMENTS.
 12. ACCESS TO LOTS 1, 2, & 3 SHALL BE THROUGH THE SHOWN ACCESS EASEMENT. THE RESPONSIBILITY AND MAINTENANCE OF SAID ACCESS IS SUBJECT TO THE MAINTENANCE AGREEMENT AND ALL COVENANTS AND RESTRICTIONS CONTAINED THEREIN, AS RECORDED AS RECEPTION NO. OF THE RECORDS OF EL PASO COUNTY CLERK AND RECORDER.
 13. PROPERTY WITHIN THIS SUBDIVISION IS SUBJECT TO THE TERMS AND PROVISIONS OF THE EL PASO COUNTY ROAD IMPACT FEE PROGRAM (RESOLUTION 12-382) AND ANY SUBSEQUENT AMENDMENTS. FEES FOR EACH LOT WITHIN THIS SUBDIVISION SHALL BE PAID IN FULL AT THE TIME OF BUILDING PERMIT ISSUANCE.
 14. DUE TO THEIR LENGTH, SOME OF THE DRIVEWAYS WILL NEED TO BE SPECIFICALLY APPROVED BY THE TRI-LAKES MONUMENT FIRE PROTECTION DISTRICT.
 15. MAILBOXES SHALL BE INSTALLED IN ACCORDANCE WITH ALL EL PASO COUNTY DEPARTMENT OF TRANSPORTATION AND THE UNITED STATES POSTAL SERVICE REGULATIONS.
 16. THE FOLLOWING REPORTS HAVE BEEN SUBMITTED IN ASSOCIATION WITH THE FINAL PLAT FOR THIS SUBDIVISION AND ARE ON FILE AT THE COUNTY DEVELOPMENT SERVICE DEPARTMENT: DRAINAGE REPORT, WATER RESOURCES REPORT, WASTEWATER DISPOSAL REPORT, GEOLOGY AND SOILS REPORT, AND FIRE PROTECTION REPORT.
 17. THE ADDRESS EXHIBITED ON THIS PLAT ARE FOR INFORMATIONAL PURPOSES ONLY. THEY ARE NOT THE LEGAL DESCRIPTION AND ARE SUBJECT TO CHANGE.



PROGRESS DOCUMENT
FOR REFERENCE ONLY

Final Plat
OWL RIDGE SUBDIVISION

TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN
COUNTY OF EL PASO, STATE OF COLORADO



VICINITY MAP
(NOT TO SCALE)

NOTARIAL:

STATE OF COLORADO) SS
COUNTY OF EL PASO)

The foregoing instrument was acknowledged before me this _____ day of _____, 2022 A.D. by Colt H. Haugen and Kathryn E. Haugen

Witness my hand and seal _____

Address _____

My Commission expires _____

BOARD OF COUNTY COMMISSIONERS CERTIFICATE:

This Plat SEDONA SUN ACRES was approved for filing by the El Paso County, Colorado Board of County Commissioners on the _____ day of _____, 2021, subject to any notes specified hereon and any conditions included in the resolution of approval. The dedications of land to the public streets and easements are accepted, but public improvements thereon will not become the maintenance responsibility of El Paso County until preliminary acceptance of the public improvements thereon will not become the maintenance responsibility of El Paso County until preliminary acceptance of the public improvements in accordance with the requirements of the Land Development Code and Engineering Criteria Manual, and the Subdivision Improvements Agreement.

Chair, Board of County Commissioners _____ Date _____

Director, Planning and Community Development Department _____ Date _____

El Paso County Assessor _____ Date _____

RECORDINGS:

STATE OF COLORADO) SS
COUNTY OF EL PASO)

I hereby certify that this instrument was filed for record in my office at _____ O'clock _____ M. this _____ day of _____, 2021 A.D., and is duly recorded under Reception Number _____ of the records of El Paso County, State of Colorado.

Chuck Broerman, Recorder

By: _____ Deputy _____ Date _____

SURVEYOR'S CERTIFICATION:

The undersigned Registered Land Surveyor in the State of Colorado hereby states that the accompanying plat was surveyed and drawn to normal standards and care of a Professional Land Surveyor practicing in the State of Colorado. The survey was performed and plat prepared under his supervision and accurately shows the described tract of land and subdivision thereof, and the requirements of Title 38 of the Colorado Revised Statutes, 1973, as amended, have been met to the best of his knowledge, information and belief, and monuments exist as shown hereon.

Tim Sloan, Professional Land Surveyor
State of Colorado, No. #38374



KNOW ALL MEN BY THESE PRESENTS:

That the undersigned, Colt H. Haugen and Kathryn E. Haugen, being the owners of the following described tract of land:

TO WIT:

PROPERTY DESCRIPTION: DEED OF TRUST #219120728

PARCEL A:

A tract of land located in the Southwest one-quarter of the Northwest one-quarter and the Northwest one-quarter of the Southwest one-quarter of Section 7, Township 11 South, Range 65 West of the 6th P.M., County of El Paso, State of Colorado, being more particularly described as follows:
Commencing at the South one-sixteenth corner of said Section and Section 12, Township 11 South, Range 66 West of the 6th P.M.;
Thence N 00 degrees 27 minutes 26 seconds W along the common aliquot line of said Section, a distance of 270.00 feet to the point of beginning;
Thence continuing N 00 degrees 27 minutes 26 seconds W along said common line, a distance of 2384.23 feet to the North one-sixteenth corner of said section;
Thence N 89 degrees 23 minutes 54 seconds E along the North one-sixteenth line of said Section 7, a distance of 1681.21 feet to the Northwest one-sixteenth corner of Section 7;
Thence S 00 degrees 02 minutes 01 seconds W along the West one-sixteenth line of said Section 7, a distance of 1325.09 feet to the West one-sixteenth corner of said Section 7;
Thence S 00 degrees 02 minutes 13 seconds W along the West one-sixteenth line of said Section 7, a distance of 111.51 feet;
Thence S 89 degrees 16 minutes 27 seconds W along a line parallel to the South line of the Northwest one-quarter of Southwest one-quarter of said Section 7, a distance of 1608.91 feet;
Thence S 00 degrees 27 minutes 26 seconds E along a line parallel to the West line of the Northwest one-quarter of the Southwest one-quarter of said Section 7, a distance of 944.10 feet;
Thence S 89 degrees 16 minutes 27 seconds W along a line parallel to the South line of the Northwest one-quarter of the Southwest one-quarter of said Section 7, a distance of 60.00 feet to the point of beginning.

PARCEL B:

DEDICATION:

The undersigned, being all the Owners, Mortgages, Beneficiaries of Deeds of Trust and holders of other interests in the land described herein, have laid out, subdivided, and platted said lands into lots, and easements as shown hereon under the name and subdivision of "Owl Ridge Subdivision". All public improvements so platted are hereby dedicated to public use and said Owner does hereby covenant and agree that the public improvements will be constructed to El Paso County standards and that proper drainage and erosion control for same will be provided at said Owner's expense, all to the satisfaction of the Board of County Commissioners of El Paso County, Colorado. Upon acceptance by resolution, all public improvements so dedicated will become matters of maintenance by El Paso County, Colorado. The utility easements shown hereon are hereby dedicated for public utilities and communication systems and other purposes as shown hereon. The entities responsible for providing the services for which the easements are established are hereby granted the perpetual right of ingress and egress from and to adjacent properties for installation, maintenance, and replacement of utility lines and related facilities.

IN WITNESS WHEREOF:

The aforementioned Colt H. Haugen and Kathryn E. Haugen, has executed this instrument this _____ day of _____, 2022 A.D.

Colt H. Haugen

Kathryn E. Haugen

PROGRESS DOCUMENT
FOR REFERENCE ONLY

SMH
CONSULTANTS

Civil Engineering • Land Surveying • Landscape Architecture
www.smhconsultants.com

Manhattan, KS - HQ P: (785) 776-0541 • Dodge City, KS P: (620) 255-1952
Kansas City, KS P: (913) 444-9615 • Colorado Springs, CO P: (719) 465-2145

Drawn By: ATJ Project 2010CS4031 DD TDS87 PCD File #

DECEMBER 2021

Appendix A

Architecture
Structural
Geotechnical



Materials Testing
Forensic
Civil/Planning

**ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED**

SOIL, GEOLOGY, AND WASTEWATER STUDY

**18885 Brown Road
Lots 1-3, Owl Ridge Subdivision
El Paso County, Colorado**

PREPARED FOR:

**SMH Consultants
411 S. Tejon Street
Suite 1
Colorado Springs, CO 80903**

JOB NO. 185466

November 15, 2021

**Respectfully Submitted,
RMG – Rocky Mountain Group**

**Reviewed by,
RMG – Rocky Mountain Group**

A handwritten signature in blue ink that reads "Kelli Zigler".

**Kelli Zigler
Project Geologist**



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

TABLE OF CONTENTS

1.0 GENERAL SITE AND PROJECT DESCRIPTION.....	4
1.1 Project Location	4
1.2 Existing Land Use	4
1.3 Project Description	4
2.0 QUALIFICATIONS OF PREPARERS	4
3.0 STUDY OVERVIEW	5
3.1 Scope and Objective	5
3.2 Site Evaluation Techniques	5
3.3 Additional Documents.....	6
4.0 SITE CONDITIONS	6
4.1 Existing Site Conditions	6
4.2 Topography	6
4.3 Vegetation	6
4.4 Aerial photographs and remote-sensing imagery	6
5.0 FIELD INVESTIGATION AND LABORATORY TESTING	6
5.1 Test Pit Excavations	7
5.2 OWTS Visual and Tactile Evaluation	7
5.3 Groundwater.....	7
6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY	7
6.1 Subsurface Soil Conditions	7
6.2 Bedrock Conditions.....	8
6.3 U.S. Soil Conservation Service	8
6.4 General Geologic Conditions	8
6.5 Engineering Geology.....	9
6.6 Structural Features.....	9
6.7 Surficial (Unconsolidated) Deposits.....	9
6.8 Features of Special Significance	9
6.9 Drainage of Water and Groundwater	9
6.10 Flooding and Surface Drainage	9
7.0 ECONOMIC MINERAL RESOURCES.....	10
8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS	10
8.1 Expansive Soils	11
8.2 Compressible Soils	11
8.3 Undocumented Fill	12
8.4 Faults and Seismicity.....	12
8.5 Radon.....	12
9.0 ON-SITE WASTEWATER TREATMENT SYSTEMS.....	13
10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT	14
11.0 STRUCTURAL FILL - GENERAL.....	14
12.0 ADDITIONAL STUDIES.....	15
13.0 CONCLUSIONS	15
14.0 CLOSING.....	16
FIGURES	
Site Vicinity Map	1
Proposed Lot Layout.....	2
USGS Topo Map.....	3
Test Pit Logs	4
USDA Soil Survey Map.....	5
Engineering and Geology Map	6
FEMA Map	7

Test Pit Location Map.....	8
Septic Suitability Map.....	9
Perimeter Drain Detail	10

APPENDIX A

Additional Reference Documents

APPENDIX B

El Paso County Health Department – Sewage Disposal System Permit

1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in part of the north ½ of lot 2 of the SW ¼ of Section 7, Township 11 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado, and is generally located northwest of the intersection of Walker Road and Brown Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Existing Land Use

The site currently consists of one parcel (per the El Paso County Assessor's website). It is approximately 61.55 acres. The parcel included is:

- Schedule No. 5100000447, current land use is classified as meadow hay land

The current zoning is "RR-5" – *Residential Rural*. The parcel is currently partially developed in the southern portion of the site where the existing residence is located.

1.3 Project Description

The site consists of approximately 61.55 acres and is partially developed. An existing two story agricultural residence is located on the southwest corner of the property. Two one-story barns are east of the residence. It is our understanding the existing 61.55 acres is to be subdivided into a total of three lots. Parcel A is to be subdivided into two lots of approximately 21.6 acres and 35 acres, respectively. Parcel B, is to retain the existing residence, well and septic, which is to encompass 5 acres. Each of the two new lots is to contain a single-family residence with well and septic. The Proposed Lot Layout is presented in Figure 2.

Each new lot will be served by an onsite wastewater treatment system (OWTS) and an individual water supply well. The site will be accessed from Brown Road.

2.0 QUALIFICATIONS OF PREPARERS

This Soil, Geology, and Wastewater 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 21 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 21 years of experience in the construction engineering (residential) field. Mr. Munger holds a B.S. in Architectural Engineering from the University of Wyoming.

3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical, geologic site conditions, and onsite wastewater treatment system (OWTS) feasibility and present our opinions of the potential effect of these conditions on the proposed development within 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 physical reconnaissance of the site and 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:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports
- Available aerial photographs
- Subsurface exploration

- Visual and tactile characterization of representative site soil and rock samples
- Geologic research and analysis
- Site development concept plans prepared by SMH Consultants

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 applicable for the scope of this report.

3.3 Additional Documents

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

4.0 SITE CONDITIONS

4.1 Existing Site Conditions

The site is partially developed. The site is generally located northwest of the intersection of Walker Road and Brown Road in El Paso County, Colorado and comprises approximately 61.55 acres. The site is zoned RR-5, rural residential. Adjacent properties to the north, west and east are zoned RR-5, rural residential.

4.2 Topography

Based on our site reconnaissance on September 8, 2021 and USGS 2019 topographic map of the Black Forest Quadrangle, the site generally slopes down from west to east with an elevation difference of approximately 70 feet across the site. There appears to be multiple irrigation ditch features that traverse the site from west to east, these can be seen in Figure 6, Engineering and Geology Map. The water levels in the irrigation ditch areas are anticipated to vary dependent upon local precipitation events.

4.3 Vegetation

Site vegetation primarily consists of native grasses and other prairie-type vegetation. Deciduous trees are scattered sparsely across the site.

4.4 Aerial photographs and remote-sensing imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, CGS surficial geologic mapping, and historical photos by historicaerials.com dating back to 1947. Historically, the site has remained partially developed land where the existing residence and barns are located since 1979. The parcel has remained vacant agricultural land north of the residence.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

It is our understanding the existing 61.55 acres is to be subdivided into a total of three lots. Parcel A is to be subdivided into two lots of approximately 21.6 acres and 35 acres, respectively. Parcel B (which is to encompass approximately 5 acres) is to retain the existing residence, well, and septic. Each of the two new lots is to contain a single-family residence with well and septic.

5.1 Test Pit Excavations

Four test pits were performed by RMG to explore the subsurface soils underlying the proposed on-site wastewater treatment systems. The number of test pits is in accordance with the 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 excavated to 8 feet below the existing ground surface. Additional information is provided in Section 9.0, On-site Disposal of Wastewater.

5.2 OWTS Visual and Tactile Evaluation

A visual and tactile evaluation, performed by RMG, is to be used in conjunction with this investigation. The soils were evaluated to determine the soils types and structure. Bedrock and restrictive layers were not encountered in the test pits. The soil descriptions of the test pit evaluation are presented in Figure 4 sheets one and two, Test Pit Logs.

5.3 Groundwater

Groundwater was not encountered in the test pits performed by RMG on September 22, 2021. No indications of redoximorphic conditions were observed.

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. A major structural feature known as the Rampart Range Fault is located approximately 12.5 miles west of the site. The Rampart Range Fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain 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 of Palmer Divide overlying the bedrock of the Upper part of the Dawson Formation. The alluvium generally consist of sandy to clayey loam, and sandy to silty clay. The upper part of the Dawson Formation is generally comprised of the arkosic sandstone, claystone, mudstone, and conglomerate and localized coal beds.

6.1 Subsurface Soil Conditions

The subsurface soils encountered in the RMG test pit excavations were classified using the United States Department of Agriculture (USDA). The on-site soils classified as silty clay, sandy clay, sandy loam, and clay loam.

The classifications shown on the logs are based upon the engineer's 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

Bedrock (as defined by USDA Soil Structure and Grade) was not encountered in the test pit excavations performed for this investigation. In general, the bedrock (as defined by Colorado Geologic Survey) beneath the site is considered to be part of the Upper Dawson Formation – facies unit five which consists of very thick-bedded to massive, cross-bedded, light-colored arkose, pebbly arkose, and arkosic pebble conglomerate. Facies unit five also contains common beds of white to light-tan, fine- to medium-grained feldspathic, cross-bedded friable sandstone. The Dawson formation is thick-bedded to massive, generally light colored arkose, and pebbly. The sandstones are poorly sorted with high clay contents. The sandstone is generally permeable, well drained, and has good foundation characteristics. The Dawson sandstone is generally not considered a restrictive layer for OWTS.

6.3 U.S. Soil Conservation Service

The U.S. Soil Conservation Service along with United States Department of Agriculture (USDA) identifies the site soils as:

- 15 – Brussett loam, 3 to 5 percent slopes. Properties of the loam include well drained soils, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms include hills.
- 67 – Peyton sandy loam, 5 to 9 percent slopes. Properties of the sandy loam 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 ponding is none, and landforms include hills.
- 69 – Peyton-Pring complex, 8 to 15 percent slopes. Properties of the 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 ponding is none, and landforms include hills.

The USDA Soils Survey Map is presented in Figure 5.

6.4 General Geologic Conditions

Based on our field observations and review of relevant geologic maps, a geologic map was prepared which identifies the geologic conditions affecting the development. The geologic conditions affecting the development are presented in the Engineering and Geology Map, Figure 6.

The site generally consists of alluvium deposits overlying sandstone bedrock. Four geologic units were mapped at the site as:

- *TKda5 – Dawson formation, facies unit five (early to middle(?) Eocene)* – The unit is dominated by very thick-bedded to massive, cross-bedded, light-colored arkose, pebbly arkose, and arkosic pebble conglomerate. Facies unit five contains common beds of white to light-tan, fine- to medium-grained feldspathic, cross-bedded friable sandstone. The unit is estimated to be about 500 feet thick in the quadrangle; the top of the unit has been removed by erosion.
- *QTa – Alluvium of Palmer Divide (early? Pleistocene or Pliocene?)* – The deposits included in this oldest alluvial category include predominately sand deposits in the northwestern part of the quadrangle. The alluvium of Palmer Divide is up to 30 feet thick in the Black Forest quadrangle. The sandy deposits are composed generally of very pale-brown and pinkish-brown, fine to coarse sand interbedded with pinkish-gray to light brownish-gray pebble gravel. The sand is poorly

sorted, medium to thin bedded, thinly laminated, and composed largely of quartz grains. The sandy pebble and cobble gravel is composed largely of subangular to subrounded fragments of white or light-gray quartz, light-pink to light-red and reddish-brown feldspar, a few fragments of pink to light-red to reddish-brown granite, and rare fragments of brownish-gray Wall Mountain Tuff.

- *psw* – Potentially Seasonally Wet Area.
- *af* – Artificial fill Area – Apparent artificial fill placed between 1955 and 1960 for the creation of multiple irrigation ditches throughout the site.

6.5 Engineering Geology

Charles Robinson and Associates (1977) have mapped two environmental engineering units at the site as:

- *1A* – Stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%).
- *3B* – Expansive and potentially expansive soil and bedrock on flat to moderate slopes (0-12%)

6.6 Structural Features

Structural features such as schistosity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed on the site, in the surrounding area, or in the soil samples collected for laboratory testing.

6.7 Surficial (Unconsolidated) Deposits

Lake and pond sediments, swamp accumulations, sand dunes, marine terrace deposits, talus accumulations, creep, or slope wash were not observed on the site. Slump and slide debris were also not observed on the site.

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 Drainage of Water and Groundwater

The overall topography of the site slopes down from the west to east. It is anticipated the direction of surface water and groundwater generally flow in the same direction. Groundwater was not encountered in the test pits performed for this current study and is not anticipated to affect shallow foundations. Multiple irrigation ditch features (apparently man-made) traverse the site from west to east.

6.10 Flooding and Surface Drainage

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0305G and the online ArcGIS El Paso County Risk Map, the entire site lies outside of identified 100 or 500-year floodplains. The site lies in Zone X. Zone X is defined by FEMA as an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. The FEMA Map is presented in Figure 7.

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 Stream Terrace Deposits. The older stream deposits contain sand, gravel, silt and clay preserved on benches or broad flat to sloping areas adjacent to streams. Extraction of the sand, gravel, silt or clay more than likely would not be considered to be economical compared to materials available elsewhere within the county.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands*, the site is mapped within the southern part of the Denver Basin Coal Region. However, the area of the site has been mapped "Poor" for coal resources. The tract contains strata that may contain coal but no coal occurrences are within five miles. No metallic mineral resources have been mapped on the site. No oil and gas wells are drilled on this tract, or within two miles of it. The nearest historic coal mine sites are located around nine miles southwest of the tract in the Colorado Springs coal field. In this part of the Denver coal region, coal resources are locally present within the lower part of the Laramie Formation of Upper Cretaceous age.

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 constraints were considered in the preparation of this report. They are not anticipated to pose a significant risk to the proposed development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Floodplains
- Ground Subsidence
- Landslides
- Rockfall
- Ponding water
- Steeply Dipping Bedrock
- Unstable or Potentially Unstable Slopes
- Scour, Erosion, accelerated erosion along creek banks and drainage ways
- Corrosive Minerals

The following section presents the geologic conditions that have been identified on the property:

8.1 Expansive Soils

Based on the test pits performed by RMG for this investigation and our experience with similar materials in this area, the silty to sandy clay generally possess low to moderate swell potential. The Dawson formation is known to have moderate to high swell potential in some locations. It is anticipated that expansive soil/bedrock may be encountered at depths anticipated to affect residential foundations. If these materials are encountered in the excavations for the proposed residences, they can readily be mitigated with typical construction practices common to this region of El Paso County, Colorado.

Mitigation

Foundation design and construction are typically adjusted for expansive soils. Mitigation of expansive soils may include overexcavation and replacement with non-expansive structural fill. Drilled piers are not anticipated. Floor slabs bearing directly on expansive soils are expected to experience movement. Overexcavation and replacement with compacted non-expansive soils can be successful in reducing slab movement.

If expansive soils or bedrock are encountered during construction, mitigation of these expansive materials should follow the recommendations presented in a lot-specific subsurface soil investigation performed for each proposed structure.

8.2 Compressible Soils

Based on the test pits performed by RMG for this investigation and our experience with similar materials in this area, the silty to sandy clay generally possess low compressibility potential. If compressible materials are encountered in the excavations for the proposed residences, they can readily be mitigated with typical construction practices common to this region of El Paso County, Colorado.

It is unknown at this time whether the proposed single-family residences will have crawlspaces, basements or a combination of both. Foundation design and construction are typically adjusted for compressible soils.

Mitigation

Mitigation of compressible soils and bedrock are typically accomplished by overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the installation of deep foundation systems. If soft or loose soils are encountered, mitigation of compressible soils can be accomplished by overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the use of a geogrid reinforced fill.

If expansive soils or bedrock are encountered during construction, mitigation of these expansive materials should follow the recommendations presented in a lot-specific subsurface soil investigation performed for each proposed structure.

8.3 Undocumented Fill

Multiple irrigation ditches appear to be traversing the property and it is assumed that man-placed artificial fill was used to create the ditches between 1955 and 1960. The locations of the irrigation ditches are presented in the Engineering and Geology Map, Figure 6.

Mitigation

If undocumented fill is located below the proposed residences, it will require removal and replacement with structural fill that has been selected, placed, and compacted in accordance with the recommendations presented in section **11.0 Structural Fill – General** of this report.

Lot-specific subsurface soil investigations performed prior to construction should consider fill depths at that time. If fill placed subsequent to this report is encountered in the lot-specific soil investigations, documentation of the fill placement and compaction should be evaluated to determine the suitability of that fill to support the proposed foundation. If no such documentation is available, that fill should also be removed and replaced.

The following section presents the geologic hazards that have been identified on the property:

8.4 Faults and Seismicity

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 0.185g 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.

8.5 Radon

"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 and the 80908/80831 zip code 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 the development. Individual well and septic systems are also proposed for the residential structures. The site was evaluated in general accordance with the El Paso Land Development Code, specifically sections 8.4.8. Four 8-foot deep test pits were performed across the site to obtain a general understanding of the soil and bedrock conditions. The Test Pits Logs are presented in Figure 4.

The United States Department of Agriculture (USDA) as discussed in section 6.3 consisted of silty clay, sandy clay, sandy loam, and clay loam. Limiting layers were not encountered in the test pits. The long term acceptance rates (LTAR) associated with the soils observed in the test pits range from 0.20 to 0.80 (soil types R-1 to 4) gallons per day per square foot. 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:

- 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, most recently amended May 23, 2018;
- Each lot (after purchase but prior to construction of an OWTS) will require an OWTS report prepared per *the Regulations of the El Paso County Board of Health, Chapter 8 OWTS Regulations*. During the site reconnaissance, a minimum of two 8-foot deep test pits will need to be excavated in the vicinity of the proposed treatment area;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCHDE);

- 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 EPCHDE;
- Each lot shall be designed to insure that a minimum of 2 sites are appropriate for a OWTS and do not fall within the restricted areas identified on the Engineering and Geology Map, Figure 4, (e.g. existing ponds, existing septic fields that may remain);

It is our opinion that if the EPCHDE physical setback requirements are met for each lot, there are no restrictions on the placement of the individual On-site Wastewater Systems.

Soil and groundwater conditions at the site are suitable for individual treatment systems. It should be noted that the LTAR values stated above are for the test pit locations performed for this report only. The LTAR values may change throughout the site. If an LTAR value of less than 0.35 (or soil types 3 to 5) are encountered at the time of the site specific OWTS evaluation, an "engineered system" will be required.

10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in Section 8.0 of this report) found to be present at this site include faults/seismicity and radioactivity/radon. Geologic constraints (as described in section 8.0 of this report) found to be present at this site include compressible soils, expansive soils, and undocumented fill. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering, design, and construction practices.

11.0 STRUCTURAL FILL - GENERAL

Areas to receive structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) prior to placing structural fill.

Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill shall consist of granular, non-expansive material. It should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557. The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

12.0 ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for future development. Unless indicated otherwise, the test pits, laboratory test results, conclusions and recommendations presented in this report are not intended for use for design and construction.

A lot-specific subsurface soil investigation will be required for all proposed structures including (but not limited to) residences, retaining walls and pumphouses, commercial buildings, etc.

13.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed 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. Exterior, perimeter foundation drains should be installed around below-grade habitable or storage spaces. A typical perimeter drain detail is presented in Figure 10. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil.

We believe the sandy clay and silty clay will classify as Type A materials and the sandy loam and clay loam will classify as Type B materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type A and B materials be laid back at ratios no steeper than 3/4:1 (horizontal to vertical) and 1:1 (horizontal to vertical), respectively, 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 the property to 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.

The foundation systems for the proposed single-family residential structures and any retention/detention facilities should be designed and constructed based upon recommendations developed in a site-specific subsurface soil investigation.

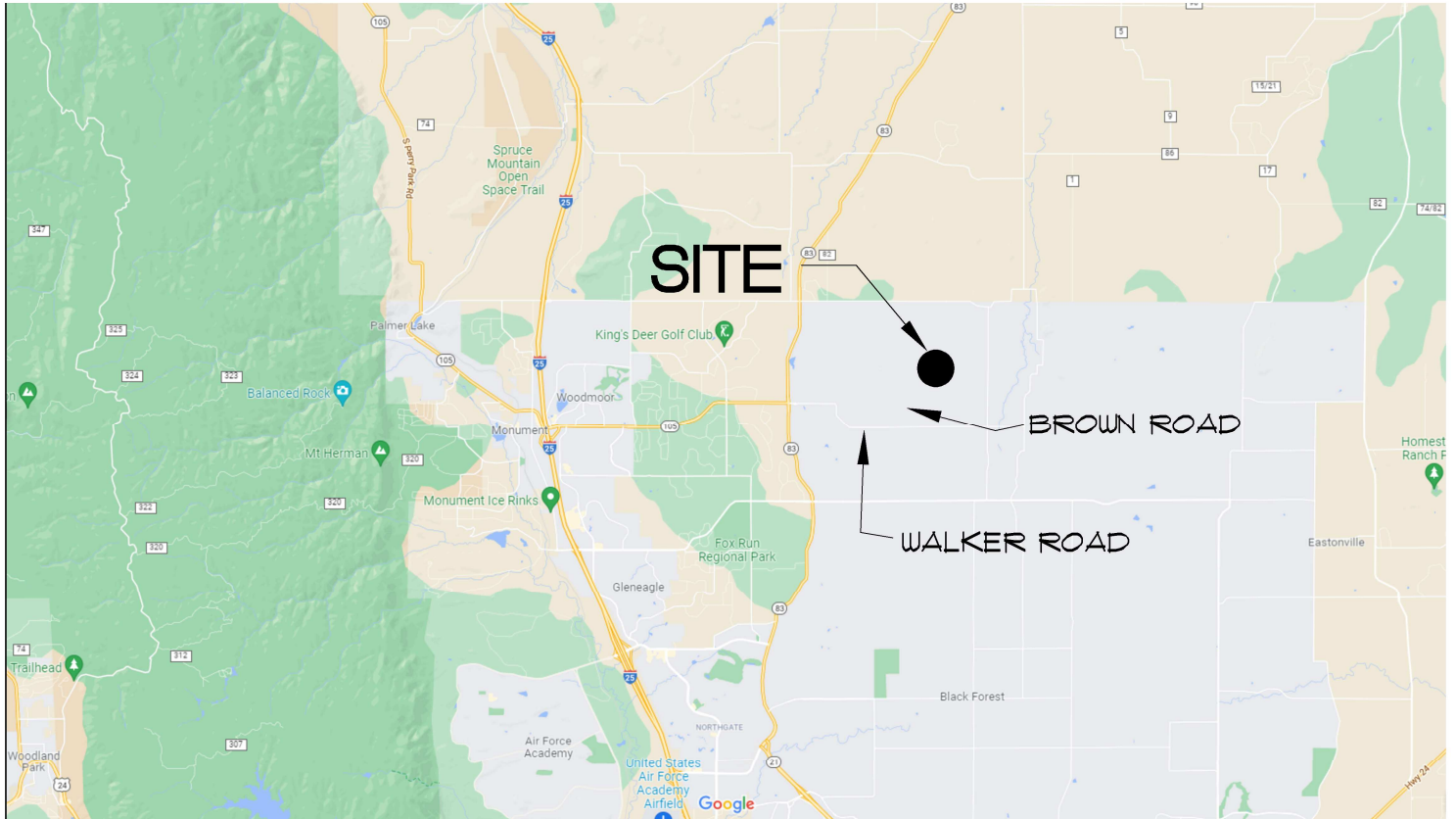
14.0 CLOSING

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 **SMH Consultants** 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



NOT TO SCALE



Southern Office:
Colorado Springs, CO
80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

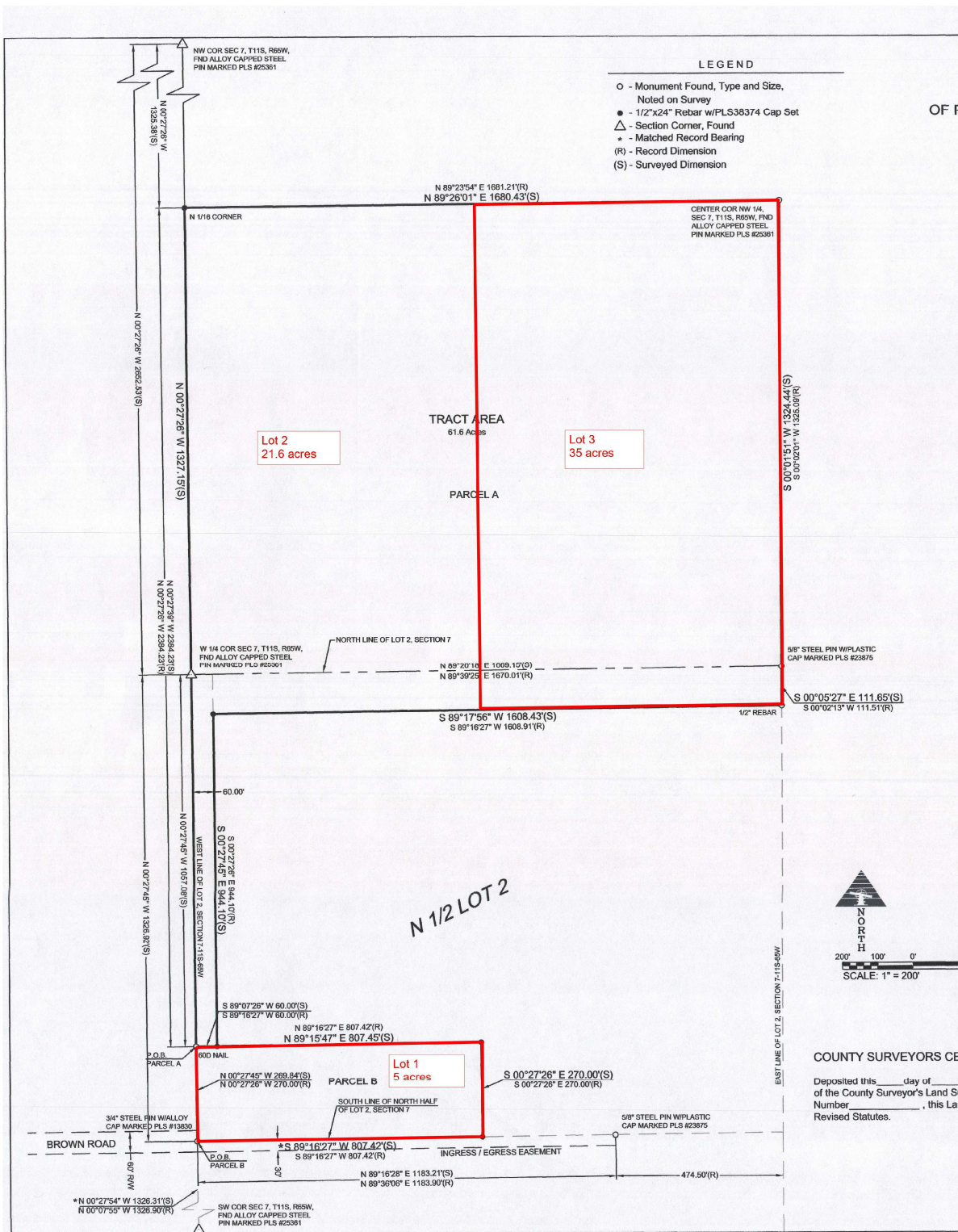
SITE VICINITY MAP

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 1

DATE 11-15-2021



NOT TO SCALE



Southern Office
 Colorado Springs, CO
 80918
 (719) 548-0600
Central Office:
 Englewood, CO 80112
 (303) 688-9475
Northern Office:
 Greeley / Evans, CO 80620
 (970) 330-1071

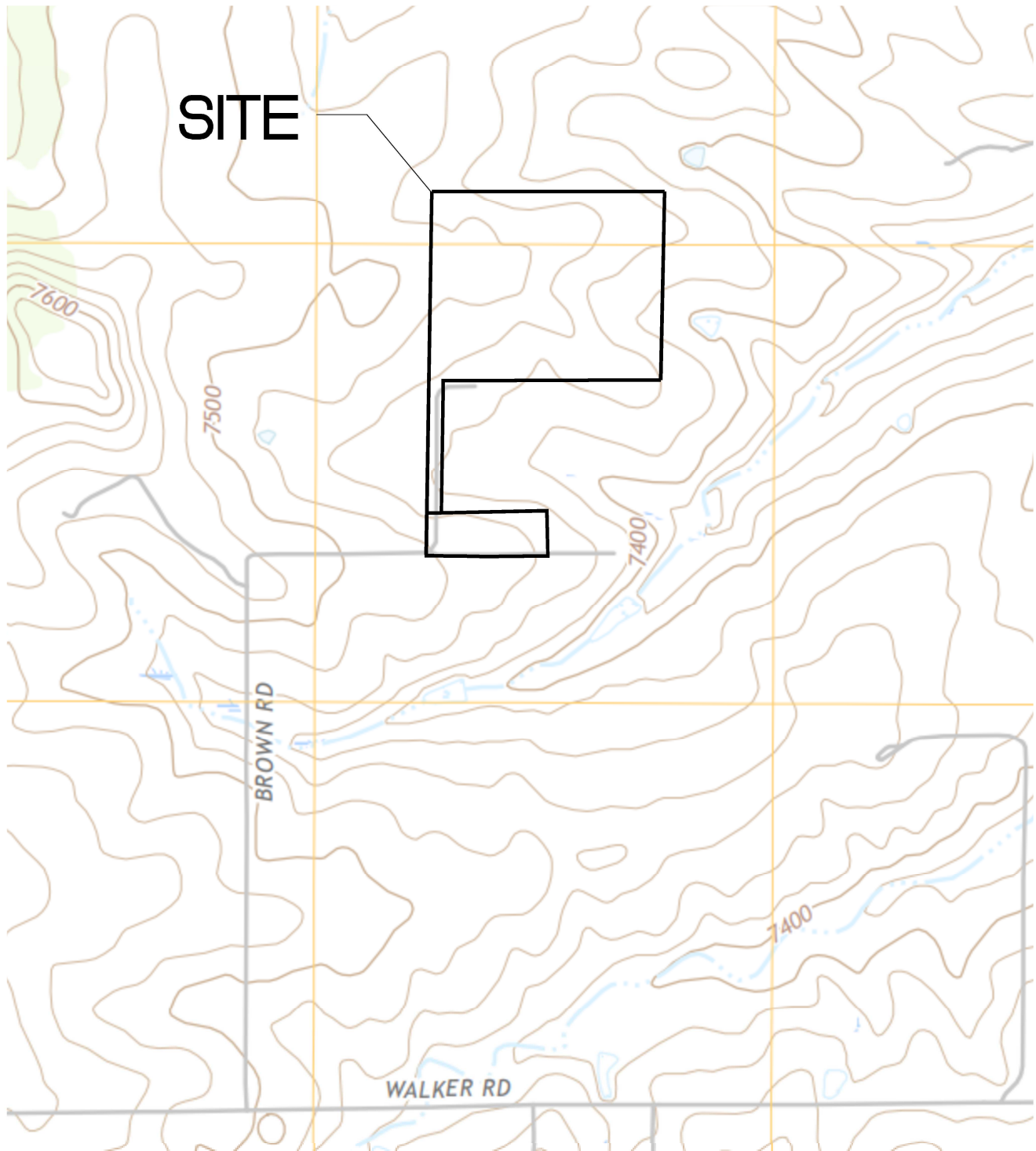
PROPOSED LOT LAYOUT

18885 BROWN ROAD
 LOTS 1-3, OWL RIDGE SUBDIVISION
 EL PASO COUNTY, COLORADO
 SMH CONSULTANTS

JOB No. 185466

FIG No. 2

DATE 11-15-2021



NOT TO SCALE



ROCKY MOUNTAIN GROUP

Southern Office:
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

USGS TOPO MAP

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 3

DATE 11-15-2021

TEST PIT TP-1			
DATE OBSERVED: 09/22/21			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 8.0 FT SILTY CLAY (STRONG)			4
	8ft		

TEST PIT TP-2			
DATE OBSERVED: 09/22/21			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 5.0 FT SANDY CLAY (STRONG)			4
5 - 8.0 FT SANDY LOAM (MODERATE)			2
	8ft		

SOIL DESCRIPTIONS



SANDY CLAY



SANDY LOAM



SILTY CLAY

TEST PIT LOGS

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

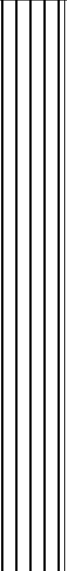
JOB No. 185466


FIG No. 4

DATE 11-15-2021



Southern Office
Colorado Springs, CO
80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

TEST PIT TP-3			
DATE OBSERVED: 09/22/21			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 8.0 FT CLAY LOAM (MODERATE)	2ft 4ft 6ft 8ft		R-1

TEST PIT TP-4			
DATE OBSERVED: 09/22/21			
SOIL DESCRIPTION	DEPTH (FT)	SYMBOL	SOIL TYPE
0 - 8.0 FT SILTY CLAY (STRONG)	2ft 4ft 6ft 8ft		4

SOIL DESCRIPTIONS



CLAY LOAM



SILTY CLAY



Southern Office
Colorado Springs, CO
80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

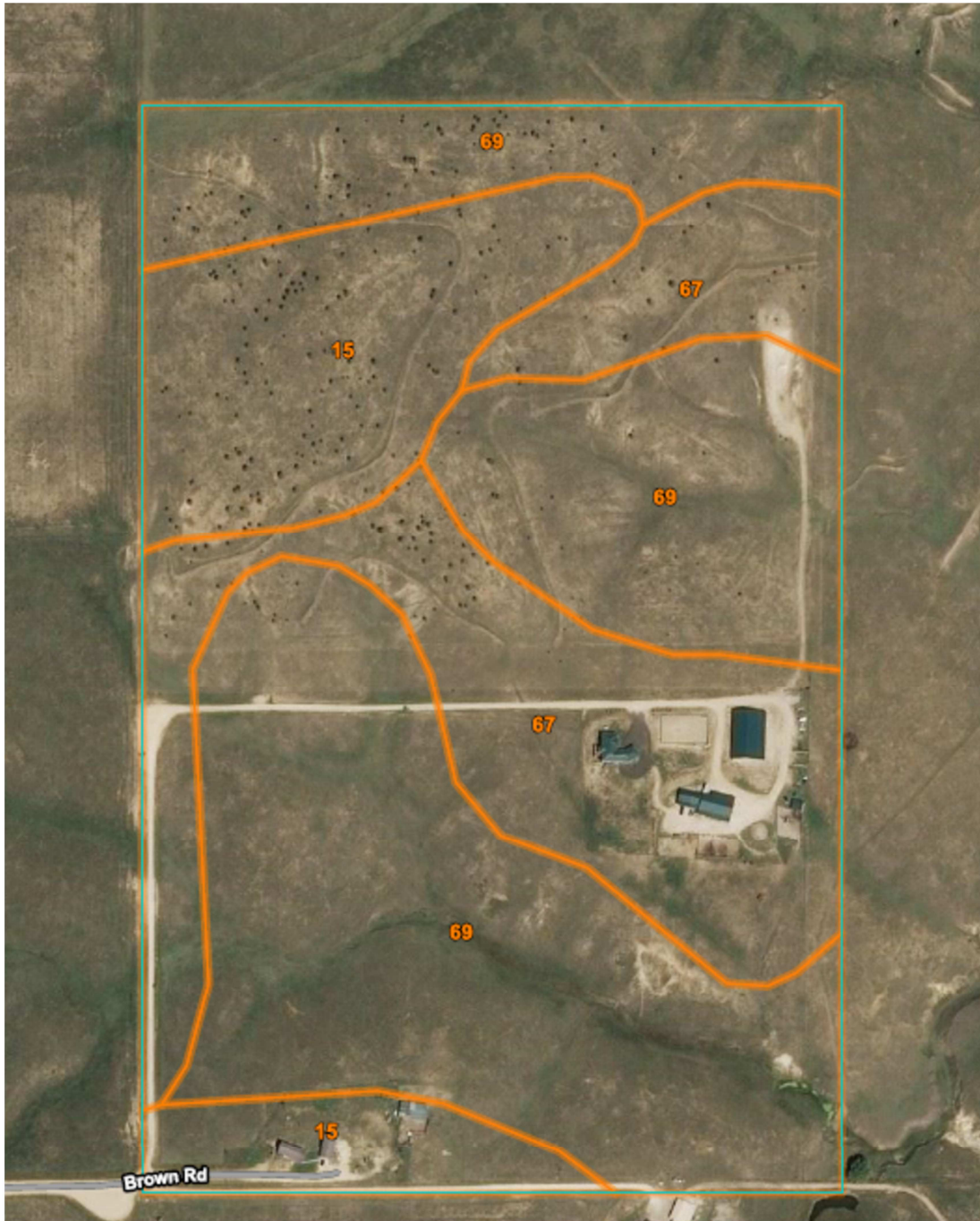
TEST PIT LOGS

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 4

DATE 11-15-2021



- 15 - BRUSSETT LOAM, 3 TO 5 PERCENT SLOPES
 67 - PEYTON SANDY LOAM, 5 TO 9 PERCENT SLOPES
 69 - PEYTON-PRING COMPLEX, 8 TO 15 PERCENT SLOPES



NOT TO SCALE



Southern Office
 Colorado Springs, CO
 80918
 (719) 548-0600
Central Office:
 Englewood, CO 80112
 (303) 688-9475
Northern Office:
 Greeley / Evans, CO 80620
 (970) 330-1071

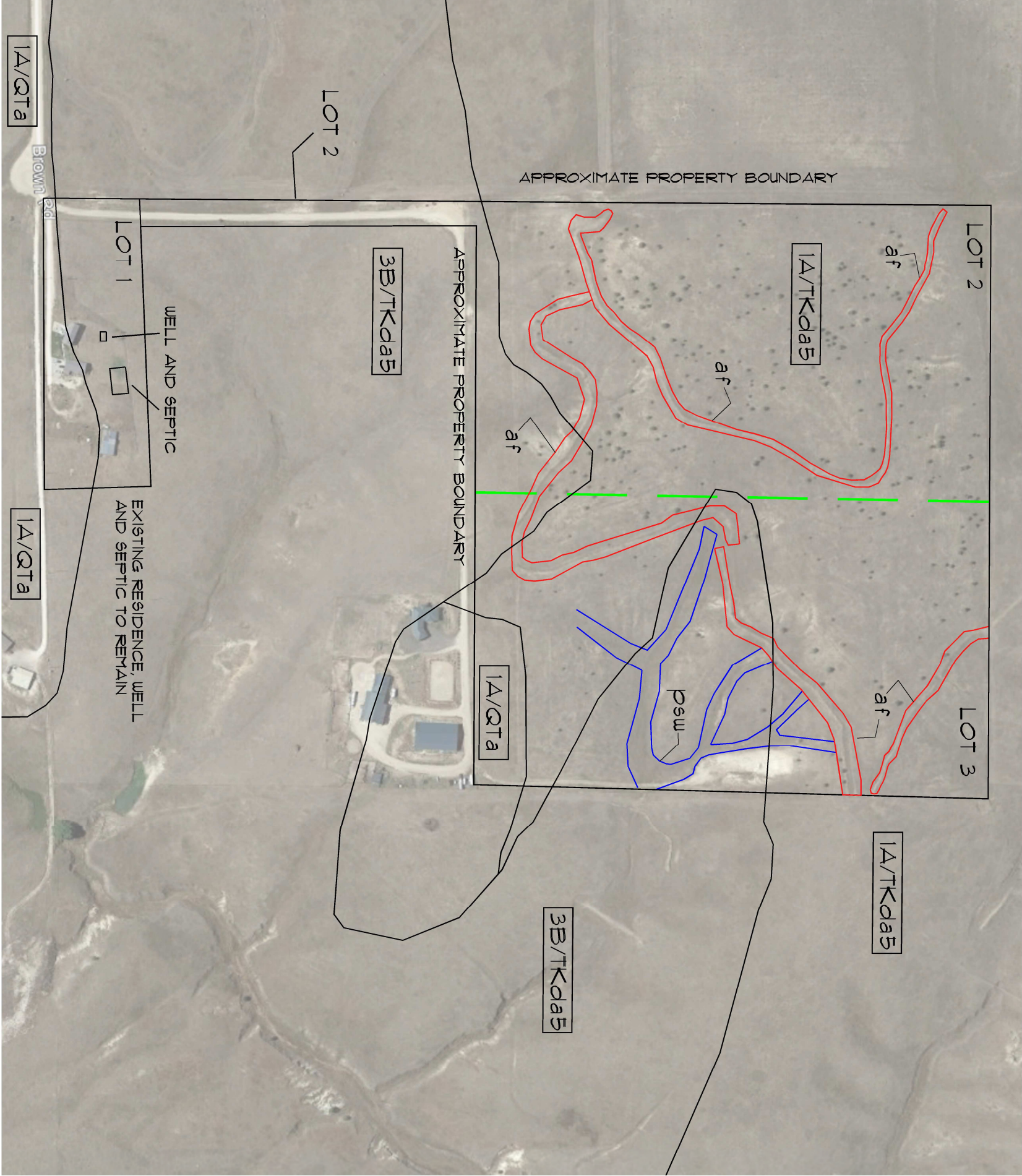
USDA SOIL SURVEY MAP

18885 BROWN ROAD
 LOTS 1-3, OWL RIDGE SUBDIVISION
 EL PASO COUNTY, COLORADO
 SMH CONSULTANTS

JOB No. 185466

FIG No. 5

DATE 11-15-2021



Geologic

- TKda5 - Dawson Formation, facies unit three (early to middle Eocene) - Unit is estimated to be about 500 feet thick
- QTa - Alluvium of Palmer Divide (early Pleistocene or Pliocene) - Unit is up to 30 feet thick
- af - Artificial Fill Area - Artificial fill placed between 1955 and 1960 for the creation of irrigation ditchesthroughout the property
- psu - Potentially Seasonally Wet Area

Engineering

- 1A - stable alluvium, colluvium and bedrock on flat to gentle slopes (0-5%)
- 3B - expansive and potentially expansive soil and bedrock on flat to moderate slopes (0-12%)

— — — — —
DENOTES BOUNDARY BETWEEN LOTS 2 AND 3

— — — — —
DENOTES ARTIFICIAL FILL AREA

JOB No. 185466



ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO 80918

(719) 548-0600

Central Office:
Englewood, CO 80112

(303) 688-9475

Northern Office:

Greeley / Evans, CO 80620

(970) 330-1071

Woodland Park Office:

(719) 687-6077

Monument Office:

(719) 488-2145

Pueblo / Canon City:

(719) 544-7750

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE
SUBDIVISION

EL PASO COUNTY, COLORADO
SMH CONSULTANTS

ENGINEER:	TECH
DRAWN BY:	KCR
CHECKED BY:	TEH
ISSUED:	11-15-2021

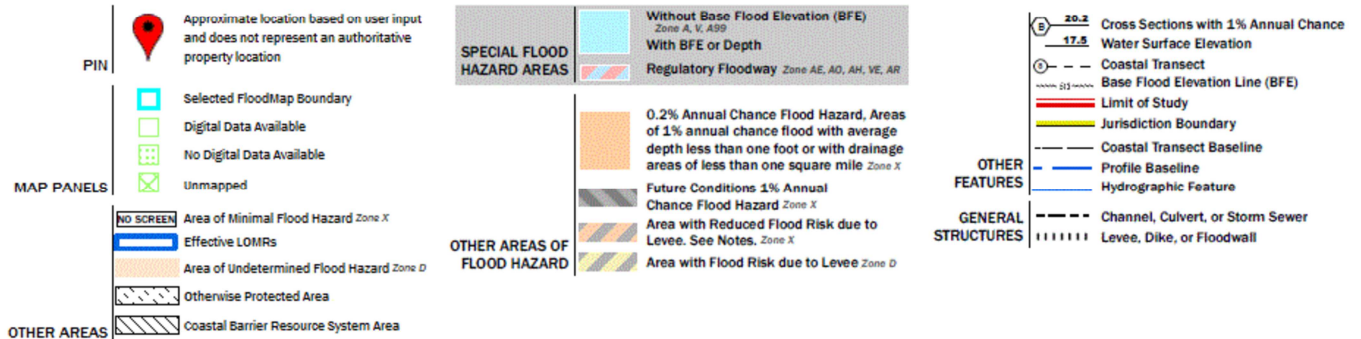
ENGINEERING AND
GEOLOGY MAP

SHEET No.

FIG-6



NOT TO SCALE



NOT TO SCALE



Southern Office
Colorado Springs, CO
80918
(719) 548-0600
Central Office
Englewood, CO 80112
(303) 688-9475
Northern Office
Greeley / Evans, CO 80620
(970) 330-1071

FEMA MAP

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 7

DATE 11-15-2021



NOT TO SCALE



DENOTES APPROXIMATE LOCATION OF TEST PITS



ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

TEST PIT LOCATION MAP

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 8

DATE 11-15-2021



NOT TO SCALE



DENOTES PROPOSED PRIMARY AND ALTERNATE SEPTIC LOCATIONS



ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs, CO
80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

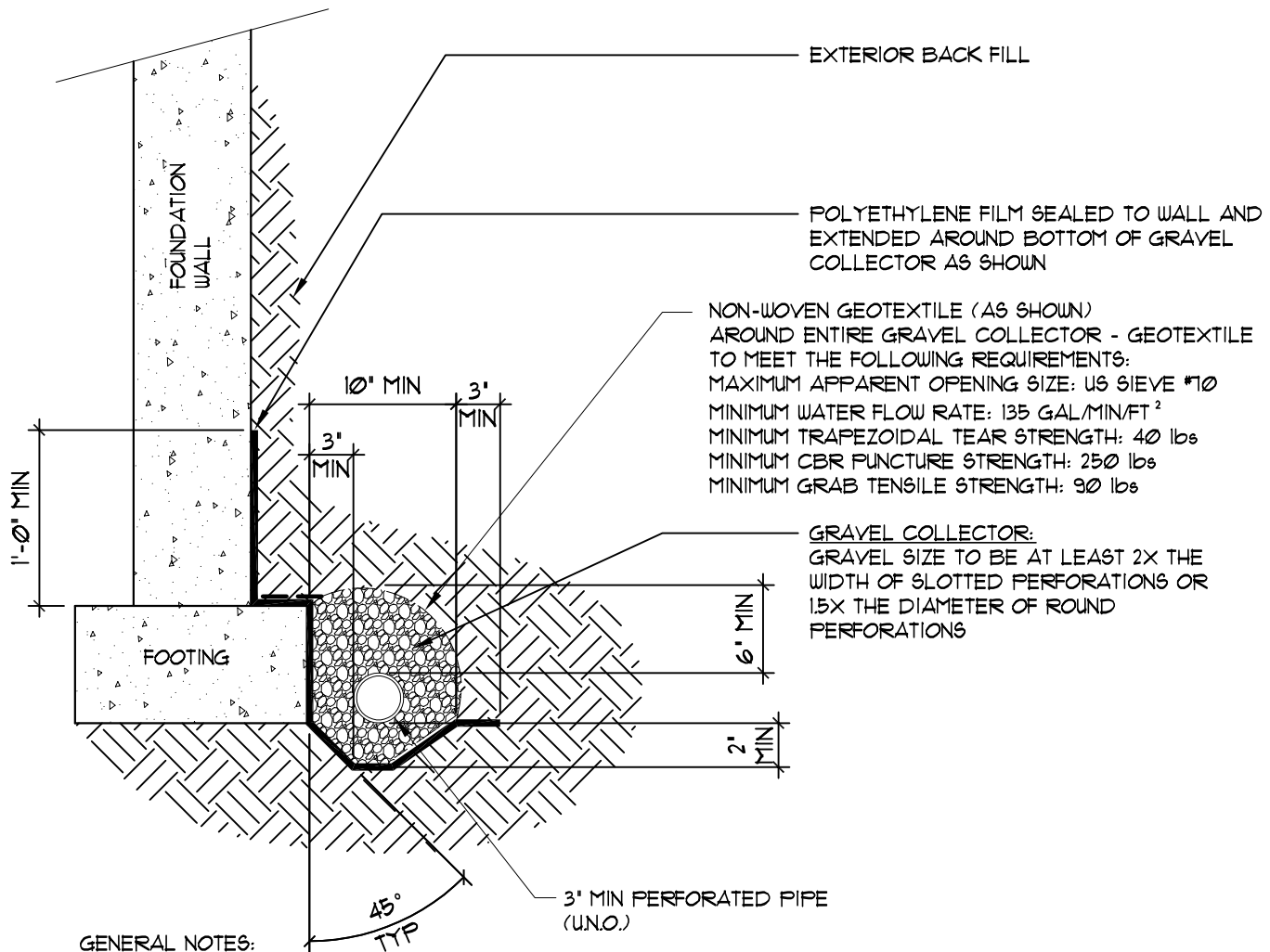
SEPTIC SUITABILITY MAP

18885 BROWN ROAD
LOTS 1-3, OWL RIDGE SUBDIVISION
EL PASO COUNTY, COLORADO
SMH CONSULTANTS

JOB No. 185466

FIG No. 9

DATE 11-15-2021



1. BOTTOM OF DRAIN PIPE SHALL BE AT OR BELOW BOTTOM OF FOOTING AT ALL LOCATIONS
2. ALL DRAIN PIPE SHALL BE PERFORATED PLASTIC, WITH THE EXCEPTION OF THE DISCHARGE PORTION WHICH SHALL BE SOLID, NON-PERFORATED PIPE.
3. DRAIN PIPE SHALL HAVE POSITIVE FALL THROUGHOUT.
4. DRAIN PIPE SHALL BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. IF A GRAVITY OUTFALL CANNOT BE ACHIEVED, THEN A SUMP PIT AND PUMP SHALL BE USED. THE OUTFALL SHOULD EXTEND PAST BACKFILL ZONES AND DISCHARGE TO A LOCATION THAT IS GRADED TO DIRECT WATER OFF-SITE.
5. ALL DRAIN COMPONENTS SHALL BE RATED/APPROVED BY THE MANUFACTURER FOR THE INSTALLED DEPTH AND APPLICATION
6. DRAIN SYSTEM, INCLUDING THE OUTFALL OF THE DRAIN, SHALL BE OBSERVED BY QUALIFIED PERSONNEL PRIOR TO BACKFILLING TO VERIFY INSTALLATION.
7. A VERTICAL SEGMENT OF PERFORATED DRAIN PIPE, CAPPED AT THE TOP, SHALL EXTEND TO FINISH GRADE WITHIN ALL WINDOW WELLS.

APPENDIX A

Additional Reference Documents

1. *Land Survey Plat Map, 20990 Jones Road El Paso County, Colorado*, prepared by SMH Consultants, Job No. 2010CS4031, last dated November 19, 2020.
2. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0305G*, Federal Emergency Management Agency (FEMA), effective December 7, 2018.
3. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*, Madole, R.F., 2003, Colorado Geological Survey Open-File Report OF03-06.
4. *Cherry Valley and Black Forest Quadrangle, Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
5. *Black Forest Quadrangle, Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
6. *Pikes Peak Regional Building Department*: <https://www.pprbd.org/>.
7. El Paso County Assessor Website
<https://property.spataleest.com/co/elpaso/#/property/5100000447>
Schedule No. 5100000447
8. *Colorado Geological Survey, USGS Geologic Map Viewer*:
<http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/>.
9. *Historical Aerials*: <https://www.historicaerials.com/viewer>, Images dated 1947, 1952, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, and 2017.
10. *USGS Historical Topographic Map Explorer*: <http://historicalmaps.arcgis.com/usgs/> Colorado Springs, Black Forest Quadrangle dated 1898, 1909, 1948, 1969, 1981 and 1989.
11. *Google Earth Pro*, Imagery dated 1999, 2004, 2005, 2006, 2011, 2013, 2015, 2017, 2019 and 2020.

AP

51000000013

Biv.

CITY-COUNTY HEALTH DEPARTMENT
COLORADO SPRINGS, COLORADO

7/11

P

SEWAGE DISPOSAL INSPECTION FORM

permit #000328

APPROVAL: V.A. & F.H.A.

YES ☒ NO ☐

File Black Fresh

DATE OF INSP. 6/18/79

LOCATION (STREET NUMBER) 18885 Brown Rd.

OCCUPANT Houser

LEGAL DESCRIPTION

CONTRACTOR NO. OF BEDROOMS 4

TYPE OF CONSTRUCTION Dwelling

SYSTEM INSTALLED BY Russ Palmer

PRIMARY TREATMENT

COMMERCIAL MFG. YES

SIZE 1250

NON. COMMERCIAL

SIZE

TYPE OF MATERIAL NO. COMPARTMENTS

WIDTH LENGTH GALLONS DEPTH (TOTAL) LIQ. CAP.

SECONDARY TREATMENT

DISPOSAL FIELD SOIL PERC. TEST

TOTAL LENGTH OF TILE LINES 254' NUMBER OF LINES 3 DISTANCE BETWEEN LINES 11'-14'

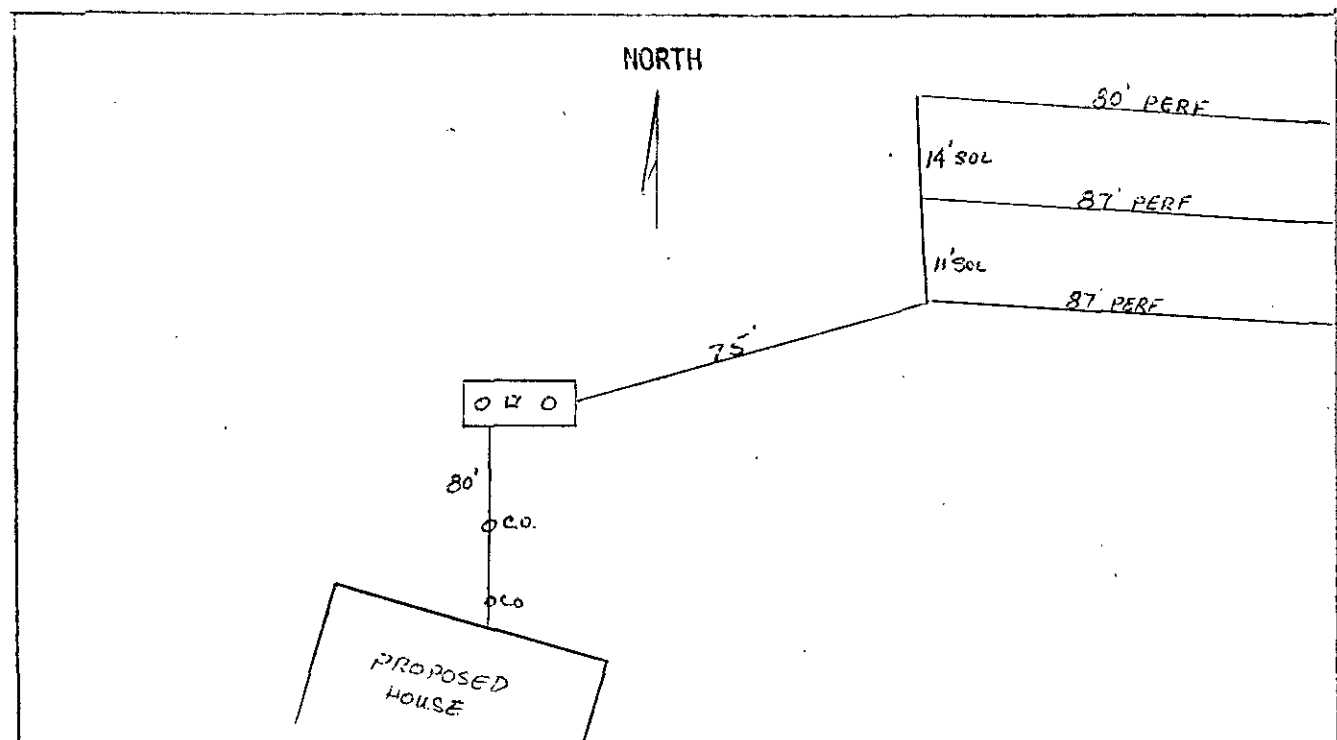
ABSORB. AREA 762' TYPE OF TILE PLASTIC TRENCH DEPTH 2' COVER TRENCH WIDTH 36" GRADE

TYPE FILTER MATERIAL river rock DEPTH 12" UNDER TILE 6" OVER TILE 2"

LEACHING PITS (NO.) SOIL PERC. TEST LINING MATERIAL

CAPACITY SQ. FT. DIAM WORKING DEPTH

DISPOSAL BED LENGTH WIDTH DEPTH TOTAL SQ. FT.



Acres 102+

Water Supply Well

EL PASO COUNTY • COUNTY HEALTH DEPARTMENT
501 North Foote Avenue • Colorado Springs, Colorado - 475-8240

PERMIT

Receipt No. 2796

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

Issued To Sandra Haugen Date May 23, 1979

Address of Property Brown Road, Black Forest, Colorado

(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 six (6) months from date of issue - whichever occurs first - (unless work is in progress).

- This Permit does not denote approval of zoning and acreage requirements. -

Permit Fee \$50.00 Charles H. Dowding, Jr., M.D., M.P.H.
Director, City-County Health Department

Date of Expiration November 23, 1979 Karen C. Smayda
Environmentalist

NOTE: LEAVE ENTIRE SEWAGE-DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION.

24-HOUR ADVANCE NOTICE REQUIRED

760 Sq. Ft.

Septic tank 1250 gals. Field 253 Feet of trench 36 inches wide
OR- Field 380 Feet of trench 24 inches wide
Seepage bed _____ ft. long _____ ft. wide. Seepage pit _____ sq. ft. _____ diam. _____ w/d

The Health Officer 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 times for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

Date 5/9/79

EL PASO CITY-COUNTY HEALTH DEPARTMENT
501 NORTH FOOTE AVENUE
COLORADO SPRINGS, COLORADO
636-0125

Application for permit to construct, Remodel, or Install a Sewage Disposal System

Name of Owner Sandro Hougen Phone 495-4279

Address of Property Brown Rd

Legal Description of Property SW 1/4 of NW 1/4 - meets & bounds

Owner's Address (if different) _____ Phone _____

Systems Contractor _____ Address _____

Type of Construction House Source and Type
of Water Supply WELL

Size of Lot 102' A

The construction of the Sewage Disposal System will comply with all applicable Laws, Ordinances, Standards or Resolutions.

HEALTH DEPARTMENT USE ONLY

Permit Number _____ Receipt Number _____

Number of Bedrooms 4 Tank Capacity 1250 gallons Absorption area 760 Sq. Ft.

REMARKS _____
3' Trench = 253'
2' Trench = 380'

APPLICATION IS ☒ APPROVED ☐ DENIED

ENVIRONMENTALIST [Signature] DATE 5/9 19 79

PLOT PLAN WILL INCLUDE THE FOLLOWING

Plot plan may be drawn on the back of this sheet or on a separate sheet.

1. Streams, Lakes, Ponds, Irrigation Ditches and other Water Courses
2. North Direction
3. Location of Property Line
4. Buildings
5. Wells
6. Location of Proposed Septic System
7. Location of percolation test
8. Geographical features
9. Other Information as required