

**PT McCune, LLC**

**WATER RESOURCES  
And  
WASTEWATER REPORT  
For  
Winsome Subdivision**

**January, 2019**  
PCD File Number: SP-18-006

**Prepared By:**



**CONSULTANTS, INC.**

PT McCune, LLC

WATER RESOURCES and WASTEWATER REPORT

JANUARY 2019

Prepared for:

PT McCune, LLC  
1864 Woodmoor Drive, Suite 100  
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Prepared by:

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Colorado Springs, CO 80919

**Executive Summary:**  
**Water Resources and Wastewater Report—Winsome Subdivision**

Development at McCune Ranch by PT McCune, LLC consists of 766.66 acres and 144 lots, located north of Hodgen Rd, and west of Meridian Rd. The development is primarily located in Section 24 (T11S R65W), with portions located in Section 13 (T11S R65W) and 19 (T11S R64W). Residential and commercial properties within the development will be provided water services through individual residential wells and wastewater served through individual on-site wastewater treatment systems (OWTS). The proposed phased development is planned as follows:

- Phase 1 - 49 rural lots
- Phase 2 - 23 rural lots
- Phase 3 - 55 rural lots and one (1) commercial lot
- Phase 4 - 16 rural lots

It is expected that each rural residential home in Winsome Subdivision will require an average of 0.60 annual acre-feet (which includes annual allocations for domestic use, irrigation, and stock water). This anticipated water demand constant is consistent with historic needs for nearby developments.

Phases 1-4 will be served by individual on-site residential wells and septic. An existing replacement plan is being modified to allocate Denver Basin water to serve the proposed development through the use of water from the Dawson Aquifer. The amount of water available for consumptive use from the Dawson Aquifer to serve the proposed development is estimated at 232.66 AF/year. Annual demand estimates using the residential constant described above comes to approximately 90.80 AF annually. Return flows from each individual OWTS will be dedicated to replace post-pumping depletions and are estimated at 40.86 AF annually, which will replace estimated depletions.

The proposed amendment to an existing replacement plan found in Water Right No. 1692-BD was submitted to the State Groundwater Commission on December 6<sup>th</sup>, 2018 to replace post-pump depletions from the Dawson Not-Nontributary Aquifer. At the time of this report, the proposed amendment had not yet been initiated. The amendment will be initiated as soon as the water service agreement between the original property owner and PT McCune, LLC has been completed. As mentioned above, the proposed source of replacement water is leaching field return flows through individual septic system to the underlying alluvium.

There may also be additional Denver Aquifer Non-Tributary water in the order of 60 AF/year available for replacement water use, however, this arrangement needs to be negotiated between the current property owner and PT McCune, LLC. It is possible that this non-tributary water may not be needed pending approval of the replacement plan amendment.

## TABLE OF CONTENTS

### **SECTION 1 INTRODUCTION**

- 1.1 New Development Description

### **SECTION 2 PROJECTION OF WATER NEEDS**

- 2.1 Analysis of Water Demands  
Table 2-1 – *Projected Water Demands for Winsome Subdivision*

### **SECTION 3 PROPOSED WATER RIGHTS AND SYSTEM FACILITIES**

- 3.1 Water Rights  
Table 3 – *Summary of Available Legal Water Supply for Winsome Subdivision Phase 1-4*
- 3.2 Source of Supply
- 3.3 Water Quality and Treatment
- 3.4 Water Storage
- 3.5 Distribution and Transmission Lines
- 3.6 Impact on Existing Wells

### **SECTION 4 COMMERCIAL DEVELOPMENT**

- 4.1 Water Supply and Quality
- 4.2 Fire Flow

### **SECTION 5 WASTEWATER REPORT**

- 5.1 Wastewater Loads  
Table 5-1 – *Projected Wastewater Loads for Winsome Subdivision*
- 5.2 On-Site Wastewater Treatment Systems

### **APPENDICES**

- Appendix A-* Preliminary Plan for Winsome Subdivision
- Appendix B-* Water Demands and Wastewater Loads –PT McCune, LLC– Winsome Subdivision- Phase 1-4
- Appendix C-* Overall Water Supply Inventory – PT McCune, LLC – Winsome Subdivision- Phase 1-4
- Appendix D-* Water Rights Decrees  
1689-BD  
1690-BD  
1691-BD  
1692-BD

## **SECTION 1 INTRODUCTION**

The purpose of this study is to provide a preliminary outline of the water resources and wastewater needs that would be necessary for Phase 1-4 of the Winsome Subdivision development.

### *1.1 New Development Description:*

Development at McCune Ranch by PT McCune, LLC consists of 766.66 acres and 144 lots, located north of Hodgen Rd, and west of Meridian Rd. The development is primarily located in Section 24 (T11S R65W), with portions located in Section 13 (T11S R65W) and 19 (T11S R64W). The proposed lots are to be provided water and sewer services through on-site individual wells and septic. Phases 1-4 are designated for 143 rural residential lots, along with one (1) commercial lot, open space, drainageway, and trails.

#### **Phases 1-4 include the following water using land uses;**

##### *Phase 1*

- 49 single family homes on individual well and septic systems

##### *Phase 2*

- 23 single family homes on individual well and septic systems

##### *Phase 3*

- 55 single family homes on individual well and septic systems, along with one (1) commercial lot with on-site well and septic systems

##### *Phase 4*

- 16 single family homes on individual well and septic systems

**Appendix A** contains a preliminary plan for the Winsome Subdivision.

## **SECTION 2 PROJECTION OF WATER NEEDS**

### *2.1 Analysis of Water Demands:*

Expected water demands are calculated in **Appendix B**. Table 2-1 below estimates the projected water demands for development at Winsome Subdivision. Each Dawson Aquifer well is proposed to divert 0.6 acre-feet of water annually for in house use in one single family residence (0.3 acre-foot per residence for domestic indoor use; irrigation of up to 4,000 square feet of lawn, garden, and

**Table 2-1 -Projected Water Demands for Winsome Subdivision**

<i># of Units</i>	<i>Land Use</i>	<i>Water Use Per Unit (AF/Unit)</i>	<i>Annual Demand (AF)</i>	<i>Average Daily Flow (ADF) (GPD)</i>	<i>Maximum Daily Flow (MDF) (@ 2.5 x ADF) (GPD)</i>	<i>Peak Hour Flow (@ 1.5 x MDF) (GPM)</i>
<b>143</b>	<b>Residential (Rural, Well &amp; OWTS)</b>	<b>0.6</b>	<b>85.8</b>	<b>76,597</b>	<b>191,493</b>	<b>199</b>
<b>1</b>	<b>Commercial</b>	<b>5</b>	<b>5</b>	<b>4,464</b>	<b>11,160</b>	<b>12</b>

trees, which require 0.25 acre-feet; and watering of four large domestic animals, which require 0.05 acre-feet).

**Total Annual Demand of the Winsome Subdivision is 90.8 acre-feet.**

**SECTION 3 PROPOSED WATER RIGHTS AND SYSTEM FACILITIES**

**3.1 Water Rights:**

Water rights adjudications have been decreed by the State of Colorado, Water Division 2 District Court. The findings and relevant information are displayed in **Appendix C**.

**Table 3-1**  
**Summary of Available Legal Water Supply**  
**for Winsome Subdivision Phases 1-4**

<b>Water</b>	<b>Annual Supply* (Acre-Feet)</b>	<b>Notes</b>
Dawson NNT	232.66	90.8 acre-feet will be drawn from this formation annually
Denver NT	149.95	90 acre-feet/year may be sold to SRMD** leaving 60 acre-feet/year for Winsome Subdivision.
Arapahoe NT	113.00	Entirety to be sold to SRMD**
Laramie-Fox Hills NT	74.78	Entirety to be sold to SRMD**

\*300-year annual supply  
\*\*Sterling Ranch Metropolitan District

The existing replacement plan associated with Water Right No. 1692-BD is to be amended to supply replacement water to augment post pumping depletions from the alluvial aquifer. The replacement plan will utilize return flows from each on-site individual septic system on the order of 0.27 AF/Year-SFE, which is estimated to provide approximately 40.86 AF/year. These return flows are sufficient to augment estimated annual post-pumping depletions within the development. It is possible that the current property owner may “leave behind” 60 AF/year of Denver Aquifer water to assist with possible replacement purposes. However, if the proposed replacement plan associated with water right 1692-BD is approved, then it is likely that the remainder of the allocated Denver Aquifer water will be sold as well. Water from the other two non-tributary formations associated with the property (Arapahoe and Laramie-Fox Hills) is being sold to another municipality and will not be used to serve the Winsome Subdivision.

Beneficial use of the water from the decrees includes domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds, piscatorial habitat less than 1000sqft, wildlife, replacement, and all other augmentation purposes.

**Appendix D** includes four decrees enumerated in Table 3-1 as the water decrees. Of the decrees, only Water Right No. 1692-BD and possibly a portion of No. 1691-BD will be associated with this development.

### 3.2 *Source of Supply:*

Domestic and commercial water demand will be met using individual wells drilled into the Dawson formation.

### 3.3 *Water Quality and Treatment:*

The water quality in the Dawson Aquifer in this area has typically been suitable for residential potable use. Water samples will be obtained from a Dawson well located on a neighboring property (11745 Quiet Waters PT), located north-east of and directly adjacent to the proposed Winsome Subdivision. Utilizing the adjacent property as a representative sample source for the individual residential well was approved by Nina Ruiz with El Paso County Development Services on November 14<sup>th</sup>, 2018. Water quality testing will be performed on the water samples per the El Paso County Land Development Code section 8.4.7(B) prior to the final plat submittal.

The commercial lot will most likely be classified as a transient non-community system with the Colorado Department of Health and Environment and will have its own public water system ID (PWSID). The source water will, at a minimum, be chlorinated, and a contract operator will be responsible for maintaining and monitoring the system on the commercial property. Water quality sampling and

reporting will be conducted by the commercial developer, as described in section 4.1 of this report.

#### 3.4 *Water Storage:*

Each single-family home and the commercial lot will have its own individual pressure tank. The size and pressure of the tanks are to be determined by the property owner.

#### 3.5 *Distribution and Transmission Lines:*

There will be four (4) well sites on the Winsome Subdivision property to obtain the non-tributary water outlined in Table 3-1 for transmission to the Sterling Ranch Development for municipal uses. In addition, there will also be several transmission lines from the well sites to deliver water to Sterling Ranch Metropolitan District property. These transmission lines will not serve the Winsome Subdivision.

#### 3.6 *Impact on Existing Wells:*

Matt Gowler facilitated the purchase of approximately 120 acres from McCune Ranch, LLC for the construction of three (3) homes on three (3) 40-acre lots (owned by the Gowers, the Kings, and the Grothes). These three lots represent the remaining McCune Ranch acreage left behind after the purchase of the 766.66 acres by PT McCune, LLC. Each of these lots include a permitted exempt/small capacity well to the Dawson aquifer, two of which have already been drilled. None of these wells, including the Gowler property (well permit no. 309240) directly adjacent to the proposed development, will be impacted by the water resource plan proposed for the development. As illustrated by the Land Survey Plat and the Existing Well Locations Map included in **Appendix F**, the Winsome Subdivision property will not impact well no. 309240 nor do the properties, as platted, overlap.

According to information available with the Colorado Division of Water Resources an exempt/small capacity Dawson aquifer well (permit no. 162283 as permitted by the Conway family), is said to be located on the proposed Winsome Subdivision, as illustrated in the Existing Well Locations Map in **Appendix F**. A search for the well structure was conducted on January 7<sup>th</sup>, 2019, resulting in no evidence that the structure exists at or near the location depicted in the permit. This is consistent with information provided by the McCunes prior to the sale of the land to the Winsome developer. At this time, it is assumed that this well does not exist on the Winsome property.

## **SECTION 4 COMMERCIAL DEVELOPMENT**

#### 4.1 *Water Supply and Quality:*

Development at Winsome Subdivision will include one (1) 7.9-acre commercial lot with its own well and septic system. As mentioned in section 3.3, the property

will likely be classified as a transient non-community system with the Colorado Department of Health and Environment. The future well will require a quality sampling suite for analysis for evaluation by the CDPHE. Water quality sampling will be conducted at the time the well is drilled, and will be conducted by the commercial developer after the design application for the transient non-community public water system is prepared and submitted to the CDPHE.

4.2 *Fire Flow:*

The commercial developer of the commercial lot will be required to provide fire suppression to the proposed structure, per the 2009 IFC. Fire suppression will include a storage tank or cistern, along with adequate booster pumps to serve the fire suppression system in the building.

**SECTION 5 WASTEWATER AND WASTEWATER TREATMENT**

5.1 *Wastewater Loads*

Wastewater projections are based on similar District historical use. There are 143 initial residential units expected in Phases 1-4 of the Winsome Subdivision, along with one (1) commercial lot, which will all have on-site septic systems.

**Appendix B** includes a complete breakdown. Average daily wastewater loads are expected to be approximately 241 gallons per day per single family residence and 2009 gallons per day for the commercial lot. Maximum daily wastewater loads are expected to be approximately 294 gallons per day per single family residence and 2452 gallons per day for the commercial lot.

*Table 5-1 - Projected Wastewater Loads for Winsome Subdivision*

<i>Wastewater Loads</i>			
<i># of Units</i>	<i>Type</i>	<i>Average Daily Flow (ADF) (GPD)</i>	<i>Maximum Daily Flow (GPD)</i>
<b>143</b>	<b>Residential</b>	<b>34,463</b>	<b>42,042</b>
<b>1</b>	<b>Commercial</b>	<b>2,009</b>	<b>2,452</b>

**Total Expected Daily Loads of Winsome Subdivision is 36,472 gallons/day.**

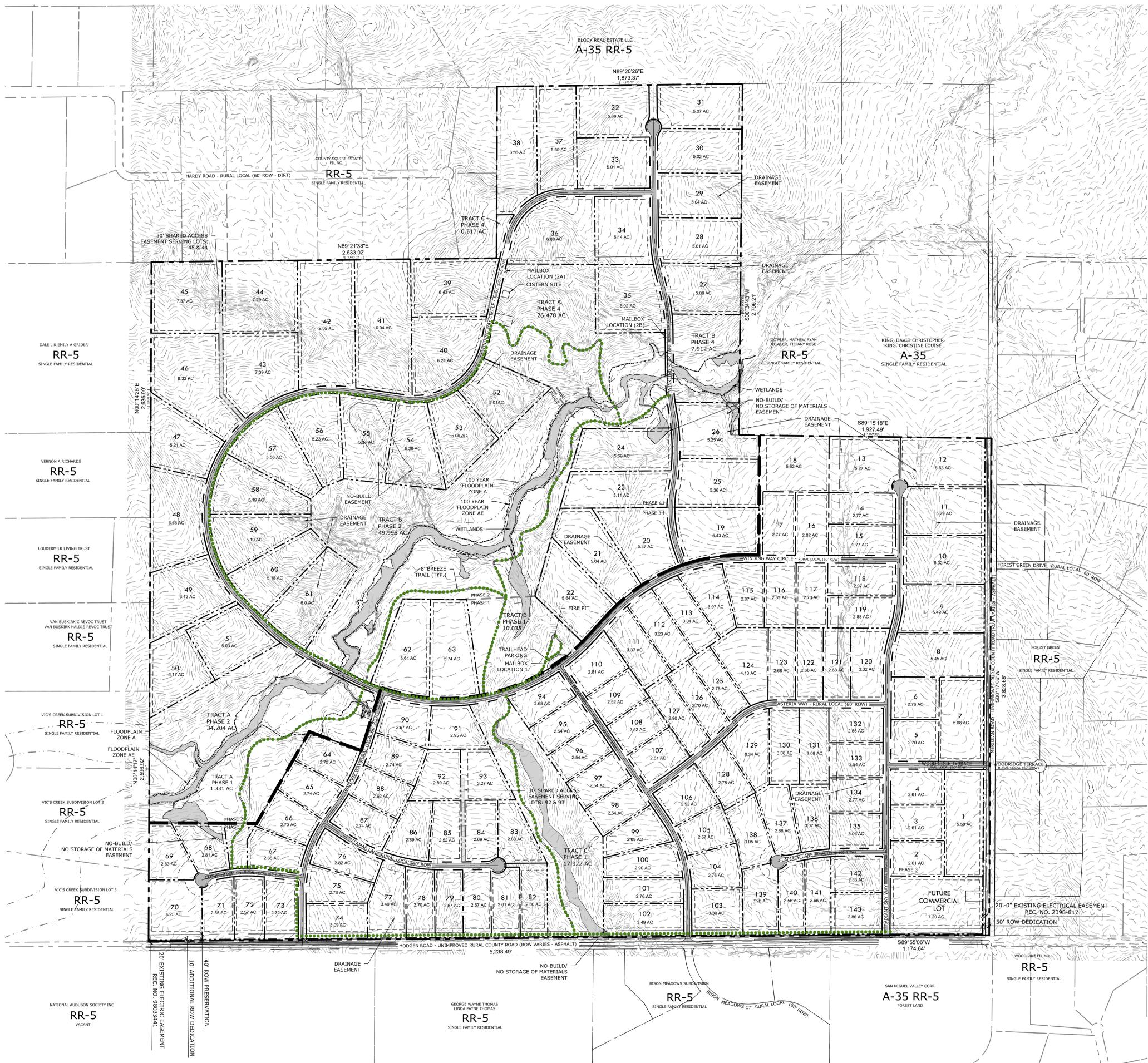
5.2 *On-Site Wastewater Treatment Systems*

143 single family homes and one (1) commercial lot on a minimum lot size of 2.5 acres will be served by individual on-site wastewater treatment systems. The site was evaluated for on-site wastewater treatment systems by Entech Engineering,

Inc. in September 2018. Five (5) test borings, and ten (10) tactile test pits were performed on the site to determine general suitability of the site for the use of on-site wastewater treatment systems. Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Percolation test and tactile test pits were located in anticipated locations of proposed on-site wastewater treatment systems. The on-site soils are described to typically have slow to rapid permeabilities

Based on the evaluation, the site is suitable for on-site wastewater treatment systems. Contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County and State guidelines and are properly maintained. Based on the testing performed, designed systems will likely be required for the majority of the lots. Each septic design will need to consider the wastewater loadings presented in Table 4-1 vs. the soil conditions found on each lot. The report does indicate that there are three properties that may need to be modified in order to accommodate the construction of an OWTS due to the presence of extensive drainage through each property or excessively steep slopes. Since the development of the soils report, the proposed platting of the McCune Ranch has been modified to accommodate OWTS development on lots 87 and 111. The only lot that still may pose a challenge to accommodating an OWTS system is lot 44 due to excessive slopes existing on the property. The Soil, Geology, and Geologic Hazard Report by Entech Engineering, Inc. dated September, 28<sup>th</sup>, 2018 is included in **Appendix E**.

# *Appendix A*



- LEGEND**
- PROPERTY BOUNDARY
  - ROW
  - LOT LINES
  - PUBLIC IMPROVEMENTS EASEMENT (P.I.E.)
  - PUBLIC UTILITY EASEMENT (P.U.E.)
  - BUILDING SETBACK
  - INTERSECTION SIGHT DISTANCE
  - 100 YEAR FLOODPLAIN (ZONE A)
  - 100 YEAR FLOODPLAIN (ZONE AE)
  - TRAIL CIRCULATION
  - 8' BREEZE TRAIL
  - WATER QUALITY/DETENTION POND
  - DRAINAGE CULVERT

Land Planning  
Landscape  
Architecture  
Urban Design

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Winsome  
PRELIMINARY PLAN

DATE: 10-12-18  
PROJECT MGR: A. BARLOW  
PREPARED BY: B. SWENSON

ENTITLEMENT

DATE	BY	DESCRIPTION
10-15-18	JBS	INITIAL SUBMITTAL

SITE PLAN

P:\181\Tommy\A-Come\_Bunch\Drawings\Winsome\RRP\_Aug\_18\181201818\_4-26-17\_RK\_banazon

# *Appendix B*

Appendix B  
PT McCune, LLC- Winsome Subdivision  
Water Demands and Wastewater Loads Estimate (Phase 1-4)

*Residential Constants*

<i>Water (Rural)</i>	<i>0.6</i>	<i>AF/Year-SFE</i>
<i>Wastewater (Base Flow)</i>	<i>241</i>	<i>GPD/SFE</i>
<i>Wastewater (MDF)</i>	<i>294</i>	<i>GPD/SFE</i>
<i>Estimated Wastewater Flow</i>	<i>0.27</i>	<i>AF/Year-SFE</i>

*Commercial Constants*

<i>Water (Rural)</i>	<i>5</i>	<i>AF/Year-SFE</i>
<i>Wastewater (Base Flow)</i>	<i>2009</i>	<i>GPD/SFE</i>
<i>Wastewater (MDF)</i>	<i>2452</i>	<i>GPD/SFE</i>
<i>Estimated Wastewater Flow</i>	<i>2.25</i>	<i>AF/Year-SFE</i>

Land Use	Density	Water Demands						Wastewater Loads			
		SFE	Unit Use	Acre-Feet	ADF (GPD)	Max Daily Use (GPD)	Peak Hour (GPM)	Return Flow AF/Year	SFE	Average Daily Flow	Max Day Daily Flow
Residential		143	0.6	85.8	76597	191493	199	38.61	143	34463	42042
Commercial		1	5	5	4464	11160	12	2.25	1	2009	2452
Total Demand		144		90.8	81061	202653	211	40.86	144	36472	44494
				AF/Year	GPD	GPD	GPM	AF/Year		GPD	GPD

# *Appendix C*

Appendix C  
PT McCune, LLC- Winsome Subdivision  
Overall Water Supply Inventory (Phases 1-4)

Land Formation/Aquifer	Finding/Decree	Tributary Status	Volume	Annual Allocation 100 Year	Annual Allocation 300 Year	Notes	Saturated		Owner
			Acre-Feet	A-F/Year	A-F/Year		Sand Thickness	Specific Yield	
<i>Currently Available On-Site Ground Water Legal Sources (Note 1 &amp; 2)</i>									
Dawson	1692-BD	NNT	69,797	697.97	232.66	Entirety of McCune Ranch Subdivision demand will be met with water from Dawson Aquifer	455	20%	George F. McCune and Evelyn McCune
Denver	1691-BD	NT	44,985	449.85	149.95	60 acre-feet/year will be kept for McCune Ranch, with the remainder sold to Sterling Ranch	345	17%	George F McCune and Evelyn McCune
Arapahoe	1690-BD	NT	33,901	339.01	113.00	Water from this aquifer will be sold to Sterling Ranch and not used at the McCune Ranch Subdivision	260	17%	George F McCune and Evelyn McCune
Laramie-Fox Hills	1689-BD	NT	22,435	224.35	74.78	Water from this aquifer will be sold to Sterling Ranch and not used at the McCune Ranch Subdivision	195	15%	George F McCune and Evelyn McCune
<b>Total Legal Supply</b>			<b>171,118</b>	<b>1,711</b>	<b>570</b>				
<b>Total Available for Use at McCune Ranch Subdivision</b>			<b>75,797</b>		<b>293</b>				

- Beneficial Uses*
- Domestic*
  - Industrial*
  - Commercial*
  - Irrigation*
  - Augmentation*
  - Stock watering*
  - Recreational water feature ponds*
  - Piscatorial*
  - Wildlife*
  - Replacement*

# *Appendix D*

**COLORADO GROUND WATER COMMISSION  
FINDINGS AND ORDER**

IN THE MATTER OF AN APPLICATION FOR DETERMINATION OF WATER RIGHT TO  
ALLOW THE WITHDRAWAL OF GROUND WATER IN THE KIOWA-BIJOU DESIGNATED  
GROUND WATER BASIN

---

APPLICANT: GEORGE F. MCCUNE AND EVELYN MCCUNE

AQUIFER: LARAMIE-FOX HILLS

ROBERT C. "BOB" BALINK El Paso County, CO

07/10/2008 03:13:17 PM

DETERMINATION NO.: 1689-BD

Doc \$0.00

Page

Rec \$36.00

1 of 7

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In compliance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, George F. McCune and Evelyn McCune (hereinafter "applicant") submitted an application for determination of water right to allow the withdrawal of designated ground water from the Laramie-Fox Hills Aquifer.

**FINDINGS**

1. The application was received complete by the Colorado Ground Water Commission on April 17, 2008.
2. The applicant requests a determination of rights to designated ground water in the Laramie-Fox Hills Aquifer (hereinafter "aquifer") underlying 900.52 acres, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, in El Paso County. According to a signed statement dated April 17, 2008, the applicant owns the 900.52 acres of land, as further described in said affidavit which is attached hereto as Exhibit A, and claims control of the ground water in the aquifer underlying this land area.
3. The proposed annual amount of ground water to be allocated and withdrawn from the aquifer for intended beneficial uses is the maximum allowable amount.
4. The above described land area overlying the ground water claimed by the applicant is located within the boundaries of the Kiowa-Bijou Designated Ground Water Basin. The Colorado Ground Water Commission (hereinafter "Commission") has jurisdiction.
5. The applicant intends to apply the allocated ground water to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The applicant's proposed place of use of the allocated ground water is the above described 900.52 acre land area.
6. The quantity of water in the aquifer underlying the 900.52 acres of land claimed by the applicant is 26300 acre-feet. This determination was based on the following as specified in the Designated Basin Rules:

RECORDER NOTE: Legibility of  
writing, typing or printing  
UNSATISFACTORY in portions  
of this document when received

- a. The average specific yield of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 15 percent.
- b. The average thickness of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 195 feet.
7. At this time, there is no substantial artificial recharge that would affect the aquifer within a one hundred year period.
8. Pursuant to Section 37-90-107(7), C.R.S., and in accordance with the Designated Basin Rules, the Commission shall allocate ground water in the aquifer based on ownership of the overlying land and an aquifer life of one hundred years. Therefore, the maximum allowed average annual amount of ground water in the aquifer that may be allocated for withdrawal pursuant to the data in the paragraphs above for the 900.52 acres of overlying land claimed by the applicant is 263 acre-feet.
9. A review of the records in the Office of the State Engineer has disclosed that none of the water in the aquifer underlying the land claimed by the applicant has been previously allocated or permitted for withdrawal.
10. Pursuant to Section 37-90-107(7)(c)(III), C.R.S., an approved determination of water right shall be considered a final determination of the amount of ground water so determined; except that the Commission shall retain jurisdiction for subsequent adjustment of such amount to conform to the actual local aquifer characteristics from adequate information obtained from well drilling or test holes.
11. The ability of wells permitted to withdraw the authorized amount of water from this non-renewable aquifer may be less than the one hundred years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.
12. In accordance with Rule 5.3.6 of the Designated Basin Rules, it has been determined that withdrawal of ground water from the aquifer underlying the land claimed by the applicant will not, within one hundred years, deplete the flow of a natural stream or its alluvial aquifer at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal and, therefore, the ground water is nontributary ground water as defined in Rule 4.2.19 of the Designated Basin Rules. No more than 98% of the amount of ground water withdrawn annually shall be consumed, as required by the Designated Basin Rules.
13. In accordance with Section 37-90-107(7), C.R.S., upon Commission approval of a determination of water right, well permits for wells to withdraw the authorized amount of water from the aquifer shall be available upon application, subject to the conditions of this determination and the Designated Basin Rules and subject to approval by the Commission.
14. The Commission Staff has evaluated the application relying on the claims to control of the ground water in the aquifer made by the applicant.

15. In accordance with Sections 37-90-107(7) and 37-90-112, C.R.S., the application was published in the Ranchland News newspaper on May 8 and May 15, 2008.
16. No objections to the determination of water right and proposed allocation of ground water were received within the time limit set by statute.
17. In order to prevent unreasonable impairment to the existing water rights of others within the Kiowa-Bijou Designated Ground Water Basin it is necessary to impose conditions on the determination of water right and proposed allocation of ground water. Under conditions as stated in the following Order, no unreasonable impairment of existing water rights will occur from approval of this determination of water right or from the issuance of well permits for wells to withdraw the authorized amount of allocated ground water from the aquifer.

#### ORDER

In accordance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, the Colorado Ground Water Commission orders that the application for determination of rights to designated ground water in the Laramie-Fox Hills Aquifer underlying 900.52 acres of land, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, is approved subject to the following conditions:

18. The allowed average annual amount of withdrawal of ground water from the aquifer shall not exceed 263 acre-feet. The allowed maximum annual amount of withdrawal may exceed the allowed average annual amount of withdrawal as long as the total volume of water withdrawn does not exceed the product of the number of years since the date of approval of this determination times the allowed average annual amount of withdrawal.
19. To conform to actual aquifer characteristics, the Commission may adjust the allowed average annual amount of ground water to be withdrawn from the aquifer based on analysis of geophysical logs or other site-specific data if such analysis indicates that the initial estimate of the volume of water in the aquifer was incorrect.
20. The applicant may pump the allowed average annual amount of withdrawal and the allowed maximum annual amount of withdrawal from one or more wells of a well field in any combination, so long as the total combined withdrawal of the wells does not exceed the amounts described in this Order.
21. No more than 98% of the ground water withdrawn annually shall be consumed. The Commission may require well owners to demonstrate periodically that no more than 98% of the water withdrawn is being consumed.
22. The use of ground water from this allocation shall be limited to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The place of use shall be limited to the above described 900.52 acre land area.

- 23. The applicant, or subsequent persons controlling this water right, shall record in the public records of the county - in which the claimed overlying land is located - notice of transfer of any portion of this water right to another within sixty days after the transfer, so that a title examination of the above described 900.52 acre land area, or any part thereof, shall reveal the changes affecting this water right. Such notice shall consist of a signed and dated deed which indicates the determination number, the aquifer, a description of the above described land area, the annual amount of ground water (acre-feet) transferred, name of the recipient, and the date of transfer.**
- 24. Subject to the above conditions, well permits for wells to withdraw the allocated annual amount of water from the aquifer shall be available upon application subject to approval by the Commission and the following conditions:**

  - a. The wells shall be located on the above described 900.52 acre overlying land area.**
  - b. The wells must be constructed to withdraw water from only the Laramie-Fox Hills Aquifer. Upon application for a well permit to construct such a well, the estimated top and base of the aquifer at the proposed well location will be determined by the Commission and indicated on the approved well permit. Plain non-perforated casing must be installed, grouted and sealed to prevent diversion of ground water from other aquifers and the movement of ground water between aquifers.**
  - c. The entire depth of each well must be geophysically logged prior to installing the casing as set forth in Rule 9 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7.**
  - d. Each well shall be constructed within 200 feet of the location specified on the approved well permit, but must be more than 600 feet from any existing large-capacity well completed in the same aquifer.**
  - e. A totalizing flow meter or other Commission approved measuring device shall be installed on each well and maintained in good working order by the well owner. Annual diversion records shall be collected and maintained by the well owner and submitted to the Commission upon their request.**
  - f. The well owner shall mark the well in a conspicuous place with the permit number and the name of the aquifer. The well owner shall take necessary means and precautions to preserve these markings.**
- 25. A copy of this Findings and Order shall be recorded by the applicant in the public records of the county in which the claimed overlying land is located so that a title examination of the above described 900.52 acre overlying land area, or any part thereof, shall reveal the existence of this determination.**

Applicant: George F. McCune and Evelyn McCune  
Aquifer: Laramie-Fox Hills  
Determination No.: 1689-BD

Page 5

Dated this 25<sup>th</sup> day of June, 2008.



\_\_\_\_\_  
Dick Wolfe, P.E.  
Executive Director  
Colorado Ground Water Commission

By: \_\_\_\_\_  
Keith Vander Horst, P.E.  
Water Resource Engineer

Prepared by: JPM

92GWS 1  
03/2005

EXHIBIT A

1689-BD

Page 1 of 2

STATE OF COLORADO  
OFFICE OF THE STATE ENGINEER  
DIVISION OF WATER RESOURCES  
1313 Sherman St. Room 821  
Denver, CO 80203  
(303) 866-3581 Fax (303) 866-3589

RECEIVED  
APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

**NONTRIBUTARY GROUND WATER LANDOWNERSHIP STATEMENT**

I (We) George F. McCune and Evelyn McCune

(Name(s))

claim and say that I (we) am (are) the owner(s) of the following described property consisting of 900.52 acres in the County of El Paso  
State of Colorado:

(Insert the property legal description)

**SW/4SW/4 Section 18 and W/2 of the W/2 Section 19, T11S, R64W, and S/2SE/4 Section 13 and All of Section 24, T11S R65W, 6<sup>th</sup> PM, El Paso County, 900.52 acres**

**See attached Quitclaim Deed dated November 29, 1976, and map.**

and, that the ground water sought to be withdrawn from the Laramie-Fox Hills aquifer underlying the above-described land has not been conveyed or reserved to another, nor has consent been given to its withdrawal by another.

Further, I (we) claim and say that I (we) have read the statements made herein; know the contents hereof; and that the same are true to my (our) knowledge.

Signature

George F. McCune

Date

Signature

Evelyn M. McCune

Date

.....  
**INSTRUCTIONS:**

Please type or print neatly in black or blue ink. This form may be reproduced by photocopy or word processing means. See additional information on the reverse side.

County of El Paso, State of Colorado, File No. 2000097 RECEIVED AT 11/29/1976 RECEIVED BY HANNEY REAL ESTATE

NOV 29 1976

RECEIVED

APR 17 2008

WATER RESOURCES STATE ENGINEER COLO.

Section

QUITCLAIM DEED

RAY C. McCUNE and GRETA C. McCUNE, as husband and wife, of the County of El Paso and State of Colorado, for the consideration of One Dollar (\$1.00) and other good and valuable consideration, in hand paid, hereby sell and quit claim to GEORGE F. McCUNE and EVELYN M. McCUNE, husband and wife, in joint tenancy, of the County of El Paso and State of Colorado, a one-half interest in and to oil minerals underlying the following described property, including oil and gas, said property lying and being in the County of El Paso and State of Colorado, to wit:

The Southwest quarter of the Southwest quarter of Section Eighteen, Township Eleven, Range Sixty-four; the West half of the West half of Section Nineteen, Township Eleven, Range Sixty-four; the South half of the Southeast Quarter of Section Thirteen, Township Eleven, Range Sixty-five; All of Section Twenty-four, Township Eleven, Range Sixty-five, containing in all Nine hundred and fifty-two hundredths (900.52) acres, more or less, according to Government Survey,

with all its appurtenances.

No Consideration

DATED and signed this 22 day of Nov, 1976.

STATE DOCUMENTARY

NOV 29 1976

FEE \$ None

Ray C. McCune

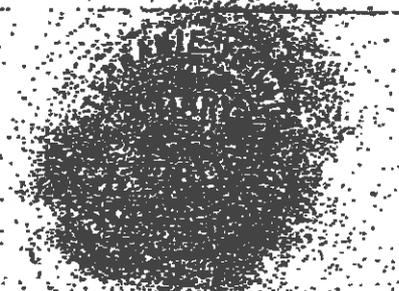
Greta C. McCune

STATE OF COLORADO ) COUNTY OF EL PASO ) ss.

The foregoing instrument was acknowledged before me this 22 day of Nov, 1976, by Ray C. McCune and Greta C. McCune.

Stephanie J. Gray Notary Public

My commission expires: 6/20/78



**COLORADO GROUND WATER COMMISSION  
FINDINGS AND ORDER**

IN THE MATTER OF AN APPLICATION FOR DETERMINATION OF WATER RIGHT TO  
ALLOW THE WITHDRAWAL OF GROUND WATER IN THE KIOWA-BIJOU DESIGNATED  
GROUND WATER BASIN

---

APPLICANT: GEORGE F. MCCUNE AND EVELYN MCCUNE

AQUIFER: ARAPAHOE

DETERMINATION NO.: 1690-BD

ROBERT C. "BOB" BALINK  
07/10/2008 03:13:17 PM  
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Rec \$36.00 1 of 7

El Paso County, CO



---

In compliance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, George F. McCune and Evelyn McCune (hereinafter "applicant") submitted an application for determination of water right to allow the withdrawal of designated ground water from the Arapahoe Aquifer.

**FINDINGS**

1. The application was received complete by the Colorado Ground Water Commission on April 17, 2008.
2. The applicant requests a determination of rights to designated ground water in the Arapahoe Aquifer (hereinafter "aquifer") underlying 900.52 acres, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, in El Paso County. According to a signed statement dated April 17, 2008, the applicant owns the 900.52 acres of land, as further described in said affidavit which is attached hereto as Exhibit A, and claims control of the ground water in the aquifer underlying this land area.
3. The proposed annual amount of ground water to be allocated and withdrawn from the aquifer for intended beneficial uses is the maximum allowable amount.
4. The above described land area overlying the ground water claimed by the applicant is located within the boundaries of the Kiowa-Bijou Designated Ground Water Basin. The Colorado Ground Water Commission (hereinafter "Commission") has jurisdiction.
5. The applicant intends to apply the allocated ground water to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The applicant's proposed place of use of the allocated ground water is the above described 900.52 acre land area.
6. The quantity of water in the aquifer underlying the 900.52 acres of land claimed by the applicant is 39800 acre-feet. This determination was based on the following as specified in the Designated Basin Rules:

RECORDED NOTICE  
writing, typing or printing  
UNSATISFACTORY in portions  
of this document when received

- a. The average specific yield of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 17 percent.
- b. The average thickness of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 260 feet.
7. At this time, there is no substantial artificial recharge that would affect the aquifer within a one hundred year period.
8. Pursuant to Section 37-90-107(7), C.R.S., and in accordance with the Designated Basin Rules, the Commission shall allocate ground water in the aquifer based on ownership of the overlying land and an aquifer life of one hundred years. Therefore, the maximum allowed average annual amount of ground water in the aquifer that may be allocated for withdrawal pursuant to the data in the paragraphs above for the 900.52 acres of overlying land claimed by the applicant is 398 acre-feet.
9. A review of the records in the Office of the State Engineer has disclosed that none of the water in the aquifer underlying the land claimed by the applicant has been previously allocated or permitted for withdrawal.
10. Pursuant to Section 37-90-107(7)(c)(III), C.R.S., an approved determination of water right shall be considered a final determination of the amount of ground water so determined; except that the Commission shall retain jurisdiction for subsequent adjustment of such amount to conform to the actual local aquifer characteristics from adequate information obtained from well drilling or test holes.
11. The ability of wells permitted to withdraw the authorized amount of water from this non-renewable aquifer may be less than the one hundred years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.
12. In accordance with Rule 5.3.6 of the Designated Basin Rules, it has been determined that withdrawal of ground water from the aquifer underlying the land claimed by the applicant will not, within one hundred years, deplete the flow of a natural stream or its alluvial aquifer at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal and, therefore, the ground water is nontributary ground water as defined in Rule 4.2.19 of the Designated Basin Rules. No more than 98% of the amount of ground water withdrawn annually shall be consumed, as required by the Designated Basin Rules.
13. In accordance with Section 37-90-107(7), C.R.S., upon Commission approval of a determination of water right, well permits for wells to withdraw the authorized amount of water from the aquifer shall be available upon application, subject to the conditions of this determination and the Designated Basin Rules and subject to approval by the Commission.
14. The Commission Staff has evaluated the application relying on the claims to control of the ground water in the aquifer made by the applicant.

15. In accordance with Sections 37-90-107(7) and 37-90-112, C.R.S., the application was published in the Ranchland News newspaper on May 8 and May 15, 2008.
16. No objections to the determination of water right and proposed allocation of ground water were received within the time limit set by statute.
17. In order to prevent unreasonable impairment to the existing water rights of others within the Kiowa-Bijou Designated Ground Water Basin it is necessary to impose conditions on the determination of water right and proposed allocation of ground water. Under conditions as stated in the following Order, no unreasonable impairment of existing water rights will occur from approval of this determination of water right or from the issuance of well permits for wells to withdraw the authorized amount of allocated ground water from the aquifer.

#### ORDER

In accordance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, the Colorado Ground Water Commission orders that the application for determination of rights to designated ground water in the Arapahoe Aquifer underlying 900.52 acres of land, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, is approved subject to the following conditions:

18. The allowed average annual amount of withdrawal of ground water from the aquifer shall not exceed 398 acre-feet. The allowed maximum annual amount of withdrawal may exceed the allowed average annual amount of withdrawal as long as the total volume of water withdrawn does not exceed the product of the number of years since the date of approval of this determination times the allowed average annual amount of withdrawal.
19. To conform to actual aquifer characteristics, the Commission may adjust the allowed average annual amount of ground water to be withdrawn from the aquifer based on analysis of geophysical logs or other site-specific data if such analysis indicates that the initial estimate of the volume of water in the aquifer was incorrect.
20. The applicant may pump the allowed average annual amount of withdrawal and the allowed maximum annual amount of withdrawal from one or more wells of a well field in any combination, so long as the total combined withdrawal of the wells does not exceed the amounts described in this Order.
21. No more than 98% of the ground water withdrawn annually shall be consumed. The Commission may require well owners to demonstrate periodically that no more than 98% of the water withdrawn is being consumed.
22. The use of ground water from this allocation shall be limited to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The place of use shall be limited to the above described 900.52 acre land area.

23. The applicant, or subsequent persons controlling this water right, shall record in the public records of the county - in which the claimed overlying land is located - notice of transfer of any portion of this water right to another within sixty days after the transfer, so that a title examination of the above described 900.52 acre land area, or any part thereof, shall reveal the changes affecting this water right. Such notice shall consist of a signed and dated deed which indicates the determination number, the aquifer, a description of the above described land area, the annual amount of ground water (acre-feet) transferred, name of the recipient, and the date of transfer.
24. Subject to the above conditions, well permits for wells to withdraw the allocated annual amount of water from the aquifer shall be available upon application subject to approval by the Commission and the following conditions:

  - a. The wells shall be located on the above described 900.52 acre overlying land area.
  - b. The wells must be constructed to withdraw water from only the Arapahoe Aquifer. Upon application for a well permit to construct such a well, the estimated top and base of the aquifer at the proposed well location will be determined by the Commission and indicated on the approved well permit. Plain non-perforated casing must be installed, grouted and sealed to prevent diversion of ground water from other aquifers and the movement of ground water between aquifers.
  - c. The entire depth of each well must be geophysically logged prior to installing the casing as set forth in Rule 9 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7.
  - d. Each well shall be constructed within 200 feet of the location specified on the approved well permit, but must be more than 600 feet from any existing large-capacity well completed in the same aquifer.
  - e. A totalizing flow meter or other Commission approved measuring device shall be installed on each well and maintained in good working order by the well owner. Annual diversion records shall be collected and maintained by the well owner and submitted to the Commission upon their request.
  - f. The well owner shall mark the well in a conspicuous place with the permit number and the name of the aquifer. The well owner shall take necessary means and precautions to preserve these markings.
25. A copy of this Findings and Order shall be recorded by the applicant in the public records of the county in which the claimed overlying land is located so that a title examination of the above described 900.52 acre overlying land area, or any part thereof, shall reveal the existence of this determination.

Applicant: George F. McCune and Evelyn McCune  
Aquifer: Arapahoe  
Determination No.: 1690-BD

Page 5

Dated this 25<sup>th</sup> day of June, 2008.



\_\_\_\_\_  
Dick Wolfe, P.E.  
Executive Director  
Colorado Ground Water Commission

By: 

\_\_\_\_\_  
Keith Vander Horst, P.E.  
Water Resource Engineer

Prepared by: JPM

92GWS 1  
03/2005

EXHIBIT A

1690-BD

Page 1 of 2

STATE OF COLORADO  
OFFICE OF THE STATE ENGINEER  
DIVISION OF WATER RESOURCES  
1313 Sherman St. Room 821  
Denver, CO 80203  
(303) 866-3581 Fax (303) 866-3589

RECEIVED

APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

**NONTRIBUTARY GROUND WATER LANDOWNERSHIP STATEMENT**

I (We) George F. McCune and Evelyn McCune  
(Name(s))

claim and say that I (we) am (are) the owner(s) of the following described property consisting of 900.52 acres in the County of El Paso State of Colorado:

(Insert the property legal description)

**SW/4SW/4 Section 18 and W/2 of the W/2 Section 19, T11S, R64W, and S/2SE/4 Section 13 and All of Section 24, T11S R65W, 6<sup>th</sup> PM, El Paso County, 900.52 acres**

**See attached Quitclaim Deed dated November 29, 1976, and map.**

and, that the ground water sought to be withdrawn from the Arapahoe aquifer underlying the above-described land has not been conveyed or reserved to another, nor has consent been given to its withdrawal by another.

Further, I (we) claim and say that I (we) have read the statements made herein; know the contents hereof; and that the same are true to my (our) knowledge.

Signature George F. McCune Date \_\_\_\_\_

Signature Evelyn M. McCune Date \_\_\_\_\_

.....  
**INSTRUCTIONS:**

Please type or print neatly in black or blue ink. This form may be reproduced by photocopy or word processing means. See additional information on the reverse side.

County of El Paso, State of Colorado  
Received at 72 on NOV 29 1976  
RECEIVED FOR 250000 MARKET VALUE Ray C. McCune / Greta C. McCune

2577 197

RECEIVED

APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

SEAL

QUITCLAIM DEED

**RAY C. McCUNE and GRETA C. McCUNE, on husband and wife, of the County of El Paso and State of Colorado, for the consideration of One Dollar (\$1.00) and other good and valuable consideration, in hand paid, hereby sell and quit claim to GEORGE F. McCUNE and EVELYN M. McCUNE, husband and wife, in joint tenancy, of the County of El Paso and State of Colorado, a one-half interest in and to all minerals underlying the following described property, including oil and gas, said property lying and being in the County of El Paso and State of Colorado, to wit:**

The Southwest quarter of the Southwest quarter of Section Eighteen, Township Eleven, Range Sixty-four; the West half of the West half of Section Nineteen, Township Eleven, Range Sixty-four; the South half of the Southeast Quarter of Section Thirteen, Township Eleven, Range Sixty-five; All of Section Twenty-four, Township Eleven, Range Sixty-five, containing in all Nine hundred and fifty-two hundredths (900.52) acres, more or less, according to Government Survey.

with all its appurtenances.

No  
Consideration

DATED and signed this 22 day of Nov, 1976.

STATE DOCUMENTARY

NOV 29 1976

FEE \$ None

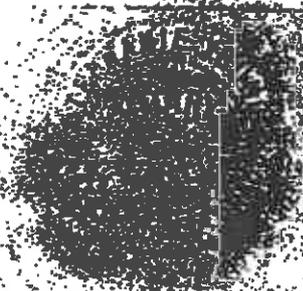
Ray C. McCune  
Ray C. McCune

Greta C. McCune  
Greta C. McCune

STATE OF COLORADO )  
COUNTY OF EL PASO ) ss.

The foregoing instrument was acknowledged before me this 22 day of Nov, 1976, by Ray C. McCune and Greta C. McCune.

Stephanie J. Green  
Notary Public  
My commission expires 6/20/78



**COLORADO GROUND WATER COMMISSION  
FINDINGS AND ORDER**

IN THE MATTER OF AN APPLICATION FOR DETERMINATION OF WATER RIGHT TO ALLOW THE WITHDRAWAL OF GROUND WATER IN THE KIOWA-BIJOU DESIGNATED GROUND WATER BASIN

---

APPLICANT: GEORGE F. MCCUNE AND EVELYN MCCUNE

AQUIFER: DENVER

DETERMINATION NO.: 1691-BD

ROBERT C. "BOB" BALINK El Paso County, CO

07/10/2008 03:13:17 PM

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Rec \$36.00 1 of 7



208078576

In compliance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, George F. McCune and Evelyn McCune (hereinafter "applicant") submitted an application for determination of water right to allow the withdrawal of designated ground water from the Denver Aquifer.

**FINDINGS**

1. The application was received complete by the Colorado Ground Water Commission on April 17, 2008.
2. The applicant requests a determination of rights to designated ground water in the Denver Aquifer (hereinafter "aquifer") underlying 900.52 acres, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, in El Paso County. According to a signed statement dated April 17, 2008, the applicant owns the 900.52 acres of land, as further described in said affidavit which is attached hereto as Exhibit A, and claims control of the ground water in the aquifer underlying this land area.
3. The proposed annual amount of ground water to be allocated and withdrawn from the aquifer for intended beneficial uses is the maximum allowable amount.
4. The above described land area overlying the ground water claimed by the applicant is located within the boundaries of the Kiowa-Bijou Designated Ground Water Basin. The Colorado Ground Water Commission (hereinafter "Commission") has jurisdiction.
5. The applicant intends to apply the allocated ground water to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The applicant's proposed place of use of the allocated ground water is the above described 900.52 acre land area.
6. The quantity of water in the aquifer underlying the 900.52 acres of land claimed by the applicant is 52800 acre-feet. This determination was based on the following as specified in the Designated Basin Rules:

RECORDER NOTE: Legibility of  
writing, typing or printing  
UNSATISFACTORY in portions  
of this document when received

- a. The average specific yield of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 17 percent.
- b. The average thickness of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 345 feet.
7. At this time, there is no substantial artificial recharge that would affect the aquifer within a one hundred year period.
8. Pursuant to Section 37-90-107(7), C.R.S., and in accordance with the Designated Basin Rules, the Commission shall allocate ground water in the aquifer based on ownership of the overlying land and an aquifer life of one hundred years. Therefore, the maximum allowed average annual amount of ground water in the aquifer that may be allocated for withdrawal pursuant to the data in the paragraphs above for the 900.52 acres of overlying land claimed by the applicant is 528 acre-feet.
9. A review of the records in the Office of the State Engineer has disclosed that none of the water in the aquifer underlying the land claimed by the applicant has been previously allocated or permitted for withdrawal.
10. Pursuant to Section 37-90-107(7)(c)(III), C.R.S., an approved determination of water right shall be considered a final determination of the amount of ground water so determined; except that the Commission shall retain jurisdiction for subsequent adjustment of such amount to conform to the actual local aquifer characteristics from adequate information obtained from well drilling or test holes.
11. The ability of wells permitted to withdraw the authorized amount of water from this non-renewable aquifer may be less than the one hundred years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.
12. In accordance with Rule 5.3.6 of the Designated Basin Rules, it has been determined that withdrawal of ground water from the aquifer underlying the land claimed by the applicant will not, within one hundred years, deplete the flow of a natural stream or its alluvial aquifer at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal and, therefore, the ground water is noncontributory ground water as defined in Rule 4.2.19 of the Designated Basin Rules. No more than 98% of the amount of ground water withdrawn annually shall be consumed, as required by the Designated Basin Rules.
13. In accordance with Section 37-90-107(7), C.R.S., upon Commission approval of a determination of water right, well permits for wells to withdraw the authorized amount of water from the aquifer shall be available upon application, subject to the conditions of this determination and the Designated Basin Rules and subject to approval by the Commission.
14. The Commission Staff has evaluated the application relying on the claims to control of the ground water in the aquifer made by the applicant.

15. In accordance with Sections 37-90-107(7) and 37-90-112, C.R.S., the application was published in the Ranchland News newspaper on May 8 and May 15, 2008.
16. No objections to the determination of water right and proposed allocation of ground water were received within the time limit set by statute.
17. In order to prevent unreasonable impairment to the existing water rights of others within the Kiowa-Bijou Designated Ground Water Basin it is necessary to impose conditions on the determination of water right and proposed allocation of ground water. Under conditions as stated in the following Order, no unreasonable impairment of existing water rights will occur from approval of this determination of water right or from the issuance of well permits for wells to withdraw the authorized amount of allocated ground water from the aquifer.

#### ORDER

In accordance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, the Colorado Ground Water Commission orders that the application for determination of rights to designated ground water in the Denver Aquifer underlying 900.52 acres of land, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, is approved subject to the following conditions:

18. The allowed average annual amount of withdrawal of ground water from the aquifer shall not exceed 528 acre-feet. The allowed maximum annual amount of withdrawal may exceed the allowed average annual amount of withdrawal as long as the total volume of water withdrawn does not exceed the product of the number of years since the date of approval of this determination times the allowed average annual amount of withdrawal.
19. To conform to actual aquifer characteristics, the Commission may adjust the allowed average annual amount of ground water to be withdrawn from the aquifer based on analysis of geophysical logs or other site-specific data if such analysis indicates that the initial estimate of the volume of water in the aquifer was incorrect.
20. The applicant may pump the allowed average annual amount of withdrawal and the allowed maximum annual amount of withdrawal from one or more wells of a well field in any combination, so long as the total combined withdrawal of the wells does not exceed the amounts described in this Order.
21. No more than 98% of the ground water withdrawn annually shall be consumed. The Commission may require well owners to demonstrate periodically that no more than 98% of the water withdrawn is being consumed.
22. The use of ground water from this allocation shall be limited to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The place of use shall be limited to the above described 900.52 acre land area.

- 23. The applicant, or subsequent persons controlling this water right, shall record in the public records of the county - in which the claimed overlying land is located - notice of transfer of any portion of this water right to another within sixty days after the transfer, so that a title examination of the above described 900.52 acre land area, or any part thereof, shall reveal the changes affecting this water right. Such notice shall consist of a signed and dated deed which indicates the determination number, the aquifer, a description of the above described land area, the annual amount of ground water (acre-feet) transferred, name of the recipient, and the date of transfer.**
- 24. Subject to the above conditions, well permits for wells to withdraw the allocated annual amount of water from the aquifer shall be available upon application subject to approval by the Commission and the following conditions:**

  - a. The wells shall be located on the above described 900.52 acre overlying land area.**
  - b. The wells must be constructed to withdraw water from only the Denver Aquifer. Upon application for a well permit to construct such a well, the estimated top and base of the aquifer at the proposed well location will be determined by the Commission and indicated on the approved well permit. Plain non-perforated casing must be installed, grouted and sealed to prevent diversion of ground water from other aquifers and the movement of ground water between aquifers.**
  - c. The entire depth of each well must be geophysically logged prior to installing the casing as set forth in Rule 9 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7.**
  - d. Each well shall be constructed within 200 feet of the location specified on the approved well permit, but must be more than 600 feet from any existing large-capacity well completed in the same aquifer.**
  - e. A totalizing flow meter or other Commission approved measuring device shall be installed on each well and maintained in good working order by the well owner. Annual diversion records shall be collected and maintained by the well owner and submitted to the Commission upon their request.**
  - f. The well owner shall mark the well in a conspicuous place with the permit number and the name of the aquifer. The well owner shall take necessary means and precautions to preserve these markings.**
- 25. A copy of this Findings and Order shall be recorded by the applicant in the public records of the county in which the claimed overlying land is located so that a title examination of the above described 900.52 acre overlying land area, or any part thereof, shall reveal the existence of this determination.**

Applicant: George F. McCune and Evelyn McCune  
Aquifer: Denver  
Determination No.: 1691-BD

Page 5

Dated this 25<sup>th</sup> day of June, 2008.



\_\_\_\_\_  
Dick Wolfe, P.E.  
Executive Director  
Colorado Ground Water Commission

By: 

\_\_\_\_\_  
Keith Vander Horst, P.E.  
Water Resource Engineer

Prepared by: JPM

92GWS 1  
03/2005

EXHIBIT A

1691-BD

Page 1 of 2

STATE OF COLORADO  
OFFICE OF THE STATE ENGINEER  
DIVISION OF WATER RESOURCES  
1313 Sherman St. Room 821  
Denver, CO 80203  
(303) 866-3581 Fax (303) 866-3589

RECEIVED

APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

**NONTRIBUTARY GROUND WATER LANDOWNERSHIP STATEMENT**

I (We) George F. McCune and Evelyn McCune

(Name(s))

claim and say that I (we) am (are) the owner(s) of the following described property consisting of 900.52 acres in the County of El Paso, State of Colorado:

(Insert the property legal description)

**SW/4SW/4 Section 18 and W/2 of the W/2 Section 19, T11S, R64W, and S/2SE/4 Section 13 and All of Section 24, T11S R65W, 6<sup>th</sup> PM, El Paso County, 900.52 acres**

**See attached Quitclaim Deed dated November 29, 1976, and map.**

and, that the ground water sought to be withdrawn from the Denver aquifer underlying the above-described land has not been conveyed or reserved to another, nor has consent been given to its withdrawal by another.

Further, I (we) claim and say that I (we) have read the statements made herein; know the contents hereof; and that the same are true to my (our) knowledge.

Signature

George F. McCune

Date

Signature

Evelyn M. McCune

Date

.....  
**INSTRUCTIONS:**

Please type or print neatly in black or blue ink. This form may be reproduced by photocopy or word processing means. See additional information on the reverse side.

County of El Paso, State of Colorado  
RECEIVED AT: El Paso NOV 29 1976  
RECEIVED AT: 200807 MARKET SEALS Ray C. McCune

DATE 2077 or 197

RECEIVED

APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

SEAL

QUITCLAIM DEED

RAY C. McCUNE and GRETA C. McCUNE, as husband and wife, of the County of El Paso and State of Colorado, for the consideration of One Dollar (\$1.00) and other good and valuable consideration, in hand paid, hereby sell and quit claim to GEORGE F. McCUNE and EVELYN M. McCUNE, husband and wife, in joint tenancy, of the County of El Paso and State of Colorado, a one-half interest in and to all minerals underlying the following described property, including oil and gas, said property lying and being in the County of El Paso and State of Colorado, to wit:

The Southwest quarter of the Southwest quarter of Section Eighteen, Township Eleven, Range Sixty-four; the West half of the West half of Section Nineteen, Township Eleven, Range Sixty-four; the South half of the Southeast Quarter of Section Thirteen, Township Eleven, Range Sixty-five; All of Section Twenty-four, Township Eleven, Range Sixty-five, containing in all Nine hundred and fifty-two hundredths (900.52) acres, more or less, according to Government Survey.

with all its appurtenances.

No  
Consideration

DATED and signed this 22 day of Nov., 1976.

STATE DOCUMENTARY

NOV 29 1976

FEE \$ None

Ray C. McCune  
Ray C. McCune

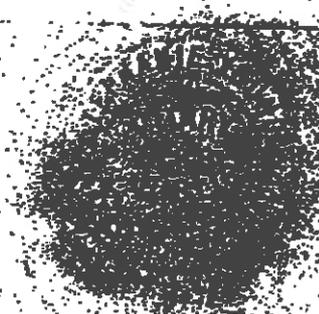
Greta C. McCune  
Greta C. McCune

STATE OF COLORADO )  
COUNTY OF EL PASO ) ss.

The foregoing instrument was acknowledged before me this 22 day of Nov., 1976, by Ray C. McCune and Greta C. McCune.

Shirley J. Gray  
Notary Public

My commission expires 6/20/78



**COLORADO GROUND WATER COMMISSION  
FINDINGS AND ORDER**

IN THE MATTER OF AN APPLICATION FOR DETERMINATION OF WATER RIGHT TO  
ALLOW THE WITHDRAWAL OF GROUND WATER IN THE KIOWA-BIJOU DESIGNATED  
GROUND WATER BASIN

---

APPLICANT: GEORGE F. MCCUNE AND EVELYN MCCUNE

AQUIFER: DAWSON

DETERMINATION NO.: 1692-BD

ROBERT C. "BOB" BALINK  
07/10/2008 03:13:17 PM  
Doc \$0.00 Page  
Rec \$36.00 1 of 7

El Paso County, CO



208078575

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In compliance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, 2 CCR 410-1, George F. McCune and Evelyn McCune (hereinafter "applicant") submitted an application for determination of water right to allow the withdrawal of designated ground water from the Dawson Aquifer.

**FINDINGS**

1. The application was received complete by the Colorado Ground Water Commission on April 17, 2008.
2. The applicant requests a determination of rights to designated ground water in the Dawson Aquifer (hereinafter "aquifer") underlying 900.52 acres, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, in El Paso County. According to a signed statement dated April 17, 2008, the applicant owns the 900.52 acres of land, as further described in said affidavit which is attached hereto as Exhibit A, and claims control of the ground water in the aquifer underlying this land area.
3. The proposed annual amount of ground water to be allocated and withdrawn from the aquifer for intended beneficial uses is the maximum allowable amount.
4. The above described land area overlying the ground water claimed by the applicant is located within the boundaries of the Kiowa-Bijou Designated Ground Water Basin. The Colorado Ground Water Commission (hereinafter "Commission") has jurisdiction.
5. The applicant intends to apply the allocated ground water to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The applicant's proposed place of use of the allocated ground water is the above described 900.52 acre land area.
6. The quantity of water in the aquifer underlying the 900.52 acres of land claimed by the applicant is 81900 acre-feet. This determination was based on the following as specified in the Designated Basin Rules:

RECORDER NOTE: Legibility of  
writing, typing or printing  
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of this document when received

- a. The average specific yield of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 20 percent.
- b. The average thickness of the saturated permeable material of the aquifer underlying the land under consideration that could yield a sufficient quantity of water that may be extracted and applied to beneficial use is 455 feet.
7. At this time, there is no substantial artificial recharge that would affect the aquifer within a one hundred year period.
8. Pursuant to Section 37-90-107(7), C.R.S., and in accordance with the Designated Basin Rules, the Commission shall allocate ground water in the aquifer based on ownership of the overlying land and an aquifer life of one hundred years. Therefore, the maximum allowed average annual amount of ground water in the aquifer that may be allocated for withdrawal pursuant to the data in the paragraphs above for the 900.52 acres of overlying land claimed by the applicant is 819 acre-feet.
9. A review of the records in the Office of the State Engineer has disclosed that none of the water in the aquifer underlying the land claimed by the applicant has been previously allocated or permitted for withdrawal.
10. Pursuant to Section 37-90-107(7)(c)(III), C.R.S., an approved determination of water right shall be considered a final determination of the amount of ground water so determined; except that the Commission shall retain jurisdiction for subsequent adjustment of such amount to conform to the actual local aquifer characteristics from adequate information obtained from well drilling or test holes.
11. The ability of wells permitted to withdraw the authorized amount of water from this non-renewable aquifer may be less than the one hundred years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.
12. In accordance with Rule 5.3.6 of the Designated Basin Rules, it has been determined that withdrawal of ground water from the aquifer underlying the land claimed by the applicant will, within one hundred years, deplete the flow of a natural stream or its alluvial aquifer at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal and, therefore, the ground water is considered to be not-nontributary ground water. Withdrawal of water from the aquifer underlying the claimed land area would impact the alluvial aquifer of Kiowa Creek or its tributaries, which has been determined to be over-appropriated. Commission approval of a replacement plan - pursuant to Section 37-90-107.5, C.R.S., and Rule 5.6 of the Designated Basin Rules - providing for the actual depletion of the alluvial aquifer and adequate to prevent any material injury to existing water rights, would be required prior to approval of well permits for wells to be located on this land area to withdraw the allocated ground water from the aquifer.
13. In accordance with Section 37-90-107(7), C.R.S., upon Commission approval of a determination of water right, well permits for wells to withdraw the authorized amount of water from the aquifer shall be available upon application, subject to the conditions of this determination and the Designated Basin Rules and subject to approval by the Commission.

14. The Commission Staff has evaluated the application relying on the claims to control of the ground water in the aquifer made by the applicant.
15. In accordance with Sections 37-90-107(7) and 37-90-112, C.R.S., the application was published in the Ranchland News newspaper on May 8 and May 15, 2008.
16. No objections to the determination of water right and proposed allocation of ground water were received within the time limit set by statute.
17. In order to prevent unreasonable impairment to the existing water rights of others within the Kiowa-Bijou Designated Ground Water Basin it is necessary to impose conditions on the determination of water right and proposed allocation of ground water. Under conditions as stated in the following Order, no unreasonable impairment of existing water rights will occur from approval of this determination of water right or from the issuance of well permits for wells to withdraw the authorized amount of allocated ground water from the aquifer.

#### **ORDER**

In accordance with Section 37-90-107(7), C.R.S., and the Designated Basin Rules, the Colorado Ground Water Commission orders that the application for determination of rights to designated ground water in the Dawson Aquifer underlying 900.52 acres of land, generally described as the SW1/4 of the SW1/4, Section 18, the W1/2 of the NW1/4 and the W1/2 of the SW1/4, Section 19, Township 11 South, Range 64 West of the 6th PM and the S1/2 of the SE1/4, Section 13 and all of Section 24, Township 11 South, Range 65 West of the 6th Principal Meridian, is approved subject to the following conditions:

18. The allowed average annual amount of withdrawal of ground water from the aquifer shall not exceed 819 acre-feet. The allowed maximum annual amount of withdrawal may exceed the allowed average annual amount of withdrawal as long as the total volume of water withdrawn does not exceed the product of the number of years since the date of approval of this determination times the allowed average annual amount of withdrawal.
19. To conform to actual aquifer characteristics, the Commission may adjust the allowed average annual amount of ground water to be withdrawn from the aquifer based on analysis of geophysical logs or other site-specific data if such analysis indicates that the initial estimate of the volume of water in the aquifer was incorrect.
20. The applicant may pump the allowed average annual amount of withdrawal and the allowed maximum annual amount of withdrawal from one or more wells of a well field in any combination, so long as the total combined withdrawal of the wells does not exceed the amounts described in this Order.
21. Commission approval of a replacement plan, providing for actual depletion of affected alluvial aquifers and adequate to prevent any material injury to existing water rights in such alluvial aquifers is required prior to approval of well permits for wells to be located on the overlying land area to withdraw ground water from the aquifer.

- 22. The use of ground water from this allocation shall be limited to the following beneficial uses: domestic, industrial, commercial, irrigation, augmentation, stock watering, recreational water feature ponds and piscatorial habitat less than 1000 square feet and wildlife, replacement and all other augmentation purposes. The place of use shall be limited to the above described 900.52 acre land area.**
- 23. The applicant, or subsequent persons controlling this water right, shall record in the public records of the county - in which the claimed overlying land is located - notice of transfer of any portion of this water right to another within sixty days after the transfer, so that a title examination of the above described 900.52 acre land area, or any part thereof, shall reveal the changes affecting this water right. Such notice shall consist of a signed and dated deed which indicates the determination number, the aquifer, a description of the above described land area, the annual amount of ground water (acre-feet) transferred, name of the recipient, and the date of transfer.**
- 24. Subject to the above conditions, well permits for wells to withdraw the allocated annual amount of water from the aquifer shall be available upon application subject to approval by the Commission and the following conditions:**

  - a. The wells shall be located on the above described 900.52 acre overlying land area.**
  - b. The wells must be constructed to withdraw water from only the Dawson Aquifer. Upon application for a well permit to construct such a well, the estimated top and base of the aquifer at the proposed well location will be determined by the Commission and indicated on the approved well permit. Plain non-perforated casing must be installed, grouted and sealed to prevent diversion of ground water from other aquifers and the movement of ground water between aquifers.**
  - c. The entire depth of each well must be geophysically logged prior to installing the casing as set forth in Rule 9 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7.**
  - d. Each well shall be constructed within 200 feet of the location specified on the approved well permit, but must be more than 600 feet from any existing large-capacity well completed in the same aquifer.**
  - e. A totalizing flow meter or other Commission approved measuring device shall be installed on each well and maintained in good working order by the well owner. Annual diversion records shall be collected and maintained by the well owner and submitted to the Commission upon their request.**
  - f. The well owner shall mark the well in a conspicuous place with the permit number and the name of the aquifer. The well owner shall take necessary means and precautions to preserve these markings.**
- 25. A copy of this Findings and Order shall be recorded by the applicant in the public records of the county in which the claimed overlying land is located so that a title examination of the above described 900.52 acre overlying land area, or any part thereof, shall reveal the existence of this determination.**

Applicant: George F. McCune and Evelyn McCune  
Aquifer: Dawson  
Determination No.: 1692-BD

Page 5

Dated this 25<sup>th</sup> day of June, 2008.

*Dick Wolfe*

\_\_\_\_\_  
Dick Wolfe, P.E.  
Executive Director  
Colorado Ground Water Commission

By: *Keith Vander Horst*  
\_\_\_\_\_  
Keith Vander Horst, P.E.  
Water Resource Engineer

Prepared by: JPM

92GWS 1  
03/2005

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APR 17 2008

EXHIBIT A

1692-BD

Page 1 of 2

STATE OF COLORADO  
OFFICE OF THE STATE ENGINEER  
DIVISION OF WATER RESOURCES  
1313 Sherman St. Room 821  
Denver, CO 80203  
(303) 866-3581 Fax (303) 866-3589

WATER RESOURCES  
STATE ENGINEER  
COLO.

**NONTRIBUTARY GROUND WATER LANDOWNERSHIP STATEMENT**

I (We) George F. McCune and Evelyn McCune  
(Name(s))

claim and say that I (we) am (are) the owner(s) of the following described property consisting of 900.52 acres in the County of El Paso State of Colorado:

(Insert the property legal description)

**SW/4SW/4 Section 18 and W/2 of the W/2 Section 19, T11S, R64W, and S/2SE/4 Section 13 and All of Section 24, T11S R65W, 6<sup>th</sup> PM, El Paso County, 900.52 acres**

**See attached Quitclaim Deed dated November 29, 1976, and map.**

and, that the ground water sought to be withdrawn from the Dawson aquifer underlying the above-described land has not been conveyed or reserved to another, nor has consent been given to its withdrawal by another.

Further, I (we) claim and say that I (we) have read the statements made herein; know the contents hereof; and that the same are true to my (our) knowledge.

Signature George F. McCune Date \_\_\_\_\_

Signature Evelyn M. McCune Date \_\_\_\_\_

.....  
**INSTRUCTIONS:**

Please type or print neatly in black or blue ink. This form may be reproduced by photocopy or word processing means. See additional information on the reverse side.

County of El Paso, State of Colorado  
RECEIVED AT 7<sup>th</sup> DISTRICT COURT NOV 29 1976  
RECEIVED BY 2500357 HANDED BY [Signature]

2077 197

RECEIVED

APR 17 2008

WATER RESOURCES  
STATE ENGINEER  
COLO.

RECORDS

QUITCLAIM DEED

RAY C. McCUNE and GRETA C. McCUNE, as husband and wife, of the County of El Paso and State of Colorado, for the consideration of One Dollar (\$1.00) and other good and valuable consideration, in hand paid, hereby sell and quit claim to GEORGE F. McCUNE and EVELYN M. McCUNE, husband and wife, in joint tenancy, of the County of Elbert and State of Colorado, a one-half interest in and to all minerals underlying the following described property, including oil and gas, said property lying and being in the County of El Paso and State of Colorado, to wit:

The Southwest quarter of the Southwest quarter of Section Eighteen, Township Eleven, Range Sixty-four; the West half of the West half of Section Nineteen, Township Eleven, Range Sixty-four; the South half of the Southeast Quarter of Section Thirteen, Township Eleven, Range Sixty-five; All of Section Twenty-four, Township Eleven, Range Sixty-five, containing in all Nine hundred and fifty-two hundredths (900.52) acres, more or less, according to Government Survey.

with all its appurtenances.

No  
consideration

DATED and signed this 22 day of Nov., 1976.

STATE DOCUMENTARY

NOV 29 1976

FEE \$ [Signature]

[Signature] Ray C. McCune

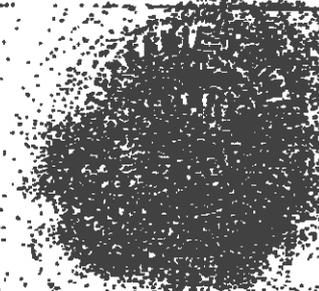
[Signature] Grete C. McCune

STATE OF COLORADO )  
COUNTY OF EL PASO )

The foregoing instrument was acknowledged before me this 22 day of Nov., 1976, by Ray C. McCune and Grete C. McCune.

[Signature] Stephanie J. [Signature]  
Notary Public

My commission expires: 6/20/78



# *Appendix E*



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907  
PHONE (719) 531-5599  
FAX (719) 531-5238

**PRELIMINARY SOIL, GEOLOGY, GEOLOGIC HAZARD,  
AND WASTEWATER STUDY,  
WINSOME SUBDIVISION  
PARCEL NO. 51000-00-493  
17480 MERIDIAN ROAD NORTH  
EL PASO COUNTY, COLORADO**

Prepared for

**Proterra Properties, LLC**  
1864 Woodmoor Drive, Suite 100  
Monument, Colorado 80132

Attn: Joe DesJardin

October 2, 2018  
Revised January 11, 2019

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.  
Geologist

Kristen A. Andrew-Hoeser, P.G.  
Engineering Geologist

LLL/nc

Encl.

Entech Job No. 181459  
AAprojects/2018/181459 countysoil/geo/ww

Reviewed by:

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



PCD Fil No. SP-18-006

**TABLE OF CONTENTS**

1.0 SUMMARY ..... 1  
2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION ..... 2  
3.0 SCOPE OF THE REPORT ..... 2  
4.0 FIELD INVESTIGATION ..... 3  
5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY ..... 3  
    5.1 General Geology ..... 3  
    5.2 Soil Conservation Survey ..... 4  
    5.3 Site Stratigraphy ..... 5  
    5.4 Soil Conditions ..... 6  
    5.5 Groundwater ..... 7  
6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS ..... 8  
    6.1 Relevance of Geologic Conditions to Land Use Planning ..... 11  
7.0 ON-SITE DISPOSAL OF WASTEWATER ..... 13  
8.0 ECONOMIC MINERAL RESOURCES ..... 14  
9.0 EROSION CONTROL ..... 15  
10.0 CLOSURE ..... 16  
BIBLIOGRAPHY ..... 17

**TABLES**

- Table 1: Summary of Laboratory Test Results
- Table 2: Summary of Tactile Test Pits Results

**FIGURES**

- Figure 1: Vicinity Map
- Figure 2: USGS Map
- Figure 3: Site Plan/Testing Location Map
- Figure 4: Soil Survey Map
- Figure 5: Eastonville Quadrangle Geology Map
- Figure 6: Geology Map/Engineering Geology
- Figure 7: Floodplain Map
- Figure 8: Typical Perimeter Drain Details
- Figure 9: Septic Suitability Map

- APPENDIX A: Site Photographs
- APPENDIX B: Test Boring Logs and Test Pit Logs
- APPENDIX C: Laboratory Test Results
- APPENDIX D: Soil Survey Descriptions

## **1.0 SUMMARY**

### ***Project Location***

The project site lies in Section 24 and a portion of the S½ of Section 13, Township 11 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, and a portion of the W½ of Section 19, Township 11 South, Range 64 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 12 miles east of Monument, Colorado, northwest of Hodgen Road and Meridian Road North.

### ***Project Description***

Total acreage involved in the project is approximately 766 acres. The proposed site development consists of one-hundred and forty-three single-family rural residential lots and one commercial lot. The development will utilize individual wells and on-site wastewater treatment systems.

### ***Scope of Report***

This report presents the results of our geologic evaluation, treatment of engineering geologic hazard study and wastewater study for individual on-site wastewater treatment systems.

### ***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 artificial fill, potentially expansive soils, potentially unstable slopes, downslope creep areas, floodplain, potentially seasonal shallow groundwater, and seasonal 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 Section 24 and a portion of the S½ of Section 13, Township 11 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, and a portion of the W½ of Section 19, Township 11 South, Range 64 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 12 miles east of Monument, Colorado, northwest of Hodgen Road and Meridian Road North. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site consists of rolling hills that vary from gradually to moderately sloping generally to the southeast and northwest. West Kiowa Creek bisects the site. Steep slopes are located along some of the drainages on the site. The drainages on site flow in a northeasterly direction through the central portion of the site. Water was observed in West Kiowa Creek at the time of this investigation. 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 and weeds. Site photographs, taken September 12 and 15, 2018, are included in Appendix A.

Total acreage involved in the proposed development is approximately 766 acres. One hundred and forty-three single-family rural residential lots and one commercial lot are proposed. The proposed residential lots are approximately 2.5 to 10 acres each, and the commercial lot is 7.2 acres. The area will be serviced by individual wells and on-site wastewater treatment systems. The proposed Site Plan/Testing Location Map is presented in Figure 3.

## **3.0 SCOPE OF THE REPORT**

The scope of the report will include the following:

- A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.
- The site will be evaluated for individual on-site wastewater treatment systems in accordance with El Paso Land Development Code.

## **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 Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on September 12 and 15, 2018.

Five (5) test borings, and ten (10) tactile test pits were performed on the site to determine general suitability of the site for the use of on-site wastewater treatment systems. The locations of the test borings, and test pits are indicated on the Site Plan/Testing Location Map, Figure 3. The Test Boring and Test Pit Logs are presented in Appendix B. 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, and Atterberg Limits, ASTM D-4318. 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, north of the Palmer Divide. Approximately 16 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 northwesterly direction (Reference 1). The rocks in the area

of the site are sedimentary in nature and typically Tertiary to Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of residual soils, man-made, and alluvial soils of the Quaternary Age. The residual soils are produced by the in-situ action of weathering of the bedrock on site. The alluvial soils were deposited by water in the major drainage on the site and as stream terrace deposits. Man-made soils exist as erosion berms. 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 2), previously the Soil Conservation Service (Reference 3) has mapped ten soil types on the site (Figure 4). In general, they vary from loam, loamy sands, and sandy loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
1	Alamosa Loam, 1-3% slopes
15	Brussett Loam, 3 to 5% slopes
21	Cruckton Sandy Loam, 1 to 9% slopes
25	Elbeth Sandy Loam, 3 to 8% slopes
26	Elbeth Sandy Loam, 8 to 15% slopes
36	Holderness Loam, 8 to 15% slopes
67	Peyton Sandy Loam, 5-9% slopes
68	Peyton-Pring Complex, 3-8% slopes
71	Pring Coarse Sandy Loam, 3 to 8% slopes
92	Tomah-Crowfoot Loamy Sands, 3 to 8% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to typically have slow to rapid permeabilities. The majority of the soils have moderate permeabilities. Limitations described for the soils include shrink-swell potential on Soil Type Nos. 15, 25, 26, and 36, slope on Soil Type Nos. 26 and 36, and the hazard of flooding on Soil Type No. 1. Soil Type No. 1 is mapped in the floodplain zone that is designated as open space. Roads may need to be designed to minimize frost-heave potential. 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 moderate erosion hazards.

### 5.3 Site Stratigraphy

The Eastonville Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 4). The Geology Map prepared for the site is presented in Figure 6. Seven mappable units were identified on this site which are described as follows:

- Qaf Recent Artificial Fill of Holocene Age:** These are man-made fill deposits associated with erosion berms on-site.
- Qal Recent Alluvium of Late Holocene Age:** These materials consist of water deposited sands located along some of the minor drainages across the site.
- Qp Piney Creek Alluvium (Alluvium One and Two) of Early Holocene Age:** These materials consist of low stream-terrace deposits above the current stream channel. The materials typically consist of silty to well graded sand.
- Qb Broadway Alluvium (Alluvium Three) of Late Pleistocene Age:** These materials consist of middle stream terrace deposits. The materials typically consist of silty to clayey gravelly sands.
- Qlo Louviers Alluvium (Alluvium Four) Late Middle Pleistocene Age:** These materials consist of upper stream terrace deposits. The materials typically consist of light brown silty sands which contain an abundance of gravels.
- Qsw Sheetwash Deposits of Holocene to Late Pleistocene Age:** These materials consist of silty to clayey sands with some cobbles and boulders. The material was deposited by the action of sheetwash and gravity.
- Qc/Tkd Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:** The Dawson Formation typically consists 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, sandy clays and sandy silts.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Eastonville Quadrangle* distributed by the Colorado Geological Survey in 2012 (Reference 4), and the *Geologic Map of the Denver 1<sup>0</sup> x 2<sup>0</sup> Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 5). The Test Pits and Profile Holes were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

#### **5.4 Soil Conditions**

The soils encountered in the Test Borings and Test Pits can be grouped into four general soil and rock types. The Test Boring soils were classified using the Unified Soil Classification System (USCS). The soils encountered in the Test Pits can be grouped into three general soil types. The test pit soils were classified using the USDA Textural Soil Classification.

Soil Type 1 is a slightly silty to silty and clayey sand (SM-SW, SM, SC). This material was encountered in the test borings and in nine of the test pits. The sand was encountered at depths ranging from the existing surface to 12 to 15 feet bgs and extended to the termination of the Test Boring Nos. 2, 3 and 5 (20 feet). These soils were encountered at loose to medium dense states and at dry to moist conditions. Samples tested had 7 to 34 percent of the soil sized particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in the sand being non-plastic. FHA Swell Testing on a sample of the sand resulted in an expansion of 30 psf, indicating a low expansion potential.

Soil Type 2 is a sandy clay (CL). This material was encountered in Test Pit No. 1 and Test Boring No. 2. The clays were encountered at depths of the existing surface grade in the test pit and at 19 feet in the test boring and extended to depths up to 8 feet bgs to the termination of the test boring (20 feet). The clays were encountered at firm consistencies and moist conditions. The sample tested had 75 percent of the soil sized particles passing the No. 200 sieve. Atterberg Limits Testing resulted in a liquid limit of 30 and a plastic index of 10.

Soil Type 3 is a silty to clayey sandstone and very clayey sandstone (SM, SC, SC-SM, CL-SC). This material was encountered Test Boring No. 4 and in Test Pit Nos. 2, 3, 6, 7 and 8. The sandstone was encountered at depths ranging from 3 to 16 feet bgs and extended to the termination of the boring and pits (7 to 20 feet). The sandstone was encountered at very dense states and moist conditions. Samples tested had 14 to 54 percent of the soil sized particles

passing the No. 200 sieve. Atterberg Limits Testing resulted in liquid limits of 21 to 31 and plastic indexes of 7 to 14. FHA Swell Testing resulted in an expansion pressure of 350 psf, indicating a low expansion potential. Highly expansive clayey sandstone and claystone are commonly interbedded in the sandstone in the area.

Soil Type 4 is a sandy claystone (CL). This material was encountered Test Boring No. 1 at 12 feet bgs and extended to the termination of the boring (20 feet). The claystone was encountered at hard consistencies and moist conditions. Samples tested had 73 percent of the soil sized particles passing the No. 200 sieve. Swell/Consolidation Testing resulted in a volume change of 2.5 percent, indicating a moderate to high expansion potential.

The Test Boring Logs and Test Pit 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.

### ***5.5 Groundwater***

Groundwater was encountered in Test Boring No. 3 at 16.5 feet. Groundwater was not encountered in the remaining test borings which were drilled to 20 feet. Areas of seasonal and potentially seasonal shallow groundwater have been mapped in low-lying areas and in 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.

It should be noted that in the sandy materials on site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

## 6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

As mentioned previously, detailed mapping has been performed on this site to produce an Geology/Engineering Geology Map (Figure 6). This map shows the location of various geologic conditions of which the developers should be cognizant during the planning, design and construction stages of the project. These hazards and the recommended mitigation techniques are as follows:

### Artificial Fill

These are man-made fill deposits associated with erosion berms on-site.

Mitigation: The small erosion berms can easily be removed or penetrated by foundations. Should any uncontrolled fill be encountered beneath foundations, removal and recompaction at 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 will be required.

### Loose or Collapsible Soils

Loose soils were encountered in one of the test borings. Any loose or collapsible soils encountered beneath foundations or floor slabs will require mitigation.

Mitigation: Any loose or collapsible soils encountered beneath foundations or floor slabs should be overexcavated 2 to 3 feet, moisture-conditioned and recompacted. The soils should be recompacted to 95 percent of the soils maximum Modified Proctor Dry Density ASTM D-1557 at  $\pm 2$  percent of optimum moisture content. The reconditioned soils on this site should be observed and tested to verify adequate compaction. Areas requiring recompaction should be determined during the excavation observation.

### Expansive Soils

Expansive soils were encountered in the test borings drilled and test pits excavated on-site. Expansive claystone is commonly encountered within the Dawson Formation. These occurrences are typically sporadic; therefore, none have been indicated on the maps. These expansive soils, if encountered beneath foundations, can cause differential movement in the structure foundation. These occurrences should be identified and mitigated on an individual basis.

**Mitigation:** Should expansive soils be encountered beneath the foundation, mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Another alternative in areas of highly expansive soils is the use of drilled pier foundation systems. Typical minimum pier depths are on the order of 25 feet or more and require penetration into the bedrock material a minimum of 4 to 6 feet, depending upon building loads. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. The use of structural floors should be considered for basement construction on highly expansive clays. Final recommendations should be determined after additional investigation of each building site.

**Slope Stability and Landslide Hazard**

The majority of the slopes in the building areas on site are gently to moderately sloping and do not exhibit any past or potential unstable slopes or landslides. However, the steeply sloping areas along the drainage in the central portion of the site have been identified as potentially unstable slopes. Additionally, areas of downslope creep have been mapped on the site. These areas are identified on the Geology/Engineering Geology Map, Figure 6. The recommendations for these areas are as follows:

- **Potentially Unstable Slope Area**

The area identified with this hazard is located along a portion of a minor drainage where cut banks have created potentially unstable slopes. Considerable care must be exercised in these areas not to create a condition which would tend to activate instability.

**Mitigation:** Building should be avoided in these areas. The lots most significantly affected by potentially unstable slopes are Lot 54 and 55. The structures on these lots should be set back a minimum of 30 feet from the crest of these slopes. The recommended setback lies within the proposed no build area. It appears there is sufficient room on the lots to avoid this hazard. Proper control of drainage at both the surface above the slope and the subsurface is extremely important. Areas of ponded water at the surface should be avoided. Utility trenches, basement excavations and other subsurface features should not be permitted to become water traps which may promote saturation of the subsurface materials. Drainage

should not be permitted over the potentially unstable slope but directed in a non-erosive manner away from the slope. Irrigation above these slopes should be kept to a minimum to prevent saturation of the subsurface soils. The use of xeriscape landscaping utilizing native plantings is recommended to reduce the need for irrigation.

- *Downslope Creep Area*

The areas identified with this hazard includes some of the steeper slopes on site, particularly in the northwest portion of the site. In these areas, we would anticipate lateral and vertical movement of the near surface soils in the downslope direction. These areas are acceptable as building sites with the following constraints on construction.

Mitigation: Building is possible in these areas if the following engineering and construction mitigation steps are taken: This type of movement will increase lateral pressures against foundation walls on the uphill side of structures. The design of foundations in these areas should account for this additional pressure. Additionally, the foundation should be designed to withstand pressures where steeper areas slope away from the foundation. Tie beams and buttresses are recommended to stiffen the foundation system.

#### Floodplain and Drainage Areas

Portions of the site associated with the West Kiowa Creek drainage are mapped within a floodplain zone according to the FEMA Map No. 08041CO350F, dated March 17, 1997 (Figure 7, Reference 6). Water was observed flowing in West Kiowa Creek. The floodplain areas have been designated as open space and/or can be avoided by construction. Additionally, areas of seasonal and potentially seasonal shallow groundwater were observed across the site. In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and frost heave potential. These areas lie within low-lying areas along the drainage in the southeastern portion of the site and in the low-lying areas and minor drainages across the site. Water was not observed in any of the minor drainages at the time of our site investigation. These areas can likely be avoided or properly mitigated by development. The floodplain should be avoided by construction unless site-specific floodplain determination and drainage studies are performed. The potential exists for high groundwater levels during high moisture periods and should structures encroach on these areas the following precautions should be followed.

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. Typical drain details are presented in Figure 8. Some of the minor drainage swales can be avoided or regraded. The main drainage that bisects the site is designated as open space and will be avoided. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Finished floors must be located at least one foot above floodplain levels. Specific drainage studies and exact floodplain locations are beyond the scope of this report.

### ***6.1 Relevance of Geologic Conditions to Land Use Planning***

We understand that the development will be rural residential lots and a commercial lot. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The most significant problems affecting development will be those associated with the drainages on site that can be avoided or properly mitigated during construction on each lot. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices or avoidance.

The upper materials are typically at medium dense to dense states. Areas of loose soils were encountered that may require recompaction. The medium dense to dense granular soils encountered in the upper soil profiles of the test borings and test pits should provide good support for foundations. Loose soils, if encountered beneath foundations or slabs, will require removal of the upper 2 to 3 feet of material and recompaction. Expansive soils, although sporadic, were encountered. Expansive clayey sandstone and claystone are common in the Dawson Formation, and may require mitigation. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of expansive soils or loose soils. Areas of artificial fill, if encountered beneath foundations will require penetration or recompaction. Areas containing arkosic sandstone will have high allowable bearing conditions. Expansive layers may also be encountered in the soil and bedrock on this site. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

A potentially unstable slope exists along portions of the site where the drainages have eroded cut banks. A 30-foot building setback is recommended from the crest of the potentially unstable slope. Septic fields should not be located within the building setback as well. The slopes primarily affect Lot 54 and 55. It appears there is sufficient room on the lots to avoid the potentially unstable slopes. Additionally, minor areas of downslope creep have been mapped on the site. Many of these areas can be avoided by construction, however, Lot 44 may be affected. These areas are acceptable as building sites with mitigation for the sloping conditions taken into consideration. Additional reinforcement may be necessary in the foundation to account for additional pressures due to sloping conditions. Tie-beams and/or buttresses may be necessary, depending on site conditions and grading plans.

Areas of seasonal shallow groundwater and potentially seasonal shallow groundwater were encountered on site. Additionally, portions of the site have been mapped in a floodplain zone associated with West Kiowa Creek. The floodplain area is in the designated open space area and can be avoided by development. Water was observed in the West Kiowa Creek floodplain, however, water was not observed in the minor drainages on-site during our site investigation. Due to the size of the lots and the proposed development, the majority of these areas can be avoided by construction on the lots. The lot boundaries in the area of Lots 87 and 111 may require adjustments to accommodate the minor drainages that bisects the lots. Regrading can also mitigate some minor drainages on some of the lots. Structures should not block drainages. Any site grading should be done in such a manner as to not create areas of ponded water around structures or septic fields. Finished floor levels must be a minimum of one foot above the floodplain level. Septic fields should not be located in drainage areas due to the potential for periodic high groundwater conditions. Specific floodplain locations and drainage studies are beyond the scope of this report.

In summary, development of the site can be achieved if the items mentioned above are mitigated. These items can be mitigated through proper design and construction or through avoidance. Investigation on each lot is recommended prior to construction.

## 7.0 ON-SITE WASTEWATER TREATMENT

The site was evaluated for individual and commercial on-site wastewater treatment systems in accordance with El Paso Land Development Code. Ten (10) tactile test pits were performed on the property. The test pits were located in potential locations of future systems. The approximate locations of the percolation tests are indicated on Figure 3, on the Geology/Engineering Geology Map, Figure 6, and on the Septic Suitability Map, Figure 9. A table showing the results of the Tactile Test Pits is presented in Table 2. Test Pit Logs are included in Appendix B.

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has been mapped with ten soil descriptions. The Soil Survey Map (Reference 2) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having slow to rapid percolation rates. The majority of the soils have been described with moderate permeabilities.

Soils encountered in the tactile test pits consisted of loamy sand, sandy clay loam and sandy clay. Bedrock was not encountered in the test pits which were excavated to 7 to 8 feet. The limiting layers encountered in the test pits are the sandy loam (Soil Type 2), and sandy clay (Soil Type 4A) which corresponds to LTAR values of 0.80 to 0.15 gallons per day per square foot. The conditions encountered in the Test Pit Nos. 1 through 4 and 6 through 8 will require a designed system. Additional investigation may identify areas where suitable for conventional systems could be used.

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 and State Guidelines and properly maintained. Based on the testing performed as part of this investigation designed systems will likely be required for the majority of the lots. A Septic Suitability Map is presented in Figure 9. Areas where OWTS sites are not recommended are indicated on Figure 9. Individual soil testing is required on the lots prior to construction. 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 drainages, floodplains or ponded areas and 25 feet from dry gulches.

## 8.0 ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 7), the area is mapped with floodplain, valley fill and upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 8), areas of the site are mapped with upland and floodplain deposits: sand and probable aggregate resource (U3, U4 and F4). According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 9), the area of the site has been mapped as "Good" for industrial minerals. However, considering the abundance of similar materials through the region and the close proximity to developed land, they would be considered to have little significance as an economic resource.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 9), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "Poor" for coal resources. No active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site (Reference 9).

The site has been mapped as "Fair" for oil and gas resources (Reference 9). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

## **9.0 EROSION CONTROL**

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils and weathered bedrock materials become increasingly less susceptible to water erosion. For the typical soils observed on site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

## **10.0 CLOSURE**

It is our opinion that the existing geologic engineering and geologic conditions will impose some minor constraints on development and construction of the site. The majority of these conditions can be avoided by construction. Others can be mitigated through proper engineering design and construction practices. The proposed development and use is 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 septic systems 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 Proterra Properties, 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.

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## TABLES

**TABLE 1**

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT PROTERRA PROPERTIES  
 PROJECT WINSOME SUBDIVISION  
 JOB NO. 181459

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	2	2-3			12.1	NV	NP				SM	SAND, SILTY
1	3	10			6.5			<0.01			SM-SW	SAND, SLIGHTLY SILTY
1	5	5			17.3						SM	SAND, SILTY
1	TP-3	2-3			23.7						SM	SAND, SILTY
1	TP-4	5-6			15.3						SM	SAND, SILTY
1	TP-5	2-3			19.2						SM	SAND, SILTY
1	TP-7	2-3			33.5						SM	SAND, SILTY
1	TP-9	5-6			21.3				30		SM	SAND, SILTY
1	TP-10	2-3			32.0						SM	SAND, SILTY
2	TP-1	5-6			74.8	30	10				CL	CLAY, SANDY
3	TP-2	5-6			14.0	30	9				SM	SANDSTONE, SILTY
3	TP-8	5-6			21.1	33	14				SC	SANDSTONE, CLAYEY
3	TP-6	5-6			54.2				350		CL-SC	SANDSTONE, VERY CLAYEY
3	4	20			18.6	21	7	<0.01			SC-SM	SANDSTONE, SILTY, CLAYEY
4	1	15	13.4	120.4	73.2	35	13	<0.01		2.5	CL	CLAYSTONE, SANDY

**Table 2: Summary Tactile Test Pit Results**

<b>Test Pit No.</b>	<b>USDA Soil Type</b>	<b>LTAR Value</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Seasonally Occurring Groundwater (ft.)</b>
1	4A*	0.15*	N/A	N/A
2	3A*	0.30*	3*	N/A
3	3A*	0.30*	3*	N/A
4	4A*	0.15*	N/A	N/A
5	1	0.80	N/A	N/A
6	4A*	0.15*	3.5*	7'
7	4A*	0.15*	3.5*	7'
8	4A*	0.15*	3*	6'
9	3	0.35	N/A	N/A
10	3	0.35	N/A	N/A

\*- Conditions that will require an engineered OWTS

## FIGURES

SITE

N Meridian

Forest Green Dr

High Trees Dr

Hodgen Rd



**ENTECH**  
ENGINEERING, INC.  
505 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-3399

VICINITY MAP  
WINSOME RANCH SUBDIVISION  
17480 MERIDIAN ROAD NORTH  
EL PASO COUNTY, CO.  
FOR: PROTERRA PROPERTIES, LLC

DRAWN:  
LLL

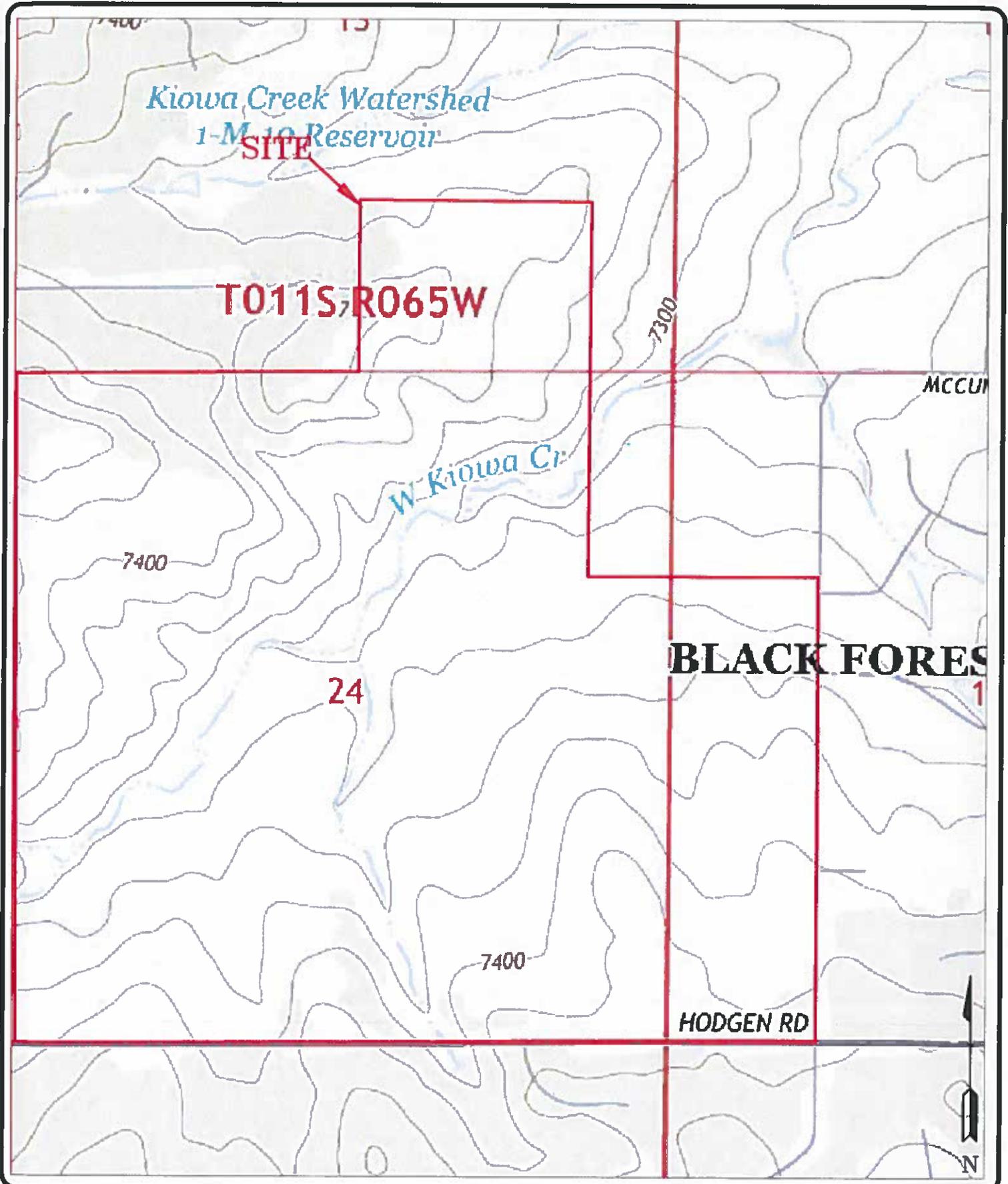
DATE:  
1/7/19

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DATE:

JOB NO.:  
181459

FIG NO.:  
1



**ENTECH**  
**ENGINEERING, INC.**  
305 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-3599

USGS MAP  
 WINSOME RANCH SUBDIVISION  
 17480 MERIDIAN ROAD NORTH  
 EL PASO COUNTY, CO.  
 FOR: PROTERRA PROPERTIES, LLC

DRAWN:  
 LLL

DATE:  
 1/7/19

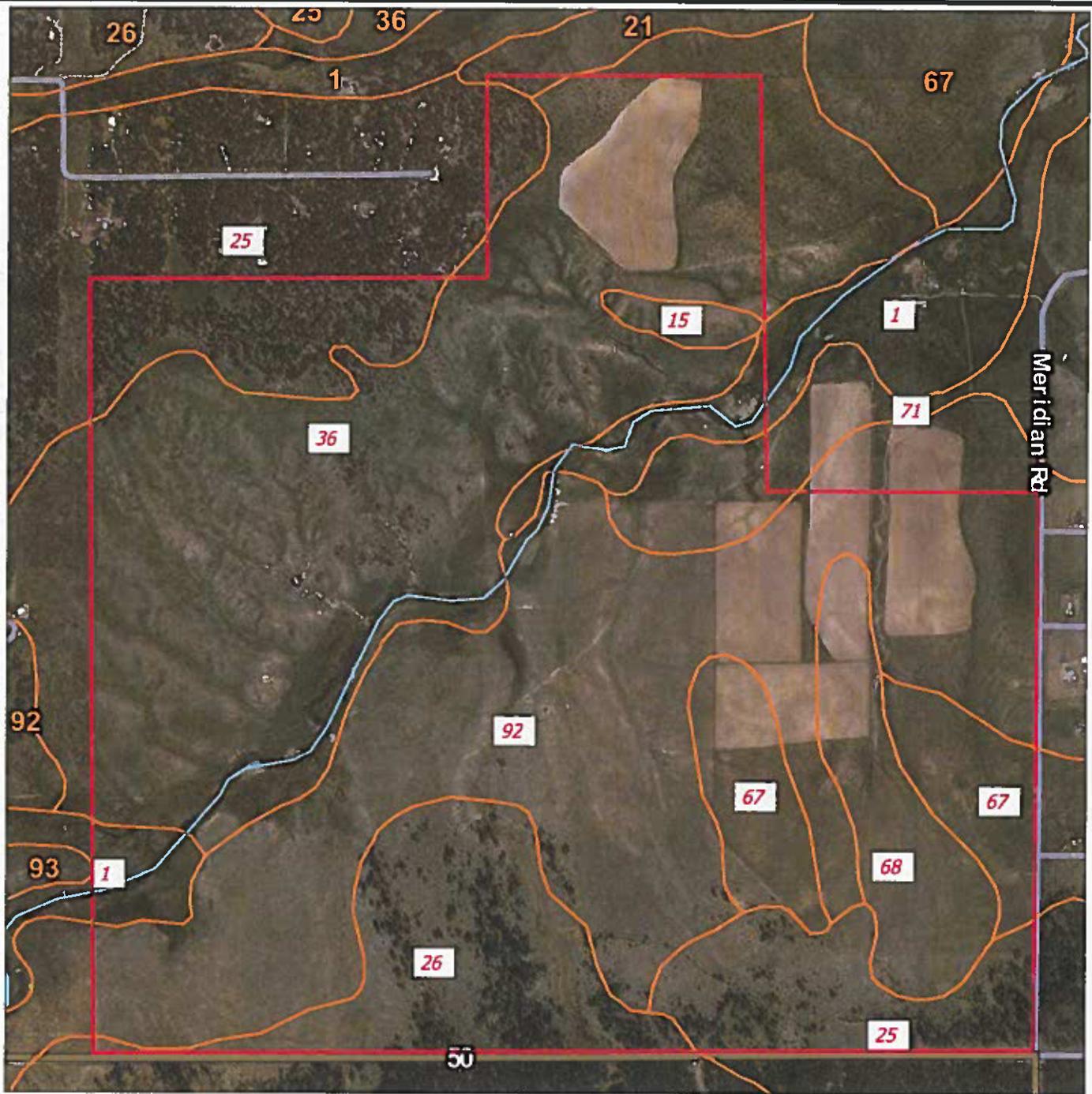
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JOB NO.:  
 181459

FIG NO.:  
 2





Meridian Rd



**ENTECH**  
**ENGINEERING, INC.**  
585 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-3399

**SOIL SURVEY MAP**  
**WINSOME SUBDIVISION**  
 17480 MERIDIAN ROAD NORTH  
 EL PASO COUNTY, CO.  
 FOR: PROTERRA PROPERTIES, LLC

JOB NO.:  
**181459**

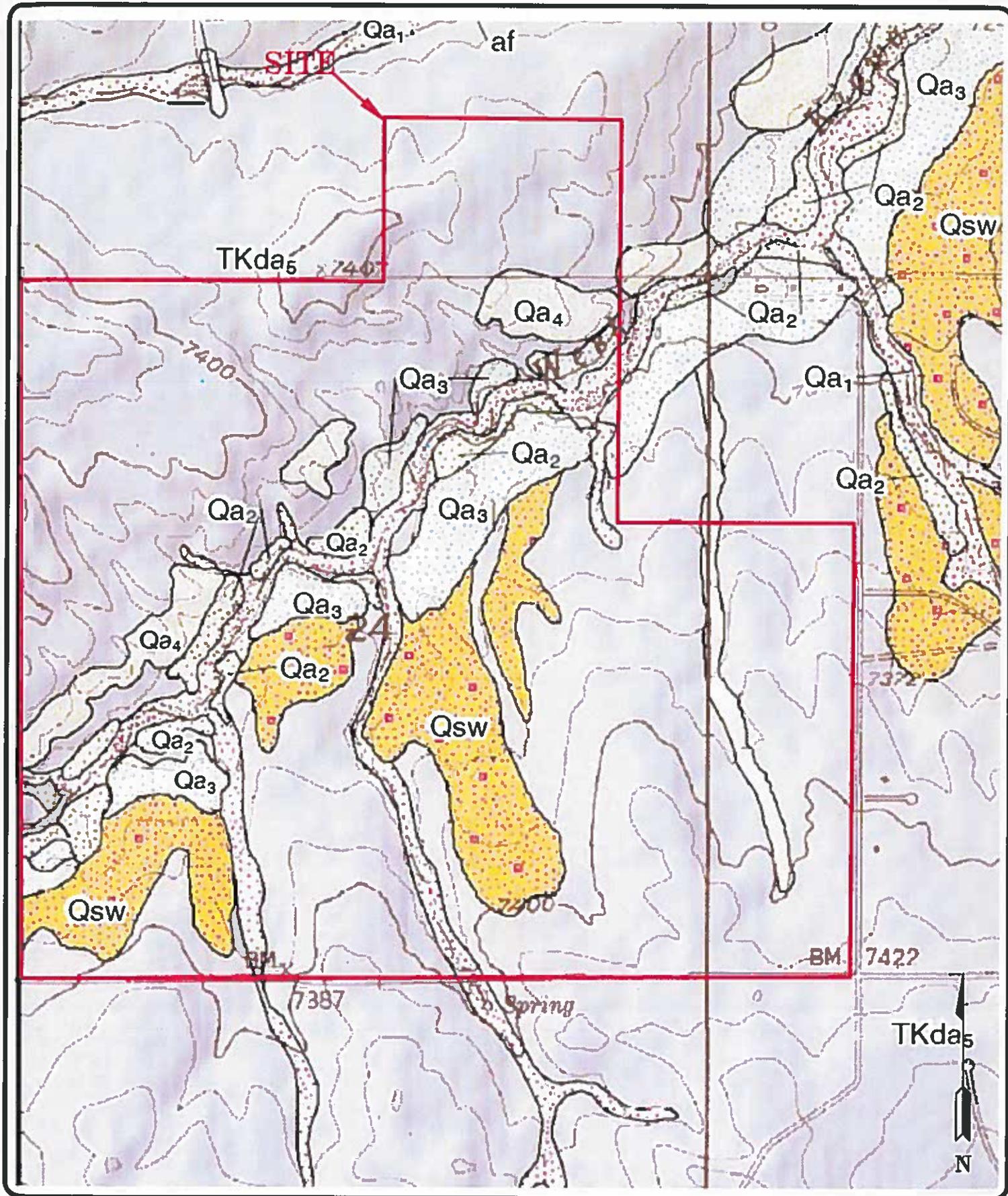
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**1/7/19**

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**ENTECH**  
**ENGINEERING, INC.**  
 303 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-3299

**EASTONVILLE QUADRANGLE GEOLOGIC MAP**  
**WINSOME SUBDIVISION**  
 17480 MERIDIAN ROAD NORTH  
 EL PASO COUNTY, CO.  
 FOR: PROTERRA PROPERTIES, LLC

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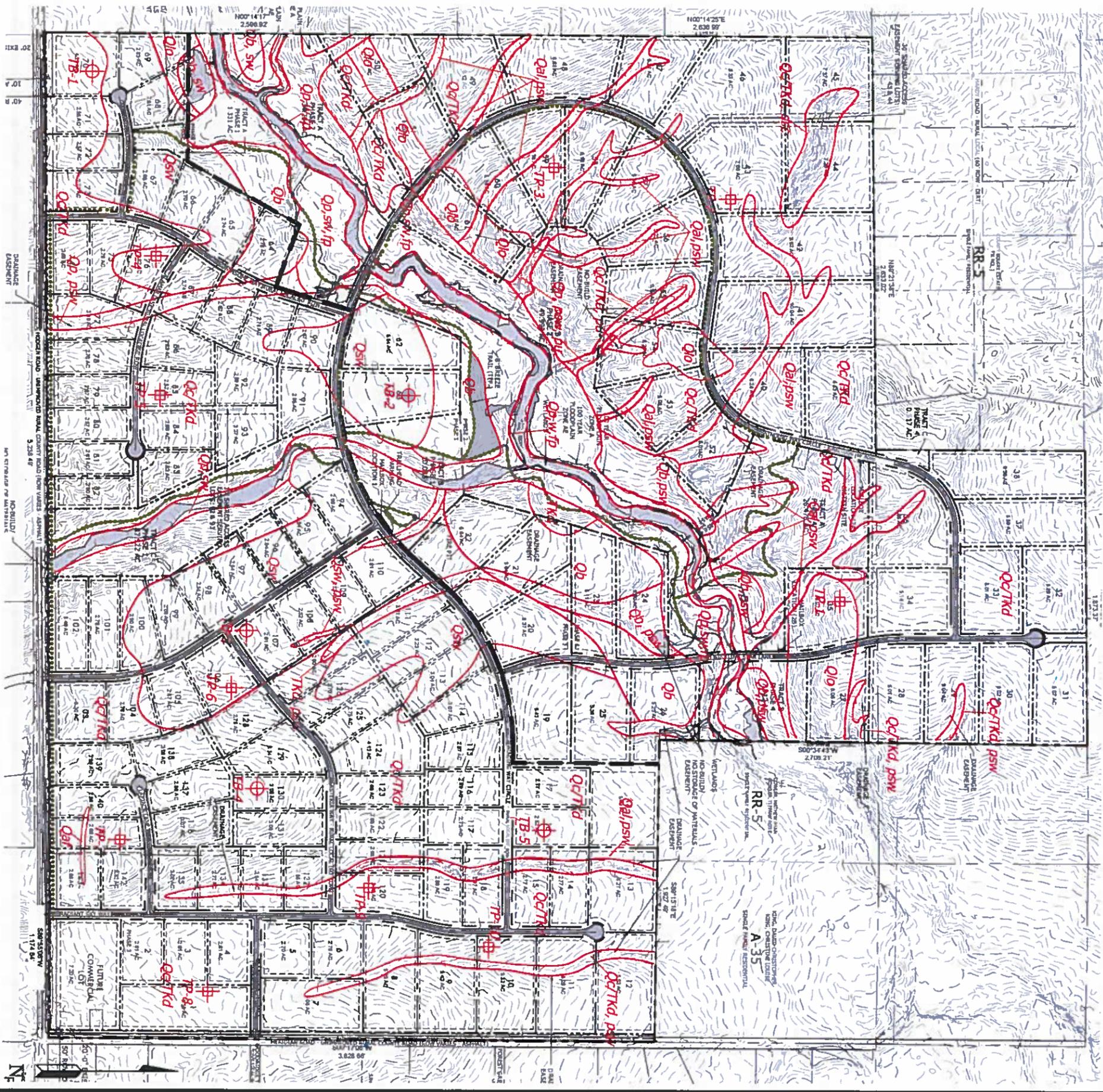
DATE:

JOB NO.:  
 181459

FIG NO.:  
 5

**LEGEND:**

- Qaf - Artificial Fill of Holocene Age:  
artificial fill associated with erosion berms
- Qal - Recent Alluvium of Holocene Age:  
recent alluvium located in several of the minor drainages on-site
- Qp - Piney Creek Alluvium Two of Early Holocene Age:  
low stream terrace deposits above current stream channel
- Qb - Broadway Alluvium of Late Pleistocene Age:  
stream terrace deposited sands
- Q10 - Louvers Alluvium of Late Middle Pleistocene Age:  
stream terrace deposited sands
- Qsw - Sheetwash of Holocene to Late Pleistocene Age:  
silty to clayey sand sheetwash deposits
- QcTKa - Colluvium of Quaternary Age overlying Dawson Formation  
of Tertiary to Cretaceous Age:  
colluvium and residual soils overlying arkosic sandstone  
with interbedded fine-grained sandstone, siltstone and claystone
- dsc - downslope creep area
- fp - floodplain
- pu - potentially unstable slope
- psw - potentially seasonal shallow groundwater area
- sw - seasonal shallow groundwater area
- w - flowing water
- ⊕ - approximate test boring location
- ⊕ - approximate test pit location



DATE	1/7/19
CHECKED	AS SHOWN
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SCALE	AS SHOWN
BY	AS SHOWN
PROJECT NO.	181459
DATE	1/7/19
6	

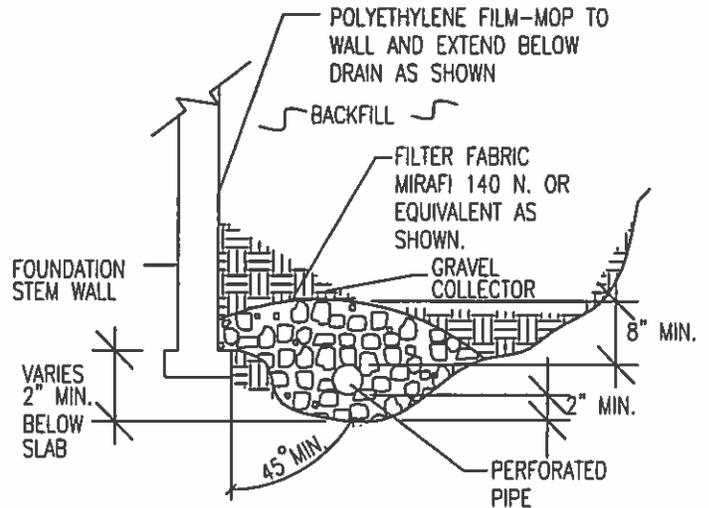
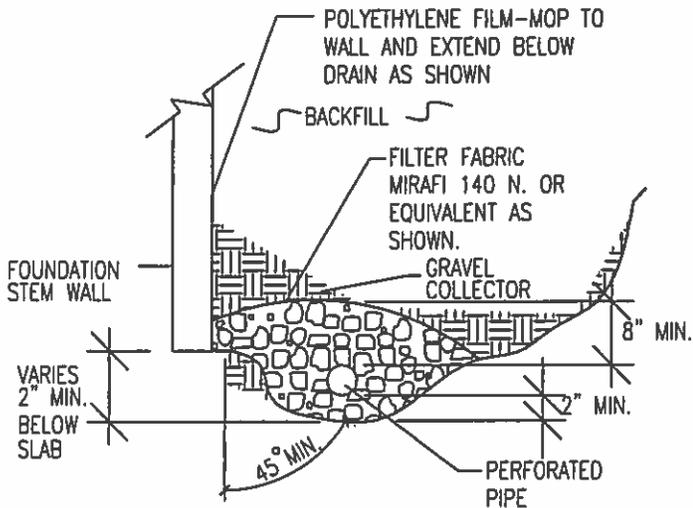
**GEOLOGY/ENGINEERING GEOLOGY MAP**  
**WINSOME SUBDIVISION**  
 17480 MERIDIAN ROAD NORTH  
 EL PASO COUNTY, CO.  
 FOR: PROTERRA PROPERTIES, LLC



**ENTECH**  
**ENGINEERING, INC.**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-5599

REVISION	BY





**NOTES:**

-GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS-85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

-PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4-INCH DIAMETER IS MOST OFTEN USED.

-ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON-PERFORATED PIPE.

-FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

-MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

-DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUFALL IS NOT AVAILABLE.



**ENTECH**  
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505 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-5599

*PERIMETER DRAIN DETAIL*

DRAWN:

DATE:

9/26/18

DESIGNED:

DS

CHECKED:

✓

JOB NO.:

18149

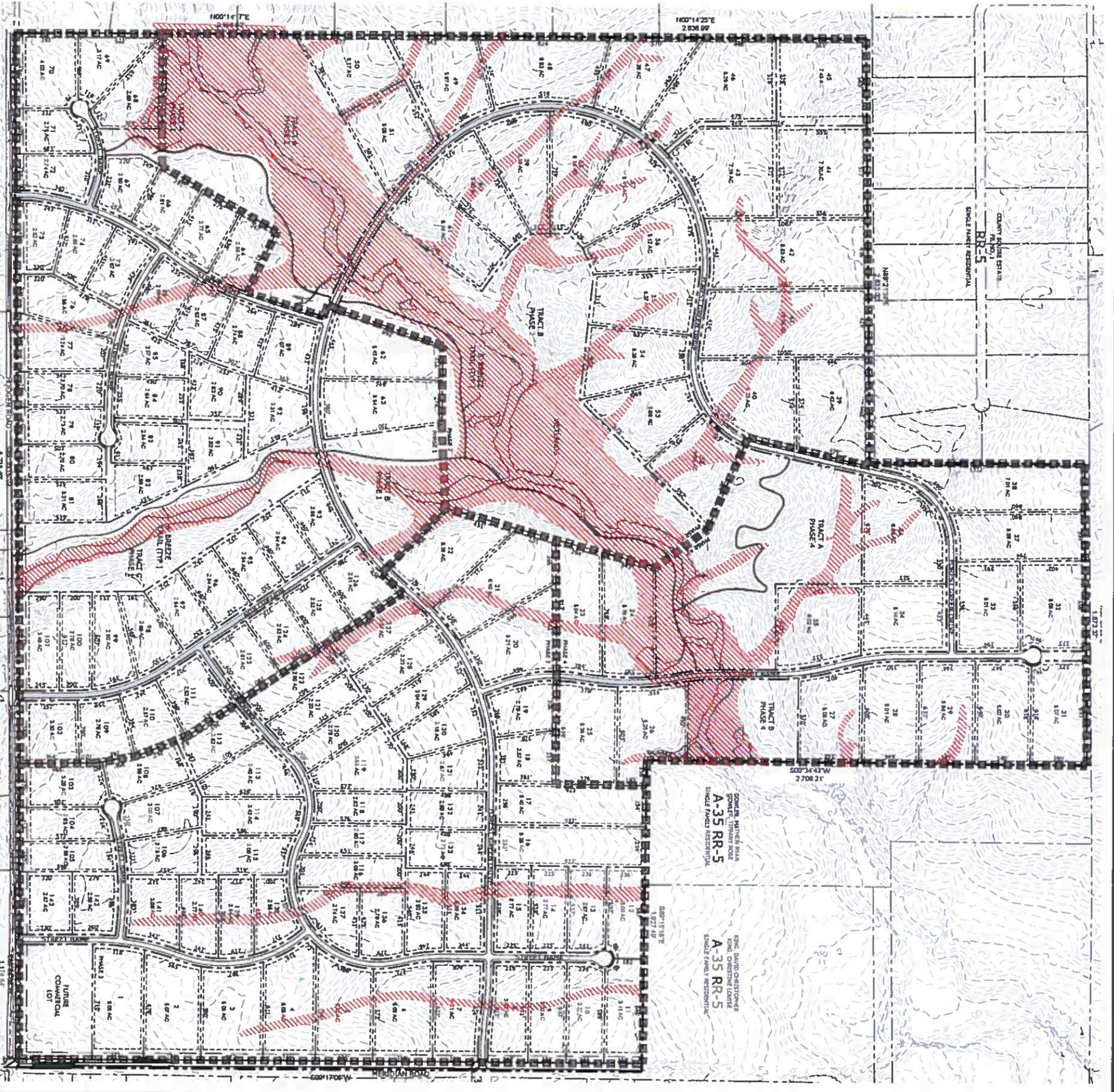
FIG NO.:

8



**LEGEND:**

- AREAS THAT ARE NOT SUITABLE FOR ON-SITE WASTE WATER TREATMENT SYSTEMS
- \* WATER WELLS MUST BE A MINIMUM OF 100 FT FROM OWTS ABSORPTION FIELDS



DATE	1/7/19
CHECKED	AS SHOWN
DRAWN	10/4/18
BY	NAME
9	

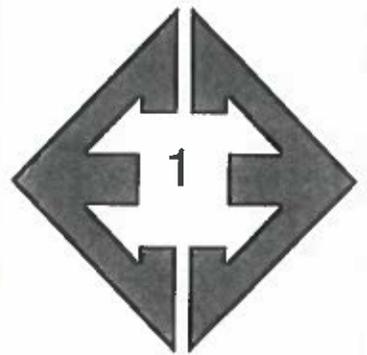
SEPTIC SUITABILITY MAP  
 WINSOME SUBDIVISION  
 17480 MERIDIAN ROAD NORTH  
 EL PASO COUNTY, CO.  
 FOR: PROTERRA PROPERTIES, LLC



**ENTECH**  
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 505 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-5599

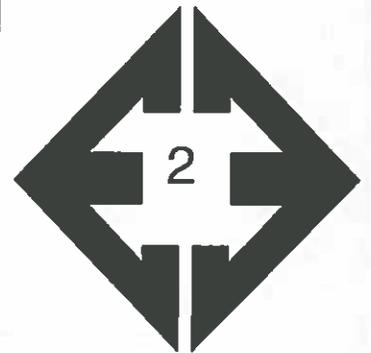
REVISION	BY

## **APPENDIX A: Site Photographs**



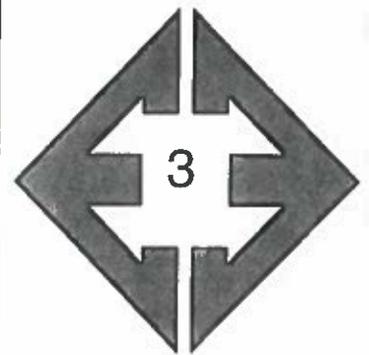
**Looking southwest  
from the northern  
portion of the site.**

September 12, 2018



**Looking south from  
the northern portion of  
the site.**

September 12, 2018



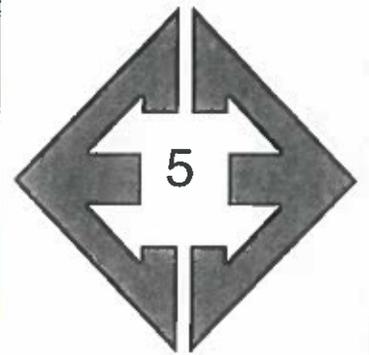
**Looking west from the northern portion of the site.**

September 12, 2018



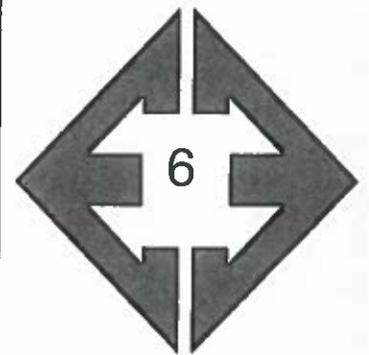
**Looking east along drainage in the northern portion of the site.**

September 12, 2018



**Looking south from  
the western portion of  
the site.**

September 12, 2018



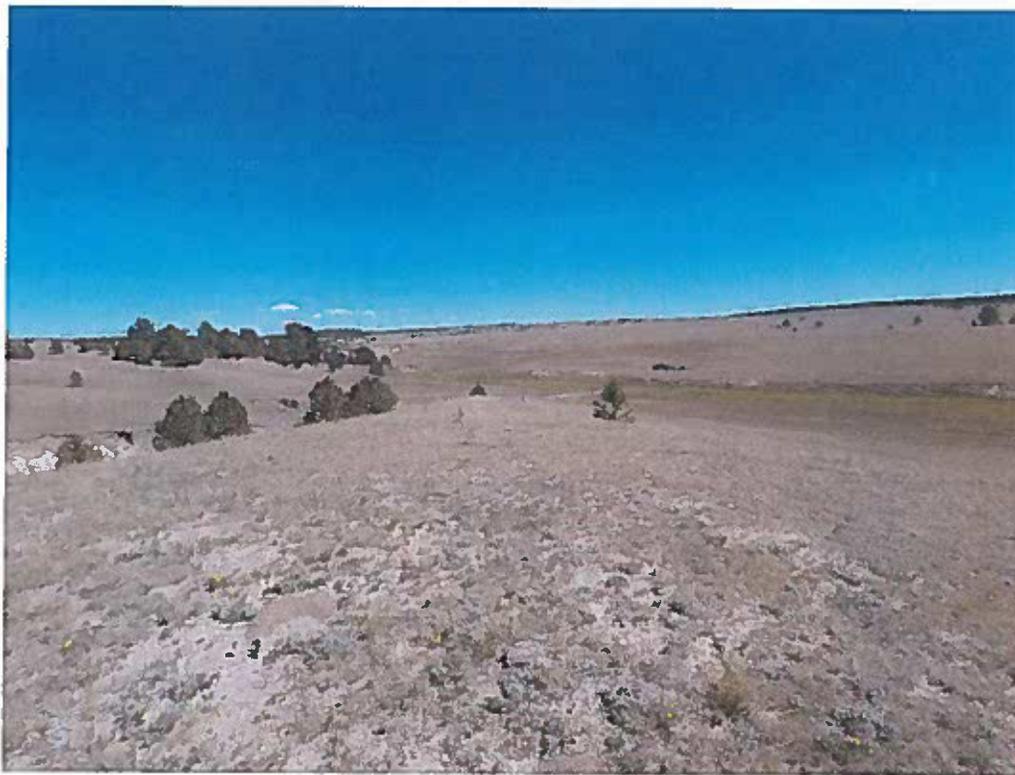
**Looking north along  
small drainage in the  
western portion of the  
site.**

September 12, 2018



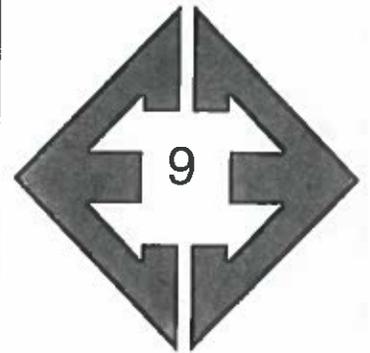
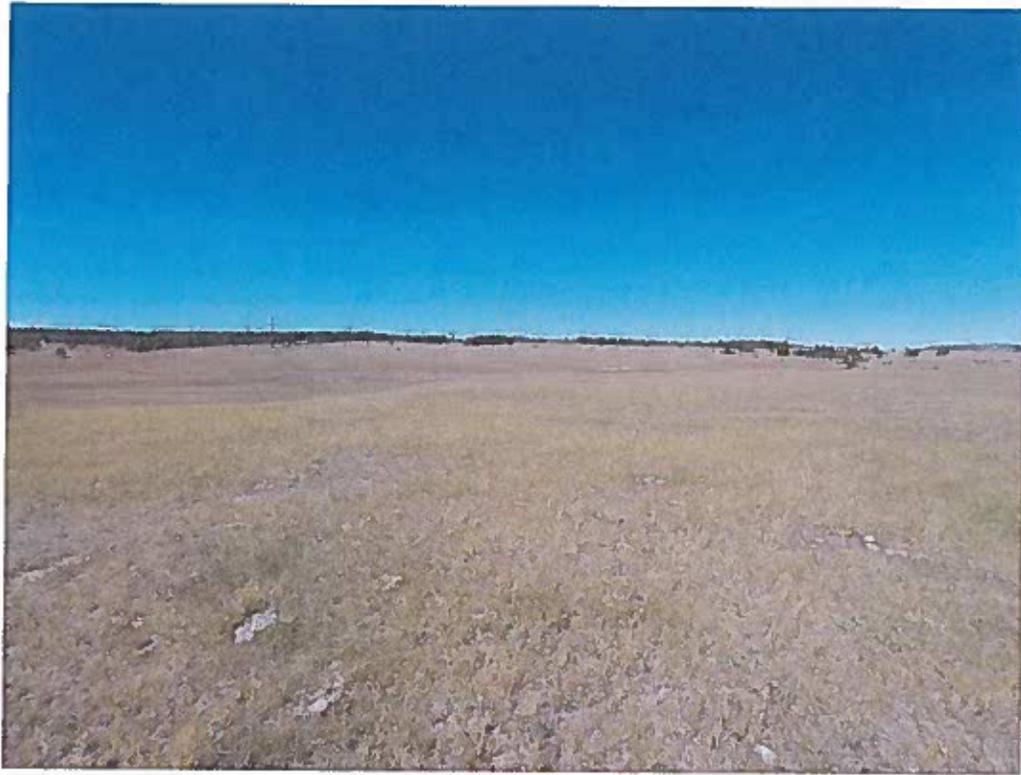
**Looking northeast  
from the central  
portion of the site.**

September 12, 2018



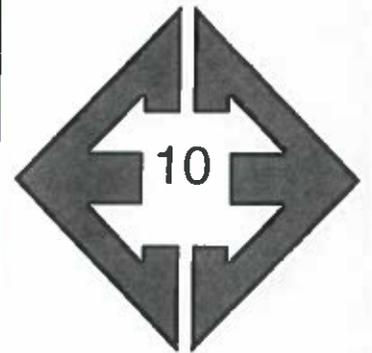
**Looking east towards  
W. Kiowa Creek in the  
central portion of the  
site.**

September 12, 2018



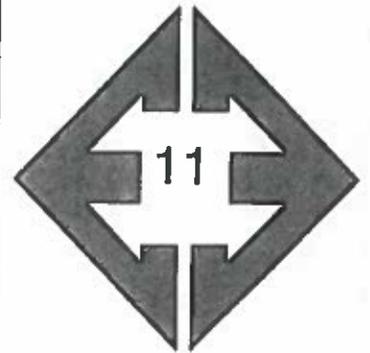
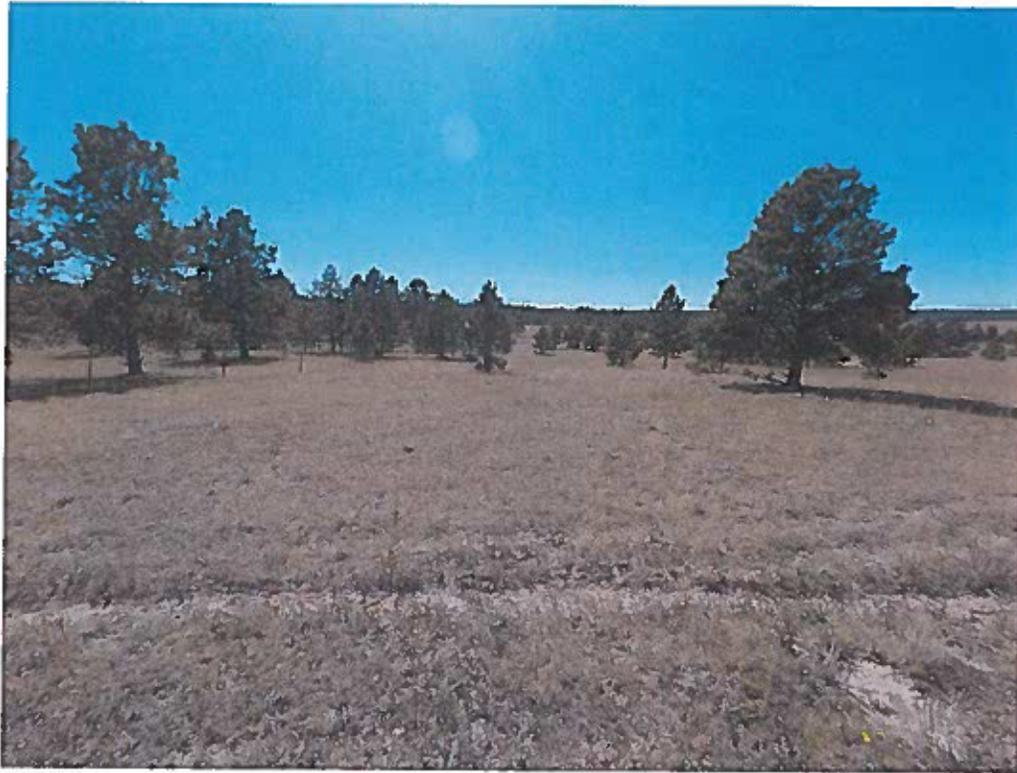
**Looking north from the southwestern portion of the site.**

September 12, 2018



**Looking east from the southwestern portion of the site.**

September 12, 2018



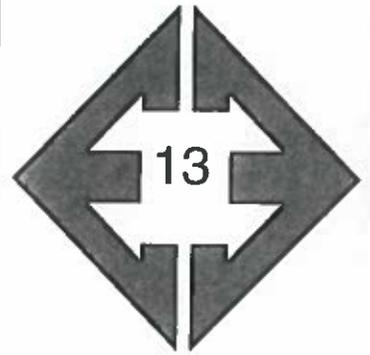
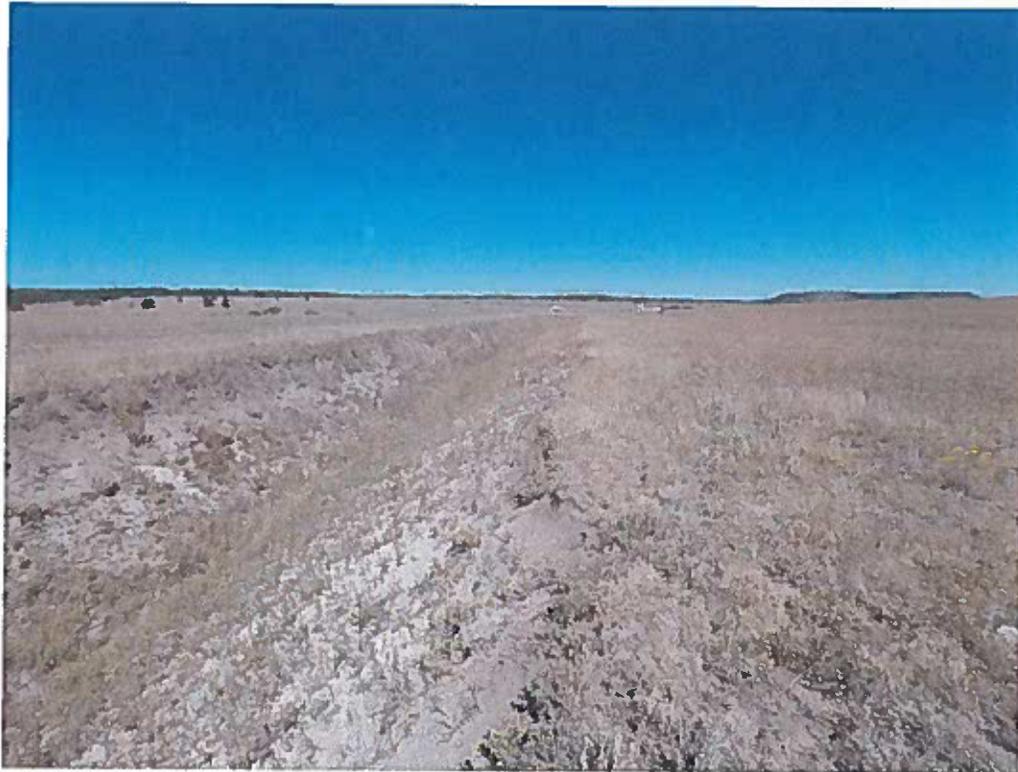
**Looking west from the southeastern portion of the site.**

September 12, 2018



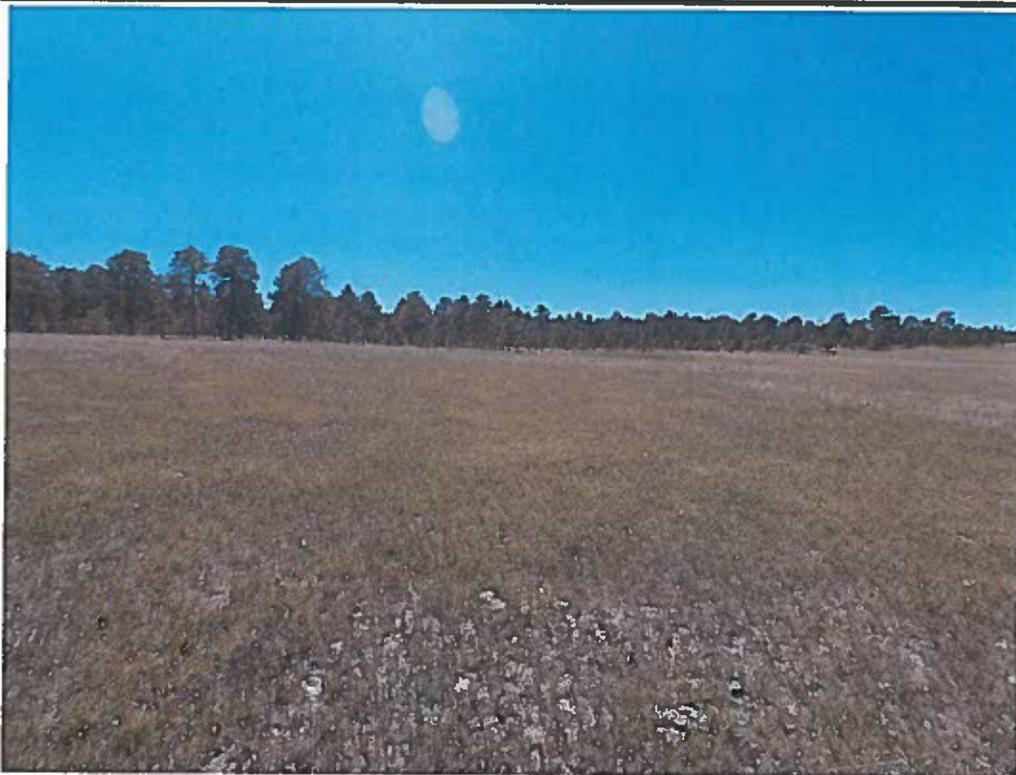
**Looking northwest from the southeast portion of the site.**

September 12, 2018



**Looking north along  
drainage in the  
northeastern portion of  
the site.**

September 15, 2018



**Looking south from  
the southeastern  
portion of the site.**

September 15, 2018

## **APPENDIX B: Test Boring Logs and Test Pit Logs**

TEST BORING NO 1  
 DATE DRILLED 9/18/2018  
 Job # 181459

TEST BORING NO 2  
 DATE DRILLED 9/18/2018  
 CLIENT PROTERRA PROPERTIES  
 LOCATION WINSOME SUBDIVISION

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 20', 9/19/18							DRY TO 17.5', 9/19/18						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST	5			29	3.7	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO MOIST	5			12	1.5	1
	5			17	4.7	1		5			16	2.4	1
SAND, CLAYEY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST	10			15	11.1	1		10			24	3.3	1
CLAYSTONE, SANDY, TAN, HARD, MOIST	15			50	12.4	4		15			25	3.1	1
	15			11"				15					
	20			50	12.8	4	CLAY, SANDY, BROWN, FIRM, MOIST	20			13	13.2	2
	20			7"				20					



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	1/7/19

JOB NO:  
 181459

FIG NO:

B-1

TEST BORING NO 3  
 DATE DRILLED 9/18/2018  
 Job # 181459

TEST BORING NO 4  
 DATE DRILLED 9/18/2018  
 CLIENT PROTERRA PROPERTIES  
 LOCATION WINSOME SUBDIVISION

REMARKS

REMARKS

WATER @ 16.5', 9/19/18

SAND, SILTY TO SLIGHTLY  
 SILTY, FINE TO COARSE  
 GRAINED, TAN, DENSE TO  
 MEDIUM DENSE, DRY TO WET

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			35	1.7	1
			16	3.0	1
10			28	3.9	1
15			24	3.6	1
20			17	10.7	1



DRY TO 20', 9/19/18

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

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			29	2.5	1
			26	5.0	1
10			16	3.7	1
15			27	6.9	1
20			50	6.2	3
			10"		



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	1/7/19

JOB NO.:  
 181459

FIG NO.:

B-2

TEST BORING NO 5  
 DATE DRILLED 9/18/2018  
 Job # 181459

TEST BORING NO.  
 DATE DRILLED  
 CLIENT PROTERRA PROPERTIES  
 LOCATION WINSOME SUBDIVISION

REMARKS

REMARKS

DRY TO 20', 9/19/18

SAND, SILTY, FINE TO COARSE  
 GRAINED, BROWN TO TAN,  
 LOOSE TO MEDIUM DENSE,  
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			5	3.8	1
5			5	6.0	1
10			14	6.2	1
15			10	8.1	1
20			27	7.8	1

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



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO:  
181459

FIG NO:

B-3

TEST PIT NO. 1  
 DATE EXCAVATED 9/12/2018  
 Job # 181459

TEST PIT NO. 2  
 DATE EXCAVATED 9/12/2018  
 CLIENT PROTERRA PROPERTIES, LLC  
 LOCATION WINSOME SUBDIVISION

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 clay loam, brown	1	[Symbol]					topsoil sandy loam, brown	1	[Symbol]				
sandy clay loam, light brown	2	[Symbol]		bl	m	3	sandy loam, fine to coarse light brown	2	[Symbol]		gr	m	2
	3	[Symbol]						3	[Symbol]				
	4	[Symbol]					weathered to formational silty sandstone	4	[Symbol]		ma		3A
sandy clay, light brown	5	[Symbol]		gr	w	4A		5	[Symbol]				
	6	[Symbol]						6	[Symbol]				
	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



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	1/7/19

JOB NO.:  
 181459  
 FIG NO.:  
 B-4

TEST PIT NO. 3  
 DATE EXCAVATED 9/12/2018  
 Job # 181459

TEST PIT NO. 4  
 DATE EXCAVATED 9/12/2018  
 CLIENT PROTERRA PROPERTIES, LLC  
 LOCATION WINSOME SUBDIVISION

REMARKS						REMARKS					
Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
1	[Symbol]		gr	m	2	1	[Symbol]		gr	m	2
2	[Symbol]					2	[Symbol]				
3	[Symbol]		ma		4A	3	[Symbol]				
4	[Symbol]					4	[Symbol]		sg		1
5	[Symbol]					5	[Symbol]				
6	[Symbol]					6	[Symbol]				
7	[Symbol]					7	[Symbol]		ma		4A
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



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 11/7/19

JOB NO.:  
 181459  
 FIG NO.:  
 B-5

TEST PIT NO. 5  
 DATE EXCAVATED 9/12/2018  
 Job # 181459

TEST PIT NO. 6  
 DATE EXCAVATED 9/12/2018  
 CLIENT PROTERRA PROPERTIES, LLC  
 LOCATION WINSOME SUBDIVISION

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						topsoil sandy clay loam, brown	1					
loamy sand, fine to coarse grained, tan	2			sg		1	sandy clay loam, tan	2					3
	3							3					
sand, fine to coarse grained, tan	4			sg		1	weathered to formational clayey sandstone, tan to gray	4					4A
	5						*signs of seasonally occurring groundwater at 7'	5					
	6							6					
	7							7					
	8							8					
	9							9					
	10							10					

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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 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 1/7/19

JOB NO.:

181459

FIG NO.:

B-6

TEST PIT NO. 7  
 DATE EXCAVATED 9/12/2018  
 Job # 181459

TEST PIT NO. 8  
 DATE EXCAVATED 9/15/2018  
 CLIENT PROTERRA PROPERTIES, LLC  
 LOCATION WINSOME SUBDIVISION

REMARKS						REMARKS					
Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
1						1					
2			gr	w	2A	2			gr	w	3A
3						3					
4			ma		3A	4			ma		4A
5						5					
6			ma		4A	6					
7						7					
8						8					
9						9					
10						10					

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: LLL	DATE: 1/7/19
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JOB NO:  
181459  
 FIG NO:  
B-7

TEST PIT NO. 9  
 DATE EXCAVATED 9/15/2018  
 Job # 181459

TEST PIT NO. 10  
 DATE EXCAVATED 9/15/2018  
 CLIENT PROTERRA PROPERTIES, LLC  
 LOCATION WINSOME SUBDIVISION

REMARKS						REMARKS					
Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
1			gr	m	3	1			gr	m	3
2						2					
3						3					
4						4					
5			gr	w	2A	5			gr	w	2A
6						6					
7						7					
8						8					
9						9					
10						10					

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:  
 LLL

DATE:  
 11/7/19

JOB NO.:

181459

FIG NO.:

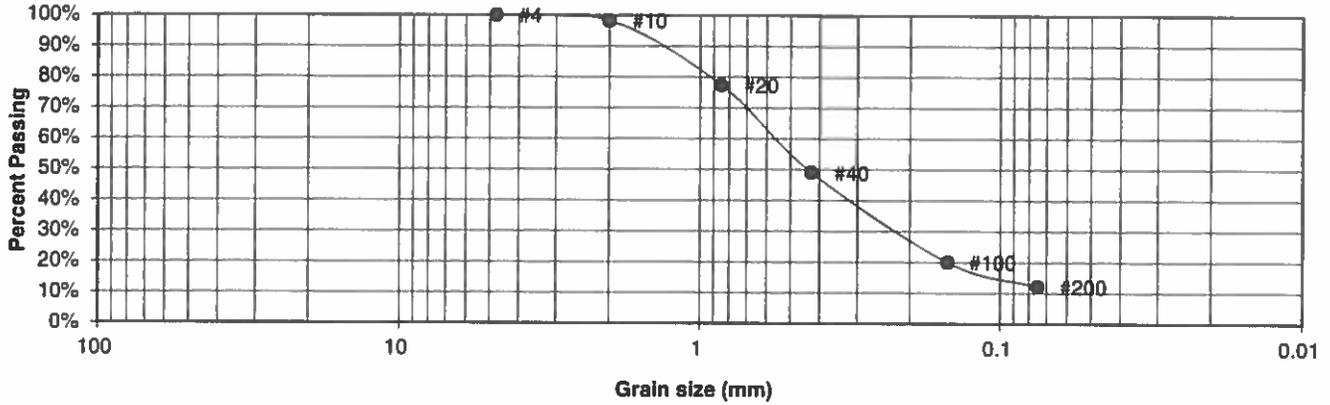
6-8

## **APPENDIX C: Laboratory Test Results**

**UNIFIED CLASSIFICATION** SM  
**SOIL TYPE #** 1  
**TEST BORING #** 2  
**DEPTH (FT)** 2-3

**CLIENT** PROTERRA PROPERTIES  
**PROJECT** WINSOME SUBDIVISION  
**JOB NO.** 181459  
**TEST BY** BL

**Sieve Analysis  
Grain Size Distribution**



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.3%
20	77.4%
40	49.0%
100	20.0%
200	12.1%

**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)



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

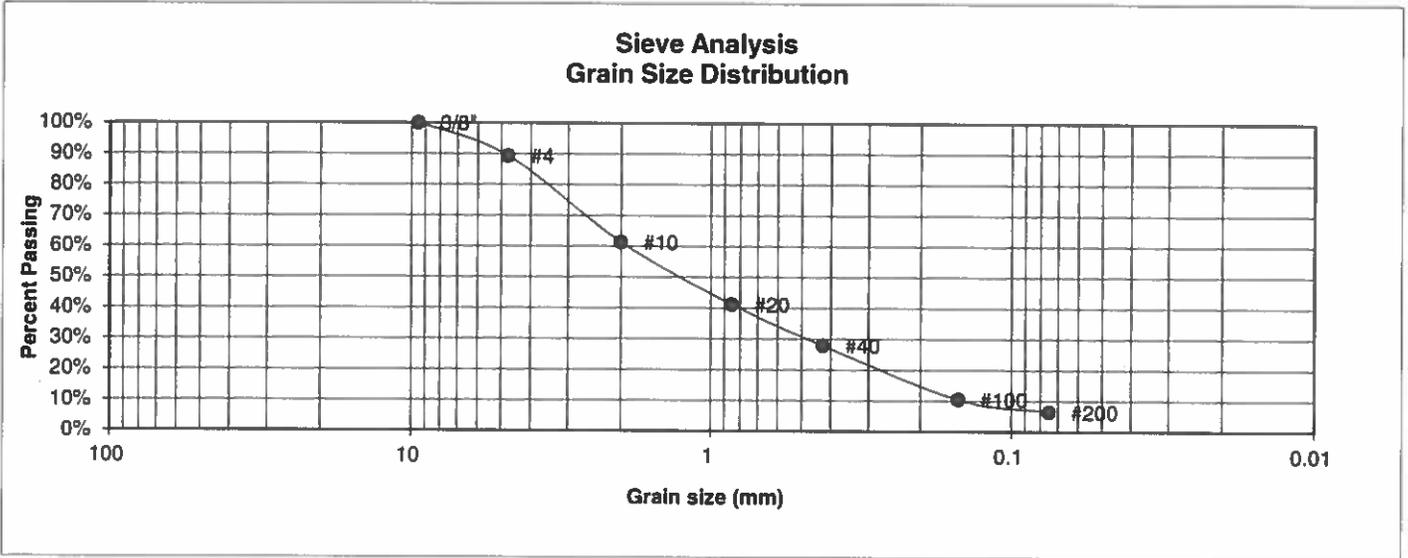
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-1

<b>UNIFIED CLASSIFICATION</b>	SM-SW	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	3	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	10	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	89.3%
10	61.3%
20	41.2%
40	27.9%
100	10.5%
200	6.5%

**Atterberg Limits**  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



**ENTECH  
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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

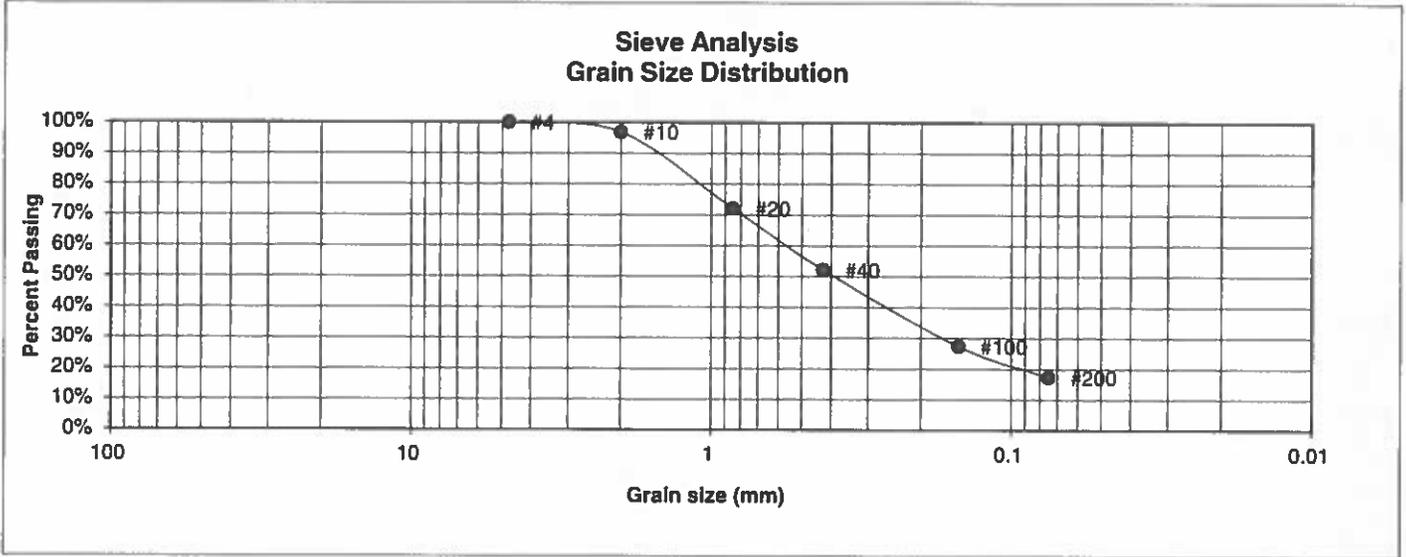
**LABORATORY TEST  
RESULTS**

<b>DRAWN:</b>	<b>DATE:</b>	<b>CHECKED:</b> LLL	<b>DATE:</b> 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-2

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	5	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	96.9%
20	72.1%
40	52.2%
100	27.4%
200	17.3%

**Atterberg  
Limits**  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

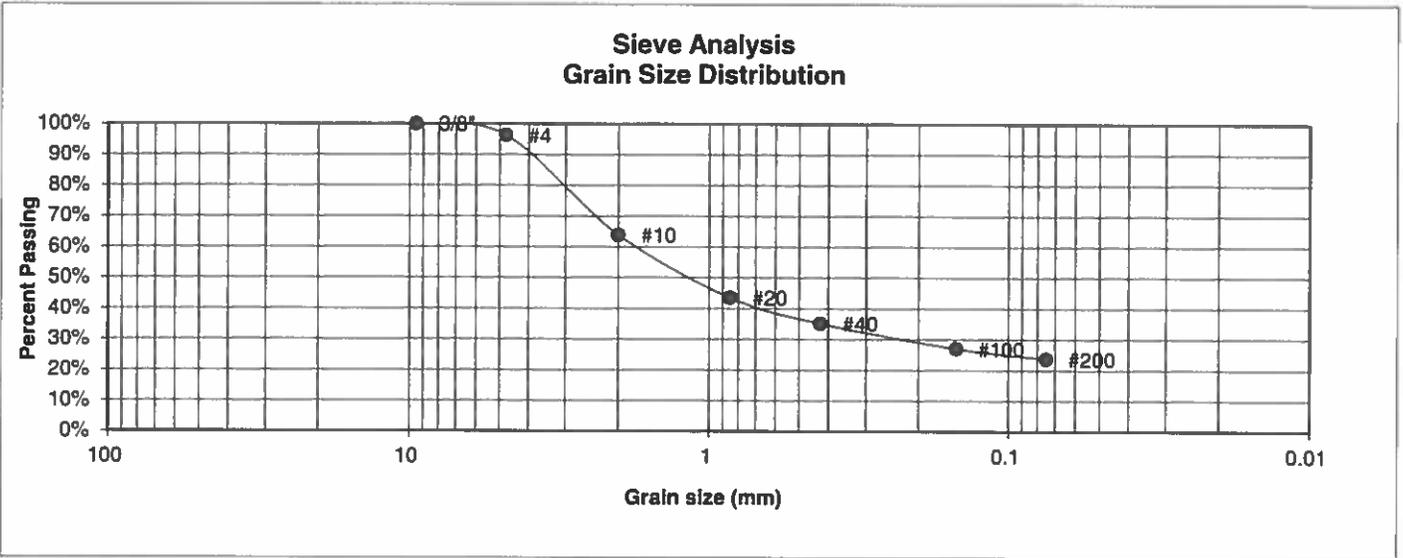
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-3

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-3	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	2-3	<b>TEST BY</b>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.3%
10	63.9%
20	43.5%
40	35.2%
100	27.0%
200	23.7%

Atterberg Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

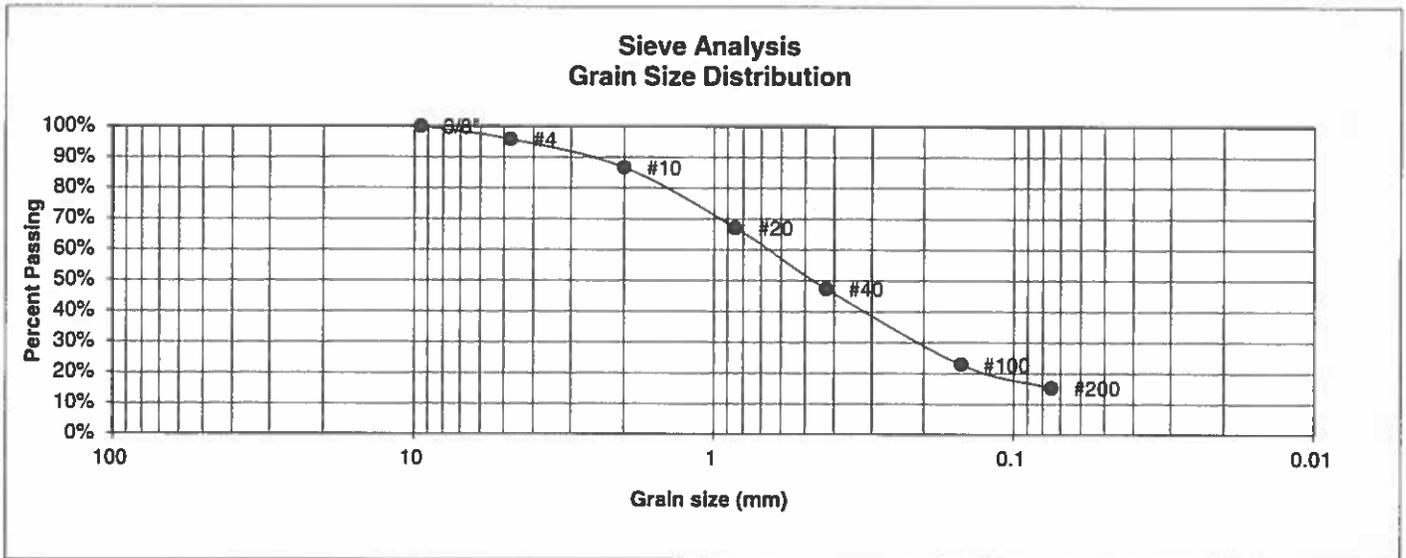
**LABORATORY TEST  
RESULTS**

<b>DRAWN:</b>	<b>DATE:</b>	<b>CHECKED:</b> LLL	<b>DATE:</b> 1/7/19
---------------	--------------	------------------------	------------------------

JOB NO.:  
181459

FIG NO.:  
C-4

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-4	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.8%
10	86.7%
20	67.2%
40	47.4%
100	22.9%
200	15.3%

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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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

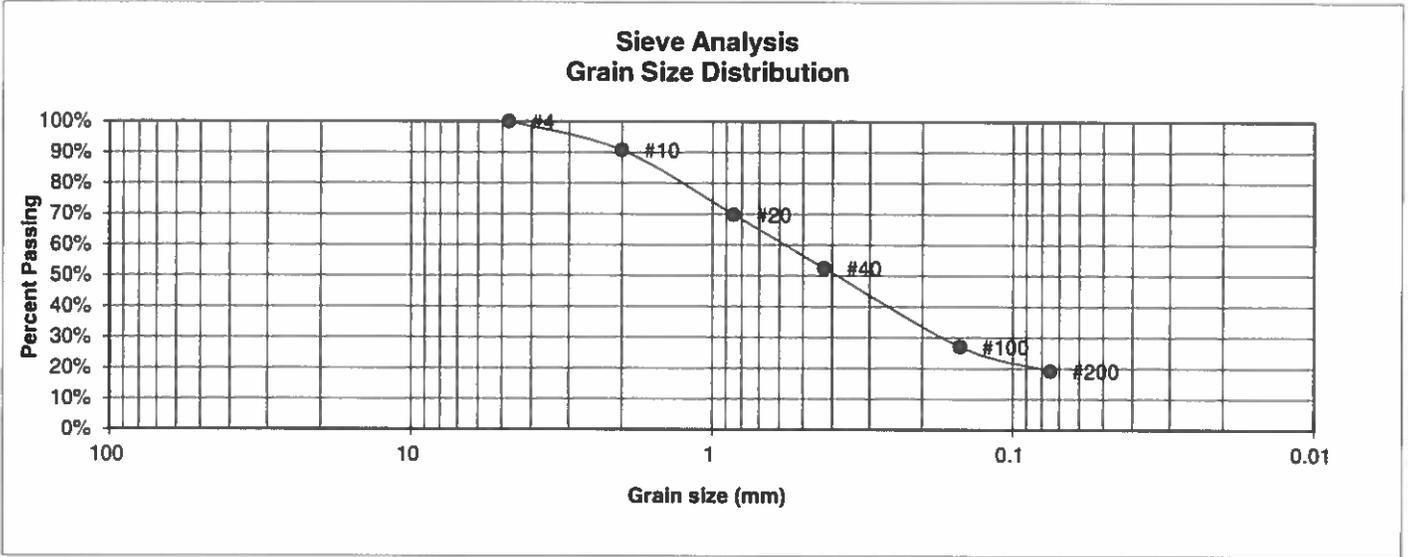
**LABORATORY TEST  
RESULTS**

<b>DRAWN:</b>	<b>DATE</b>	<b>CHECKED:</b> LLL	<b>DATE:</b> 1/7/19
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JOB NO.:  
181459

FIG NO.:  
6-5

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-5	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	2-3	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	90.8%
20	69.8%
40	52.5%
100	27.1%
200	19.2%

**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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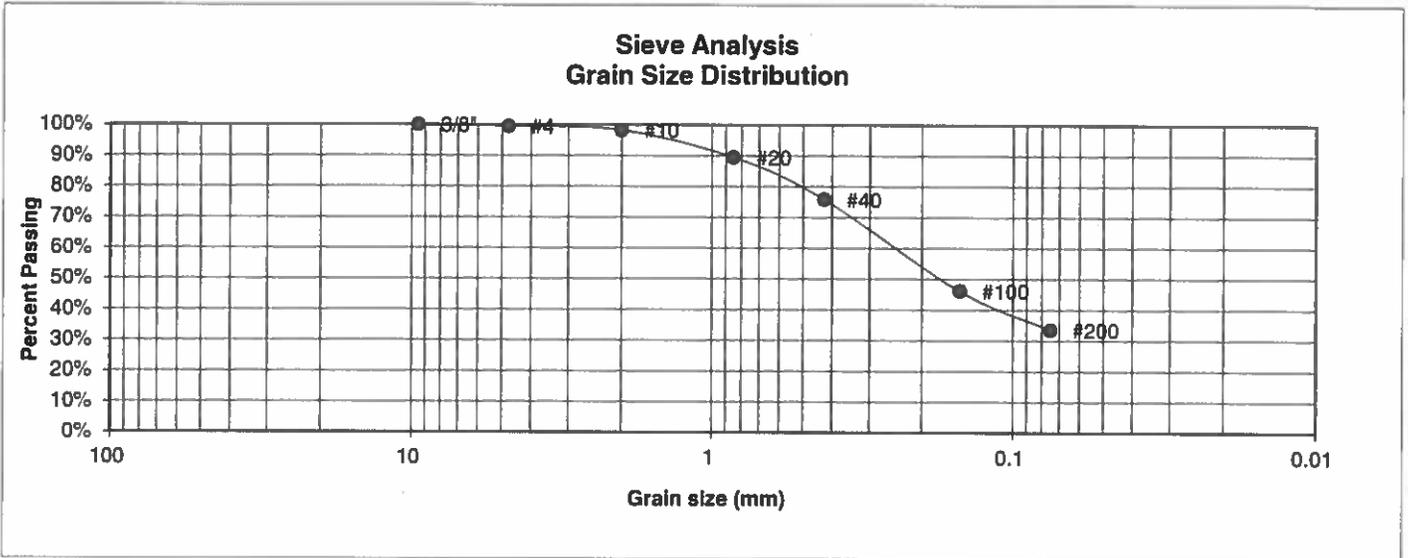
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-6

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-7	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	2-3	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.5%
10	98.3%
20	89.5%
40	75.8%
100	46.1%
200	33.5%

**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**

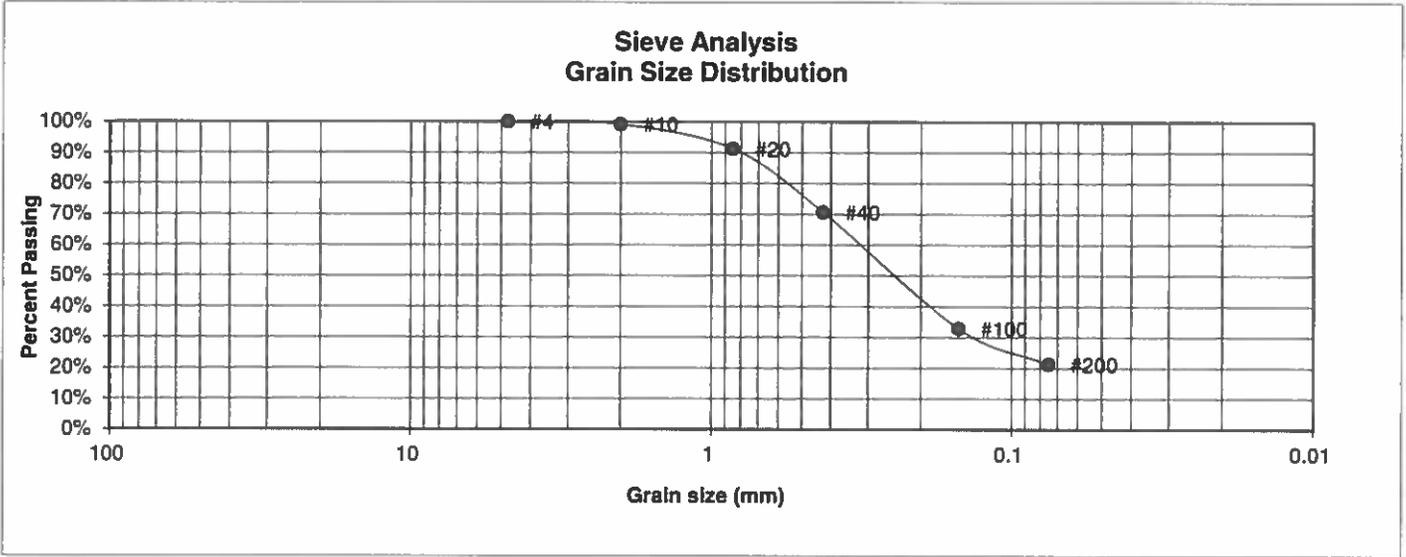
<b>DRAWN:</b>	<b>DATE:</b>	<b>CHECKED:</b> LLL	<b>DATE:</b> 1/7/19
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JOB NO:  
181459

FIG NO:

6-7

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-9	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	91.2%
40	70.6%
100	32.9%
200	21.3%

**Atterberg Limits**  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

<b>Swell</b>	
Moisture at start	12.7%
Moisture at finish	22.9%
Moisture increase	10.1%
Initial dry density (pcf)	98
Swell (psf)	30



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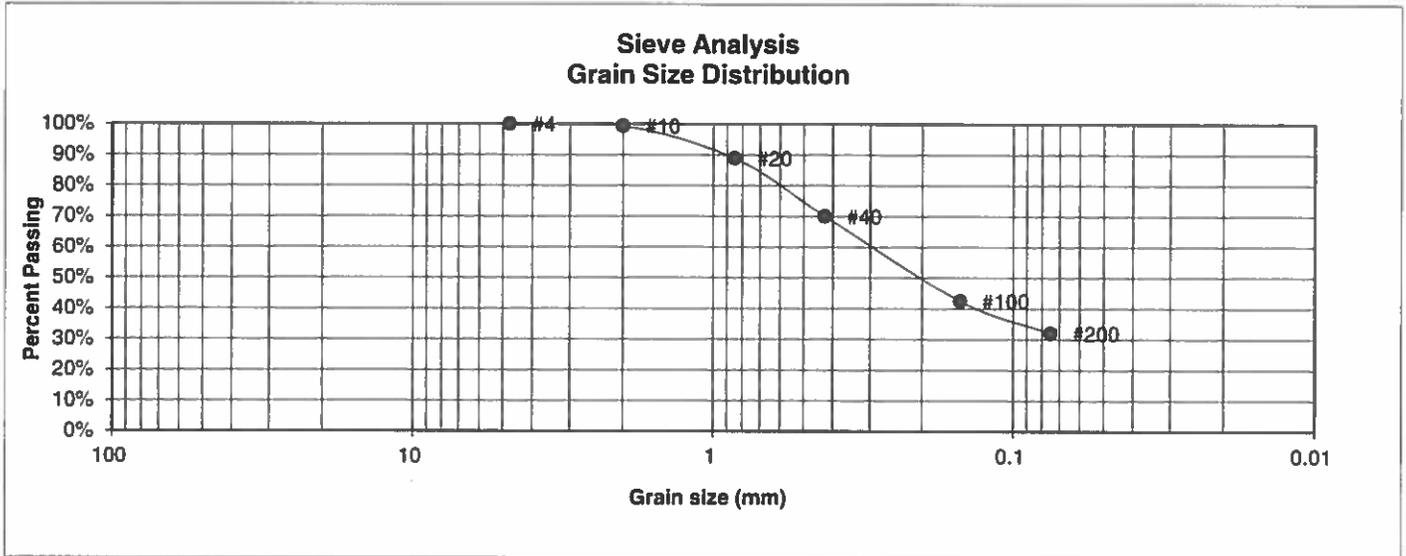
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: LLB	DATE: 1/7/19
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JOB NO:  
181459

FIG NO:  
L-8

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	1	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-10	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	2-3	<b>TEST BY</b>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.4%
20	88.9%
40	70.0%
100	42.6%
200	32.0%

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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COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

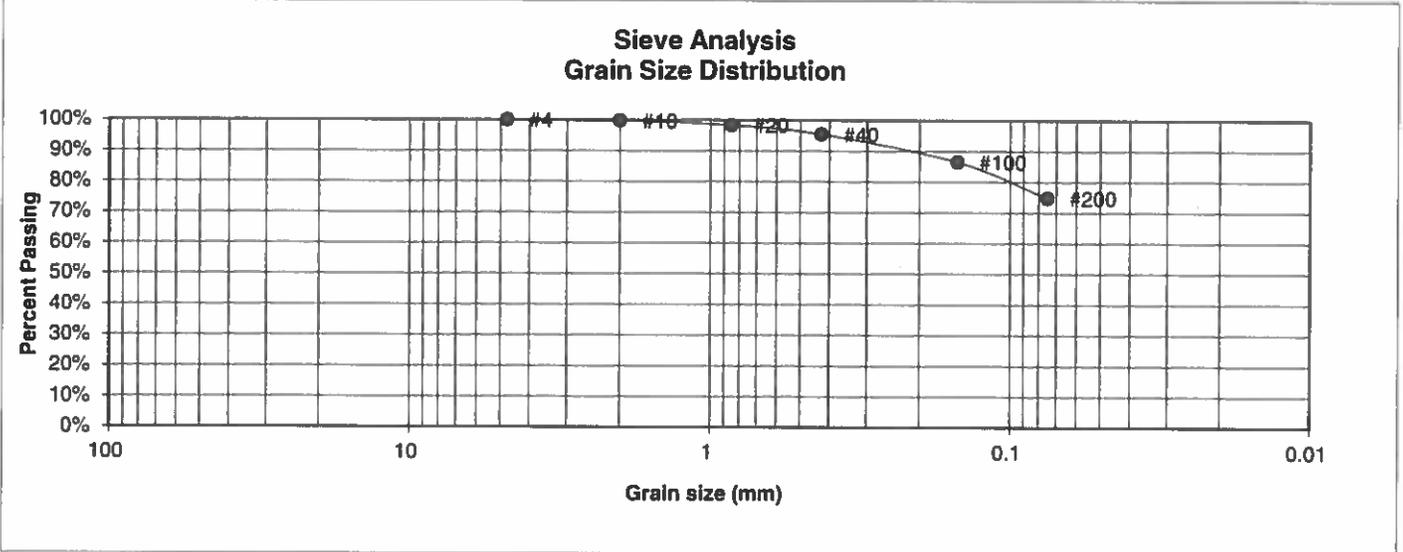
DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:

L-9

<b>UNIFIED CLASSIFICATION</b>	CL	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	2	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-1	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.8%
20	98.4%
40	95.4%
100	86.5%
200	74.8%

Atterberg Limits	
Plastic Limit	20
Liquid Limit	30
Plastic Index	10

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



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**LABORATORY TEST  
RESULTS**

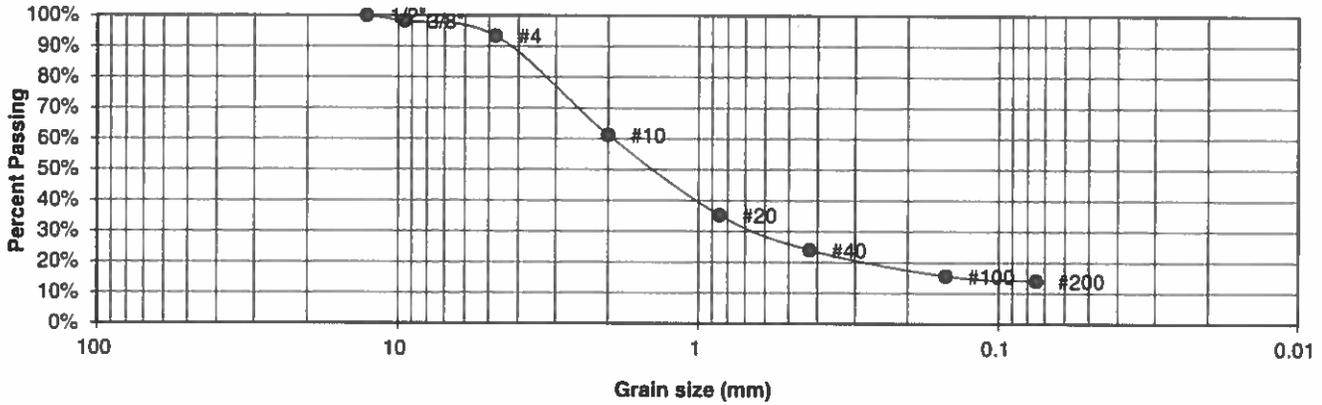
DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-10

<b>UNIFIED CLASSIFICATION</b>	SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	3	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-2	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL

**Sieve Analysis  
Grain Size Distribution**



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.2%
4	93.4%
10	61.2%
20	35.3%
40	24.0%
100	15.6%
200	14.0%

<u>Atterberg Limits</u>	
Plastic Limit	21
Liquid Limit	30
Plastic Index	9

<u>Swell</u>	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



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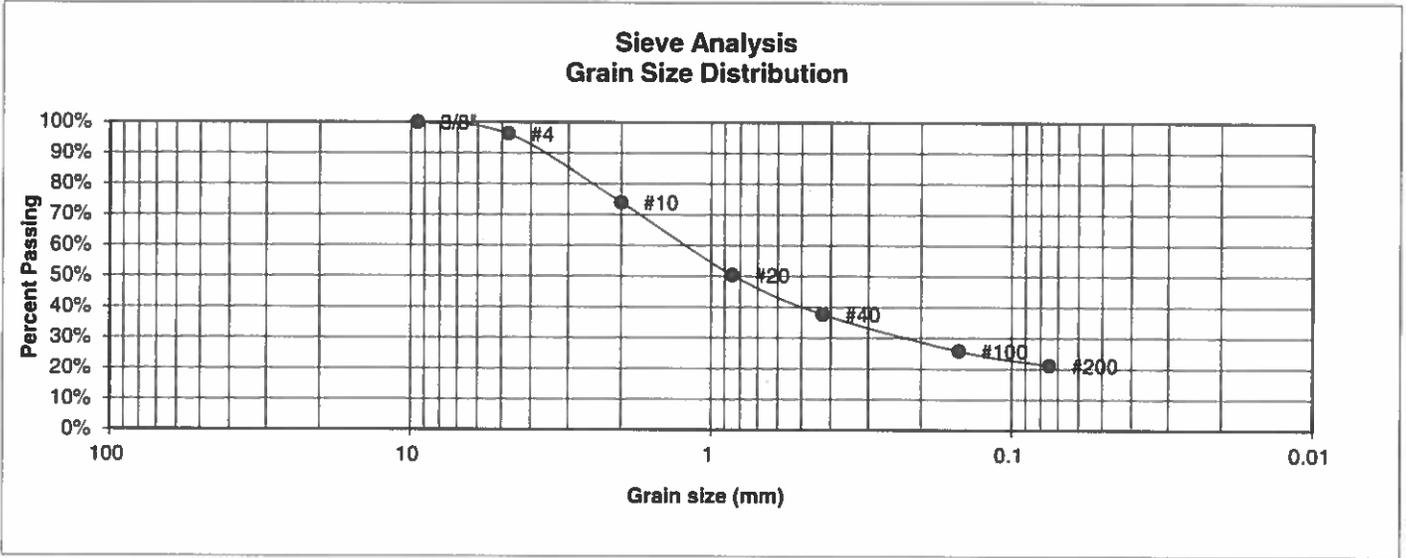
**LABORATORY TEST  
RESULTS**

<b>DRAWN:</b>	<b>DATE:</b>	<b>CHECKED:</b>	<b>DATE:</b>
		LLL	1/7/19

JOB NO.:  
181459

FIG NO.:  
C-11

<b>UNIFIED CLASSIFICATION</b>	SC	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	3	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-8	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.2%
10	74.0%
20	50.4%
40	37.7%
100	25.8%
200	21.1%

Atterberg Limits	
Plastic Limit	19
Liquid Limit	33
Plastic Index	14

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



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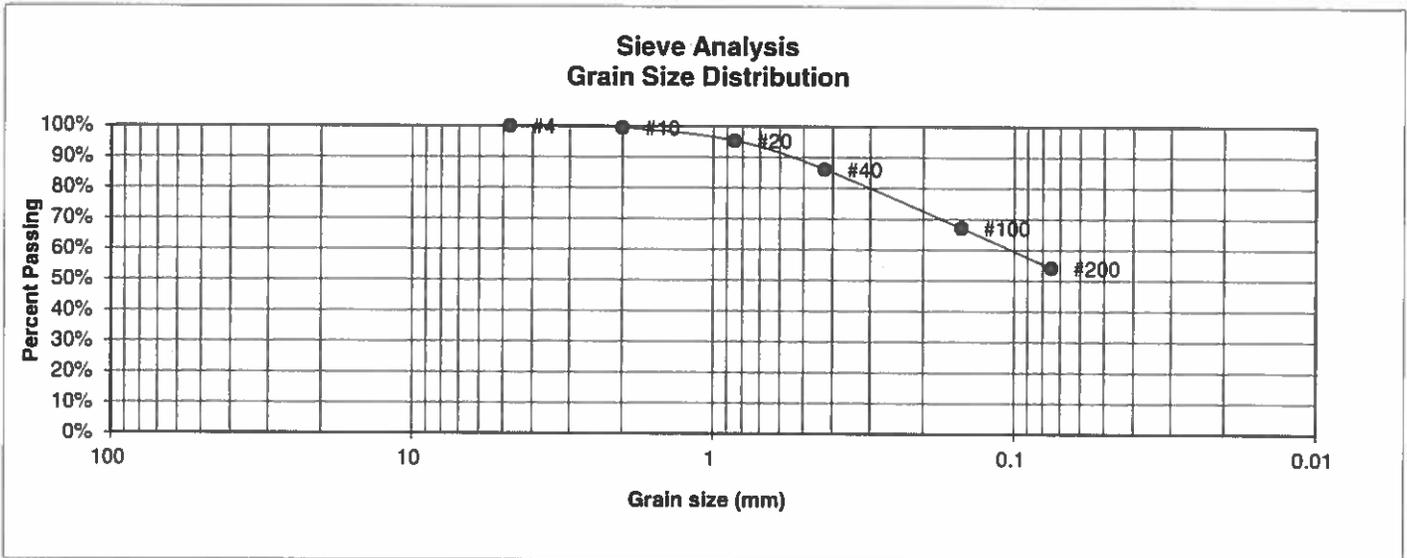
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	1/7/19

JOB NO.:  
181459

FIG NO.:  
C-12

<b>UNIFIED CLASSIFICATION</b>	CL-SC	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	3	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	TP-6	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	5-6	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.5%
20	95.4%
40	86.1%
100	67.1%
200	54.2%

**Atterberg Limits**  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

**Swell**

Moisture at start	8.4%
Moisture at finish	20.4%
Moisture increase	12.0%
Initial dry density (pcf)	101
Swell (psf)	350



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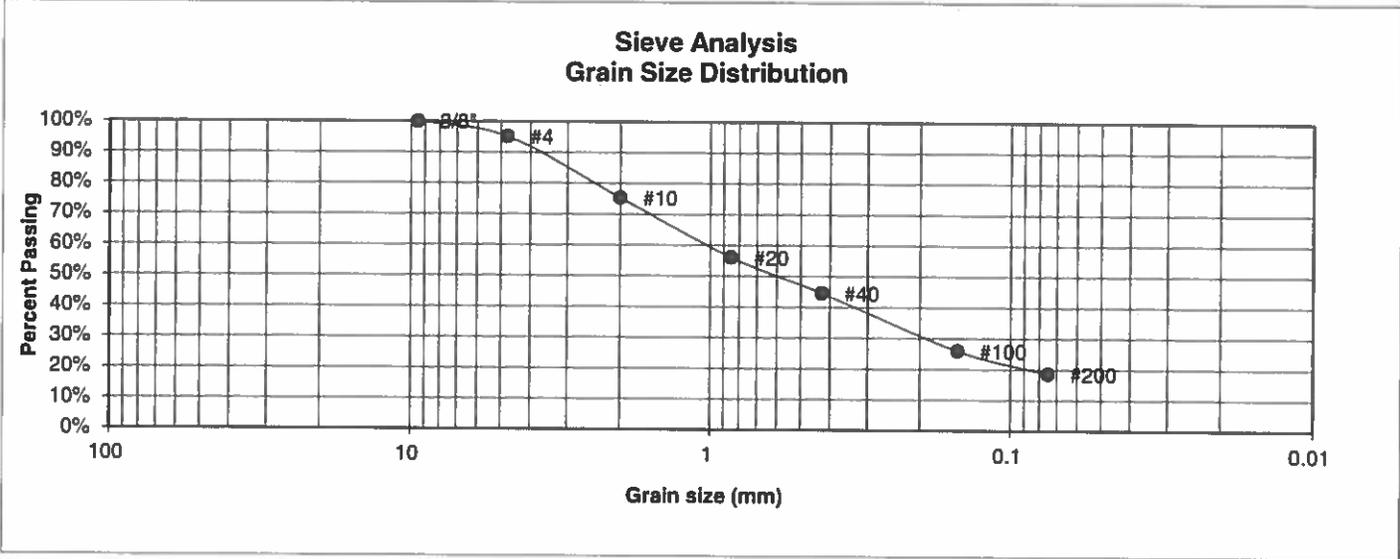
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-13

<b>UNIFIED CLASSIFICATION</b>	SC-SM	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	3	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	4	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	20	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.1%
10	75.3%
20	56.1%
40	44.6%
100	26.0%
200	18.6%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	21
Plastic Index	7

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



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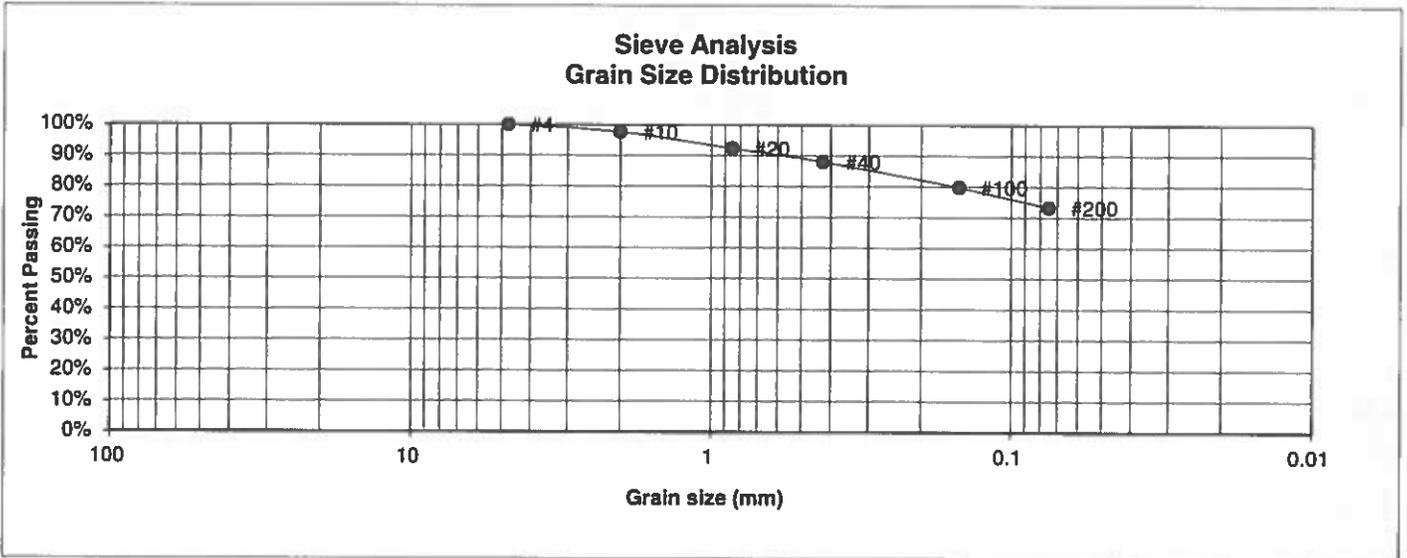
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: LLL	DATE: 1/7/19
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JOB NO.:  
181459

FIG NO.:  
C-19

<b>UNIFIED CLASSIFICATION</b>	CL	<b>CLIENT</b>	PROTERRA PROPERTIES
<b>SOIL TYPE #</b>	4	<b>PROJECT</b>	WINSOME SUBDIVISION
<b>TEST BORING #</b>	1	<b>JOB NO.</b>	181459
<b>DEPTH (FT)</b>	15	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.7%
20	92.3%
40	88.0%
100	79.8%
200	73.2%

Atterberg Limits	
Plastic Limit	22
Liquid Limit	35
Plastic Index	13

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: 1/7/19
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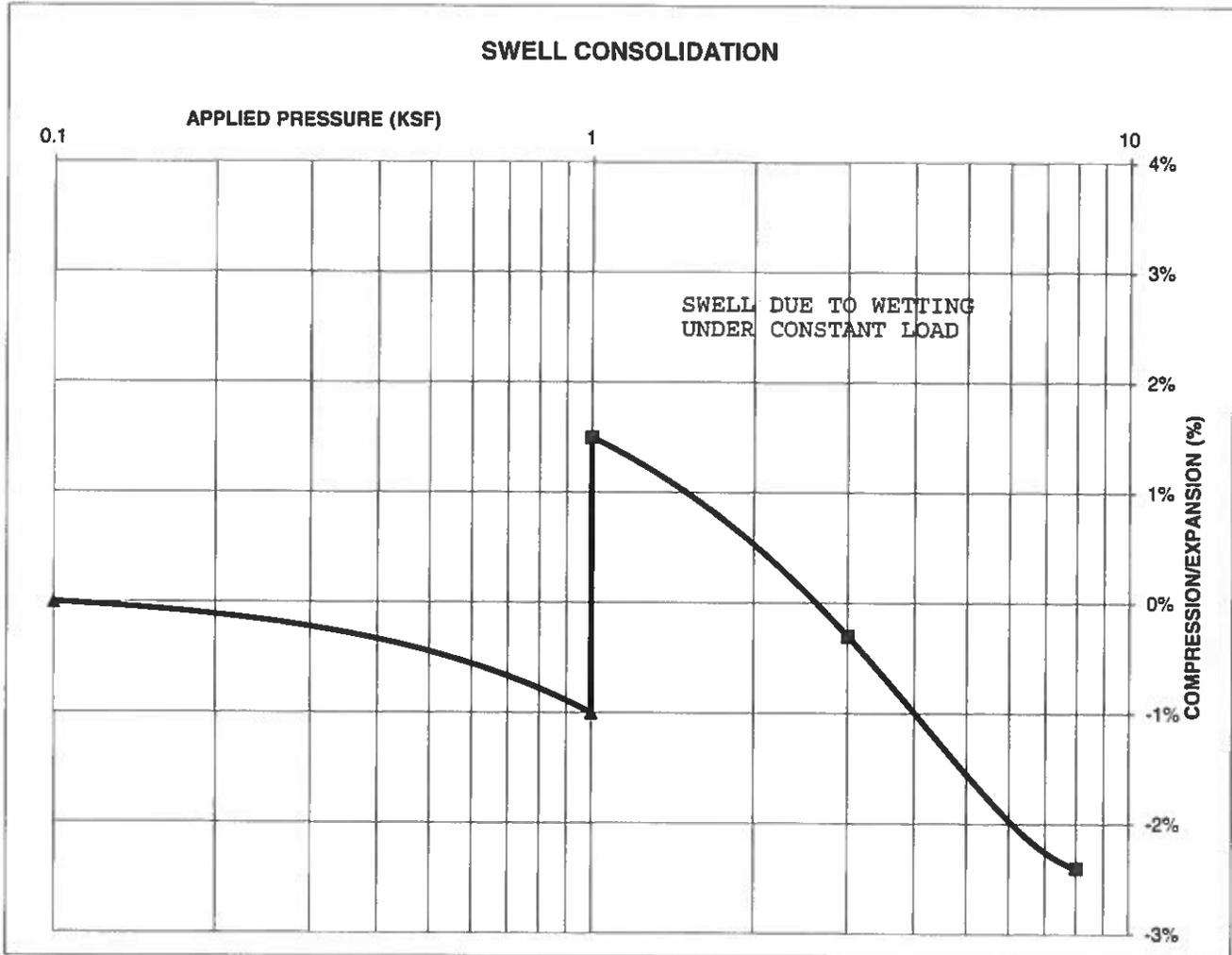
JOB NO:  
181459

FIG NO:  
C-15

**CONSOLIDATION TEST RESULTS**

TEST BORING #	1	DEPTH(ft)	15
DESCRIPTION	CL	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			120
NATURAL MOISTURE CONTENT			13.4%
SWELL/CONSOLIDATION (%)			2.5%

JOB NO. 181459  
 CLIENT PROTERRA PROPERTIES  
 PROJECT WINSOME SUBDIVISION



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 COLORADO SPRINGS, COLORADO 80907

**SWELL CONSOLIDATION  
 TEST RESULTS**

DRAWN:

DATE:

CHECKED:

DATE:

LLH

1/7/19

JOB NO.:  
 181459

FIG NO.:  
 C-16



## **APPENDIX D: Soil Survey Descriptions**

## El Paso County Area, Colorado

### 1—Alamosa loam, 1 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 3670

*Elevation:* 7,200 to 7,700 feet

*Farmland classification:* Prime farmland if irrigated and reclaimed of excess salts and sodium

#### Map Unit Composition

*Alamosa and similar soils:* 85 percent

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

#### Description of Alamosa

##### Setting

*Landform:* Flood plains, fans

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium

##### Typical profile

*A - 0 to 6 inches:* loam

*Bt - 6 to 14 inches:* clay loam

*Btk - 14 to 33 inches:* clay loam

*Cg1 - 33 to 53 inches:* sandy clay loam

*Cg2 - 53 to 60 inches:* sandy loam

##### Properties and qualities

*Slope:* 1 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Poorly drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):*

Moderately high (0.20 to 0.60 in/hr)

*Depth to water table:* About 12 to 18 inches

*Frequency of flooding:* Frequent

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 5 percent

*Salinity, maximum in profile:* Very slightly saline to strongly saline  
(2.0 to 16.0 mmhos/cm)

*Available water storage in profile:* High (about 10.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 5w

*Hydrologic Soil Group:* D

*Ecological site:* Mountain Meadow (R048AY241CO)

*Hydric soil rating:* Yes

**Minor Components**

**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 15, Oct 10, 2017

## El Paso County Area, Colorado

### 15—Brussett loam, 3 to 5 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367k  
*Elevation:* 7,200 to 7,500 feet  
*Frost-free period:* 115 to 125 days  
*Farmland classification:* Prime farmland if irrigated

#### Map Unit Composition

*Brussett and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Brussett

##### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Eolian deposits

##### Typical profile

*A - 0 to 8 inches:* loam  
*BA - 8 to 12 inches:* loam  
*Bt - 12 to 26 inches:* clay loam  
*Bk - 26 to 60 inches:* silt loam

##### Properties and qualities

*Slope:* 3 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 5 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* High (about 9.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* Loamy Park (R048AY222CO)  
*Hydric soil rating:* No

**Minor Components**

**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 15, Oct 10, 2017

## El Paso County Area, Colorado

### 21—Cruckton sandy loam, 1 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367s  
*Elevation:* 7,200 to 7,600 feet  
*Mean annual precipitation:* 16 to 18 inches  
*Mean annual air temperature:* 42 to 46 degrees F  
*Frost-free period:* 110 to 120 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Cruckton and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Cruckton

##### Setting

*Landform:* Flats, hills  
*Landform position (three-dimensional):* Side slope, talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from arkose

##### Typical profile

*A - 0 to 11 inches:* sandy loam  
*Bt - 11 to 28 inches:* sandy loam  
*C - 28 to 60 inches:* loamy coarse sand

##### Properties and qualities

*Slope:* 1 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 5.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Divide (R049BY216CO)  
*Hydric soil rating:* No

### Minor Components

#### 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 15, Oct 10, 2017

## El Paso County Area, Colorado

### 25—Elbeth sandy loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367x  
*Elevation:* 7,300 to 7,600 feet  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Elbeth and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Elbeth

##### Setting

*Landform:* Hills  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from arkose

##### Typical profile

*A - 0 to 3 inches:* sandy loam  
*E - 3 to 23 inches:* loamy sand  
*Bt - 23 to 68 inches:* sandy clay loam  
*C - 68 to 74 inches:* sandy clay loam

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Moderate (about 7.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Hydric soil rating:* No

#### Minor Components

##### 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 15, Oct 10, 2017

## El Paso County Area, Colorado

### 26—Elbeth sandy loam, 8 to 15 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367y

*Elevation:* 7,300 to 7,600 feet

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Elbeth and similar soils:* 85 percent

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

#### Description of Elbeth

##### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium derived from arkose

##### Typical profile

*A - 0 to 3 inches:* sandy loam

*E - 3 to 23 inches:* loamy sand

*Bt - 23 to 68 inches:* sandy clay loam

*C - 68 to 74 inches:* sandy clay loam

##### Properties and qualities

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):*

Moderately high (0.20 to 0.60 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Moderate (about 7.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* B

*Hydric soil rating:* No

##### Minor Components

##### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

**Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 36—Holderness loam, 8 to 15 percent slopes

#### Map Unit Setting

*National map unit symbol:* 3689

*Elevation:* 7,200 to 7,400 feet

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Holderness and similar soils:* 85 percent

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

#### Description of Holderness

##### Setting

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Loamy alluvium derived from arkose

##### Typical profile

*A - 0 to 9 inches:* loam

*Bt - 9 to 43 inches:* clay loam

*C - 43 to 60 inches:* gravelly sandy clay loam

##### Properties and qualities

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):*

Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 5 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water storage in profile:* High (about 9.6 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* C

*Ecological site:* Loamy Park (R048AY222CO)

*Hydric soil rating:* No

### Minor Components

#### 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 15, Oct 10, 2017

## El Paso County Area, Colorado

### 67—Peyton sandy loam, 5 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369d  
*Elevation:* 6,800 to 7,600 feet  
*Mean annual air temperature:* 43 to 45 degrees F  
*Frost-free period:* 115 to 125 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Peyton and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Peyton

##### 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 and/or arkosic residuum weathered from sedimentary rock

##### Typical profile

*A - 0 to 12 inches:* sandy loam  
*Bt - 12 to 25 inches:* sandy clay loam  
*BC - 25 to 35 inches:* sandy loam  
*C - 35 to 60 inches:* sandy loam

##### Properties and qualities

*Slope:* 5 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Moderate (about 7.3 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Divide (R049BY216CO)  
*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

### Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 68—Peyton-Pring complex, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369f  
*Elevation:* 6,800 to 7,600 feet  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Peyton and similar soils:* 40 percent  
*Pring and similar soils:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Peyton

##### 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 and/or arkosic residuum weathered from sedimentary rock

##### Typical profile

*A - 0 to 12 inches:* sandy loam  
*Bt - 12 to 25 inches:* sandy clay loam  
*BC - 25 to 35 inches:* sandy loam  
*C - 35 to 60 inches:* sandy loam

##### Properties and qualities

*Slope:* 3 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Moderate (about 7.3 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4c  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Divide (R049BY216CO)  
*Hydric soil rating:* No

## 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  
*Natural 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 storage in profile:* Low (about 6.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* B  
*Ecological site:* Loamy Park (R048AY222CO)  
*Hydric soil rating:* No

## Minor Components

### Other soils

*Percent of map unit:*  
*Hydric soil rating:* No

### Pleasant

*Percent of map unit:*  
*Landform:* Depressions  
*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 15, Oct 10, 2017

## 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  
*Natural 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 storage in profile:* Low (about 6.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* B  
*Ecological site:* Loamy Park (R048AY222CO)  
*Hydric soil rating:* No

#### Minor Components

##### Other soils

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

**Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 36b9  
*Elevation:* 7,300 to 7,600 feet  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Tomah and similar soils:* 50 percent  
*Crowfoot and similar soils:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Tomah

##### Setting

*Landform:* Alluvial fans, hills  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from arkose and/or residuum weathered from arkose

##### Typical profile

*A - 0 to 10 inches:* loamy sand  
*E - 10 to 22 inches:* coarse sand  
*C - 48 to 60 inches:* coarse sand

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Very low (about 2.0 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Divide (R049BY216CO)  
*Hydric soil rating:* No

#### Description of Crowfoot

##### Setting

*Landform:* Alluvial fans, hills

*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

**Typical profile**

*A - 0 to 12 inches:* loamy sand  
*E - 12 to 23 inches:* sand  
*Bt - 23 to 36 inches:* sandy clay loam  
*C - 36 to 60 inches:* coarse sand

**Properties and qualities**

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 4.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4e  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Divide (R049BY216CO)  
*Hydric soil rating:* No

**Minor Components**

**Other soils**

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*  
*Landform:* Depressions  
*Hydric soil rating:* Yes

## Data Source Information

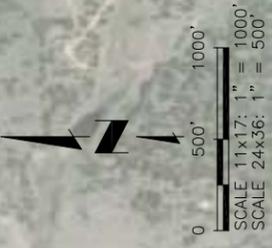
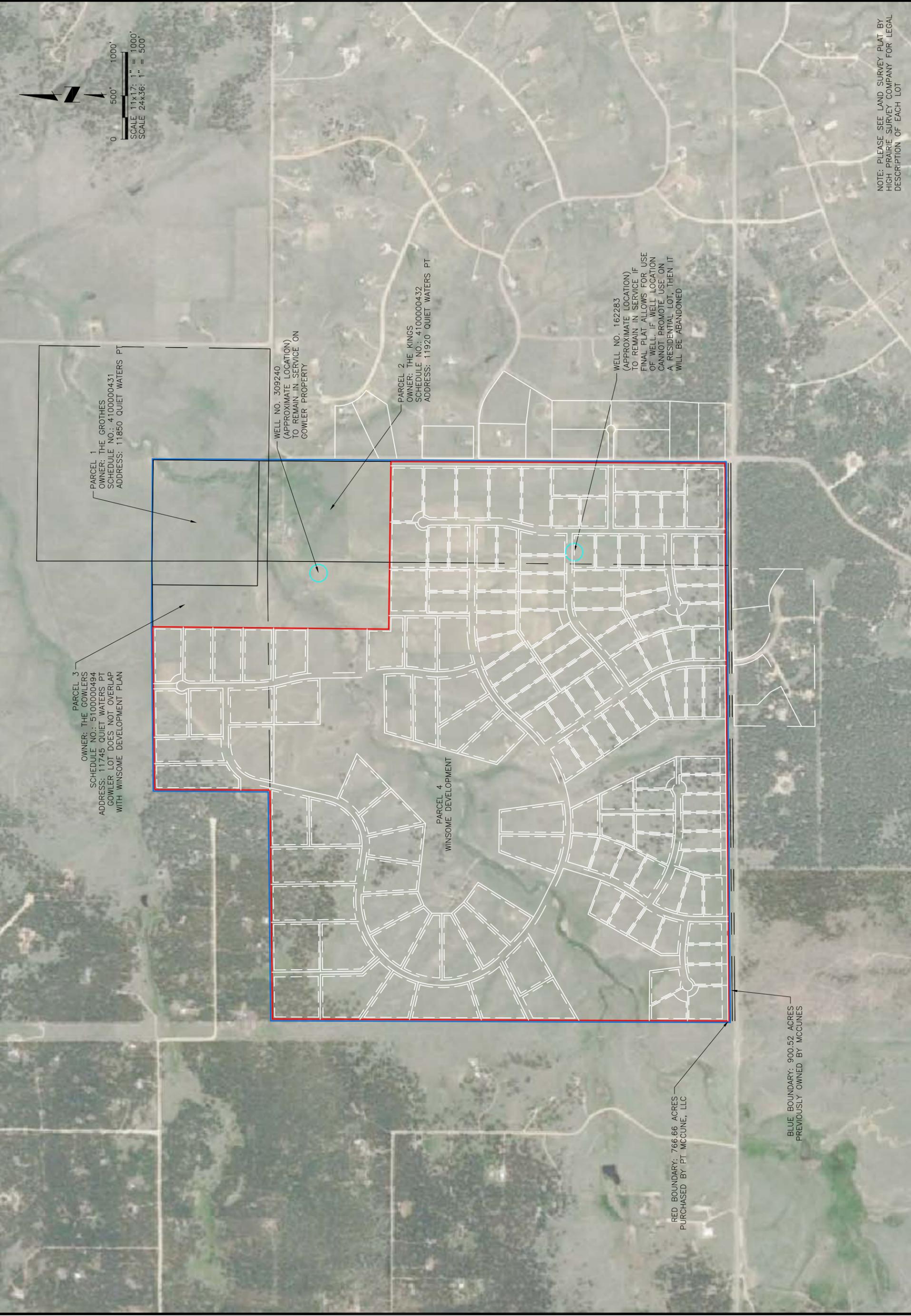
Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 15, Oct 10, 2017

# *Appendix F*



NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

Project No.: 255.02
Date: 12/05/18
Design: DES
Drawn: GUS
Check: DES



NOTE: PLEASE SEE LAND SURVEY PLAT BY HIGH PRAIRIE SURVEY COMPANY FOR LEGAL DESCRIPTION OF EACH LOT