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# Water Resources Report

Estates at Rolling Hills Ranch Filing 2 PUD

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PCD Project No.: PUDSPXXX — PUDSP204

## **INTRODUCTION**

### **Purpose**

This document addresses the water resources for the Meridian Service Metropolitan District (MSMD) as it relates to the Meridian Ranch development and Estates at Rolling Hills Ranch Filing 2 PUD in particular. MSMD is the entity responsible to finance construction and ensure the continuing operation and maintenance of the potable water delivery improvements. MSMD has been providing treated water to the Meridian Ranch development since 2003. Treatment of the water consists of disinfection of the water as required for all community water systems in addition to addressing iron, manganese and turbidity commonly found in Denver basin ground water wells. Monthly reporting is provided to the Colorado Department of Public Health and Environment (CDPHE) as required, to date there have been no deficiencies.

### ***Description of the Service Area***

Meridian Ranch encompasses 2,650 acres of proposed residential, commercial and business development. It is located approximately 12 miles northeast of downtown Colorado Springs, three miles north of the town of Falcon and immediately north of the Woodmen Hills development. The development is located within Township 12 South, Range 64 West, Sections 19-21 and 28-30 and consists of a mixture of residential, commercial, business, school and open space/park uses. The water system that serves Meridian Ranch is classified as a “public water system” (PWSID# CO0121455), and meets the applicable requirements of the Colorado Department of Public Health and Environment.

Meridian Ranch is situated in the Upper Black Squirrel Creek Designated Groundwater Basin which is managed by the Upper Black Squirrel Creek Management District. MSMD currently services over 12,000 in equivalent population in several filings within Meridian Ranch, Falcon High School and portions of Latigo Trails as an out of district user.

## **QUANTITY OF WATER**

From land use information derived from the approved Meridian Ranch Sketch Plan, a permanent resident and employment forecast for the Meridian Ranch Development may be obtained for the ultimate build-out of the project. By applying the El Paso County unit water demand factors to the land use forecasts, the quantity of water required for the development may be forecast for the proposed project and the ultimate development. The estimated service population and land use can be found in Table 1 - Land Use/Population below.

**Table 1 - Land Use/Population**

Land Use	Master Plan				Existing/Approved Projects: Meridian Ranch Filings 1 - 11 Estates 2 & 3, Latigo Trails 2A, 7, & 8 Stonebridge Filing 1 - 4, The Vistas Filing 1 Windingwalk, RHR 1-3, ERHR 1				Proposed: Estates at RHR Filing 2 PUD				Projected Total			
	Units/ Acres	Pop.	Emp.	Equiv. Pop.	Units/ Acres	Pop.	Emp.	Equiv. Pop.	Units/ Acres	Pop.	Emp.	Equiv. Pop.	Units/ Acres	Pop.	Emp.	Equiv. Pop.
Single Family Residential <sup>1</sup>	4,792	13,178	-	13,178	4,230	11,633	-	11,633	98	270	-	270	4,328	11,902	-	11,902
School <sup>2</sup>	113	4,000	380	4,380	83	2,740	260	3,000	-	-	-	-	83	2,740	260	3,000
Commercial <sup>3</sup>	15	-	94	94	8	-	47	47	-	-	-	-	8	-	47	47
Civic	23	-	36	36	14	-	21	21	-	-	-	-	14	-	21	21
Park/Open Space	545	-	-	-	37	-	-	-	1	-	-	-	38	-	-	-
Golf Course	174	-	12	12	174	-	12	12	-	-	-	-	174	-	12	12
<b>TOTAL</b>		17,178	522	17,700		14,373	340	14,713		270	-	270		14,642	340	14,982

<sup>1</sup> Maximum of 4500 single family dwelling units in Meridian Ranch, 292 for Latigo Trails. 2.75 persons/single family dwelling unit per El Paso County Falcon-Peyton Master Plan, Chapter 2.3.3 Population Projections

<sup>2</sup> Falcon Schools: High school current enrollment - 1,350, planned expansion - 1,780, Meridian Ranch Elem. enrollment – 600, Future middle school & elem. – 1,600. Staffing based on 9.5% staff-student ratio. (Source: Falcon School District).

<sup>3</sup> Commercial building area equals 18% of gross commercial area. One employee/1250 sq. ft. of commercial area.

### **Water Demand**

Unit water demands are based on industry standard factors and MSMD historic water demand figures. Demand is first calculated in acre feet per year (AFY) to determine the water supply needs. This value is then factored to determine the average daily demand (ADD) in gallons per minute (GPM). This figure is used to project the maximum daily demand (MDD) and peak hour demand (PHD) and can be used to estimate revenues and operating costs. The maximum daily demand and the peak hour demand have been determined by applying the accepted peaking factors of 2.5 and 4.0 to the ADD respectively. The MDD is used to determine the storage needs and the PHD is used for modeling the system delivery pressures and to size the distribution mains. See Table 2 - Water Demand below for more information.

The total water demand for single family residential homes sites is based on 0.33 acre-feet per year (includes outside irrigation), 25 gallons per day for students and staff at the school sites and 45 gallons per day per person for all other uses. The irrigation demand for irrigation is based on 0.0566 acre-feet per year for every 1,000 square feet of irrigated landscape. The irrigation demand for the open space is based on five percent of irrigated land and the commercial/business at ten percent of irrigated land at 0.0566 acre-feet per year for every 1,000 square feet.

**Table 2 - Water Demand**

Land Use	Master Plan				Existing/Approved Projects				Proposed: Estates at RHR Filing 2 PUD				Projected Current Demand			
	AFY	ADD	MDD	PHD	AFY	ADD	MDD	PHD	AFY	ADD	MDD	PHD	AFY	ADD	MDD	PHD
	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>	<i>gpm</i>
<i>Potable</i>																
Single Family Residential <sup>1</sup>	1,581	980	2,451	3,921	1,396	865	2,163	3,461	32	20	50	80	1,428	885	2,213	3,542
School	123	76	190	304	84	52	130	208	-	-	-	-	84	52	130	208
Commercial Business	5	3	7	12	2	1	4	6	-	-	-	-	2	1	4	6
Paint Brush Hills Metro <sup>3</sup>	2	1	3	5	1	1	2	3	-	-	-	-	1	1	2	3
Golf Course	85	-	-	-	85	-	-	-	-	-	-	-	85	-	-	-
Subtotal	1,796	1,061	2,652	4,243	1,569	920	2,300	3,680	32.3	20.0	50.1	80	1,601	940	2,350	3,760
<i>Irrigation</i>																
Single Family Residential	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
School	97	60	150	240	89	55	139	222	-	-	-	-	89	55	139	222
Commercial Business	4	2	6	9	2	1	3	5	-	-	-	-	2	1	3	5
Park/Open Space	6	4	9	14	3	2	5	8	-	-	-	-	3	2	5	8
Golf Course <sup>2</sup>	67	42	104	167	5	3	8	12	0.2	0.1	0.2	0.4	5	3	8	13
Subtotal	173	108	269	430	100	62	155	248	0.2	0.1	0.2	0.4	100	62	155	248
<b>Total</b>	<b>1,970</b>	<b>1,168</b>	<b>2,921</b>	<b>4,673</b>	<b>1,669</b>	<b>982</b>	<b>2,455</b>	<b>3,927</b>	<b>32.5</b>	<b>20</b>	<b>50</b>	<b>81</b>	<b>1,701</b>	<b>1,002</b>	<b>2,505</b>	<b>4,008</b>

<sup>1</sup> Single Family Residential water demand is based on 0.33 AFY. This amount includes both domestic indoor use and outside irrigation.

<sup>2</sup> Golf Course irrigation is provided by surface water diversion. Absolute Decree Case No. 2005CW43

<sup>3</sup> Perpetual lease to Paint Brush Hills Metropolitan District

## WATER SUPPLY

The service area is located in the Upper Black Squirrel Creek Groundwater Management District and the water bearing formations in descending stratigraphic order are the Dawson, Denver, Arapahoe, and Laramie Fox Hills. These four aquifers are collectively known as the Denver Basin aquifers and are found approximately at depths of 500, 1,400, 1,900, and 2,500 feet below the ground surface.

Table 3 Water Supply (below) shows the maximum annual yield of water currently appropriated by the Colorado Ground Water Commission for use within the MSMD.

Table 3 Water Supply

Well No.	Permit No.	Appropriation	State Maximum Annual Appropriation (100-yr) (AFY)	El Paso County Maximum Annual Appropriation (300-yr) (AFY)
<b>Meridian Ranch</b>				
DA-1	60140-F	157-BD	31.9	10.6
FUTURE DAWSON		157-BD	820.0	273.3
D-3	64496-F	156-BD	1171.0	390.3
A-1	56516-F	155-BD	942.0	314.0
A-2	56517-F	155-BD		
A-4	59680-F	155-BD		
A-9	59681-F	155-BD		
LFH-1	56513-F	154-BD	755.0	251.7
LFH-2	56514-F	154-BD		
LFH-3	56515-F	154-BD		
LFH-4	59678-F	154-BD		
LFH-9	59679-F	154-BD		
<b>TOTAL</b>	<b>Meridian Ranch</b>		<b>3719.9 AFY</b>	<b>1239.9 AFY</b>
<b>Guthrie Ranch</b>				
G LFH-1 <sup>3</sup>	61234-F <sup>2</sup>	228-BD	289.8	96.6
G LFH-2 <sup>3</sup>	61235-F <sup>2</sup>			
G A-1 <sup>3</sup>	61236-F <sup>1</sup>	229-BD	240.6	80.2
G A-2 <sup>3</sup>	61237-F <sup>1</sup>			
FUTURE DENVER		230-BD	131.8	43.9
G No. 1 <sup>4</sup>	612-RFP-R	Permit Date 8/26/03	170.0	170.0
G No. 2 <sup>4</sup>	27554-FP-R	Permit Date 7/28/05	30.0	30.0
<b>TOTAL</b>	<b>Guthrie Ranch</b>		<b>862.1 AFY</b>	<b>420.7 AFY</b>
<b>Latigo Trails</b>				
FUTURE ARAPAHOE		568-BD	124.6	41.5
FUTURE DENVER		569-BD	369.6	123.2
DA-2	74410-F	570-BD	130.0	43.3
DA-3	74409-F			
FUTURE DAWSON				
LFH-1	46406-F	Permit Date 8/07/06	453.0	151.0
<b>TOTAL</b>	<b>Latigo Trails</b>		<b>1301.1 AFY</b>	<b>433.6 AFY</b>
<b>Hart Ranch</b>				
FUTURE LARAMIE FOX		2099-BD	42.1	14.0
FUTURE DENVER		2100-BD	31.1	10.4
<b>TOTAL</b>	<b>Hart Ranch</b>		<b>73.1 AFY</b>	<b>24.4 AFY</b>
<b>TOTAL WATER AVAILABLE TO MSMD</b>			<b>5956 AFY</b>	<b>2119 AFY</b>

<sup>1</sup> Well permit number for well appropriation 229-BD (Total appropriation of 483 AFY)

<sup>2</sup> Well permit number for well appropriation 228-BD (Total appropriation of 580 AFY)

<sup>3</sup> Total appropriation is an equal split of ground water with Woodmen Hills Metropolitan District (WHMD).

<sup>4</sup> Total appropriation is split with WHMD, 69% Meridian Ranch, 31% Woodmen Hills.

The Meridian Ranch development has water rights and appropriation for the Denver Basin groundwater and renewable alluvial ground water.

MSMD is currently extracting groundwater from eleven (11) onsite wells, three (3) off-site wells located within the Latigo Trails development, and six (6) wells from the offsite area known as Guthrie Ranch.

### *Water System Improvements*

The water system that serves Meridian Ranch is classified as a “public water system”, and meets all the applicable requirements of the CDPHE.

The water system uses groundwater as its primary source of supply. Filtration and disinfection facilities have been constructed at a central location to ensure good water quality. Elevation differences that exist throughout the property require that the distribution system is divided into two pressure zones to ensure that the water is delivered at no less than 40 psi during peak hour flow and at no more than 120 psi during periods of low use. Storage facilities and distribution piping are provided to ensure that the residual pressure requirements are achieved both during peak hour demands and during maximum day demands with a superimposed fire flow of 1500 gpm for the residential areas and up to 3500 gpm for commercial areas. The upper pressure zone (Zone 1) is a closed loop distribution system served by pumps that provide the required pressures, these are located in the same location as the filtration and disinfection facilities. The lower pressure zone (Zone 2) is a conventional gravity system served by storage tanks to provide the required pressures.

MSMD currently provides water service to 112 Latigo Trails home sites as out of district users. Latigo Trails is located within Zone 1 north of and adjacent to Meridian Ranch. The water used to provide this service comes from a Laramie Fox Hills well under permit no. 46406-F. This well is permitted for use within the Meridian Service Metropolitan District as well.