

**Master Water and Wastewater Report
Meadowbrook Crossing Subdivision**

El Paso County, Colorado

Prepared for:
Meadowbrook Crossing LLC
90 South Cascade Suite 1500
Colorado Springs, Colorado 80903

Prepared by:
Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Kiowa Project No. 16039

May 5, 2017

I. Introduction

All utility design for the proposed development was performed in accordance with the Cherokee Metropolitan District Standard Specifications and Details. In general, Cherokee Metropolitan District follows the design standards and specifications established by the City of Colorado Springs Department of Utilities. Supporting design calculations are included in the Appendix A of this report.

II. Project Description

Meadowbrook Crossing Subdivision is a proposed development of single-family lots located in central El Paso County, Colorado. The site is located within the south half of Section 8, Township 14 South, Range 65 West of the 6th Principal Meridian. The site is shown on Figure 1. Meadowbrook Crossing will cover 32.8 acres. The development plan shows a total of 114 single-family residential lots ranging in size from 5,400 to 7,000 square feet served by paved public roadways. A typical roadway section showing the location of the water and wastewater lines has been presented on the Preliminary Water and Wastewater Plan, Exhibit 1.

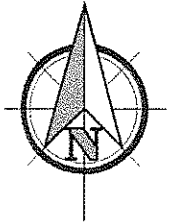
III. Water Distribution System

The water distribution system for Meadowbrook Crossing will be connected to the existing Cherokee Metropolitan District water mains within Meadowbrook Boulevard at the intersections with proposed Preble Drive and Newt Drive. The water mains within Meadowbrook Crossing will be 8-inch PVC (DR 18) located generally 8 feet north and west of the proposed street centerlines consistent with District standards and specifications. Appurtenances including fire hydrants, valves, blow-off valves, and fittings within Meadowbrook Crossing have been designed as well in conformance with District standards and specifications. The layout of the water distribution system is shown on Exhibit 1, Preliminary Water and Wastewater Plan, that is contained within the map pocket in Appendix D of this report. Demand flow calculations are contained in the Appendix A of this report and are provided to the District for review and analysis.

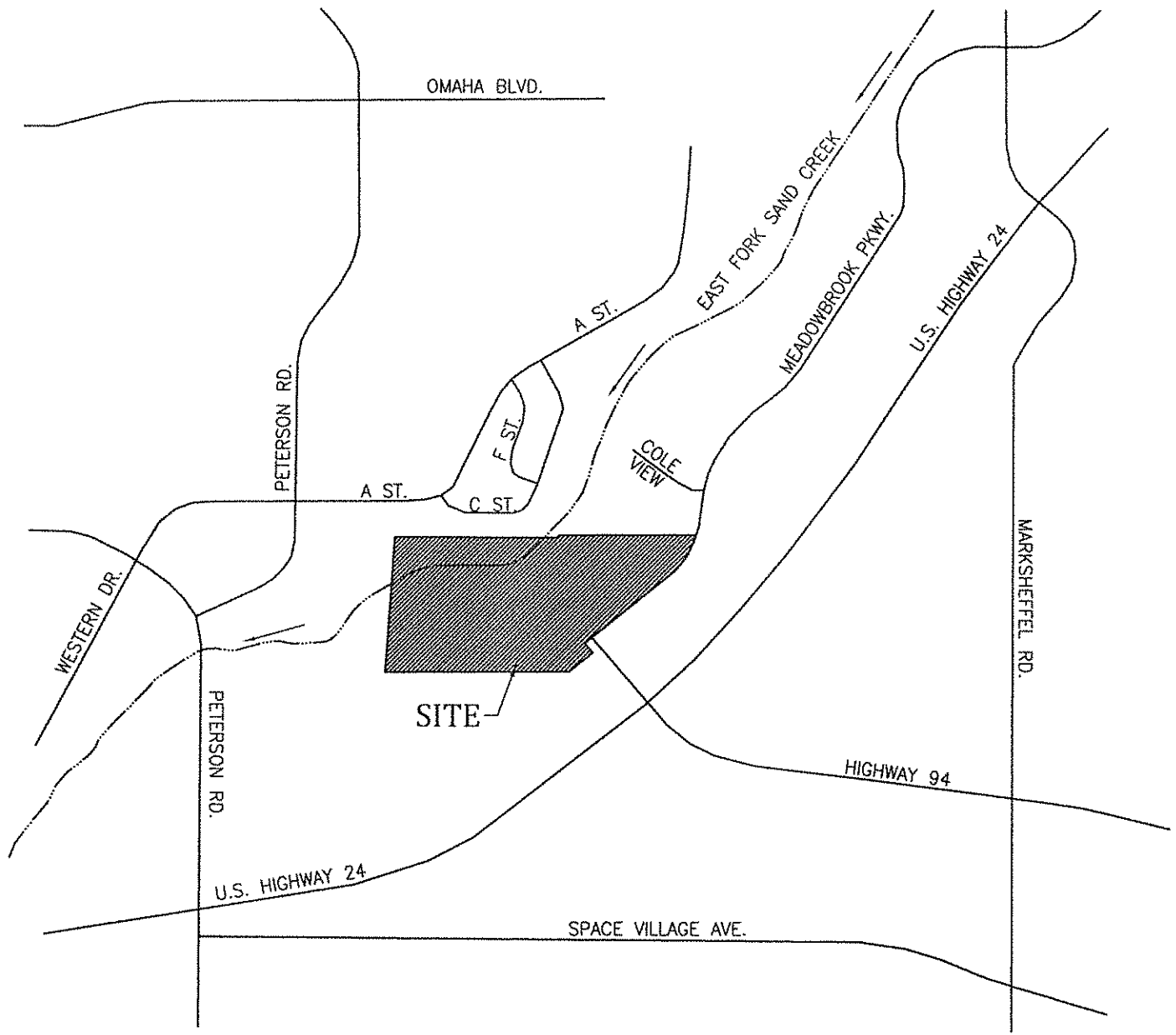
IV. Wastewater Collection System

The sanitary sewer collection system will be comprised of 8 inch PVC (SDR 35) gravity sewer located 2.5 feet south and east of the proposed street centerlines. The collection system will outfall to the existing 18-inch sanitary sewer outfall line located at the southwest corner of the subdivision. The existing 18-inch outfall line will be relocated as shown on Exhibit 1, Preliminary Water and Wastewater Plan.

Wastewater flow calculations that are contained in Appendix A of this report indicate that the new 8-inch PVC sanitary sewers will be adequate for the Meadowbrook Crossing Subdivision gravity sewer system. The proposed Preliminary Water and Wastewater Plan is included in Appendix D of this report and shows the location of the collection system and relocated outfall sanitary sewer.



SCALE: NTS



16039 Fig. 1 Vicinity Map.dwg/Dec 14, 2016

FIGURE 1
VICINITY MAP
MEADOWBROOK SUBDIVISION

V. Wastewater Collection and Treatment

The collection system within Meadowbrook Crossing is shown and anticipated for by the District. Contained within Appendix B is a commitment to serve the subdivision from the District.

Wastewater conveyed by the collection system and outfall line will discharge to the Cherokee Metropolitan District's Black Squirrel Water Reclamation Plant. A description of the Plant's current operation and future projects can be found on the District's website. The Black Squirrel Water Reclamation Plant has adequate capacity to treat and discharge wastewater flows generated by Meadowbrook Crossing in conformance with current CDPHE standards and regulations.

VI. Water Supply, Resources and Quality

Contained within Appendix C of this report is the water supply summary for Meadowbrook Crossing. The estimated water supply requirements listed on the Water Supply Information Summary has been based upon the District's average domestic water supply of .31 acre-feet per dwelling unit per year, inclusive of irrigation. Irrigation demand for the three landscape tracts shown on the plat is estimated at .93 acre feet per year. Estimated area of the tracts dedicated for landscaping is .53 acres.

Summarized on the District's website is a description of the existing water supply and distribution system, as well descriptions for possible future improvements and expansions to the system. The water requirements necessary for the Meadowbrook Crossing Subdivision has been accounted by the District. Based upon the water resources that are available to the District, subdivisions served by Cherokee Metropolitan District be supplied with water resources meeting the requirements of El Paso County's 300-year water supply regulations for future subdivisions relying on the Denver aquifer.

The quality of the water produced for by the WWSD for domestic and commercial consumption is subject to regulations prescribed by the CDPHE that limit the concentration of certain contaminants in treated or untreated water. Contained within Appendix B is the District's 2016 Consumer Confidence Report that summarizes the quality of the water produced by the District and its conformance with CDPHE regulations.

APPENDIX A

**Water Demand Calculations
Wastewater Calculations**

Meadowbrook Crossing Subdivision
Water Demand Calculations

Single-Family	114 units	
Persons per Dwelling Unit	<u>3.5 persons</u>	
	399 persons	
1 Person =	<u>150 gpd</u>	
Average Daily Flow (ADF) =	59,850 gpd	ADF = persons x gpd
Peak Flow Factor =	<u>6</u>	
Peak Hourly Flow (PHF) =	359,100 gpd	PHF = ADF x Peak Flow Factor
Single-Family PHF =	249 gpm	

Meadowbrook Crossing Subdivision

Wastewater Calculations

Single-Family	114 units	
Persons per Dwelling Unit	<u>3.5 persons</u>	
	<u>399 persons</u>	
1 Person =	<u>100 gpd</u>	
Average Daily Flow (ADF) =	39,900 gpd	ADF = persons x gpd
Peak Flow Factor =	<u>4</u>	
Peak Hourly Flow (PHF) =	159,600 gpd	PHF = ADF x Peak Flow Factor
Single-Family PHF =	111 gpm	

Total PHF =	43 gpm	
Total PHF =	0.10 cfs	cfs = gpm / (7.48 gal/ft ³) / (60 sec/min)
Pipe (8" SDR35) Capacity =	1.23 cfs	Qcap = (1.486/0.009)*0.349*0.167 ^{2/3} *0.005 ^{1/2} Pipe Slope = 0.5%
Pipe Capacity is Greater than Total PHF		

APPENDIX B

**Cherokee Metropolitan District
2016 Consumer Confidence Report**



CHEROKEE METROPOLITAN DISTRICT

6250 Palmer Park Blvd., Colorado Springs, CO 80915-2842

Telephone: (719) 597-5080 Fax: (719) 597-5145

Public Water Supply ID # CO0121125

2016 Drinking Water Consumer Confidence Report For Calendar Year 2015

Esta información es importante. No la puedes leer, busque a alguien que la pueda traducir.

We are pleased to present to you this year's Annual Water Quality Report. This report is designed to inform you about the quality of water and services we deliver to you every day. Our constant goal is to provide you with a safe and dependable supply of drinking water.

General Information About Drinking Water

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. Some people may be more vulnerable to contaminants in drinking water than the public in general. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV-AIDS or other immune system disorders, some elderly, and infants can be particularly at risk of infections. These people should seek advice about drinking water from their health care providers. For more information about contaminants and potential health effects, or to receive a copy of the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by cryptosporidium and microbiological contaminants, call the EPA *Safe Drinking Water Hotline* at (800) 426-4791.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- **Microbial contaminants**, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic contaminants**, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic water discharges, oil and gas production, mining, or farming.
- **Pesticides and herbicides**, may come from a variety of sources, such as agriculture, urban stormwater runoff, and residential uses.
- **Organic chemical contaminants**, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and also may come from gas stations, urban storm water runoff and septic systems.
- **Radioactive contaminants**, can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Colorado Department of Public Health and Environment prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

Our Water Sources

In 2015 Cherokee Metro received its water supply from two distinct sources: Groundwater from deep aquifers in the Denver Basin (non-renewable water), north of Black Forest and alluvial groundwater from the Upper Black Squirrel Basin (renewable water). In 2015 the supplies from the Denver Basin wells supplied approximately 10% of the District's water supply. The Upper Black Squirrel Creek Alluvial Aquifer, Supplies groundwater from 19 municipal wells spanning an area nine miles north to ten miles south of the town of Ellicott. These municipal wells are drilled approximately 180 feet deep into the Upper Black Squirrel Creek aquifer.

The Colorado Department of Public Health and Environment has provided us with a Source Water Assessment Report for our water supply. You may obtain a copy of the report by visiting www.cdphc.state.co.us/wg/sw/swaphorn.html or by contacting our Superintendent, Arthur Sintas, at (719) 597-5080. The Source Water Assessment Report provides a screening-level evaluation of potential contamination that **could** occur. It **does not mean** that the contamination **has or will occur**. We can use this information to evaluate the need to improve our current water treatment capabilities and prepare for future contamination threats. This can help us ensure that quality finished water is delivered to your homes. In addition, the source water assessment results provide a starting point for developing a source water protection plan. Potential sources of contamination in our source water area come from row crops, fallow, small grains, pasture / hay, septic systems and roads.

The following definitions will help you understand the terms and abbreviations used in this report:

Terms and Abbreviations

- **Parts per million (ppm) or Milligrams per liter (mg/l):** One part per million corresponds to one minute in two years or one penny in \$10,000.
- **Parts per billion (ppb) or Micrograms per liter (µg/l):** One part per billion corresponds to one minute in 2,000 years, or one penny in \$10,000,000.
- **Pico Curies per Liter (pCi/L):** A measure of radioactivity in water.
- **Action Level (AL):** The concentration of a contaminant, if exceeded, triggers treatment or other requirements a water system must follow.
- **Maximum Contaminant Level Goal (MCLG):** The "goal" is the level of a contaminant in drinking water, below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- **Maximum Contaminant Level (MCL):** The "maximum allowed" is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- **Maximum Residual Disinfectant Level Goal (MRDLG):** The level of a drinking water disinfectant, below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Maximum Residual Disinfectant Level (MRDL):** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Running Annual Average (RAA):** The average of monitoring results for the previous 12 calendar months.

Detected Contaminants

Cherokee Metropolitan District routinely monitors for contaminants in your drinking water according to federal and state laws. The following tables show all contaminants detected in the period of January 1 to December 31, 2015, unless otherwise noted. The State of Colorado requires the District to monitor for certain contaminants once every three years, because the concentrations of these contaminants are not expected to vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. Some of our data, though representative, may be more than one year old. The "Range" column in the tables will show the lowest and highest measured values for contaminants that were sampled more than once. Violations, if any, are reported in the last section of this report.

Note: Only detected contaminants appear in this report. If no table appears in this section, it means Cherokee Metropolitan District did not detect any contaminants in the last round of monitoring.

Radionuclides

Radiological	Collection Date	Average	Range Low to High	Unit	MCL	Typical Source
Gross Alpha	2015	8.1	0.6 - 8.1	pCi/L	15	Erosion of natural deposits
Radium 226	2015	0.7	0.1 - 0.7	pCi/L	Ra 226+ 228 = 5	Erosion of natural deposits
Radium 228	2015	0.8	0.0 - 0.8	pCi/L	Ra 226+ 228 = 5	Erosion of natural deposits
Uranium	2015	3.7	1.6 - 3.7	ppb	30	Erosion of natural deposits

Inorganic Contaminants

Contaminant	Sample Date	Average	Range low- High	Unit	MCL	MCLG	Typical Source
Arsenic	2015	0.55	0 to 1.6	ppb	10	10	Erosion of natural deposits; run off from orchards; runoff from glass and electronics production wastes
Barium	2015	0.064	0.04 to 0.06	ppm	2	2	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Cadmium	2015	0.3	0 to 0.3	ppb	5	5	Erosion of Natural deposits, used in metal alloys Erosion of Natural deposits
Fluoride	2015	0.76	0.33 to 1.8	ppm	4	4	Erosion of Natural deposits: Water additive which promotes strong teeth: Discharge from fertilizer and aluminum factories.
Nitrate (As N)	2015	5.58	0 to 8.3	ppm	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Selenium	2015	3.17	0 to 4.9	ppb	50	50	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines

Lead and Copper	Collection Date	90 th Percentile	Unit	AL	Typical Source
Copper	07/15/2014 to 07/23/2014	0.45	ppm	1.3	Corrosion of household plumbing systems; Erosion of natural deposits.
Lead	07/15/2014 to 07/23/2014	4.60	ppb	15	Corrosion of household plumbing systems; Erosion of natural deposits.

Disinfection By-Products	Date	Average	Range Low to High	Unit	MCL	Typical Source
Total Haloacetic Acids (HAA5)	2015	7.82	1.1 to 10.9	ppb	60	By-product of drinking water disinfection
Total Trihalomethanes (TTHM)	2015	17.66	0 to 29.2	ppb	80	By-product of drinking water disinfection

Organic Contaminants

Contaminant	Sample Date	Average	Range low- High	Unit	MCL	MCLG	Typical Source
Hexachlorobenzene	2015	0	0 to 0.01	ppb	1	0	Discharge from metal refineries and agricultural chemical factories
Hexachloro-cyclopentadiene	2015	0.062	0.062	ppb	50	50	Discharge from chemical factories
Xylenes	2015	0.04	0 to 0.29	ppb	10,000	10,000	Discharge from petroleum factories; and chemical factories

EPA has implemented the Unregulated Contaminant Monitoring Rule (UCMR) to collect data for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. EPA uses the results of UCMR monitoring to learn about the occurrence of unregulated contaminants in drinking water and to decide whether or not these contaminants will be regulated in the future. We performed monitoring and reported the analytical results of the monitoring to EPA in accordance with its Third Unregulated Contaminant Monitoring Rule (UCMR3). Once EPA reviews the submitted results, the results are made available in the EPA's National Contaminant Occurrence Database (NCOD) (<http://www.epa.gov/dwucmr/national-contaminant-occurrence-database-ncod>) Consumers can review UCMR results by accessing the NCOD. Contaminants that were detected during our UCMR3 sampling and the corresponding analytical results are provided below.

UNREGULATED CONTAMINANT - MONITORING REGULATION (UCMR)*

Contaminant	Collection Date	Highest Value	Unit	Typical Source
1,4-Dioxane	03/03/2015	0.24	ug/L	Variety of applications as in inks and adhesives.
Hexavalent Chromium	03/03/2015	0.14	ug/L	Used on metal for decorative or protective coating and pigments in dyes, paints, inks, and plastics.
Molybdenum	03/03/2015	1.4	ug/L	Erosion of Natural deposits, used to make steel alloys and high-pressure and high-temperature applications.
Strontium	03/03/2015	320	ug/L	Used in making ceramics and glass products, pyrotechnics, paint pigments, fluorescent lights, and medicines.
Vanadium	03/03/2015	0.36	ug/L	Used to make metal alloys, rubber, plastics, ceramics, and other chemicals.

*There is no MCL for the unregulated contaminants

Health Information About Water Quality

Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels in your home may be higher than other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to flush your tap for 30 seconds to two minutes before using tap water or you may have your water tested. Additional information is available from the *Safe Drinking Water Hotline* at (800) 426-4791.

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause Blue Baby Syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, and detected levels are above 5 ppm, you should ask advice from your health care provider.

If you have any questions about this report or your water utility, please contact our Superintendent Art Sintas at (719) 597-5080. We want our valued customers to be informed about their water utility. If you want to learn more about the utility, please call the above contact or attend our open Board of Directors' meeting scheduled at 5:30 p.m. on the second Tuesday of each month, at our office located at 6250 Palmer Park Boulevard. Other information can be found on our website www.cherokeemetro.org

Violations

There were no violations for 2015.

Appendix C
Water Supply Summary

FORM NO.
GWS-76
02/2005

WATER SUPPLY INFORMATION SUMMARY
STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

1313 Sherman St., Room 818, Denver, CO 80203
Phone – Info (303) 866-3587 Main (303) 866-3581 Fax (303) 866-3589 <http://www.water.state.co.us>

Section 30-28-133,(d), C.R.S. requires that the applicant submit to the County, "Adequate evidence that a water supply that is sufficient in terms of quantity, quality, and dependability will be available to ensure an adequate supply of water."

1. NAME OF DEVELOPMENT AS PROPOSED: Meadowbrook Crossing

2. LAND USE ACTION: Final Plat

3. NAME OF EXISTING PARCEL AS RECORDED:
SUBDIVISION: None (1 Parcel Unplatted) , FILING (UNIT) , BLOCK , LOT

4. TOTAL ACREAGE: 32.8 5. NUMBER OF LOTS PROPOSED 104 PLAT MAP ENCLOSED? YES or NO

6. PARCEL HISTORY – Please attach copies of deeds, plats, or other evidence or documentation.

- A. Was parcel recorded with county prior to June 1, 1972? YES or NO
B. Has the parcel ever been part of a division of land action since June 1, 1972? YES or NO
If yes, describe the previous action:

7. LOCATION OF PARCEL – Include a map delineating the project area and tie to a section corner.

1/4 of the 1/4, Section 8, Township 14 N or S, Range 65 E or W
Principal Meridian: Sixth New Mexico Ute Costilla

Optional GPS Location: GPS Unit must use the following settings: Format must be UTM, Units must be meters, Datum must be NAD83, Unit must be set to true N, Zone 12 or Zone 13
Easting: _____
Northing: _____

8. PLAT – Location of all wells on property must be plotted and permit numbers provided.

Surveyor's Plat: YES or NO If not, scaled hand drawn sketch: YES or NO

9. ESTIMATED WATER REQUIREMENTS 10. WATER SUPPLY SOURCE

USE	WATER REQUIREMENTS		EXISTING WELL		DEVELOPED SPRING		NEW WELLS -	
	Gallons per Day	Acre-Feet per Year					PROPOSED AQUIFERS – (CHECK ONE)	
HOUSEHOLD USE # 114 of units		35.34					<input type="checkbox"/> ALLUVAL	<input type="checkbox"/> UPPER ARAPAHOE
COMMERCIAL USE # _____ of S. F							<input type="checkbox"/> UPPER DAWSON	<input type="checkbox"/> LOWER ARAPAHOE
IRRIGATION # 0.53 of acres		0.93					<input type="checkbox"/> LOWER DAWSON	<input type="checkbox"/> LARAMIE FOX HILLS
STOCK WATERING # _____ of head							<input type="checkbox"/> DENVER	<input type="checkbox"/> DAKOTA
OTHER: _____							<input type="checkbox"/> OTHER: _____	
TOTAL		36.27					WATER COURT DECREE CASE NUMBERS: _____	
			<input type="checkbox"/> MUNICIPAL		<input type="checkbox"/> DISTRICT			
			<input type="checkbox"/> ASSOCIATION		NAME Cherokee Metro			
			<input type="checkbox"/> COMPANY		LETTER OF COMMITMENT FOR SERVICE <input checked="" type="checkbox"/> YES or <input type="checkbox"/> NO			

11. WAS AN ENGINEER'S WATER SUPPLY REPORT DEVELOPED? YES or NO IF YES, PLEASE FORWARD WITH THIS FORM. (This may be required before our review is completed.)

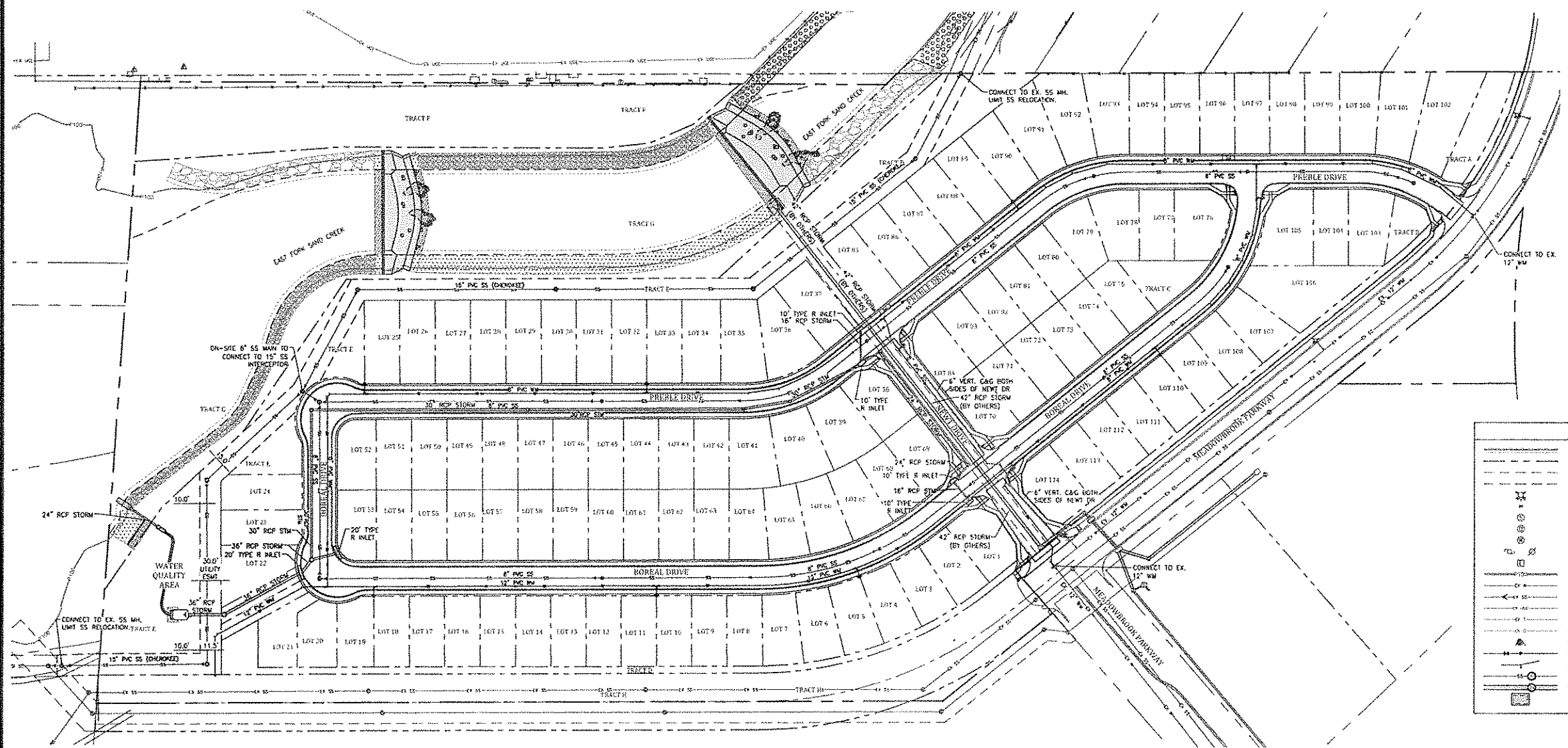
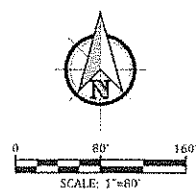
12. TYPE OF SEWAGE DISPOSAL SYSTEM

- SEPTIC TANK/LEACH FIELD CENTRAL SYSTEM
DISTRICT NAME: Cherokee Metro District
 LAGOON VAULT
LOCATION SEWAGE HAULED TO: _____
 ENGINEERED SYSTEM (Attach a copy of engineering design.) OTHER:



Appendix D

Preliminary Water and Wastewater Plan



LEGEND	
	CURB & GUTTER (CURB SECTION AS SHOWN ON PLANS)
	EXISTING OR PROPOSED PROPERTY LINE
	EXISTING EASEMENT
	PROPOSED EASEMENT
	EXISTING FIRE HYDRANT
	EXISTING WATER VALVE
	EXISTING SANITARY SEWER MANHOLE
	EXISTING STORM SEWER MANHOLE
	EXISTING WATER MANHOLE
	EXISTING UTILITY POLE
	EXISTING ELECTRIC BOX OR TRANSFORMER
	PROPOSED 100 YEAR FLOODPLAIN
	EXISTING WATER LINE
	EXISTING SANITARY SEWER & FLOW DIRECTION
	EXISTING UNDERGROUND ELECTRIC LINE
	EXISTING UNDERGROUND TELEPHONE LINE
	EXISTING GAS LINE
	PROPOSED FIRE HYDRANT, PER CSU STANDARDS
	PROPOSED WATER LINE AND VALVE
	PROPOSED WATER LINE, THRUST BLOCK & MJ RESTRAINTS
	PROPOSED SANITARY SEWER PIPE AND MANHOLE
	PROPOSED STORM SEWER PIPE AND MANHOLE
	PROPOSED STORM CURB INLET

MEADOWBROOK CROSSING
PRELIMINARY UTILITY PLAN
 EL PASO COUNTY, COLORADO

Kiowa
 Engineering Corporation
 7175 West Jefferson Avenue, Suite 1300
 Lakewood, Colorado 80235
 (303) 692-0369

Project No.:	16839
Date:	May 2, 2012
Design:	EJS
Drawn:	EJS
Check:	MWE
Revises:	

SHEET



EKH 1