

**ENGINEERING STUDY  
FOR  
MONUMENT RIDGE EAST  
WASTEWATER DISPOSAL REPORT**

Prepared For:

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**\*\*\*\*\* APPENDICES \*\*\*\*\***

- Appendix A Woodmoor Water and Sanitation District Report
- Appendix B District Letter of Commitment

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- Figure 1 Vicinity Map
- Figure 2 Floodplain Map
- Figure 3 1-Mile Radius Map

## SECTION 1 - EXECUTIVE SUMMARY

This report presents the results of the engineering study for Water Resources serving the Monument Ridge East development. The development is located south and east of the I-25 & County Line Rd. in Northern El Paso County.

The Monument Ridge East development consists of approximately 63 acres. The development is a mixture of single and multi-family residential, and open space uses and is located south of and adjacent to County Line Rd and East of and adjacent to Monument Hill Road in Northern El Paso County. The site lies within Section 2, Township 14 South, Range 67 West, of the 6<sup>th</sup> Principal Meridian.

The development is on vacant land except for one single family home which has been abandoned. The abandoned home will be demolished.

The development is proposing a Metro District that will provide funding for initial construction costs of public infrastructure and provide and coordinate stormwater and open space maintenance among other services. Woodmoor Water and Sanitation District will provide water and sanitary sewer services to the Development. Natural gas will be provided by Black Hills Energy and Mountain View Electric Association will provide electric service.

Monument Ridge East proposed land uses consist of 37 single family detached residential lots on 18.96 acres and 305 single family attached units/lots on 40.52 acres.

The average annual water demand for Monument Ridge East is estimated to be 105.23 acre-feet of water per year (93,948 gallons per day). Woodmoor Water and Sanitation District is the service provider through extensions of the existing distribution system.

## SECTION 2 – INTRODUCTION

### 2.1 Purpose

The purpose of this report is to present wastewater system improvements recommended to serve Monument Ridge East; a land development project located in El Paso County. It is also intended to serve as a guideline for the ensuing design of recommended improvements.

### 2.2 Scope

The scope of this report includes:

1. The definition of the service areas as well as identification of significant physical and environmental characteristics and constraints.
2. An analysis of available data to determine existing and to project future water supplies, demands and quality.
3. A description of legal, institutional, and managerial arrangements that ensure adequate control of the proposed improvements; and,
4. A preliminary recommendation for a selected supply, treatment, pumping and transmission alternatives.

## SECTION 3 - EXISTING CONDITIONS

### 3.1 Description of the Service Area

The Monument Ridge East Preliminary Plan development is approximately 63 acres consisting of multifamily residential, single family residential and open space uses. Located southeast of the I-25 and County Line Rd (Palmer Divide Rd) interchange and is within Section 2, Township 14 South, Range 67 West of the 6th P.M. (Parcel Nos. 71022-00-006, 71022-00-008, 71022-00-010, 71022-00-013, 71022-01-001, 71022-01-014).

Monument Ridge East lies within the Woodmoor Water & Sanitation District. Woodmoor Water & Sanitation district will provide potable water & wastewater service to the development.

### 3.2 Land Use

The Monument Ridge East development is located in El Paso County on the northern edge of El Paso County urban development. Vacant land can be found north within Douglas County which is protected by a conservation easement. I-25 borders the property to the west with large lot residential beyond. Large lot residential borders the property to the East.

### **3.3 Topography and Floodplains**

The topography of the service area is typical of a high desert, short grass prairie and stands of Ponderosa Pines and is generally gradually to moderately sloping to the north. The subject property drains generally from south to north through the eastern portion of the site

The Federal Emergency Management Agency (FEMA) floodplain mapping for the Monument Ridge East development is shown in Figure 2. There is no Federal Emergency Management Agency (FEMA) established floodplain on the subject property.

### **3.4 Geology**

The site is comprised of several different soil types. From the Soil Survey of El Paso County, the subject property falls into the following soil types:

1. "1" Alamosa loam, 1 to 3 percent slopes; Type D Soil
2. "41" Kettle gravelly loamy sand, 8 to 40 percent slopes; Type B Soil
3. "69" Peyton-Pring complex, 8 to 15 percent slopes; Type B Soil
4. "92" Tomah-Crowfoot loamy sands, 3 to 8 percent slopes; Type B soil

Note: "##" indicates Soil Conservation Survey soil classification number.

### **3.5 Groundwater**

Soil borings in the Monument Ridge East development area have indicated shallow groundwater near areas mapped as designated wetlands.

Figure 1: Vicinity Map

Figure 2: FEMA Floodplain Map

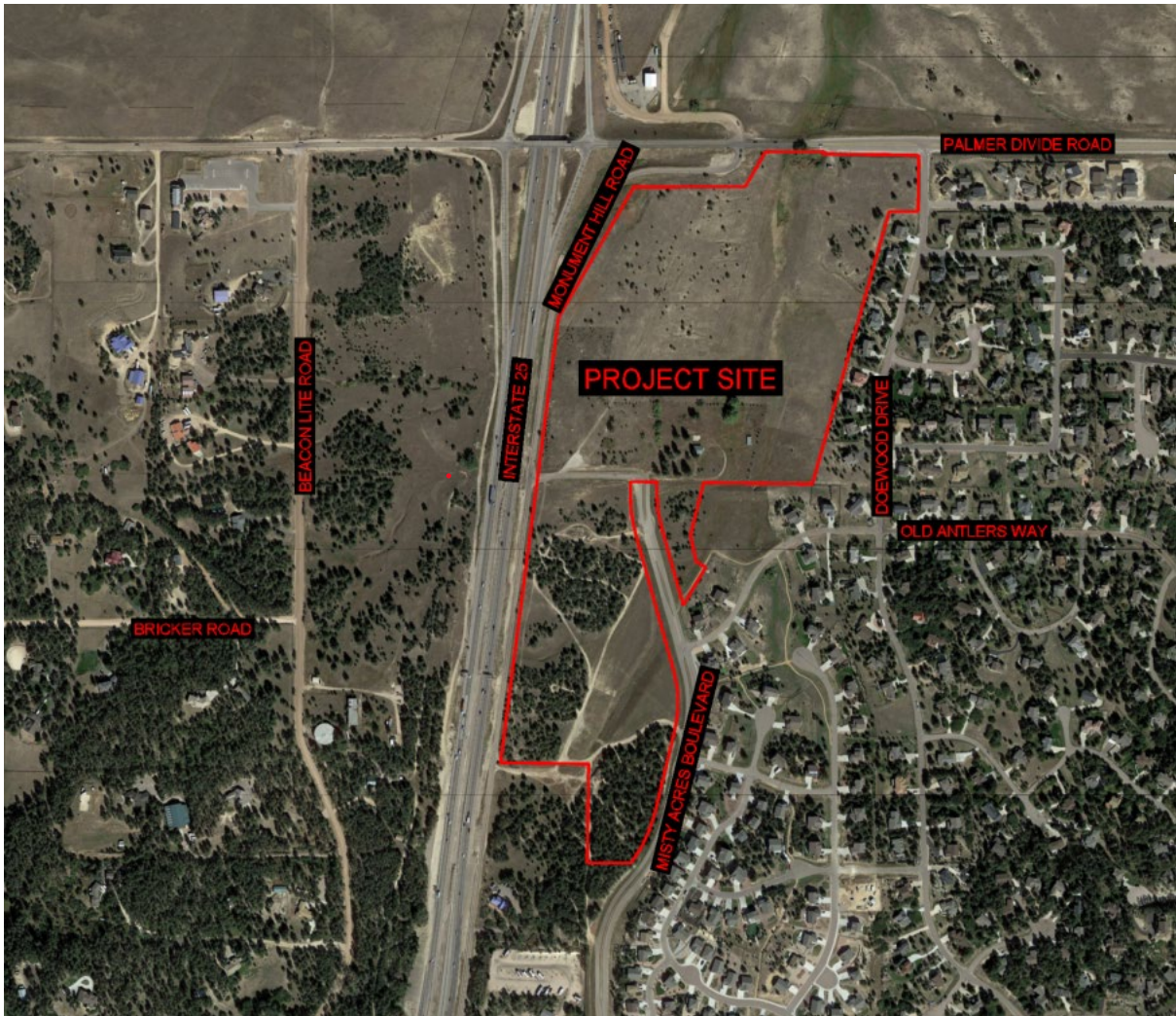
### **3.6 Climate**

The climate of the study area is characterized by mild summers and winters, light precipitation, high evaporation and moderately high wind velocities.

The average annual monthly temperature is 48.4 F with an average monthly low of 20 F in the winter and an average monthly high of 70 F in the summer. Two years in ten will have a maximum temperature higher than 98 F and a minimum temperature lower than -16 F.

Precipitation averages 21.93 inches annually, with 80% of this occurring during the months of April through September. The average annual Lake evaporation is between 45-50 inches.

**Figure 1 – Vicinity Map**  
(Source: Google Earth Imagery 2019)



  
NORTH  
1" = 800'

# National Flood Hazard Layer FIRMMette



104°51'58"W 39°7'50"N



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- |                                    |  |  |
|------------------------------------|--|--|
| <b>SPECIAL FLOOD HAZARD AREAS</b>  |  | Without Base Flood Elevation (BFE)<br><i>Zone A, V, A99</i>  |
|                                    |  | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>   |
|                                    |  | Regulatory Floodway  |
| <b>OTHER AREAS OF FLOOD HAZARD</b> |  | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i> |
|                                    |  | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>  |
|                                    |  | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>  |
|                                    |  | Area with Flood Risk due to Levee <i>Zone D</i>  |
| <b>OTHER AREAS</b>                 |  | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>   |
|                                    |  | Effective LOMRs  |
| <b>GENERAL STRUCTURES</b>          |  | Area of Undetermined Flood Hazard <i>Zone D</i>  |
|                                    |  | Channel, Culvert, or Storm Sewer   |
|                                    |  | Levee, Dike, or Floodwall  |
| <b>OTHER FEATURES</b>              |  | 20.2 Cross Sections with 1% Annual Chance  |
|                                    |  | 17.5 Water Surface Elevation   |
|                                    |  | Coastal Transect   |
|                                    |  | Base Flood Elevation Line (BFE)  |
|                                    |  | Limit of Study   |
|                                    |  | Jurisdiction Boundary  |
|                                    |  | Coastal Transect Baseline  |
|                                    |  | Profile Baseline   |
|                                    |  | Hydrographic Feature   |
| <b>MAP PANELS</b>                  |  | Digital Data Available   |
|                                    |  | No Digital Data Available  |
|                                    |  | Unmapped   |



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/18/2023 at 3:52 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

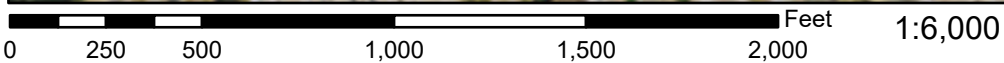
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



# National Flood Hazard Layer FIRMette



104°51'59"W 39°7'38"N



Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

104°51'22"W 39°7'10"N

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

<b>SPECIAL FLOOD HAZARD AREAS</b>		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
<b>OTHER AREAS OF FLOOD HAZARD</b>		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
<b>OTHER AREAS</b>		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
<b>GENERAL STRUCTURES</b>		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
<b>OTHER FEATURES</b>		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
<b>MAP PANELS</b>		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/18/2023 at 3:50 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

### **3.7 Natural Hazards Analysis**

Natural hazards analysis indicates that no unusual surface or subsurface hazards are in the service area. However, because the soils are described to have collapsible and expansive characteristics, proper mitigation will need to be performed as stated in the Soil, Geology, and Geologic Hazard report prepared by Entech Engineering, Inc.

### **3.8 Organizational Context**

Monument Ridge East is not situated within any El Paso County identified Drainage Basins. There are three water and sanitation utility providers near or adjacent to the development.

A portion of this development currently has a Metropolitan District in place (Misty Acres Metropolitan District.) to provide and coordinate services including drainage and open space maintenance among other services.

Monument Ridge East lies within and is annexed onto the Woodmoor Water and Sanitation District. The district will be the entity responsible for the continuing operation and maintenance of water and wastewater improvements.

The adjacent service providers include:

- Town of Monument water department. West of I-25
- Monument Sanitation District, West of I-25
- Triview Metropolitan District, to the South

### **3.9 Wastewater Facilities**

The Woodmoor Water and Sanitation District has been providing wastewater service for a long period of time in accordance with the Colorado Department of Health and Environment. The district will provide wastewater collection and wastewater treatment for the development in exchange for fees and recurring periodic charges.

Appendix A contains the current Woodmoor Water and Sanitation District Water Report.

### **3.10 Relationship to Neighboring Water and Wastewater Facilities**

The locations of other major water and wastewater Districts, relative to the Monument Ridge East, are shown on Figure 3.

Figure 3 identifies water wells and habitable buildings within a 1-mile radius of the center of Monument Ridge East. There are several wells within the 1-mile radius of the development. These wells are shown in the exhibit and consist of mostly private domestic wells outside of the Woodmoor Water & Sanitation District.

### **3.11 Wastewater Demand**

The Monument Ridge East development will be serviced by Woodmoor Water and Sanitation District. The average district wide water demands for the district are indicated below:

Woodmoor Water and Sanitation District: 0.3584 ac-ft./year per Single Family Equivalent (SFE)

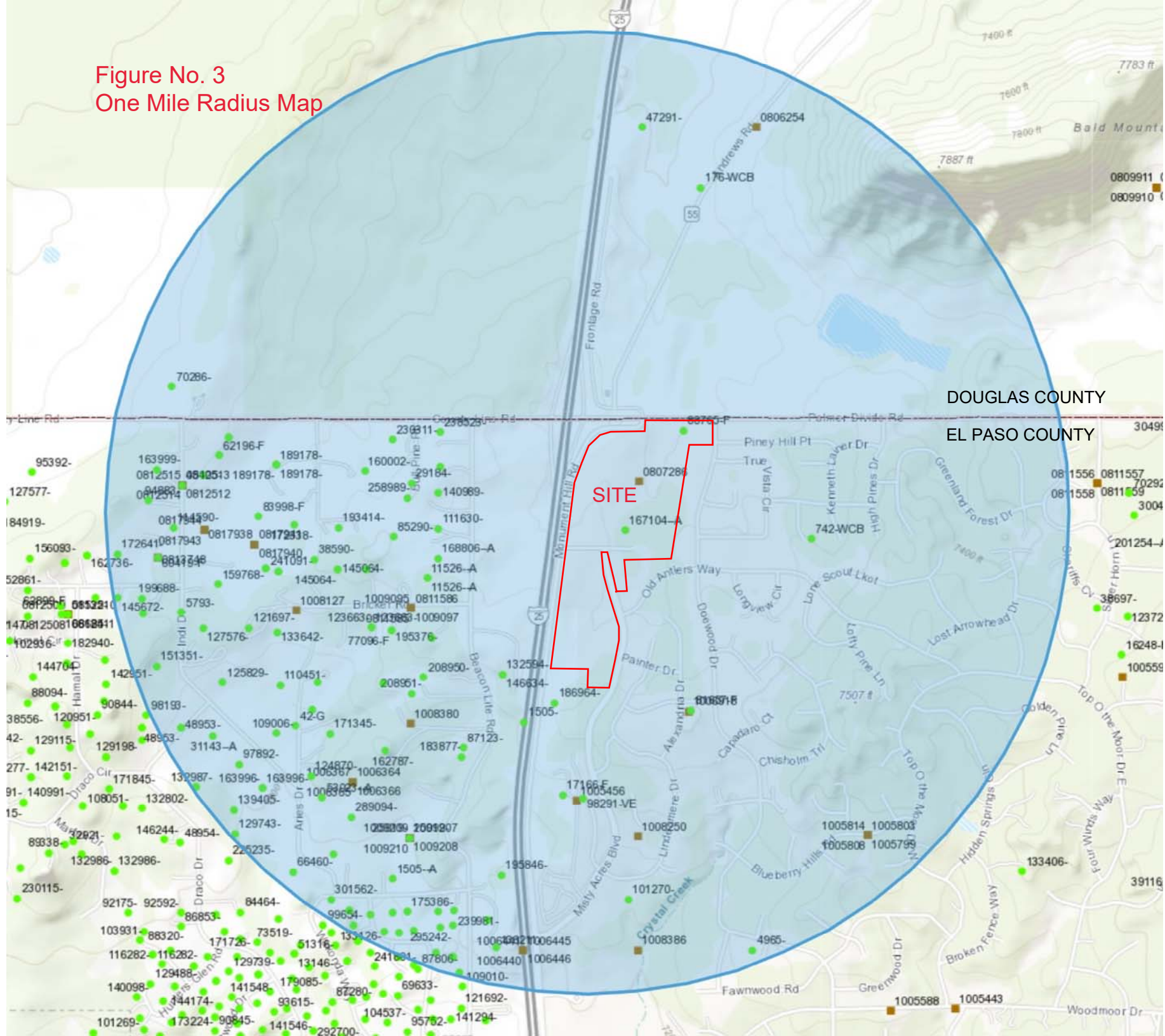
Woodmoor Water and Sanitation District: 0.2688 ac-ft./year per Multi Family Equivalent (MFE)

These demands have been developed from actual usage records and are recognized by the State Engineers Office. These water demands include irrigation; no separate meters are provided for irrigation.

These water demands have been used to project the wastewater demands for the Monument Ridge East Development. Wastewater production is estimated to be 80% of the projected water demand.

Figure 3: 1-Mile Radius Map

Figure No. 3  
One Mile Radius Map





## 4.2 Population

By using the land use information noted above and applying standard unit densities of 2.9 persons per dwelling for single family residential uses, 2.5 persons per dwelling for multifamily residential uses and 600 square feet per employee for commercial/industrial uses, permanent resident and employment forecasts for Monument Ridge East are shown in the above table.

## 4.3 Wastewater Demand

Wastewater flow is estimated to be 80% of domestic water demand. The Monument Ridge East wastewater flow is estimated to be 76.19acre-feet (95.24 x 0.8) or 68,015 gallons per day (gpd). Woodmoor Water and Sanitation District will provide wastewater treatment for Monument Ridge East.

Water demand was determined by applying Woodmoor Water and Sanitation District unit water demand factors to the above land use forecasts. Water demands have been developed for Villas at Aspen Trails as shown in the following table:

<b>WATER DEMAND</b>				
<b>Land Use</b>	<b>SKETCH PLAN</b>			
	AFY	ADD	MDD	PHD
<b>Potable</b>	(gpm)			
<b>SF Residential (include irr.)</b>				
Phase 1	13.26	8.22	14.8	19.40
Phase 2	0.00	0.00	0.00	0.00
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Multifamily</b>				
Phase 1	23.92	14.83	26.70	35.00
Phase 2	58.06	36.00	64.79	84.95
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Commercial</b>				
Phase 1	0.00	0.00	0.00	0.00
Phase 2	0.00	0.00	0.00	0.00
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Light Industrial</b>				
Phase 1	0.00	0.00	0.00	0.00
Phase 2	0.00	0.00	0.00	0.00
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Park/Open Space</b>	0.00	0.00	0.00	0.00

<b>Subtotal</b>	95.24	59.05	106.29	139.35
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<b>Irrigation</b>				
<b>Multifamily</b>				
Phase 1	2.83	1.75	3.15	4.13
Phase 2	7.16	4.44	8.00	10.48
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Commercial</b>				
Phase 1	0.00	0.00	0.00	0.00
Phase 2	0.00	0.00	0.00	0.00
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Light Industrial</b>				
Phase 1	0.00	0.00	0.00	0.00
Phase 2	0.00	0.00	0.00	0.00
Phase 3	0.00	0.00	0.00	0.00
Phase 4	0.00	0.00	0.00	0.00
<b>Park/Open Space</b>	0.00	0.00	0.00	0.00
<b>Subtotal</b>	9.99	6.19	11.15	14.62
<b>TOTAL</b>	105.23	65.24	117.24	153.97
<b>Monument Ridge East Demands</b>				
Phase 1	40.01			
Phase 2	65.23			
Phase 3	0.00			
Phase 4	0.00			

#### 4.4 Wastewater Capacity

The Woodmoor Water and Sanitation District has the capacity to serve the proposed development.

#### 4.5 Wastewater Discharge Permit

The Woodmoor Water and Sanitation District has been providing potable water in accordance with El Paso County Health Department and Colorado Department of Health and Environment standards and reporting requirements for several decades. The Woodmoor Water and Sanitation District provides treatment and disinfection of their raw water sources prior to distribution. Water Quality is summarized in Appendix A.

### SECTION 5 - WASTEWATER SYSTEM IMPROVEMENTS

#### 5.2 General

The wastewater system operated by Woodmoor Water and Sanitation District is classified as a "community water system" and meets the applicable requirements of the Colorado Department of Health and Environment (CDHE). The wastewater system operated by Woodmoor Water and Sanitation District has been providing wastewater treatment services for many decades.

Monument Ridge East will be served by Woodmoor Water and Sanitation District. The lower (southern) portions of Waterview East (Phase II) will be served by an existing gravity pressure zone. The upper portions of Waterview East (Phase II) will require construction of a potable water booster pump station to create a pumped pressure zone to serve the northern portion of Waterview East (Phase II). Service will be extended to the property through extension of the system piping from the vicinity of Powers Boulevard and Fontaine Boulevard.

#### 5.3 Wastewater Treatment

Wastewater will be conveyed to a State Permitted wastewater treatment facility for treatment per the discharge permit prior to be discharged to the stream system.

#### 5.4 Collection

The wastewater collection system will collect waste flow from each customer and convey the waste to the treatment facility via a series of collection pipes and interceptors. All pipe and appurtenances will be designed to meet or exceed AWWA standards.

#### 5.4 Other Costs and Gains

##### Estimated Costs

Item	Units	Quantity	Unit Price	Extension
Sanitary Sewer Extension	LF	10,000	\$80	\$80,000
Total Estimated Cost				\$80,000



The costs included above only include capital costs for wastewater system improvements required to serve Monument Ridge East and are estimated from best available data. These costs do not include other costs or gains that may be incurred in the acquisition of land, financing, investing, local distribution, the salvage value of equipment or other necessary infrastructure, among others, unless specifically noted.

## **5.5 Rates and Charges**

The Widefield Water and Sanitation District will impose one-time charges to recoup the cost of constructing water system improvements as well as regular periodic billings to recoup continuing costs for operations, maintenance, and equipment replacement. This system of rates and charts is published by each district annually.