Falcon Highlands

Water Resources Report

Owner/Developer
Challenger Homes
8605 Explorer Drive Ste. 250
Colorado Springs, CO 80920
(719) 598-5192
Contact: Jim Byers

Engineer
Atwell, LLC
143 Union Blvd., Suite 700
Lakewood, CO 80228
303-462-1100
Contact: Kevin Blumhardt, PE

Atwell Project Number
24004308

Submitted by: Atwell, LLC

August 21, 2024

Contents

Appendices

1.0 INTRODUCTION

The purpose of this report is to provide an update to prior Water Resources Reports for the Falcon Highlands Metropolitan District (FHMD, the District) and address the specific needs of the proposed Falcon Highlands Filing no. 1 (The Site), using up to date standards and specifications.

2.0 PROJECTED LAND USE

The Site is located within Section 12, Township 13 South, Range 65 West of the Sixth Principal Meridian, County of El Paso, State of Colorado. The Site is bounded by Antelope Meadows to the south, Bridal Vail Way to the west. Falcon Highlands Filing No. 2 is located to the north of the site.

The overall area consists of approximately 23.59 acres that is proposed to be developed into 24 single-family residential units, roadways, and open space. The site lies in Falcon Highlands Metro District.

Refer the land use and points of tie in exhibit, for lotting and water main tie-in connections.

3.0 WATER DEMANDS AND SUPPLY

3.1 Water Supply

Based on information proved by Josh Miller of FHMD, the district currently owns the water rights to serve 710 SFE's, currently the district is only serving 450 SFE's. Of these remaining 260 SFE's, the current infrastructure can only provide services for approximately 50 SFE's. For the remaining 210 SFE's the development of an additional well will be required. Reference appendix B for correspondence from District Manage Josh Miller.

The FHMD Water Facility Master Plan is reference in Appendix C, for information regarding "Table 1: Existing Supply and Demand Summary", as well as "Table 3: Water Rights by tract and Basin (in AFY)". Section 3 of the referenced report details the existing supply from deep underground wells as well as future well supply.

3.2 Water Demand

The Site is currently proposing 24 SFE's, according to the above information and the information given by District Manager Josh Miller, the district will be able to supply the requested supply. Reference appendix B for correspondence from District Manage Josh Miller.

4.0 LONG-TERM AND MASTER PLANNING

Currently the Site has been include in the Master plan, we are not proposing a master plan. For information regarding a water master plan refer to appendix C.

5.0 WATER SYSTEM FACILITIES

5.1 Water Supply Sources

The District currently has three wells in the Falcon Area, these wells fall within the Districts service area.

The District currently was adequate legal water supply for the existing demand as well as the proposed demand of the Site.

5.2 Water Quality and Treatment

The District owns and operates two water treatments plants to treat the supply of water from its wells. Both plants have a combined treatment capacity of 1.516 million gallons per day.

The district disinfects and treats 100% of the water supply and meets and/or exceeds all CDPHE drinking water standards.

See Appendix D for a copy of the 2022 FHMD Consumer Confidence Report, which outlines the water quality delivered to district customers.

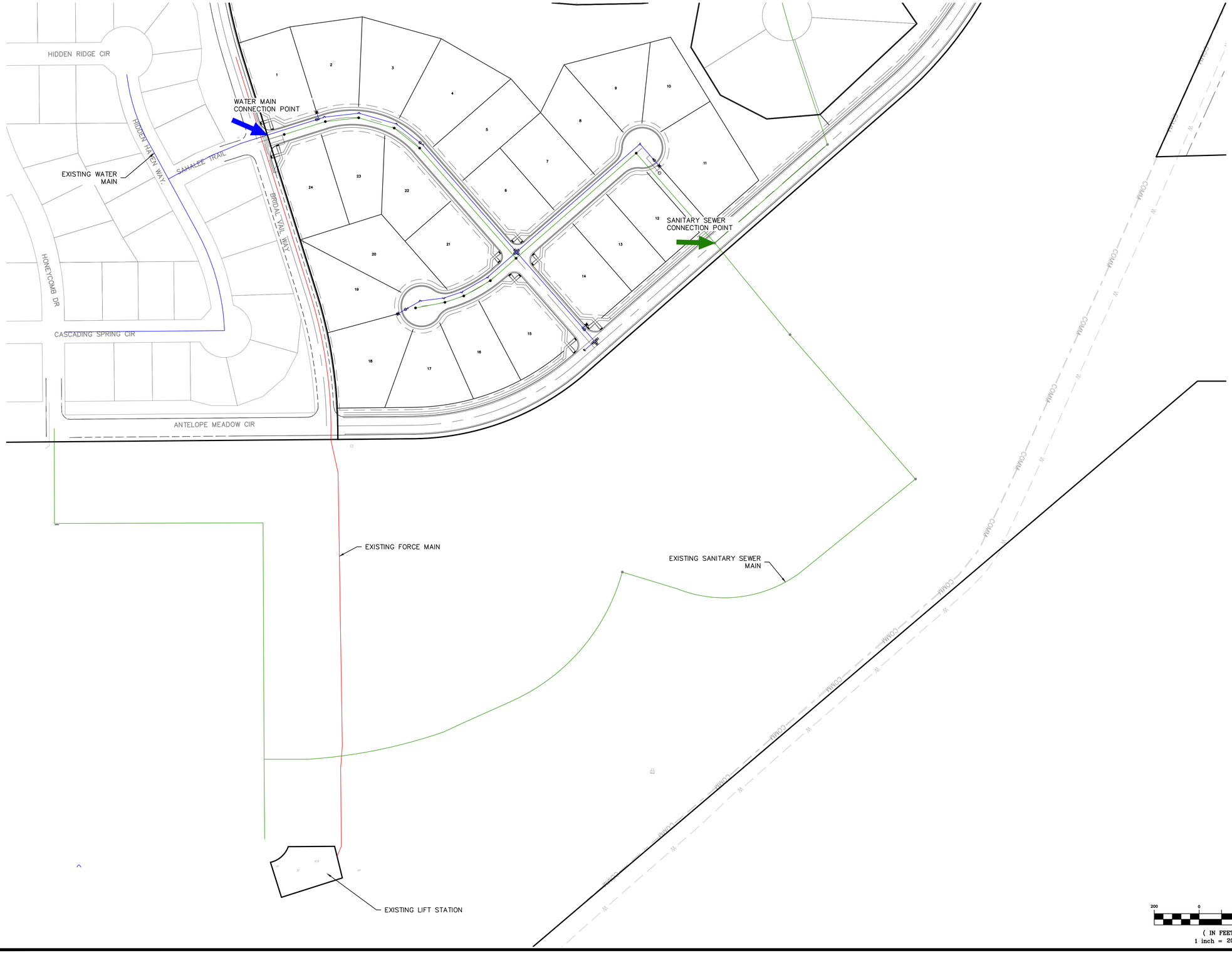
5.3 Water Storage

The district currently has one water storage tank with a capacity of 1.0 million gallons.

Appendix A

FALCON HIGHLANDS SOUTH FILING NO. 1

UTILITY TIE-IN EXHIBIT



200 0 200 400

(IN FEET)
1 inch = 200 ft.

PROJECT NO.: _____
DATE: 08/21/2024

ATWELL
866.850.4200 www.atwell-group.com
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CAD FILE: 24004.308-UTILITY TIE-IN EXHIBIT.DWG

Appendix B

FALCON HIGHLANDS Metropolitan District

121 South Tejon, Suite 1100
Colorado Springs, CO 80903
Phone: 719-635-0330 Fax: 719-473-3630
Email: Josh.Miller@CLAconnect.com

Street Lights
Contact: Mountain View Electric, 719-495-2283
(ask for Customer Service)

July 1, 2024

Challenger Homes, LLC
Mr. Jim Byers
Vice President of Community Development
8605 Explorer Drive, Suite 250
Colorado Springs, CO 80920

Re: Will Serve Letter – Water Falcon Highlands Filing No. 3 PUD/Preliminary Plan

Dear Mr. Byers:
The District has received the request from Challenger Homes requesting a commitment from the District to provide water to the property owned by Challenger Homes within the District, commonly known as Filing 3. Filing 3 is within the District's boundaries and is eligible to receive water service from the District.

The District will provide water service to Filing 3 subject to the following:

1. The District currently owns water rights to serve 710 single family equivalents ("SFEs"). The District currently serves 450 SFEs. Of the remaining available 260 SFEs, approximately 50 SFEs can be produced by the current water production infrastructure. The provision of the remaining 210 SFEs will require the development of an additional well.

2. The provision of water service beyond 710 SFEs requires the District to acquire additional water rights and to develop those rights into physical water available for delivery via its water system before water service can be provided.

3. The District is able to provide, based on current supply the 24 SFE's requested for the initial development within Filing 3.

In addition to these conditions, the District's ability to provide water depends on the current supply available and demand on the District's water system at the time a water tap is requested for purchase. The District will not reserve capacity in its water system unless and until a water tap is purchased and any other District fees are paid. There is no guarantee that water will be available at the time a water tap is requested for purchase. At all times, service is dependent upon compliance with the District's rules, regulations and policies.If you have any questions, please do not hesitate to call.

Sincerely,

Falcon Highlands Metropolitan District

Josh Miller, District Manager

C: Ryan Mangino, District Engineer

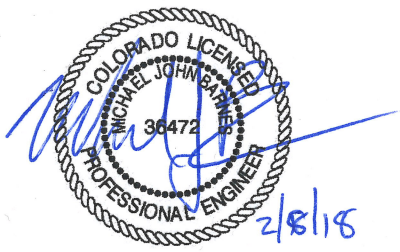
Appendix C

Kennedy/Jenks Consultants

143 Union Boulevard, Suite 600
Lakewood, Colorado 80228
303-985-3636
FAX: 303-985-3800
Toll Free: 866-535-5285

Water Facility Master Plan

8 February 2018



Prepared for

Falcon Highlands Metropolitan District
7467 Antelope Meadows Circle
Falcon, CO 80831

K/J Project No. 1746036*00

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Section 1: Executive Summary

The purpose of this Facility Master Plan (Plan) is to assess the capability of the Falcon Highlands Metropolitan District's (FHMD) water system to meet the demands of the existing users as well as the demand projected for the ultimate build out. The water system consists of water rights and aquifers, water supply and wells, water treatment, water storage, booster pumps, and the water distribution system. The necessary system improvements are identified to address any existing and future deficiencies, and the improvements are summarized in a capital improvement program that FHMD can use for planning and budgeting. The FHMD service area in shown in Figure 1 in Appendix A.

Water Rights and Supply

Using the Colorado Department of Water Resources (DWR) 100-year water supply requirements, the District has 310.6 acre-feet per year (AFY) of water available for delivery through its water system, based on the DWR water permits for the existing wells. This is the volume of water that the District is permitted to pump from its wells over a calendar year. Using El Paso County's (EPC) 300-year water supply requirements for planning, the Petrock & Fendel has determined that the FHMD has up to 213.7 AFY of water rights based on an analysis dated June 9, 2017. Similarly, DWR calculated that the District has 202.2 AFY of annual water rights using the EPC 300-year requirements for planning. This calculation is in the DWR letter to EPC dated February 10, 2011 in response to the Falcon Highland's Filing 3 Final Plat, submittal dated January 18, 2011.

Average Annual Demand (ADD) Planning Criteria

The current criteria used to calculate the average annual demand (ADD) for planning is 0.4 AFY/per single family equivalent ("AFY/SFE"). The criteria of 0.4 AFY/SFE was developed in 2013 based primarily on data from 2012. Based on the demand data obtained since 2012, 2012 appears to have been a high demand year due to an unusually low amount of annual precipitation, which increased irrigation demand in the District. Additional factors may have contributed to higher water demand in 2012, including new construction.

Based on available data, since 2012, the actual ADD per tap has been 0.28 AFY/SFE. This reduced demand may be attributable to normal annual precipitation amounts, reduced water used since active development within the District had ended, and conservation. While this actual reduced demand supports the use of lower demand criteria, it is too low to use for future planning purposes since it does not account for the increased demand that occurs during low precipitation years. Therefore, we recommend that the District use an ADD of 0.32 AFY/SFE for planning purposes, which is more in line with average annual water use over a longer period. In addition, this is the same demand criteria that is used for planning by the Woodmen Hills Metropolitan District (WHMD).

Based on the ADD criteria of 0.32 AFY/SFE, the ADD for planning purposes is currently 142.7 AFY for the existing 446 SFEs in FHMD. The future projected demand for the ultimate build-out of 938 SFEs is 300 AFY.

The District has a supply of 310.6 AFY based on its permits with DWR, which is sufficient to meet the existing and future ADD. Using the EPC 300-year planning criteria, DWR calculated that the District has 202.2 AFY of annual water rights for planning purposes, which is insufficient to meet the projected future ADD. Therefore, the FHMD will need to acquire new water rights to meet the ADD for the ultimate build-out to comply with the EPC requirements.

Maximum Daily Demand (MDD) Planning Criteria

In addition to the ADD per SFE, the FHMD must also consider the maximum daily demand (MDD) on its water system when considering the allowable number of SFEs that can be connected to the system. The MDD is the average water usage by all customers in the FHMD's water system on the highest single demand day.

The FHMD does not have data to support a calculated MDD value for its system due to a lack of appropriate monitoring equipment and software. In lieu of that data and an extrapolation of a likely MDD from 2012, the FHMD has been using 1.0 gallon per minute per SFE ("gpm/SFE") as its MDD planning criteria.

Based on the revised recommended ADD per SFE, we recommend that the FHMD adopt a lower MDD of 0.5 gpm/SFE, which is similar to the 0.45 gpm/SFE used by WHMD for planning purposes. (Since FHMD has fewer SFEs, it would be expected to have a higher gpm/SFE value compared to WHMD.) Using 0.5 gpm/SFE, the MDD is estimated as 223 gpm for the existing 446 SFEs connected to the system.

The FHMD uses its three well pumps to meet its MDD. The State of Colorado Design Criteria for Potable Water Systems indicates that pumps should be capable of meeting the demand with a pump out of service, and based on this, the FHMD's "firm" well pumping capacity is 200 gpm using two well pumps. Consequently, the FHMD does not have sufficient capacity to meet the estimated MDD of 223 gpm of its existing customers. However, based limited daily flow data from June-August 2017, the actual MDD may be less than 200 gpm, which is consistent with reported well pump operation.

Peak Hour Demand (PHD) Planning Criteria

Finally, the water system also needs to have the capacity to meet the peak hour demand (PHD), which is the peak instantaneous usage on an hourly basis by all customers in the system. The District also does not have data to support a calculated PHD. Given this, we recommend the use of 0.7 gpm/SFE for planning purposes. This criterion is similar to the 0.68 gpm/SFE planning value used by WHMD. Using this criterion, the existing PHD is estimated as 312 gpm.

Supply and Demand Summary

Tables 1 and 2 summarize the capability of the water system to meet the existing and future demands based on the demand planning criteria. The current water system does not have the capacity to meet the current estimated MDD and PHD, and does not have the capacity to meet any future condition. The water system improvements and/or actions needed to correct the deficiencies are described below.

Table 1: Existing Supply and Demand Summary - 446 SFEs

	ADD (AFY)	MDD (gpm)	PHD (gpm)
Supply			
Source	Water rights	Well pumps	Booster pumps
Capacity	202.2[a]	200	300
Demand	142.7	223	312
Net Supply	71	-23	-12

a. Based on El Paso County planning criteria, as calculated by DWR

Table 2: Future Supply and Demand Summary - 938 SFEs

	ADD (AFY)	MDD (gpm)	PHD (gpm)
Supply			
Source	Water rights	Well pumps	Booster pumps
Capacity	213.7 [a]	200	300
Demand	300	470	660
Net Supply	-97.8	-270	-360

a. Based on El Paso County planning criteria as calculated by Petrock & Fendel

System Improvements/Actions to Meet Existing Demand

1. Implement short term recommendations for water system management described below to reduce the MDD to less than 200 gpm.
2. Improve the SCADA system to monitor and record the maximum daily water usage, and use this data to refine the MDD and PHD design criteria.
3. Replace the booster pump flow meter and the well flow meters to improve the accuracy of flow measurement.
4. If the MDD exceeds the supply after taking the above actions, then additional water supply will be needed. This would require a new well, or a renewable water supply source.
5. Reduce the discharge pressure setpoint of the booster pump from 55 psi to 50 psi. This will increase the output of the booster pump from 250 to 300 gpm to approximately meet the estimated PHD of the existing users.

Capital Improvements to Meet Future Demand

Figure 3 in Appendix A shows a schematic of the existing system with the system improvements needed to meet future demand with continued use of groundwater only. The necessary capital improvements to meet the existing and future demand are listed below in the order in which they need to be implemented.

1. Increase water supply capacity to meet a MDD of approximately 300 gpm. This will be needed immediately if the short-term recommendations are not successful in reducing the MDD. Beyond this, the water supply capacity will need to be increased prior to

adding new taps to the system. The improvements needed to achieve this with a new well are as follows:

   a. Add a 4th well and interconnection piping to the main WTP
   b. Add a third filter at the WTP
   c. Increase chlorination capacity at the WTP
   d. Interconnect the LFH #2 well to the main WTP

2. Before the number of the SFEs in the system are projected to increase to approximately 600, the following must be implemented.
   a. Obtain new water rights, or a renewable water supply, to increase the water supply to meet an ADD of 300 AFY to comply with EPC planning criteria.
   b. Add a 5th well pump if a renewable water supply has not been obtained.
   c. Add a 3rd booster pump

The engineer's opinion of probable construction cost of these capital improvements is $4.09 million, as shown in Tables 7 and 8 in the report. This does not include the cost to obtain new water rights, or a renewable water supply.

Renewable Water Alternative

The FHMD should further investigate the potential to obtain renewable water as an alternative to the development of new wells to pump non-renewable groundwater. Renewable water has the potential to be a more reliable water source since the supply of well water may diminish over time as the aquifers are depleted. In addition, renewable water is not subject to the EPC 300-year rule.

Recommendations for Water System Management

Below are short-term and long-term recommendations that the FHMD should consider for management of the water system. The short-term recommendations should be taken by the FHMD before the 2018 irrigation season to minimize the risk of exceeding the MDD criteria of 200 gpm.

Short Term Recommendations

1. Continue to work with Walmart and Park Place to reduce their irrigation demand which will reduce the overall MDD on the system. In addition, continue to communicate with El Paso County to obtain and refine their requirements for landscaping for Walmart.
2. Review the effectiveness of the Water Conservation Policy that was adopted on April 19, 2014 to reduce outdoor irrigation and water use. The Policy will be a key tool in reducing the maximum day watering use.
3. Develop a plan to require both commercial and single-family residents to minimize or stop irrigation during extreme conditions, such as a drought, which may cause demand to exceed the well pumping capacity. The plan should be developed in advance so that it can be implemented quickly if an extreme condition occurs.

Long Term Recommendations

1. Adopt a policy that requires all existing and future commercial development to install separate domestic and irrigation meters to monitor and regulate use.
2. Review water rates and fees to promote conservation.
3. Continue to promote conservation with residential users who consume more than 0.5 AFY. Determine the cause of their high use, which could be due to excessive irrigation, service line leaks, etc.
4. Have the FHMD's water attorney research any available renewable, and non-renewable water rights in the vicinity of FHMD boundaries to augment existing water rights to assist with meeting El Paso County requirements.
5. Consider adoption of a "water resource fee" for new water taps to pay for future capital projects.
6. Continue to promote an emergency connection with WHMD to provide metered water if needed.

Conclusions

The District's capability to meet the ADD and MDD is primarily based on its DWR permitted water rights to meet the ADD, and its well pumping capacity to meet the MDD. While the District has capacity to add new taps based on average demand criteria, it does not have sufficient well pumping capacity to meet the current projected MDD based on the recommended design criteria. Therefore, no new taps should be added to the system unless actual operating data is available to demonstrate that the MDD is less than the well pumping capacity.

In summary, it is risky for the FHMD to rely on new wells to meet future demands due to the unknown output and cost to develop new wells, and the potential high cost to acquire new water rights. Further, it's unknown whether the aquifers will be a long term viable water supply due to the likely draw down of the aquifers. Consequently, it would be prudent for the FHMD to review the potential to acquire a renewable tributary or renewable surface water supply. A recent report completed for the Colorado Springs Utilities (CSU) indicates that CSU should be proactive in providing renewable water to entities outside the CSU service area. However, it's unknown when this water would be available, which may require FHMD to develop a part or all its remaining groundwater resources as an interim measure.

Section 2: Background

The Falcon Highland Metropolitan District (FHMD) was formed in 2003 as a Title 32 special district to provide water, sewer, parks, storm drainage, and open space to users within its service area. FHMD is composed of three (3) Tracts:

- Tract A – 449 acres
- Tract B – 179 acres
- Tract C – 183 acres

The FHMD service area is shown in Figure 1.

FHMD provides water supply using groundwater rights deeded to the District by the original developer, Cygnet. These groundwater rights are contained in two designated basins: the Upper Black Squirrel Basin and the Denver Basin. Tract A is in the Upper Black Squirrel Basin and Tracts B and C are in the Denver Basin. FHMD has water rights in the Denver, Arapahoe, and Laramie Fox Hills aquifers within these basins.

The decrees and annual appropriations associated with these groundwater rights are determined, managed, and permitted by the Colorado Division of Water Resources (DWR). The volume of groundwater is calculated based on a 100-year water supply.

However, since FHMD is located within El Paso County (EPC), FHMD is subject to the terms of the 300-year rule which was adopted by the County on November 20, 1986. EPC uses this rule to calculate the available water supply for planning purposes, which essentially reduces the District's water rights by one third compared to DWR water right records. El Paso County requires the "Determination of Sufficiency" for all groundwater supplies using "Presumptive Use Values" and/or actual historic water demand analysis. Tributary, renewable, or aquifer waters are not subject to El Paso County's 300-year rule.

Using El Paso County's (EPC) 300-year water supply requirements for planning, the FHMD water rights attorney, Petrock & Fendel, has determined that the FHMD has up to 213.7 AFY of water rights based on an analysis dated June 9, 2017. Similarly, DWR calculated that the District has 202.2 AFY of annual water rights using the EPC 300-year requirements. The DWR calculation is in the DWR letter to EPC dated February 10, 2011 in response to the District's Filing 3 Final Plat, submittal dated January 18, 2011. (The letter is included Appendix A.)

The water rights in acre-feet per year (AFY) associated with the tracts and basins are shown in Table 3.

Due to the poor water quality and low production rates associated with wells within the Denver Aquifer, the water rights within the Denver Aquifer are included in the Water Rights values, but not included in the Future Permitted Capacity DWR values.

Table 3: Water Rights by Tract and Basin (in AFY)

Aquifer	Basin	Water Rights		Existing Permitted Capacity	Future Permitted Capacity
		DWR	EPC	DWR	DWR
Tract A	Upper Black Squirrel				
Denver		189	63	0	0
Arapahoe		118	39.3	118	118
Laramie Fox Hills		128	42.7	128	128
	Subtotal	435	145	246	246
Tract B	Denver				
Denver		0	0	0	0
Arapahoe		34.9	11.6	0	34.9
Laramie Fox Hills		64.6	21.5	64.6	64.6
	Subtotal	99.5	33.1	64.6	64.6
Tract C	Denver				
Denver		0	0	0	0
Arapahoe		57.6	19.2	0	57.6
Laramie Fox Hills		49.1	16.4	0	49.1
	Subtotal	106.7	35.6	0	106.7
	Totals	**641.2**	**213.7**	**310.6**	**452.2**

Section 3: Supply

3.1 Existing Supply

FHMD currently has three operational deep groundwater wells as described below:

- Arapahoe #1 (A#1)
    - Depth: 1560 vertical feet
    - Drilled: 4/23/2003
    - 142-BD, DWR Permit #05: 7950-F
    - Annual appropriation: 118 AFY (DWR-100 yr. basis)
    - Pumping capacity: 90 gpm
- Laramie Fox Hills #1 (LFH #1)
    - Depth: 2160 vertical feet
    - Drilled: 4/10/2003
    - 141-BD, DWR Permit #05794-9
    - Annual appropriation: 128 AFY (DWR-100 yr. basis)
    - Pumping capacity: 110 gpm
- Laramie Fox Hills #2 (LFH #2)
    - Depth: 2155 vertical feet
    - Drilled: 1/17/2008
    - 83CW134, DWR Permit #66364-E
    - Annual appropriation: 64.5 AFY (DWR-100 yr. basis)
    - Pumping capacity: 110 gpm

The total pumping capacity of the above three wells is 310 gpm. The Colorado Department of Public Health and Environment (CDPHE) Potable Water Design Criteria indicates that pumps should be capable of meeting the demand with a pump out of service, and based on this, the FHMD's "firm" well pumping capacity is 200 gpm. The firm capacity of 200 gpm is available to meet the MDD of the users.

The LFH #1 well was rehabilitated on 2014 and the Arapahoe #1 well was rehabilitated in 2017. Both the pumps and motors were replaced and lowered to account for the draw down levels within the aquifers.

3.2 Future Well Supply

FHMD has two non-tributary wells in Tract C which were quitclaimed to the District on July 23, 2015 by Cygnet. These are:

- Arapahoe #2
    - Depth estimated: 1560 vertical feet
    - 01CW65
    - Annual appropriation: 57.6 AFY
- Laramie Fox Hills #3 (LFH #3)
    - Depth estimated: 2155 vertical feet
    - 01CW65
    - Annual appropriation: 49.1 AFY

These wells have not been permitted, drilled, equipped or tested, so the actual well pumping capacity is unknown. For planning purposes in this report, we have estimated the pumping capacity of these wells to be similar to the existing Arapahoe #1 Well (90 gpm) and Laramie Fox Hills Well #1(110 gpm). Prior to creating engineering documents to develop these wells, the groundwater hydrogeologist (Bishop, Brogden & Associates) and Kennedy/Jenks will conduct an on-site/permit investigation of the well area to refine the estimated pumping capacity of the wells.

3.3 Supply Options for Ultimate Build-out

Based on FHMD's existing water portfolio of groundwater supply, it only has two remaining non-tributary wells that can be developed. The two wells in Tract C, which would be named Arapahoe #2 and Laramie Fox Hills #3, will be used to meet the future MDD of the FHMD system. If they each have an output of 100 gpm, then the capacity may be sufficient to meet the future MDD. (The future MDD is estimated based on general planning criteria rather than calculated using actual flow data. FHMD will need to modify its flow monitoring and SCADA system to gather flow data so that the MDD can be calculated and used to refine the MDD planning criterion. After this is done, the number and capacity of future wells needed can be refined.)

However, even if the new well output is sufficient, the FHMD does not have sufficient water supply to comply with the EPC 300-year planning criteria. Based on this planning criteria, the FHMD would need 900 AFY of water rights to meet the FHMD ultimate demand of

approximately 300 AFY. Consequently, FHMD will need to acquire approximately 300 AFY of new water rights.

In summary, it is risky for the FHMD to rely on new wells to meet future demands due to the unknown output and cost to develop new wells, and the potential high cost to acquire new water rights. Further, it's unknown whether the aquifers will be a long term viable water supply due to the likely draw down of the aquifers. Consequently, it would be prudent for the FHMD to review the potential to acquire a renewable tributary or renewable surface water supply. A recent report completed for the Colorado Springs Utilities (CSU) indicates that CSU should be proactive in providing renewable water to entities outside the CSU service area. However, it's unknown when this water would be available, which may require FHMD to develop a part or all its remaining groundwater resources as an interim measure.

FHMD deeded its return flow rights to WHMD, presumably to reduce the cost of sanitary sewer service to the District. It was suggested that a discussion take place with WHMD to buy back the rights to augment some of the other not-non-tributary groundwater rights. This would enable FHMD to effectively increase its water rights.

Section 4: Demand

4.1 Demand Criteria

The water system needs to have the capacity to meet all the following demand criteria.

- Average Annual Demand (ADD). This is the average annual demand that needs to be met by the District's groundwater supply. FHMD meets this demand using water rights permitted by the DWR to pump groundwater from deep aquifers.

- Maximum Daily Demand (MDD). The MDD is the average water usage by all customers in the FHMD's water system on the highest single demand day. FHMD uses its well pumps to meet the MDD.

- Peak Hour Demand (PHD). Peak hour demand is the peak instantaneous usage on an hourly basis by all customers in the system. FHMD uses its booster pumps and water stored in the water tank to meet the PHD.

- Fire Flow. This is the demand to meet residential and commercial facility fire flow criteria set by the Falcon Fire Protection District. FHMD uses its fire pump and water stored in the water tank to meet the fire flow demand.

4.2 Existing Demand

4.2.1 Average Annual Demand (ADD)

The current ADD criteria is 0.4 acre-feet of water per year/per single family equivalent ("AFY/SFE") was developed in 2013 based primarily on data from 2012. 2012 appears to have been a high demand year due to an unusually low amount of annual precipitation, which increased irrigation demand in the District. Additional factors may have contributed to higher water demand in 2012, including significant water demand for new construction and the establishment of new landscaping.

To review and update this ADD criteria, Kennedy/Jenks analyzed the monthly meter reading data since 2011, and daily flow meter data provided by Clifton Larson Allen (CLA) for the months of June, July and August in 2017. Based on this analysis, the actual ADD per SFE has decreased, and has been 0.28 AFY/SFE in the past few years. This reduced demand may be attributable to normal precipitation amounts, the significant reduction in active development in the District, and conservation. While this actual reduced demand supports the use of lower demand criteria, it is too low to use for planning purposes since it does not account for the increased demand that occurs during low precipitation years. Therefore, we recommend that the District use an ADD of 0.32 AFY/SFE for planning purposes, which is likely more in line with average annual water use over a longer period. This is the same criteria that is used by the Woodmen Hills Metropolitan District (WHMD) for planning purposes.

While demand per SFE has decreased since 2013, it should be noted that FHMD has not experienced a drought cycle since 2011-2012. Precipitation has played an important role in reducing irrigation demands and therefore the supply requirements. It will be important to monitor water consumption during the next low precipitation/high irrigation period and review whether the water consumption matches the revised SFE demand criteria.

As of August 2017, FHMD had the following SFEs connected to the system as indicated in Table 4.

Table 4: Existing System SFE's

Land Use	Units (SFE's)
Residential	348
Commercial (Domestic)	58
Commercial (Irrigation)	40
Total	446

Based on 446 SFEs and an ADD of 0.32 AFY/SFE, the total ADD is currently 142.7 AFY.

4.2.2 Maximum Day Demand (MDD)

The District does not have data to support a calculated MDD value for its system due to a lack of appropriate monitoring equipment and software. In lieu of that data, and an extrapolation of a likely MDD from 2012, the District has been using a MDD criteria of 1.0 gallon per minute per SFE ("gpm/SFE").

Based on the existing 446 SFE's and the revised recommended ADD per SFE, Kennedy/Jenks recommends that the District adopt a lower MDD of 0.5 gpm/SFE for planning purposes. Using this revised MDD criteria, the MDD is 223 gpm. This demand appears reasonable based on actual demand data from 2012. For instance, in June 2012, the average daily demand for the entire month was 155 gpm, and consequently it's highly likely that the MDD exceeded 200 gpm on multiple occasions. In addition, this value is similar to the 0.45 gpm/SFE used by WHMD for planning purposes. Since FHMD has fewer SFEs, it would be expected to have a higher gpm/SFE value compared to WHMD.

To refine the MDD, FHMD needs to record the daily flow delivered to the distribution system. This can be done by configuring the FHMD SCADA system to record the daily flow that is pumped into the distribution system by the booster pumps. This will yield the MDD, which can be used as a key data source to refine the gpm/SFE demand criteria in the future. We recommend that FHMD purchase software and configure the SCADA system to record this information

4.2.3 Peak Hour Demand (PHD)

The District does not have data to calculate the PHD. Given this, Kennedy/Jenks recommends the use of 0.7 gpm/SFE for planning purposes. This criterion is similar to the 0.68 gpm/SFE planning value used by WHMD, and since FHMD has fewer SFEs, FHMD would be expected to

have a higher gpm/SFE value compared to WHMD. Using this criterion, the existing PHD is estimated as 312 gpm.

To refine the PHD, Kennedy/Jenks recommends that FHMD gather actual data from its SCADA system, as described above to gather PHD data.

4.2.4 Fire Flows

The Falcon Fire Protection District determines the fire flows that are needed to respond to residential and commercial fires. The District has adopted the fire flow rates listed in the Uniform Fire Code, which are as follows:

- Residential: 1500 gpm for three hours
- Commercial: 3500 gpm for three hours

The FHMD meets this demand using a fire pump with a capacity of 3500 gpm that is programmed to start when the water system pressure drops below a low pressure setpoint. In addition, the FMHD storage tank level is operated to reserve a volume of 630,000 gallons, which is the volume needed for the fire pump to operate for three hours at 3500 gpm.

4.3 Future Build-Out Demand

There are 610.4 undeveloped acres within FHMD's existing District Boundaries as noted in Figure 1 in Appendix A. This is equivalent to 492 undeveloped SFE's based on projections that were made for the original land use plan and density when FHMD was formed. (These numbers do not account for any rezoning change in density, inclusive, or exclusive of property.) Based on this, at full build-out, FHMD would have a total of 938 SFEs, and would have the demands indicated in Table 5, using the design criteria developed above.

Table 5: Future Demand Criteria

Design Condition	Proposed Planning Criteria	Total Demand
ADD	0.32 AFY/SFE	300 AFY
MDD	0.5 gpm/SFE	470 gpm
PHD	0.7 gpm/SFE	660 gpm

Section 5: Supply and Demand Summary

5.1 Existing Supply and Demand Summary

The water system supply needs to have the capacity to meet the following demands:

- Average Annual Demand
- Maximum Day Demand
- Peak Hour Demand

Table 6 presents a summary of the general supply and demand for the existing condition with 446 SFEs. While the supply is sufficient to meet the ADD, the pumping capacity to meet the MDD and the PHD is slightly deficient. Potential system improvements to minimize the risk and/or probability of exceeding the system capacity are described in Section 7.

Table 6: Existing Supply and Demand Summary

	ADD (AFY)	MDD (gpm)	PHD (gpm)
Supply			
Source	Water rights	Well pumps	Booster pumps
Capacity	202.2[1]	200	300[2]
Demand	142.7	223	312
Net Supply	71	-23	-12

Notes:

1. Based on the DWR letter to EPC dated February 10, 2011 in response to the District's Filing 3 Final Plat, submittal dated January 18, 2011 (paper)
2. This assumes that the booster pumps operate with a pressure setpoint of 50 psig.

5.2 Future Supply and Demand Summary

Table 7 presents a summary of the general supply and demand for the future build-out with 938 SFEs. In each case, the supply is inadequate to meet the future demand, and system capacity improvements are needed to meet the demand. The necessary system improvements to meet the future demand are described in Section 7.

Table 7: Future Supply and Demand Summary

	ADD (AFY)	MDD (gpm)	PHD (gpm)
Supply			
Source	Water rights	Well pumps	Booster pumps
Capacity	213.7[1]	200	300[2]
Demand	300	470	660
Net Supply	-86.3	-270	-360

Notes:

1. Based on the EPC 300-year rule, and assuming FHMD can provide flow augmentation as needed so that all current paper water rights can be used.
2. This assumes that the booster pumps operate with a pressure setpoint of 50 psig.

Section 6: Treatment and Distribution System Capacity

6.1 General

The water treatment, storage, and distribution system consists of the following major facilities:

- Main Water Treatment Plant (WTP)
- Laramie Fox Hills Well #2 Water Treatment Plant
- Distribution System Booster Pumps
- Fire Pumps
- Water Storage Tank
- Distribution Piping

The water treatment system is regulated by the Colorado Department of Public Health and Environment (CDPHE) and must comply with the Colorado Primary Drinking Water Regulations. In addition, the water treatment facilities must meet the Colorado Design Criteria for Potable Water Systems. This section of the report summarizes the capacity of these facilities, based on equipment or permitted capacities. A schematic of these facilities is shown in Figure 2 in Appendix A.

The entire water system is operated and maintained by the District Facility Manager (plant operator) to comply with CDPHE permits and requirements.

6.2 Permitting

Letters from CDPHE related to the permitting of the water treatment facilities are included in Appendix B. The permit contains requirements for filtration and disinfection, which are the primary contaminants that are regulated. Iron and manganese are secondary contaminants related to taste and aesthetics, and are not regulated by CDPHE.

6.3 Main Water Treatment Plant (WTP)

6.3.1 General

The main water treatment plant is located at 7467 Antelope Meadows Circle and treats the water from wells Arapahoe #1 (A1) and Laramie Fox Hills #1 (LFH1). The treatment facility disinfects and filters the water prior to delivery to the water storage tank. In addition, the treatment facility can reduce the level of iron and manganese in the water as needed by adding potassium permanganate. Chlorine dosing alone also has the potential to oxide iron and manganese in the right conditions. Greensand media is used in the filters to facilitate the iron and manganese removal.

6.3.2 Flow Measurement

The flows from Arapahoe Well #1 and Laramie Fox Hills Well #1 are measured independently for each well using propeller meters that are located in the water treatment plant building. In addition, magnetic flow meters are used to measure the water flow from the filters as well as the backwash flow from the filters. (As of October 2017, the two magnetic flow meters are not operational.)

6.3.3 Filtration

Currently the plant has two greensand filters, each rated at 220 gallons per minute. This equates to a maximum filter hydraulic loading rate of 5 gpm/ft^2, which has been approved by the CDPHE. CDPHE's Design Criteria require that at least two filter units be provided that are both independently capable of meeting the plant design capacity (MDD) at the approved filtration rate. Thus, the firm capacity of the filter system is 220 gpm. When more than two filter units are used, the filters must be capable of meeting the design capacity at the approved filtration rate with the largest filter out of service. With the addition of one additional filter rated at 220 gpm, the capacity of the filter system would be increased to 440 gpm.

Potassium permanganate can be added to the filters to decrease the iron and manganese concentration in the filtered water. Solid potassium permanganate is added to a 250-gallon mixing drum and mixed to a specific concentration before it is pumped into an injection port directly next to the chlorination port. The metering pump used to inject the potassium permanganate solution has a capacity of 17 gallons per day. The designed dosing rate for the plant was calculated to be 6.6 gallons per day (assuming continuous operation) at 0.5 ppm.

The District's operator has indicated potassium permanganate addition has not been necessary to remove iron. This may be due to low concentration of iron in the groundwater, and/or the removal of iron by chlorination, which can remove iron via precipitation. At the higher flow rates projected for the future, it may become necessary to add potassium permanganate for iron removal.

The plant is equipped with an 8,750-gallon backwash tank. The filters are designed to be backwashed at a rate of 12-13 gpm/ft^2 for approximately 10-12 minutes. The backwash tank is sized for the two existing filters and a future filter rated at 220 gpm. The backwash tank is part of a closed-circuit system and pumps the backwash water into the header prior to the motionless mixer. The backwash water is supplied by the storage tank and is supposed to be metered by one of the two inoperable mag meters. The District's operator has reported that minimal backwashing has been required to date.

6.3.4 Disinfection

The plant must disinfect the water to be able to provide a 4-log virus inactivation to comply with CDPHE Design Criteria for Potable Water Systems. This equates to a minimum chlorine contact time (CT) of 2 minutes per mg/L based on a pH between 6 and 9 and a temperature of 25˚C. Due to the over 2,000 feet of 8" pipe from the WTP to the storage tank and a baffling factor of 1 for the plug flow experienced, this equates to a CT of 2.65 minutes per mg/L for a flow of 200 gpm and a residual chlorine concentration of 0.76 mg/L. The maximum flow from the WTP that

would have the necessary minimum CT is 1,983 gpm. When combined with the 100 gpm disinfection capacity of LFH2 discussed below, this equates to a system capacity of 2,083 gpm.

The plant uses sodium hypochlorite solution to disinfect the water from the two wells. The sodium hypochlorite is stored in 250 gallon drums, and is added to the water using a metering pump that discharges to a motionless mixer within the water piping. The metering pump is rated at 2 gallons per hour and can supply 2 milligrams per liter (mg/l) of chlorine at a water flow of 220 gallons per minute (gpm). A back-up metering pump is stored at the plant and can be easily installed if the in-service metering pump fails.

The metering pump operates only when a well pump is operating. The dosage rate of the metering pump is set manually to achieve a target chlorine residual in the pumped water. The plant operator uses a target dosage to achieve a residual of approximately 1.0 mg/l, which he has found is sufficient to maintain a chlorine residual of above minimum regulatory limit of 0.2 mg/l in the distribution system. If both well pumps are operating, then the dosage rate of the metering pump would need to be manually increased to achieve the target chlorine residual at the higher pumping rate.

6.4 Water Treatment Plant – Laramie Fox Hills #2 Well

6.4.1 General

A second water treatment plant is located to the southwest of the intersection of Woodman Road and Golden Sage Road within a small building, and is used to treat the water pumped from the Laramie Fox Hills #2 Well (LFH2). The LFH2 water treatment plant has a capacity of 100 gpm and is like the main water treatment plant for A1 and LFH1 in that it consists of filtration with potassium permanganate dosing for iron and manganese removal and disinfection with sodium hypochlorite. The water from this facility is discharged into a 4-inch pipe that is directly connected to the water storage tank.

6.4.2 Permitting

Letters from CDPHE related to the permitting of the water treatment facilities are included in Appendix D. The permit contains requirements for filtration and disinfection, which are the primary contaminants that are regulated. Iron and manganese are secondary contaminants related to taste and aesthetics, and are not regulated by CDPHE.

6.4.3 Filtration

A Pure Aqua MF-1000 single green sand filter is used at the LFH2 water treatment plant, and has a CDPHE approved filter rate of 5.1 gpm/ft^2. At this filter rate, the filtration capacity is 100 gpm, which matches the well pumping capacity. CDPHE also approved a decreased backwash rate of 5.1 gpm/ft^2 because iron levels are a secondary maximum contaminant level.

The LFH2 water treatment plant is not equipped with a backwash tank, or a connection to a sewer. Consequently, a truck with a storage tank would be needed on-site to allow

backwashing of the filters. In addition, since there is only one filter, the well would not be usable if the filter is out of service

6.4.4 Disinfection

The water is disinfected using a chlorination system that is similar to that used at the main WTP. The 4-inch pipe running from the LFH2 water treatment plant to the water storage tank combined with a target chlorine residual of 0.76 mg/L at 100 gpm gives the well a calculated CT of 10.80 minutes per mg/L. This gives the well a 21.6 log virus inactivation, well above the 4-log virus inactivation required.

The plant uses sodium hypochlorite addition to disinfect the water from LFH2. The sodium hypochlorite is stored in a 40 gallon drum, and is added to the water using a metering pump. The metering pump is rated at 2 gallons per hour and can supply up to 2 parts per million (ppm) of chlorine at a water flow of 220 gallons per minute (gpm). A back-up metering pump is stored at the plant and can be easily installed if the in-service metering pump fails.

The metering pump operates only when the LFH2 is operating. The dosage rate of the metering pump is set manually to achieve a target chlorine residual in the pumped water. The plant operator uses a target dosage to achieve a residual of between 1.0 and 1.5 mg/l, which he has found is sufficient to maintain a chlorine residual of above minimum regulatory limit of 0.2 mg/l in the distribution system.

6.5 Water Storage Tank

6.5.1 General

The treated water from the water treatment plants is stored in a steel, above ground storage tank with a capacity of one million gallons. The tank is located in the Rolling Thunder Business Park area as shown in Figure 1. The water tank provides storage for fire flows and operational storage to meet peak user demands.

6.5.2 Fire Flow Storage Volume

The tank must always have the storage volume needed to meet fire flow, which is currently based on pumping 3500 gpm for three hours, which equates to 630,000 gallons of storage. This demand and volume is based on general fire code guidance for a commercial facility, but the Falcon Fire Protection District can allow a different volume based on the specific fire needs of the District. The Fire Protection District staff have determined that this is the appropriate capacity to meet the fire demand for the main commercial district that includes Walmart.

6.5.3 Operational Storage Volume

The operational storage volume is the available operational volume after accounting for the fire storage volume, and is equal to the volume between the normal low and high level operational levels in the tank. According to the plant operator, the tank is operated between a low level setpoint of 18 feet and a high level setpoint of 28 feet. Based on this, the operational volume is

approximately 300,000 gallons, which is sufficient to meet the estimated peak demands of the current system.

The plant control system uses the tank low and high level setpoints to start and stop the A1 and LFH1 well pumps. The plant operator must manually select whether one or two pumps are operational, and manually adjust the chlorination dose for one or two pump operation.

6.6 Distribution Pumping Capacity

6.6.1 General

The pumps that deliver pressurized water to the distribution system are located in a pump station building that is located adjacent to the water storage tank. Booster pumps are used to provide pressurized flow to meet the normal user demand, and a fire pump is used to provide pressurized flow during the atypical high demand that can occur during a fire. A single control panel controls the booster pumps and the fire pump.

6.6.2 Booster Pumps

The water in the storage tank is primarily pumped into the distribution system using a single lead booster pump to meet normal user demands. A second booster pump is installed as a back-up to the operational pump, and the second pump will start automatically if the lead pump does not operate. In addition, a spare booster pump and motor are stored in the pump station building.

Each pump is rated at 250 gpm at 125 feet total dynamic head (TDH), and each is equipped with a variable frequency drive to meet the variable user demand. The control system automatically varies the speed of the lead pump to meet a target discharge pressure so that the pressure in the distribution system is maintained at a relatively constant pressure. The target setpoint is currently set at 55 psig, which results in a pumping output of approximately 250 gpm. The pump output could be increased to approximately 300 gpm if the pressure setpoint is reduced to approximately 50 psig, which would allow the booster pumps to approximately meet the estimated PHD. The lower pressure setting would still result in adequate pressure in the distribution system during normal demand.

6.6.3 Fire Pump

A single fire pump with a capacity of 3500 gpm at 66 feet TDH is installed at the pump station and is connected to the common pipe header with the booster pumps. The fire pump is also capable of operating at a flow of 1500 gpm with a TDH of 90 feet. The fire pump will start automatically so that the discharge pressure does not fall below 20 psig.

The fire pump is not UL listed, and therefore is not certified under the National Fire Protection Agency's (NFPA) standards. In order for a pump to be NFPA certified, it must be factory tested and a new fire pump would be required. However, the pump is sized to meet the District's fire flow needs.

Based on the International Fire Code IFC) and initial conversations with the Falcon Fire Protection District, the fire pump is sized sufficiently to supply the required 3 hours of 3,500 gpm fire flow, and the water storage tank contains the minimum storage of 630,000 gallons. The Fire Protection District was consulted during the design of the system.

Kennedy/Jenks held a conference call with Fire Chief Trent Harvey and Deputy Chief Jeff Petersma of the Falcon Fire Protection District in September 2017 regarding the required storage capacity and IFC reduction for internally sprinkled buildings. The Deputy Chief subsequently confirmed that the Fire Protection District approved the installation of the fire pump and that the size is adequate for the demand of the Walmart building sprinkler system.

Kennedy/Jenks also contacted the Falcon Fire Protection District about the fire flow demand for the Rolling Thunder Business Park after initial modeling indicated that the existing FHMD system could not supply 3500 gpm without significant improvements. In an email dated December 7, 2017, Fire Chief Hartwig indicated that three of the six structures in the Business Park are less 5900 square feet, and therefore a fire flow of 1500 gpm is sufficient. The three other structures are between 10,000 and 11,000 square feet and therefore would require 2,250 gpm of fire flow. However, since these three structures have a sprinkler system, 1500 gpm of fire flow is sufficient. The Chief noted that all future structures in the Business Park will need to be limited to needing no more than 1500 gpm.

6.6.4 Flow Metering

An 8-inch magnetic flow meter is installed downstream of the booster pumps to measure the flow from the booster pumps. The instantaneous flow is indicated locally at the flow meter and is transmitted for display in the SCADA system.

The flow meter has a range of 0-3000 gpm, but this is oversized for the normal flow conditions, which ranges from approximately 30 to 250 gpm. Consequently, the flow indication of this meter may not be as accurate as would be desirable to provide data to determine the MDD. A 4-inch flow meter would be a more appropriate size for the typical flow range. As of October 2017, flow readings from the booster pump flow meter are being recorded so that they can be compared to the water meter flow readings to assess whether the booster pump flow meter is sufficiently accurate.

6.7 Emergency Power

The Colorado Design Criteria for Potable Water Systems mandates that the District have provisions in place so that during power outages the distribution system can meet average day demand. The District has an emergency generator at the main water treatment plant to provide power to wells AR1 and LFH1 and the water treatment facilities. The District also has an emergency generator at the distribution pump station site to provide power for the booster pumps and appurtenances.

6.8 Distribution Piping Capacity

6.8.1 Pipe Sizing

The distribution system piping should be designed to meet the following general design criteria:

- Provide a minimum of 48 psig for normal use by customers at flows during the MDD of 223 gpm. (0.5 gpm per SFE for 446 SFEs)
- Provide a minimum of 48 psig for normal use by customers at the PHD of 312 gpm. (0.7 gpm per SFE for 446 SFEs)
- Provide a minimum pressure of 20 psi in the system during a residential fire requiring 1500 gpm plus MDD.
- Provide a minimum pressure of 20 psi in the system during a commercial fire requiring 3500 gpm plus MDD.
- Meet the above with a maximum water velocity of 10 feet per second in the piping at all conditions listed.

6.8.2 System Modeling

The distribution system piping was modeled to check the ability of the system to meet the above design criteria, and to identify any piping deficiencies. Following is a summary of the model results for the scenarios described below. The figures that show the outputs of the model scenarios are included in Appendix I.

6.8.2.1 Maximum Day Demand – Scenario 1

Scenario 1 was modeled to check for adequate system pressure at the user connections during the MDD of 223 gpm. The pressure was adequate, with a range of pressures from 48 to 77 psi. The water velocity in the piping was very low, with a maximum of less than 0.25 feet per second.

6.8.2.2 Maximum Day Demand with Residential Fire – Scenario 2

This scenario was modeled to check for adequate system pressure at the user connections if a residential fire occurred at the end of Cascading Spring Circle, which would require 1500 gpm at the fire. In no instance did the pressure drop below 20 psi. The pressure was adequate to fight the fire, with 26 psi available at the fire site. The lowest pressure in the system was 25 psi. The maximum water velocity was 9.6 feet per second in the pipe feeding the fire.

6.8.2.3 Maximum Day Demand with Commercial Fire – Scenario 3

This scenario was modeled to check for adequate system pressure at the user connections if a commercial fire occurred at Meridian Road in the Falcon Highlands Market Place, which would require 3500 gpm at the fire. In no instance did the pressure drop below 20 psi. The pressure

was adequate to fight the fire, with 26 psi available at the fire site. The lowest pressure in the system was 23 psi. The maximum water velocity was 4.1 feet per second in the pipe feeding the fire.

6.8.2.4 Maximum Day Demand with Commercial Fire – Scenario 4

This scenario was initialed modeled to check for adequate system pressure at the user connections if a commercial fire occurred in the Rolling Thunder Business Park required 3500 gpm at the fire. In this scenario, it would not be possible to provide the design fire flow to the businesses in the Park since the existing 8-inch piping is not large enough to deliver 3500 gpm. To meet this design demand, approximately 1000 lineal feet of 8-inch pipe and 250 lineal feet of 12-inch pipe would need to be replaced with 15-inch pipe. Based on this, Kennedy/Jenks asked the Falcon Fire Protection District if a lower design fire flow of 1500 gpm would be adequate for fire protection in the Business Park. As previously noted, Fire Chief Hartwig noted that this is conditionally acceptable.

The model run using a fire flow of 1500 gpm indicated that the pressure was adequate to fight the fire, with 26 psi available at the fire site. The maximum water velocity was 9.6 feet per second feeding the fire, thus complying with the velocity criteria.

6.8.2.5 Peak Hour Demand

Scenario 1 was modeled to check for adequate system pressure at the user connections during the PHD of 312 gpm. The pressure was adequate, with a range of pressures from 48 to 76 psi. The water velocity in the piping was very low, with a maximum of 0.25 feet per second.

Section 7: Recommended Improvements

7.1.1 Recommended Improvements – Existing System

The existing water system does not have the capacity to meet the existing MDD criteria, nor does it have the capacity to deliver the recommended commercial fire flow to the Rolling Thunder Business Park. We recommend the following capacity and operational improvements to address these deficiencies.

7.1.1.1 Capacity Improvements

1. Distribution System Piping. Based on the modeling, the existing 8-inch and 12-inch piping that serves the Rolling Thunder Business Park is too small to deliver the design fire flow of 1500 gpm at a minimum pressure of 20 psi. However, prior to replacing the existing piping based on the modeling results alone, Kennedy/Jenks recommends testing the actual flow from a hydrant to see if 1500 gpm at 20 psi can be furnished.

7.1.1.2 Operational Improvements

1. Improve the water system, control system and SCADA system to improve the capability of the system to operate automatically during unattended operation. The following improvements will help to achieve this.

    a. The system should be programmed to start a second well pump as a lag pump automatically without operator intervention.

    b. Install a second chlorination pump at the main water treatment plant so that each well has a dedicated chlorination pump to start and stop chlorination when either well pump starts, and modify the control programming as needed. This will allow the control system to automatically start and stop either well as needed.

    c. Improve the control system so that it can automatically control how much water is pumped from each well to facilitate compliance with the permitted volume of water that can be pumped from each well.

    d. Install a redundant level device at the water storage tank to minimize the potential loss of a tank level signal.

2. Replace the flow meters in the water system so that accurate daily flows are measured. This includes the well flow meters, the booster pump flow meter, and possibly the filtration system flow meters. The well flow meters read significantly higher than the distribution system water meters, and should be replaced with magmeters, which are more accurate. The 8-inch booster pump flow meter is oversized since it has a range of 0-3000 gpm, but is generally measuring less than 200 gpm, which may lead to inaccurate flow reading. This is a critical flow meter since it measures the actual system demand, and will be used to refine the MDD criteria as data from this meter is recorded. (As of October 2017, flow readings from the booster pump flow meter are being

recorded so that they can be compared to the water meter flow readings to assess whether the booster pump flow meter is sufficiently accurate.)

3. Modify the SCADA system to record the daily flows so that the District can develop a database of maximum daily flows that can be used to monitor and develop future design criteria.

4. Develop a plan to require both commercial and single-family residents to minimize or stop irrigation during extreme conditions, such as a drought, which may cause demand to exceed the well pumping capacity. The plan should be developed in advance of the 2018 irrigation season so that it can be implemented quickly if an extreme condition occurs.

5. Improve the control and monitoring of the LFH2 well and WTP. Improvements to achieve this are as follows:

    a. Modify the antenna communications and PLC/SCADA system as needed so that the LFH2 system can be monitored and controlled from the District SCADA system at the main WTP.

    b. Install piping to interconnect the LFH2 discharge with the main WTP so that the LFH2 flow can be filtered and disinfected at the main WTP. This interconnection would facilitate automated control of LFH2 that could be coordinated with automated operation of wells LFH1 and A1. This would also allow automated control of all the wells to facilitate control of pumping from the aquifers in accordance with the water rights for each well.

    c. Install a filter backwash tank a LFH2 so that filter backwashing can be performed without renting a vactor truck to receive the backwash flow. Installation of a filter backwash tank would not be needed if LFH2 is interconnected to the main WTP as described above.

6. Continue discussions with the WHMD to develop a plan to install an emergency interconnection.

7. During low flow periods that routinely occur at night during the non-irrigation season, the booster pump is likely operating inefficiently, thus consuming more electricity than necessary. Review the pump station electricity bills and assess if potential cost savings would pay for implementing energy efficiency improvements. For instance, assess whether the installation of a small jockey pump would pay for itself with energy savings.

7.1.2 Recommended Improvements – Future System

FHMD is projected to grow from the current 446 SFE's to 938 SFE's in the future. This will increase flows for the following key demand criteria.

- Average Annual Demand – 300 AFY

- Maximum Daily Demand – 470 gpm

- Peak Hour Demand – 650 gpm

To accommodate this growth, the following improvements are needed. These improvements are in addition to the improvements described above for the existing system.

1. Additional water supply is needed to meet the increased ADD. FHMD has well water rights of up to 202.2 AFY using the El Paso County criteria of a 300-year well water supply. Therefore, FHMD will either need to acquire additional well water rights or renewable water rights to meet the projected future ADD of 300 AFY.

2. Additional well pumping capacity is needed to meet the MDD if FHMD uses new wells to meet the future demand. Assuming new wells can deliver a capacity equivalent to the capacity of the existing wells, two additional wells will be needed, each with a capacity of 100 gpm. However, there is a risk that the wells will not be able to produce 100 gpm, and on-site testing will be needed to confirm this capacity. Alternatively, if FHMD can obtain renewable water rights, then the flow from the renewable supply could be used to supplement the existing well pumping capacity.

3. An additional booster pump will be needed to meet the projected peak hour demand in the future. This will likely be needed even if a renewable source is used.

4. An additional filter will be needed to meet future demand if new well water, or untreated, renewable water is added to the system. The filter would be added to the main treatment plant, which means that the new wells will need to be connected to the main treatment plant using new 6-inch new piping. If the treated renewable water is available, then a new filter will not be needed.

7.1.3 General Recommendations

1. Continue to promote water conservation.

2. Continue to work with Walmart and Park Place to reduce their irrigation demand which will reduce the overall MDD. In addition, continue to communicate with El Paso County to obtain and refine their requirements for landscaping for Walmart.

3. Review the effectiveness of the Water Conservation Policy that was adopted on April 19, 2014 to reduce outdoor irrigation and water use. The Policy will be a key tool in reducing the maximum day watering use.

4. Adopt a policy that requires all existing and future commercial development to install separate domestic and irrigation meters to monitor and regulate use.

5. Review water rates and fees to promote conservation.

6. Continue to promote conservation with residential users who consume more than 0.5 AFY. Determine the cause of their high use, which could be due to excessive irrigation, service line leaks, etc.

7. Have the District's water attorney research any available renewable, and non-renewable water rights in the vicinity of FHMD boundaries to augment existing water rights to assist with meeting El Paso County requirements.

8. Consider adoption of a "water resource fee" for new water taps to pay for future capital projects.

7.1.4 Capital Improvement Program to Meet Future Demand

A summary of the capital improvements to meet the projected future demand and the opinion of probable cost is included below for budgeting purposes. Table 8 contains the cost of improvements to design and construct two new wells, which has a project cost of $3.55 million. Table 9 contains the cost of improvements to add a new filter and booster pump, which has a project cost of $0.54 million. These are planning level estimates with an accuracy of -30% to +50%.

Table 8: Two New Wells - Opinion of Probable Cost

			OPINION OF COST	
ITEM DESCRIPTION	**UNIT**	**QTY.**	**UNIT COST**	**TOTAL COST**
Mobilization/Permits/Insurance/Bonds	LS	1	$20,000	$20,000
New Well - LFH #3	LS	1	$800,000	$800,000
New Well - Arap. #2	LS	1	$800,000	$800,000
6" C-900 PVC and Fittings	LF	7,000	$60	$420,000
6" PVC with 12" Casing Horizontal Directional Drilling	LF	225	$170	$39,000
Connect to Water Treatment Plant	EA	1	$2,500	$2,500
Potholing Unidentified Utilities	EA	4	$800	$3,200
Asphalt Pavement Removal/Replacement	SY	85	$65	$5,600
Rotomill and Overlay (2-inches thick)	SY	250	$25	$6,300
Remove and Replace Unsuitable Subgrade	CY	10	$60	$600
Concrete Flatwork Allowance (curb & gutter and sidewalk)	LF	20	$100	$2,000
Erosion and Sediment Control, Including Site Restoration	LS	1	$25,000	$25,000
Survey	LS	1	$10,000	$10,000
Geotechnical Testing and Reporting	LS	1	$6,000	$6,000
Traffic Control	LS	1	$10,000	$10,000
SUBTOTAL				**$2,150,000**
Contractor Overhead and Profit			20%	**$430,000**
SUBTOTAL				**$2,580,000**
Contingency			30%	$645,000
TOTAL CONSTRUCTION COST				$3,225,000
Engineering			10%	$323,000
TOTAL PROJECT COST				**$3,548,00**

Table 9: New Filter and Booster Pump - Opinion of Probable Cost

ITEM DESCRIPTION	UNIT	QTY.	OPINION OF COST	
			UNIT COST	TOTAL COST
Mobilization/Permits/Insurance/Bonds	LS	1	$5,000	$5,000
Filter (220 gpm)	LS	1	$136,500	$136,500
Filter Piping and Filter Installation	LS	1	$54,600	$54,600
Demo Walls in Plant and Relocate Equipment	LS	1	$15,000	$15,000
Demo and Repairs Necessary to Install Filter	LS	1	$25,000	$25,000
Booster Pump (300 gpm)	LS	1	$25,000	$25,000
Electrical Installation (Pump and Filter)	LS	1	$50,000	$50,000
PLC Scada Integration (Pump and Filter)	LS	1	$10,000	$10,000
SUBTOTAL				**$321,000**
Contractor Overhead and Profit			20%	$64,000
SUBTOTAL				$385,000
Contingency			30%	$116,000
SUBTOTAL CONSTRUCTION COST				**$501,000**
Engineering			10%	$39,000
TOTAL CAPITAL COST				**$540,000**

Section 8: Regional Water Opportunities

8.1 General

The scope of work for the project does not include an analysis of opportunities to obtain water supply from a regional water system. However, connecting to a regional system is an alternative that the District should pursue as a regional connection may provide a more reliable long-term water supply, and has the potential to be less costly than developing two new wells.

In particular, FHMD should further investigate the potential to obtain renewable water from a regional system as an alternative to the development of new wells to pump non-renewable groundwater. Renewable water has the potential to be a more reliable water source since the supply of well water may diminish over time as the aquifers are depleted. In addition, renewable water is not subject to the EPC 300-year rule. If renewable water can be obtained, it should meet the following criteria:

- Average Annual Demand. At least 100 AFY in available water rights is needed to supplement the existing groundwater. If the renewable water is more cost-effective than the continued use of the groundwater, then contract for at least 300 AFY in water so that the renewable water alone can meet the projected future ADD.
- Maximum Day Demand. Provide capacity for a minimum of 200 gpm of continuous supply to supplement the existing well supply. Provide capacity for a minimum of 400 gpm of continuous supply if only the renewable water supply is used in the future.
- Treated Water. If the renewable water is treated, then it could be added directly to the existing water storage tank. An additional booster pump would be needed pressurize the water for distribution, as is currently done.

Following is a summary of potential alternatives that have been identified based on past efforts by Kennedy/Jenks.

- Sterling Ranch / Bar X. Groundwater rights in the Denver Basin north and west of FHMD.
- Falcon Water Authority. A potential development of sixteen wells and other related infrastructure.
- Woodmen Hills Metropolitan District. Potential partner to jointly procure water
- Colorado Springs Utilities (CSU). CSU is interested in selling and delivering renewable water from its Southern Delivery System (SDS) to well-based special districts.

In summary, it is risky for the FHMD to rely on new wells to meet future demands due to the unknown output and cost to develop new wells, and the potential high cost to acquire new water rights. Further, it's unknown whether the aquifers will be a long term viable water supply due to the likely draw down of the aquifers. Consequently, it would be prudent for the FHMD to review the potential to acquire a renewable tributary or renewable surface water supply. A recent report completed for the Colorado Springs Utilities (CSU) indicates that CSU should be

proactive in providing renewable water to entities outside the CSU service area. However, it's unknown when this water would be available, which may require FHMD to develop a part or all its remaining groundwater resources as an interim measure.

Appendix A: Figures

Appendix B: Water Rights

Letter from DWR to EPC dated February 10, 2011.

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RESOURCES

John W. Hickenlooper
Governor

Mike King
Executive Director

Dick Wolfe, P.E.
Director/State Engineer

February 10, 2011

Tony Deconinck
El Paso County Planning Department
DSDcomments@elpasoco.com

RE: Falcon Highlands, Filing 3 Final Plat (reconsideration); Subdivision SF-05-034
Section 12, T13S, R65W, 6th P.M.
Upper Black Squirrel Creek Designated Ground Water Basin
Water Division 2, Water District 10

Dear Mr. Deconinck:

According to the January 18, 2011 submittal concerning the above referenced final plat to subdivide approximately 136 acres into 158 residential lots, the applicant has applied for a reconsideration of the plat with no changes except the introduction of phasing. This project was originally approved in 2005 but was not recorded, and had expired.

In letters from the State Engineer's Office, dated November 4, 2005, September 7, 2006, and October 23, 2006, it was this Office's opinion that the proposed water supply was adequate and could be provided without causing injury. This letter supersedes that October 23, 2006 letter.

Water Supply Demand

According to the submittal, the estimated water requirements are 0.26 acre-feet annually per lot (a total of 41 acre-feet annually for 158 residential lots), for single family residences.

Source of Water Supply

The proposed water supplier is the Falcon Highlands Metropolitan District ("FHMD"). An updated letter of commitment from FHMD, dated December 2010, accompanied the January 18, 2011 submittal. The following Table 1 outlines the water rights FHMD is relying on for its water supply and the current and proposed water commitments:

VERSION # 1
DATE 2-14-11

Table 1. Water Supply

Water Right	Source	Trib. Status	Comment	Annual Amnt. (100-yr Aquifer Life)	Annual Amnt. (300-yr water supply)[2]
Water Sources within Designated Basins (Can only be applied on described overlying land area)					
141-BD	Klf	NT – 2%		128 AF	42.7 AF
142-BD	Ka	NT – 2%		118 AF	39.4 AF
143-BD	Tkd	NNT – 4%		189 AF	63.1 AF
			Subtotal	*435 AF*	*145.2 AF*
Water Sources from outside Designated Basins (Unrestricted area of application)					
01-CW-65	Klf	NT		49.1 AF[5]	16.4 AF[5]
01-CW-65	Ka	NT		57.6 AF[5]	19.2 AF[5]
01-CW-65	Tkd	NNT		0 AF[1]	0 AF
83-CW-133	Ka	NNT	59.7 AF[3] Not available	0 AF	0 AF
83-CW-134	Klf	NT		64.55 AF	21.5 AF
83-CW-135	Tkd	NNT	4.8 AF[3] Not available	0 AF[2]	0 AF
			Subtotal	*171.3 AF*	*57.1 AF*
TOTAL SUPPLY				***606.7 AF***	***202.2 AF***
Commitments					
Falcon Highlands, Phase I, Filing 1 (1/9/2004)[4]				-50 AF	-50 AF
Falcon Highlands, Phase II, Filing 2 (9/7/2006)[4]				-58 AF	-58 AF
Falcon Highlands Market Place (including replat of Lot 7), Phase III, Filing 1 & 2 (8/14/2006)[4]				-22 AF	-22 AF
Rolling Thunder Business Park (11/15/2007)[4]				-8	-8
The Shoppes (2/1/2007)[4]				-16	-16
Meridian Crossing (4/8/2008)[4]				-5.9	-5.9
Falcon Highlands, Phase III, Filing 3 (proposed)				-41 AF	-41 AF
Commitments Total				*200.9*	*200.9*
TOTAL REMAINING SUPPLY				***405.8 AF***	***1.34 AF***

1- No augmentation plan approved for use NNT ground water
2- Total (300yr) number arrived at by summing all nonrenewable water supplies annual allocations and dividing by 3
3- Aug. plan would not accommodate application of water on the subject land areas
4- Dates represent dates of comment letters written by DWR

The above referenced 136 acres lie within the allowed place of use of Determination of Water Right nos. 141-BD, 142-BD, and 143-BD and the proposed uses are uses allowed by that Determination. FHMD is able to supply the following beneficial uses as allowed by the Determinations of Water Right: domestic, livestock watering, lawn irrigation, commercial and replacement supply. As long as the water uses are consistent with these beneficial uses, FHMD is not required to apply for a change in water right to add municipal use.

FHMD's water sources from outside Designated Basins in Table 1 are constant with the proposed uses and include municipal use.

The proposed source of water for this subdivision are bedrock aquifers in the Denver Basin. The State Engineer's Office does not have evidence regarding the length of time for which this source will be a physically and economically viable source of water. According to 37-90-107(7)(a), C.R.S., "Permits issued pursuant to this subsection (7) shall allow withdrawals on the basis of an aquifer life of 100 years." Based on this **allocation** approach, the annual amounts of water determined in 141-BD, 142-BD, and 143-BD is equal to one percent of the total amount, as determined by rule 5.3.2.1 of the Designated Basin Rules, 2 CCR 410-1. Therefore, the water may be withdrawn in those annual amounts for a maximum of 100 years.

In the *El Paso County Land Development Code*, effective November, 1986, Chapter 5, Section 49.5, (D), (2) states:

"- Finding of Sufficient Quantity - The water supply shall be of sufficient quantity to meet the average annual demand of the proposed subdivision for a period of three hundred (300) years."

The State Engineer's Office does not have evidence regarding the length of time for which this source will "meet the average annual demand of the proposed subdivision." However, treating El Paso County' s requirement as an **allocation** approach based on three hundred years, the allowed average annual amount of withdrawal of 606.7 acre-feet/year would be reduced to one third of that amount, or 202.2 acre-feet/year. As a result, the water may be withdrawn in that annual amount for a maximum of 300 years.

The proposed annual water supply of 202.2 acre-feet is more than the estimated annual demand of 201 acre-feet.

State Engineer's Office Opinion

Based upon the above and pursuant to Section 30-28-136(1)(h)(I), C.R.S., it is our opinion that the proposed water supply is adequate and can be provided without causing injury to decreed water rights.

Our opinion that the water supply is **adequate** is based on our determination that the amount of water required annually to serve the subdivision is currently physically available, based on current estimated aquifer conditions.

Our opinion that the water supply can be provided without causing injury **is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory** allocation **approach, for the proposed uses [for Designated Basins add: on the subdivided land] is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision.**

Our opinion is qualified by the following:

The Ground Water Commission has retained jurisdiction over the final amount of water available pursuant to the above-referenced decree, pending actual geophysical data from the aquifer.

The amounts of water in the Denver Basin aquifer, and identified in this letter, are calculated based on estimated current aquifer conditions. For planning purposes the county should be aware that the economic life of a water supply based on wells in a given Denver Basin aquifer may be less than the 300 years used for allocation due to anticipated water level declines. We recommend that the county determine whether it is appropriate to require development of renewable water resources for this subdivision to provide for a long-term water supply.

Should you have any questions, please contact Justina P. Farris of this office.

Sincerely,

Keith Vander Horst, P.E.
Designated Basins Team Leader

cc: Steve Witte, P.E., Division Engineer
Doug Hollister, Water Commissioner
Upper Black Squirrel Creek GWMD
Determination Nos. 141-BD, 142-BD, 143-BD

KVH/JPF: FalconHighlandsSF05034_Feb2011.doc

STATE OF COLORADO

OFFICE OF THE STATE ENGINEER
Division of Water Resources
Department of Natural Resources

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Denver, Colorado 80203
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October 23, 2006

Carl Schueler
El Paso County Development Services Department
2880 International Circle
Colorado Springs, CO 80910

Re: Falcon Highlands, Phase II, Filing 3
Sec. 12, T13S, R65W, 6th PM
Upper Black Squirrel Creek Designated Ground Water Basin
W. Division 2, W. District 10

Dear Mr. Schueler:

We have reviewed your October 10, 2006 notice, which revises the number of residential lots from 156 to 158 for the above referenced proposal (subdividing 122.6 acres). The revision increases the estimated water requirement from 40.56 acre-feet annually to 41.08 acre-feet annually. The per-lot demand break down addressed in our most recent letter, dated September 7, 2006, remains unchanged. The proposed water supplier remains Falcon Highlands Metropolitan District ("FHMD"). The commitment letter from FHMD, dated August 25, 2006, in conjunction with the October 2, 2006 letter concerning commitments from Mr. Holt, FHMD's manager, should suffice in accounting for the increase. Information in our files indicates FHMD has sufficient water resources available on an annual basis to supply this subdivision.

Based upon the above and pursuant to Sections 30-28-136(1)(h)(I) and 30-28-136(1)(h)(II), C.R.S., it is our opinion that the proposed water supply remains adequate and can be provided without causing injury to decreed water rights.

Our opinion that the water supply is **adequate** is based on our determination that the amount of water required annually to serve the subdivision is currently physically available, based on current estimated aquifer conditions.

Our opinion that the water supply can be **provided without causing injury** is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory **allocation** approach, for the proposed uses on the subdivided land is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision.

Our opinion is qualified by the following:

The Division 2 Water Court and Ground Water Commission have retained jurisdiction over the final amounts of water available pursuant to the decrees and determinations, pending actual geophysical data from the aquifer.

The amounts of water in the Denver Basin aquifer, are calculated based on estimated current aquifer conditions. For planning purposes the county should be aware that the economic life of a water supply based on wells in a given Denver Basin aquifer may be less than the 100 years (or 300 years) used for allocation due to anticipated water level declines. We recommend that the county determine whether it is appropriate to require development of renewable water resources for this subdivision to provide for a long-term water supply.

Should you have any questions, please contact Eric Thoman of this office.

Sincerely,

Kevin G. Rein, P.E.
Chief of Water Supply

KGR/EBT:FalconHighlandsF3_no3.doc

cc: Steve Witte, Division Engineer
Tracy Doren, Upper Black Squirrel Creek GWMD
Designated Basins Branch
Records

STATE OF COLORADO

OFFICE OF THE STATE ENGINEER
Division of Water Resources
Department of Natural Resources

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Bill Owens
Governor

Russell George
Executive Director

Hal D. Simpson, P.E.
State Engineer

September 7, 2006

Carl Schueler
El Paso County Development Services Department
2880 International Circle
Colorado Springs, CO 80910

Re: Falcon Highlands, Phase II, Filings 2 and 3, Final Plat, SF-05-033
Sec. 12, T13S, R65W, 6th PM
Upper Black Squirrel Creek Designated Ground Water Basin
W. Division 2, W. District 10

Dear Mr. Schueler:

We have reviewed the June 26, 2006 re-submittal regarding the above-referenced subdivision along with the clarifications from Springs Engineering, dated August 28, 2006. These comments modify our opinion stated in our letter dated November 4, 2005.

Falcon Highlands, Filing 3 will subdivide 122.6 acres into 156 residential lots. Water and waste water services for the proposed subdivision are to be provided by the Falcon Highlands Metropolitan District (FHMD). An updated letter of commitment from FHMD, dated August 25, 2006, accompanied the August 28, 2006 submittal. In addition, the applicant proposes to revise the demand figures for Falcon Highlands, Filing 2, to which our office provided supportive comments in a letter dated November 4, 2005.

The applicant's August 28, 2006 submittal contained supporting documentation for a household and irrigation demand of 0.26 acre-feet per lot. Based on this value, the total proposed annual water demand for the Falcon Highland Subdivision, Filing 3 will be 41 acre-feet and the demand for Filing 2 will be reduced from 67 acre-feet to 58 acre-feet.

Table 1. Water Supply

Water Right	Source	Trib. Status	Comment	Annual Amnt. (100-yr Aquifer Life)	Annual Amnt. (300-yr water supply)[2]
Water Sources within Designated Basins (Can only be applied on described overlying land area)					
141-BD	Klf	NT – 2%		128 AF	42.7 AF
142-BD	Ka	NT – 2%		118 AF	39.3 AF
143-BD	Tkd	NNT – 4%		189 AF	63.0 AF
			Subtotal	*435 AF*	*145 AF*
Water Sources from outside Designated Basins (Unrestricted area of application)					
01-CW-65	Klf	NT		49.1 AF[5]	16.4 AF[5]
01-CW-65	Ka	NT		57.6 AF[5]	19.2 AF[5]
01-CW-65	Tkd	NNT		0 AF[1]	0 AF
01-CW-65			Return Flow Requirements	-0.712 AF	-0.712 AF

83-CW-133	Ka	NTT	59.7 AF[3] Not available	0 AF	0 AF
83-CW-134	Klf	NT	Reserved for post pumping depletions	0 AF[2]	0 AF
83-CW-135	Tkd	NNT	4.8 AF[3] Not available	0 AF[2]	0 AF
			Subtotal	*106.0*	*34.9 AF*
TOTAL SUPPLY				***541.0 AF***	***179.9 AF***
Commitments					
Falcon Highlands, Phase I, Filing 1 (1/9/2004)[4]				-50 AF	-50 AF
Falcon Highlands, Phase II, Filing 2 (proposed)				*-58 AF*	*-58 AF*
Falcon Highlands, Phase III, Filing 1 (8/14/2006)[4]				*-22 AF*	*-22 AF*
Subtotal				*411.0 AF*	*49.9 AF*
Falcon Highlands, Phase II, Filing 3 (proposed)				*-41 AF*	*-41 AF*
TOTAL REMAINING SUPPLY				***370.0 AF***	***8.9 AF***

1- No augmentation plan approved for use NNT ground water
2- Total (300yr) number arrived at by summing all nonrenewable water supplies annual allocations and dividing by 3
3- Aug. plan would not accommodate application of water on the subject land areas
4- Dates represent dates of comment letters written by DWR
5- Return flow requirements to be made directly to Sand Creek in the amount of 0.712 AF/yr

Information in our files indicates FHMD has sufficient water resources to supply this subdivision for periods of both 100 and 300 years. The State Engineer, under the provisions of Section 30-28-136(1)(h)(II), C.R.S., offers the opinion that the proposed water supply is adequate and will not cause injury to existing water rights.

Water in the Denver Basin aquifers is allocated based on a 100 year aquifer life under the provisions of Sections 37-90-107(7) and 37-90-111(5), C.R.S. For planning purposes the county should be aware that the economic life of a water supply based on wells in a given Denver Basin Aquifer may be less than 100 years indicated due to anticipated water level declines. Furthermore, the water supply plan should not rely solely upon non-renewable aquifers. Alternative renewable water resources should be acquired and incorporated in a permanent water supply plan that provides future generations with a water supply.

If you have any questions, please contact Eric B. Thoman of this office.

Sincerely,

Keith Vander Horst

for Kevin G. Rein, P.E.
Chief of Water Supply

KGR/KVH/EBT/FalconHighlandsF3_no2.doc

cc: Steve Witte, Division Engineer
Tracy Doren, Upper Black Squirrel Creek GWMD
Designated Basins Branch
Records

STATE OF COLORADO

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Bill Owens
Governor

Russell George
Executive Director

Hal D. Simpson, P.E.
State Engineer

November 4, 2005

Carl Schueler
El Paso County Development Services Department
2880 International Circle
Colorado Springs, CO 80910

Re: Falcon Highlands, Phase II, Filing 3, Final Plat, SF-05-033
Sec. 12, T13S, R65W, 6th PM
Upper Black Squirrel Creek Designated Ground Water Basin
W. Division 2, W. District 10

Dear Mr. Schueler:

At your request, we reviewed the proposal for the above referenced subdivision. As currently proposed in the submitted Water Supply Information Summary (Summary) and accompanying Engineering Study (Study), Falcon Highlands, Filing 3 will subdivide 122.6 acres into 156 residential lots. Please note that the cover sheet indicates that this is a 159 lot subdivision. Water and waste water services for the proposed subdivision are to be provided by the Falcon Highlands Metropolitan District (FHMD). Accompanying the subject proposal was a current letter of commitment, dated July 15, 2005. In a letter from the applicant's consultant, dated October 28, 2005 and submitted under separate cover, the applicant clarifies that return flow requirements for the decreed water rights pursuant to 01-CW-65 will be made directly to Sand Creek. According to the Summary, the total proposed annual water demand for the Falcon Highland Subdivision, Filing 3 will be 47 acre-feet. This breaks down into 36 acre-feet for household use for the 156 residential lots (0.23 acre-feet per lot), and 11 acre-feet is for irrigation purposes, which would be equivalent to approximately 5 acres of lawn and garden (or 1,400 square feet of lawn and garden per lot). Note that URS's memo dated November 1, 2005 indicates that 2500 ft^2 of sod will be irrigated per lot.

Please be aware that aside from the minimum allowable annual per household water consumption rate set by your office (0.26 acre-feet per year, El Paso County Development Code Section 49.5), our office also maintains a minimum allowable annual per household water consumption rate of 0.30 acre-feet per year per lot. The SEO reviews this value in our analysis for the purpose of

reasonable sustainability (i.e. adequacy). To consider household use consumption values below 0.30 acre-feet per year per lot, we require documentation showing that this rate can be maintained within reason for the prescribed 100-years must be submitted. The required documentation was supplied within the Study (see Section 3.11 and Appendix D) and in an attached memorandum from URS dated November 1, 2005.

Table 1. Water Supply

Water Right	Source	Trib. Status	Comment	Annual Amnt. (100-yr Aquifer Life)	Annual Amnt. (300-yr water supply)[2]
Water Sources within Designated Basins (Can only be applied on described overlying land area)					
141-BD	Klf	NT – 2%		128 AF	42.7 AF
142-BD	Ka	NT – 2%		118 AF	39.3 AF
143-BD	Tkd	NNT – 4%		189 AF	63.0 AF
			Subtotal	*435 AF*	*145 AF*
Water Sources from outside Designated Basins (Unrestricted area of application)					
01-CW-65	Klf	NT		49.1 AF[5]	16.4 AF[5]
01-CW-65	Ka	NT		57.6 AF[5]	19.2 AF[5]
01-CW-65	Tkd	NNT		0 AF[1]	0 AF
01-CW-65			Return Flow Requirements	-0.712 AF	-0.712 AF
83-CW-133	Ka	NTT	59.7 AF[3] Not available	0 AF	0 AF
83-CW-134	Klf	NT	Reserved for post pumping depletions	0 AF[2]	0 AF
83-CW-135	Tkd	NNT	4.8 AF[3] Not available	0 AF[2]	0 AF
			Subtotal	*106.0*	*34.9 AF*
TOTAL SUPPLY				***541.0 AF***	***179.9 AF***
Commitments					
Falcon Highlands, Phase I, Filing 1 (1/9/2004)[4]				-50 AF	-50 AF
Falcon Highlands, Phase II, Filing 2 (proposed)				*-67 AF*	*-67 AF*
Falcon Highlands, Phase III, Filing 1 (proposed)				*-22 AF*	*-22 AF*
Subtotal				*402.0 AF*	*40.9 AF*
Falcon Highlands, Phase II, Filing 2 (proposed)				*-47 AF*	*-47 AF*
TOTAL REMAINING SUPPLY				***355.0 AF***	***-6.1 AF***

1- No augmentation plan approved for use NNT ground water
2- Total (300yr) number arrived at by summing all nonrenewable water supplies annual allocations and dividing by 3
3- Aug. plan would not accommodate application of water on the subject land areas
4- Dates represent dates of comment letters written by DWR
5- Return flow requirements to be made directly to Sand Creek in the amount of 0.712 AF/yr

100-Year Aquifer Life Analysis:

Our records show that FHMD, through its determination of water rights and other decreed water, has a conditionally available supply totaling 541.7 acre-feet. Of this amount, 0.7 AF/yr is committed to return flows for the water decreed under Case No. 01-CW-65, 50 acre-feet is committed to Filings 1, of Phase I, 67 acre-feet is committed to Filing 2 of Phase II and 22 acre-feet for Filing 1 of Phase III of the Falcon Highlands Subdivision, leaving an available supply of 402

acre-feet. Based upon this available supply and a proposed water requirement of 47 acre-feet for the subject subdivision, the available water supply remains sufficient to meet the requirements of 100-year aquifer life under Sections 37-90-107(7) and 37-90-111(5), C.R.S. In addition, the amount of ground water proposed to be used for irrigation purposes would be sufficient to meet both the 2% and 4% return flow requirements of the above-referenced determinations of water right and relinquishing water in the prescribed amount directly to Sand Creek would satisfy the return flow requirements for the water decreed in 01-CW-65 (See Table above).

300-Year Water Supply Analysis

FHMD, through its determination of water rights and other decreed water, has a conditionally available 300-year water supply totaling 180.6 acre-feet. Of this amount, 0.7 AF/yr is committed to return flows for the water decreed under Case No. 01-CW-65 and 50 acre-feet is committed to Filings 1, of Phase I, 67 acre-feet is committed to Filing 2 of Phase II and 22 acre-feet for Filing 1 of Phase III of the Falcon Highlands Subdivision, leaving an available supply of 40.9 acre-feet. Based upon this available supply and a proposed water requirement of 47 acre-feet for the subject subdivision, the available water supply is insufficient to meet the County's 300-year water supply requirement.

In previous letters we stated our concern regarding the western edge of the proposed subdivision, which occurs within Section 11, Township 13 South, Range 65 West of the 6th PM, as an area that is outside of the area where the appropriations under Determination of Water Right 141-BD, 142-BD and 143-BD can be applied, and furthermore is outside of the Upper Black Squirrel Creek Designated Basin. To satisfy this concern Falcon Highlands, Filing 2 will designate this area as a "no irrigation" zone (See Plat Note No. 26), so that water from the above-mentioned appropriations will not be applied to any part of Section 11 and thus avoiding export of designated ground water outside of the Upper Black Squirrel Creek Designated Basin. This condition is acceptable to the SEO so long as a restrictive covenant or similar procedure is imposed by the county.

Based on the information provided to the State Engineer's office, the State Engineer under the provisions of Section 30-28-136(1)(h)(II), C.R.S., offers the opinion that so long as the above stated amendments are adhered to, the proposed water supply is adequate and will not cause injury to vested water rights.

Water in the Denver Basin Aquifers is allocated based on a 100 year aquifer life under the provisions of Sections 37-90-107(7) and 37-90-111(5), C.R.S. For planning purposes the county should be aware that the economic life of a water supply based on wells in a given Denver Basin Aquifer may be less than 100 years indicated due to anticipated water level declines. Furthermore, the water supply plan should not rely solely upon non-renewable aquifers.

Alternative renewable water resources should be acquired and incorporated in a permanent water supply plan that provides future generations with a water supply.

If you have any questions, please contact Eric B. Thoman of this office.

Sincerely,

Kevin G. Rein, P.E.
Chief of Water Supply

KGR/SMS/EBT/FalconHighlandsF3_FP.doc

cc: Steve Witte, Division Engineer
Tracy Doren, Upper Black Squirrel Creek GWMD
Designated Basins Branch
Records

Appendix C: Well - Arapahoe Well # 1

C.1.1 Site Pictures

C.1.2 Approval Letter

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
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Located in Glendale, Colorado

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8100 Lowry Blvd.
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Colorado Department
of Public Health
and Environment

PUEBLO DISTRICT OFFICE
4718 North Elizabeth Street, Suite B
Pueblo, Colorado 81008-2054
Phone (719) 545-4650 FAX (719) 543-8441

March 8, 2005

Greg Timm
Falcon Highlands Metropolitan District
24 N. Tejon
Colorado Springs, CO 80903

Subject: Plans Review for Falcon Highlands Metropolitan District
PWSID CO0121247
El Paso County, Colorado

Dear Mr. Timm:

The Water Quality Control Division (the Division) has received and reviewed the plans and specifications for the Triview Metropolitan District in accordance with Article 1.11.2 of the Colorado Primary Drinking Water Regulations (CPDWR). The design meets the requirements of the State of Colorado Design Criteria For Potable Water Systems and the New Water System Capacity Planning Manual and is approved for construction subject to the following condition:

- The sampling is incomplete for Well A-1. The following parameters must be tested for before the water system may commence routine operations:

Inorganic	Phase I, II, and V Organic	Radionuclides
Antimony	Dioxin*	Gross Alpha
Beryllium	Chlordane	Gross Beta
Copper	Glyphosate*	Total Dissolved Solids
Cyanide*	Polychlorinated biphenyl's	Uranium
Nickel		
Thallium		
Nitrite-N*		

* Typically waived due to oxidation by chlorine

Additional monitoring and/or treatment facilities may be necessary should any of these contaminants be detected at significant levels.

This approval addresses the following items:

- One new well named Well A-1;
- A 1,000,000 gallon storage tank;
- Filtration for iron using Aquasand Pressure Filters;
- Potassium Permanganate for iron treatment;
- Disinfection with sodium hypochlorite; and
- All associated piping and appurtenances.

Any change orders or addendums that address treatment or piping must be submitted to this office for review and approval.

In accordance with the current Colorado Operators Certification Board regulations, the Falcon Highlands Metropolitan District is required to be under the responsible control of at least a Class "C" water treatment plant operator and a Class "1" distribution system operator. The submitted inventory form did not list a certified operator. Therefore, the operator requirement is not being met. To assist you in locating or becoming a certified operator, you should contact Betsy Beaver in our Denver office at 303-692-3503, or the Operator Certification Program Office at 303-394-8994 for testing schedules and application forms.

Upon completion of construction, a written certification from the design engineer stating that the facility was built as approved must be submitted to this office. This certification should include the date that the new wells commenced routine operations.

Approval of this project is based only upon engineering design to provide safe potable water, as required by the Colorado Primary Drinking Water Regulations and shall in no way influence local building department or local health department decisions on this project.

If construction of the treatment facility is not begun within 365 days of this letter, the Division's approval will expire. All information will be required to be updated and resubmitted for review and approval by the Division.

Please direct any further correspondence regarding this approval to:

Joseph C. Talbott, Jr., EIT
Colorado Department of Public Health and Environment
Water Quality Control Division
4718 N. Elizabeth St., Suite B
Pueblo, CO 81008

Attached to this letter you will find a Customer Satisfaction Survey. We would greatly appreciate it if you would take a few moments to complete this survey and return it to us. Simply fill out the form, fold it according to the directions and drop it in the mail. The postage is already paid! Thank you for your time.

If you have any questions or comments, please call me at 719-545-4650 x21.

Sincerely,

Joseph C. Talbott, Jr., EIT
Technical Services Unit
Water Quality Control Division

Gary A. Soldano, P.E.
Southeast Regional Office Supervisor
Water Quality Control Division

cc: Charles Cothern, P.E., URS
Mike McCarthy, El Paso County Department of Public Health
Dave Rogers/DW File, Compliance Assurance & Data Management Unit, WQCD-Denver

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department
of Public Health
and Environment

PUEBLO DISTRICT OFFICE
4718 North Elizabeth Street, Suite B
Pueblo, Colorado 81008-2054
Phone (719) 545-4650 FAX (719) 543-8441

June 3, 2005

John Popovich
Falcon Highlands Metropolitan District
19 N. Tejon, Suite 200
Colorado Springs, CO 80903

Subject: Plans Review for Falcon Highlands Metropolitan District
PWSID CO0121247
El Paso County, Colorado

Dear Mr. Popovich:

The Water Quality Control Division (the Division) has received and reviewed the submitted items in response to the Division's conditional approval of March 8, 2005. All conditions have been met and the design meets the requirements of the State of Colorado Design Criteria For Potable Water Systems and the New Water System Capacity Planning Manual and Well A-1 is approved for use. The project engineer is still required to submit a written certification stating that the facility was built as approved. This certification should include the date that Well A-1 commenced routine operations.

If you have any questions or comments, please call me at 719-545-4650 x21.

Sincerely,

Joseph C. Talbott, Jr., EIT
Technical Services Unit
Water Quality Control Division

Gary A. Soldano, P.E.
Southeast Regional Office Supervisor
Water Quality Control Division

cc: Charles Cothern, P.E., URS
Mike McCarthy, El Paso County Department of Public Health
Erica Kannely/DW File, Compliance Assurance & Data Management Unit, WQCD-Denver

jct

Appendix D: Well - Laramie Fox Hills # 1

D.1.1 Site Pictures

D.1.2 Approval Letter

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department of Public Health and Environment

PUEBLO DISTRICT OFFICE
4718 North Elizabeth Street, Suite B
Pueblo, Colorado 81008-2054
Phone (719) 545-4650 FAX (719) 543-8441

August 22, 2005

John Popovich
Falcon Highlands Metropolitan District
24 N. Tejon
Colorado Springs, CO 80903

Subject: Plans Review for Falcon Highlands Metropolitan District
PWSID CO0121247
El Paso County, Colorado

Dear Mr. Popovich:

The Water Quality Control Division (the Division) has received and reviewed the plans and specifications for the Falcon Highlands Metropolitan District in accordance with Article 1.11.2 of the Colorado Primary Drinking Water Regulations (CPDWR). The design meets the requirements of the State of Colorado Design Criteria For Potable Water Systems and is approved for construction subject to the following condition:

- Upon completion of construction, a written certification from the design engineer/owner/contractor stating that the facility was built as approved must be submitted to this office. This certification should include the date that the system commenced routine operations.

This approval addresses the following items:

- One new well named Well LFH-1; and
- All associated piping and appurtenances.

Any change orders or addendums that address treatment or piping must be submitted to this office for review and approval.

In accordance with the current Colorado Operators Certification Board regulations, the Falcon Highlands Metropolitan District is required to be under the responsible control of at least a Class "C" water treatment plant operator and a Class "1" distribution system operator. The submitted inventory listed you as the certified operator. Our records state that you hold a Class "C" water treatment plant operator certification, but that there is no distribution system operator certified. Therefore, the operator requirement is not being met. If this information is incorrect or to assist you in locating or becoming a certified operator, you should contact Betsy Beaver in our Denver office at 303-692-3503, or the Operator Certification Program Office at 303-394-8994 for testing schedules and application forms.

Approval of this project is based only upon engineering design to provide safe potable water, as required by the Colorado Primary Drinking Water Regulations and shall in no way influence local building department or local health department decisions on this project.

If construction of the treatment facility is not begun within 365 days of this letter, the Division's approval will expire. All information will be required to be updated and resubmitted for review and approval by the Division.

Please direct any further correspondence regarding this approval to:

Joseph C. Talbott, Jr., EIT
Colorado Department of Public Health and Environment
Water Quality Control Division
4718 N. Elizabeth St., Suite B
Pueblo, CO 81008

Attached to this letter you will find a Customer Satisfaction Survey. We would greatly appreciate it if you would take a few moments to complete this survey and return it to us. Simply fill out the form, fold it according to the directions and drop it in the mail. The postage is already paid! Thank you for your time.

If you have any questions or comments, please call me at 719-545-4650 x21.

Sincerely,

Joseph C. Talbott, Jr., EIT
Technical Services Unit
Water Quality Control Division

Gary A. Soldano, P.E.
Southeast Regional Office Supervisor
Water Quality Control Division

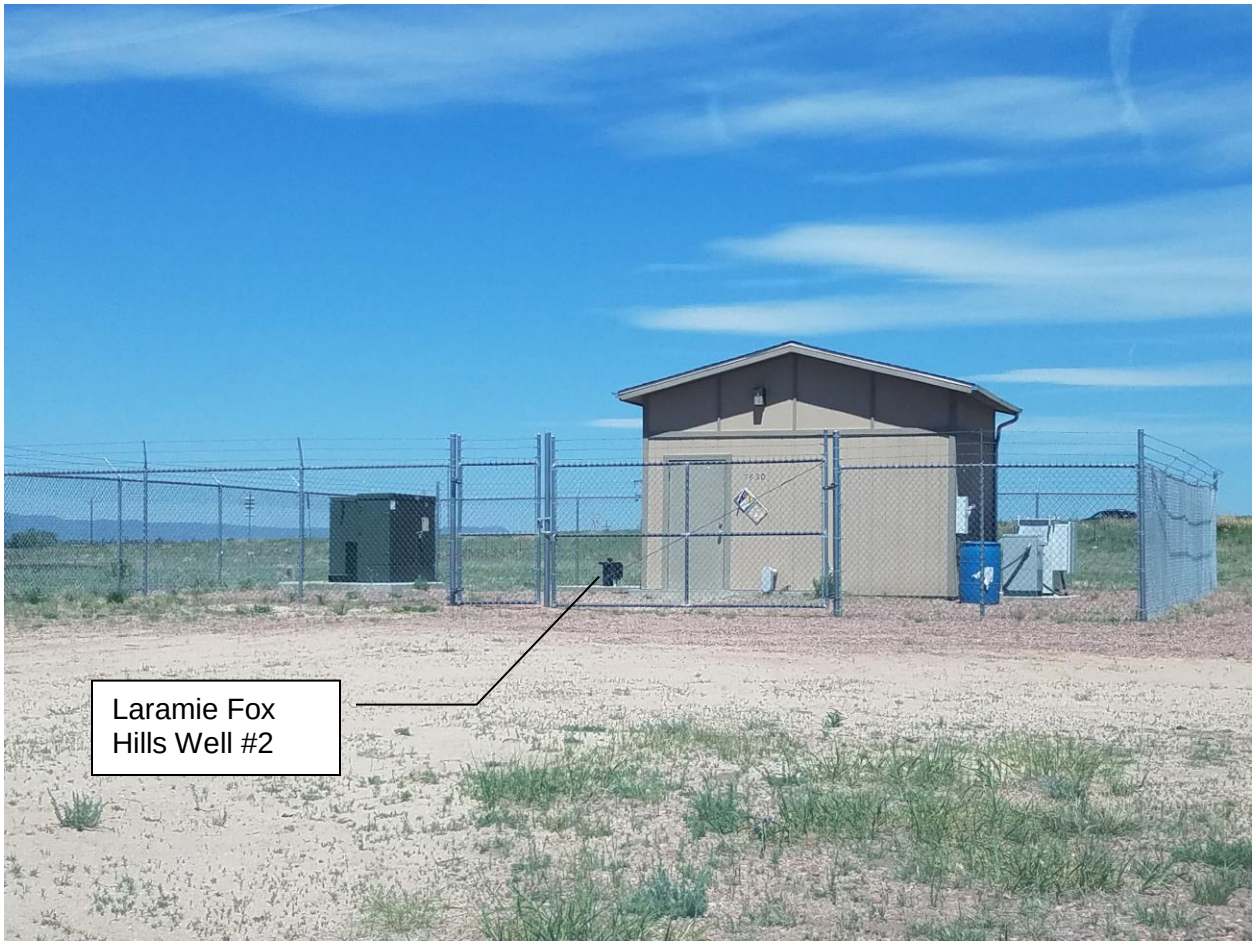
cc: Charles Cothern, P.E., URS
Mike McCarthy, El Paso County Department of Public Health
Erica Kannely/DW File, Compliance Assurance & Data Management Unit, WQCD-Denver

ecc: Betsy Beaver, Facility Operator Program, WQCD-Denver

jct

Appendix E: Well - Laramie Fox Hills # 2

E.1.1 Site Pictures



Approval Letter

STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
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Located in Glendale, Colorado

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department
of Public Health
and Environment

May 23, 2013

David Peak
Falcon Highlands Metropolitan District
c/o CliftonLarsonAllen, LLP
8390 E. Crescent Parkway, Suite 500
Greenwood Village, CO 80111

RE: Approval of Drinking Water Final Plans and Specifications for Construction
Falcon Highlands Metropolitan District, Laramie-Fox Hills Well (LFH No. 2 Well)
Public Water System Identification (PWSID) No. CO0121247; El Paso County

Dear Mr. Peak:

The Water Quality Control Division (the Division), Engineering Section has received and reviewed the Final Plans and Specifications for the Laramie-Fox Hills Well (LFH No. 2 Well) and associated disinfection and iron filtration treatment in accordance with Article 1.11.2 of the *Colorado Primary Drinking Water Regulations* (CPDWR). The design meets or exceeds the requirements of the *State of Colorado Design Criteria For Potable Water Systems* (Design Criteria) and is hereby approved.

This approval is limited to the following:

- LFH No. 2 Well (WL006): Groundwater source
    - Well Permit Number 66364-F. Drilled well. Screen: 1,910 to 2,133 feet, total depth: 2,155 feet, static water level approximately 1,300 feet.
    - Surface improvements: 4 feet by 4 feet by 4 inches thick sloped concrete pad.
    - Well improvements: Baski pitless adapter, casing raised to provide a minimum of 12" between grade and wellhead; wire wrapped vent screen.
    - Permitted flow: Maximum pumping rate of 150 gallons per minute (gpm) as indicated in the Colorado Groundwater Commission Statement of Beneficial Use.
    - Well pumping capacity: 100 gpm.
    - Associated piping and appurtenances.
- Disinfection and Iron Filtration Treatment Plant (TP007)
    - Treatment for LFH No. 2 Well (WL006), Design flowrate of 100 gpm.
    - Sodium hypochlorite disinfection treatment (D421):
        - Sodium hypochlorite feed pump (design basis: PULSAtron Series C), 40 gallon solution feed tank, and 66 gallon polyethylene secondary chemical containment pallet (design basis: Grainger ENPAC Drum Spill Containment Pallet).
        - Sodium hypochlorite injection point prior to iron filter. The compliance monitoring sample point remains the entry point after the finished water storage tank.
        - Well and chlorine pump electrically connected to control dosing.

- Pressure sand filtration for iron removal (F343):
  - One pressure filter vessel with manganese greensand media (design basis: Pure Aqua Inc., Industrial Media Filters MF-1000 Series Model GSF60-A-60Hz).
  - Potassium permanganate feed pump (design basis: PULSAtron Series C), 40 gallon solution feed tank, and 66 gallon polyethylene secondary chemical containment pallet (design basis: Grainger ENPAC Drum Spill Containment Pallet).
- Treatment appurtenances. Raw water sampling tap, chlorinated/filtered water sample tap located after the filter and prior to the transmission piping to the finished water tank, water meter (design basis: Elster AMCO Flow Meter evoQ_4), and Hach CEL/890 Advanced Portable Laboratory.
- Associated piping and appurtenances.

The approval includes the following deviations from the Design Criteria:

- Section 8.4.10 of the Design Criteria requires a normal filtration rate of 3 gpm/ft^2 for iron and manganese control. The reported design information indicates that at the 100 gpm pumping rate from the well, and a media cross sectional area of 19.6 ft^2, the filtration rate calculates to 5.1 gpm/ft^2. Based on iron being a secondary maximum contaminant level, along with the information supplied to support this deviation, the Division accepts this deviation request and has approved a normal filtration rate of 5.1 gpm/ft^2 for iron and manganese control for this system.
- Section 8.4.11 of the Design Criteria requires a normal back wash rate of 10 to 12 gpm/ft^2 for iron and manganese control. The reported design information indicates that at the 100 gpm pumping rate from the well, and a media cross sectional area of 19.6 ft^2, the backwash rate calculates to 5.1 gpm/ft^2. Based on iron being a secondary maximum contaminant level, along with the information supplied to support this deviation, the Division accepts this deviation request and has approved a normal backwash rate of 5.1 gpm/ft^2 for iron and manganese control of this system.

The approval is subject to the following conditions:

- The public water system has elected to perform **triggered source water monitoring**. Therefore, the system does not need to maintain 4-log virus inactivation on a continuous basis. However, the system is required to have the capability of providing 4-log inactivation before or at the first customer. The system has provided evidence that successfully demonstrates the disinfection provided is capable of achieving 4-log virus inactivation. The conditions as outlined in the engineering plans and specifications which must exist for 4-log inactivation of viruses to be achieved are as follows:
  - To achieve continuous, 4-Log inactivation of viruses, the system would have to continuously maintain a chlorine residual of 0.2 mg/L after the transmission pipe and prior to the finished water storage tank, assuming the maximum pumping rate of 100 gpm, a pH of 7.7, a liquid temperature at or greater than 25.3° Celsius, and minimum active transmission pipe storage volume of approximately 1,420 gallons (2,180 feet of nominal 4-inch diameter pipe) with a baffle factor of 1. As specified in the engineering plans and specifications additional chlorine contact time is also provided via the iron filtration vessel, and a chlorine residual of 0.76 mg/l is identified in order to maintain a detectable residual in the distribution system.
- In the event the system has a routine positive total coliform sample, the system will be required to monitor the source water for fecal indicators. If it is determined that fecal contamination exists within the source, the system may be required to meet the above conditions on a continuous basis until the source of contamination can be identified and removed if the system continues to use the source. If the system is required to maintain 4-log virus inactivation, the system will be required to monitor for chlorine residual at the location indicated above.
  - The Falcon Highlands Metropolitan District is a groundwater system with a population less than or equal to 3,300, therefore Article 13 of the CPDWR requires daily chlorine monitoring at the entry point for systems required to meet 4-log virus inactivation. The system will be required to work with the Division's Compliance Assurance Section to determine appropriate monitoring at that time.
- Part 1.2.11 of the Design Criteria requires all chemicals and materials that come in contact with water to be ANSI/NSF 60 and 61 certified, respectively, for potable water use.

- All wells, pipes, tanks and equipment shall be disinfected in accordance with AWWA procedures prior to start-up of the facility as required in Part 3.14 of the Design Criteria.
- All change orders or addenda that address treatment or piping must be submitted to this office in duplicate for review and approval by the Division.
- Upon completion of construction and prior to commencement of operation, a completed "Construction Completion Certification 'As Built' Form" from the design engineer stating that the system was constructed as approved and the operational starting date must be submitted to the Division. This form is available at: http://www.colorado.gov/cdphe/drinkingwaterdesign under the "Drinking Water Design Submittal Forms" heading.
- Article 1.12.3 of the CPDWR requires that systems submit any revisions to the Monitoring Plan within 30 days of the effective date of the change. Information on monitoring plans is available online at: http://www.colorado.gov/cdphe/wqforms on the Drinking Water page under the "Inventory/System Updates" heading.
- As required by Part 1.1.12 of the Design Criteria, if construction of the treatment facility is not commenced within 365 days of this letter, this approval will expire and all information will be required to be updated and resubmitted for review and approval by the Division.

The documents reviewed were:

- Application for Drinking Water Construction Approval dated September 23, 2011 and titled *New Laramie-Fox Hills Well-LFH#2*. Prepared by Kennedy/Jenks Consultants for the Falcon Highlands MD.
- Application for Drinking Water Construction Approval Supplemental dated September 6, 2012 and titled *Application for Drinking Water Construction Approval Laramie Fox Hills Well#2.* Prepared by Kennedy/Jenks Consultants for the Falcon Highlands MD.
- Application for Drinking Water Construction Approval Supplemental dated February 8, 2013and titled *Request for Information; Drinking Water Plans Submittal*. Prepared by Kennedy/Jenks Consultants for the Falcon Highlands MD.
- Application for Drinking Water Construction Approval Supplemental dated April 5, 2013 and titled *Laramie Fox hills #2 Drinking Water Plan Submittal.* Prepared by Kennedy/Jenks Consultants for the Falcon Highlands MD.
- Miscellaneous correspondence.

The following notifications and requirements may apply to the project:

- Approval of this project is based only upon engineering design to provide safe potable water, as required by the CPDWR and shall in no way influence local building department or local health department decisions on this project. This review does not relieve the owner from compliance with all Federal, State, and local regulations and requirements prior to construction nor from responsibility for proper engineering, construction, and operation of the facility.
- In accordance with the current Colorado Operators Certification Board regulations, the Falcon Highlands Metropolitan District water supply system is required to be under the responsible control of a Class "C" water treatment operator and a Class "1" distribution system operator. According to our records, the water system is under the responsible charge of Steven Dodd who currently holds a Class "C" water treatment plant operator certification and a Class "1" distribution system operator certification. Therefore the operator certification requirements are being met.
- Any point source discharges of water from the facility are potentially subject to a discharge permit under the State Discharge Permit System. Any point source discharges to state waters without a permit are subject to civil or criminal enforcement action. If you have any questions regarding permit requirements contact the Permits Unit at (303) 692-3500.

Please direct any further correspondence regarding the technical approval (plans and specifications/design review) to:

David Knope, P.E.
Colorado Department of Public Health and Environment
Water Quality Control Division - Engineering Section
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Thank you for your time and cooperation in this matter. If you have any questions, or require additional information, I can be reached at 719-545-4650, ext. 113, or via e-mail at dave.knope@state.co.us.

Sincerely,

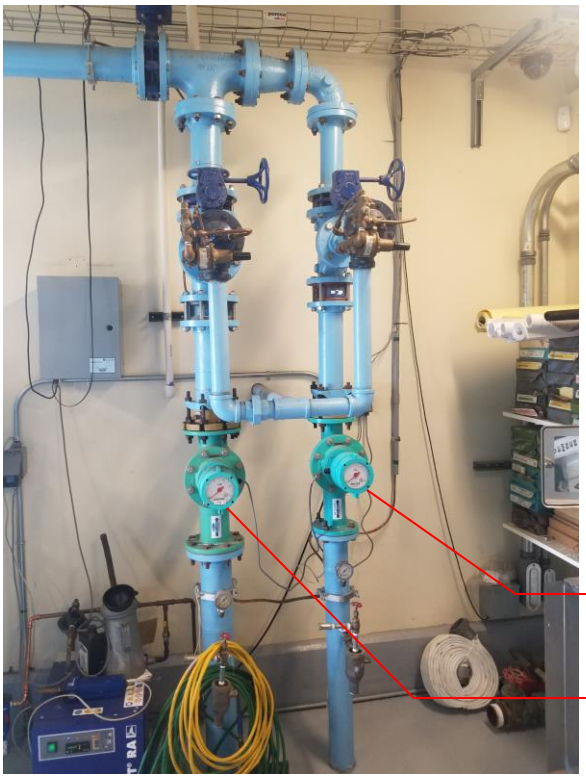
Digitally signed by Dave Knope, P.E.
DN: cn=Dave Knope, P.E., o, ou, email=dave.knope@state.co.us, c=US
Date: 2013.05.23 07:11:37 -06'00'

David W. Knope, P.E.
Senior Review Engineer
Engineering Section
Water Quality Control Division
Colorado Department of Public Health and Environment

cc: Thomas Napolilli, P.E., Kennedy/Jenks Consultants
Mike McCarthy, El Paso County Public Health
Doug Camrud, P.E., WQCD ES Engineering Review Unit Manager
Heather Drissel, P.E., WQCD FSS Field Unit II, Unit Manager
Drinking Water File PWSID No. CO0121247

Appendix F: Water Treatment - Arapahoe Well # 1 and Laramie Fox Hills #1

F.1.1 Site Pictures



Arapahoe #1 Flow Meter

Laramie Fox Hills #1 Flow Meter

Chemical Mixer

Filter and Control Valves

Appendix G: Water Treatment - Laramie Fox Hills # 2

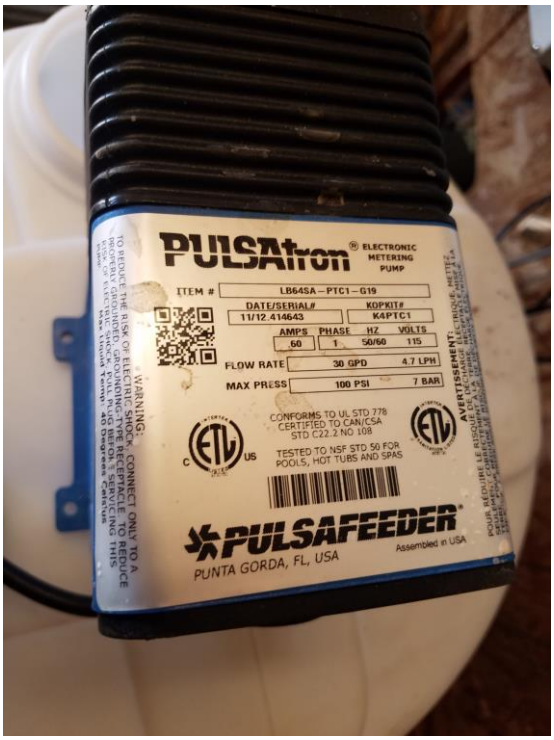
G.1.1 Site Pictures

LFH2 Flow Meter

LFH2 Chlorine Addition

LFH2 Chlorine Storage and Pump

LFH2 Filter Nameplate

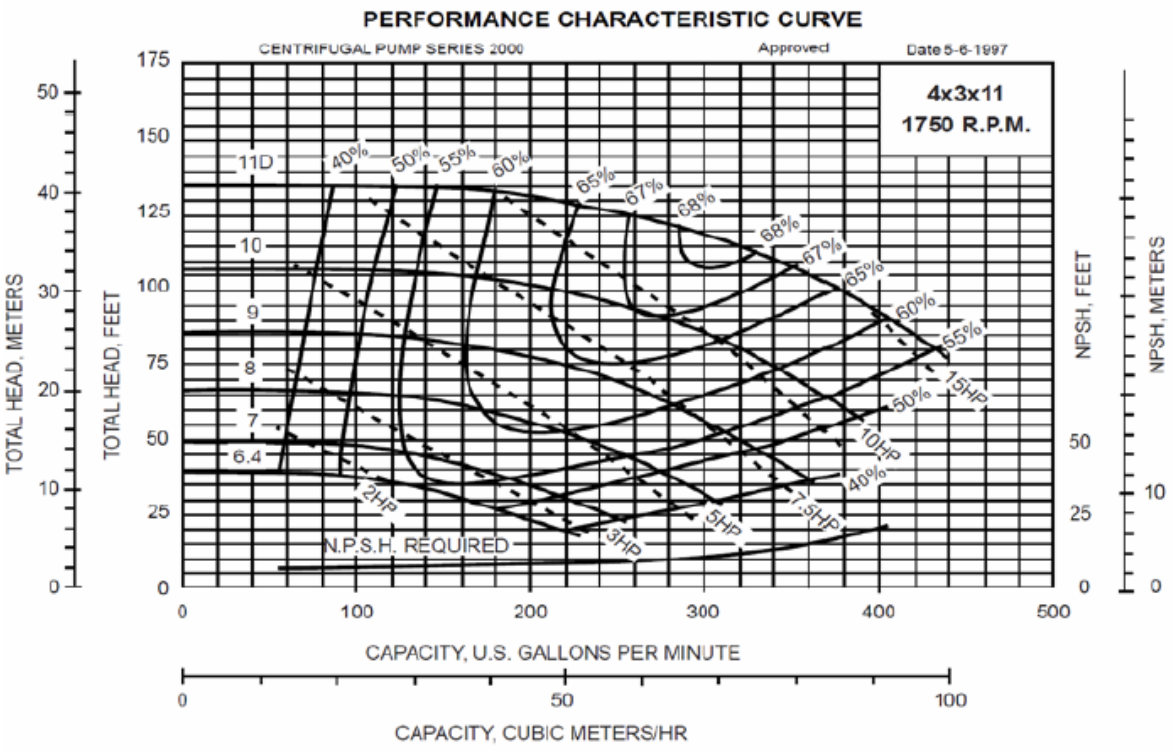


LFH2 Chlorine Pump Nameplate

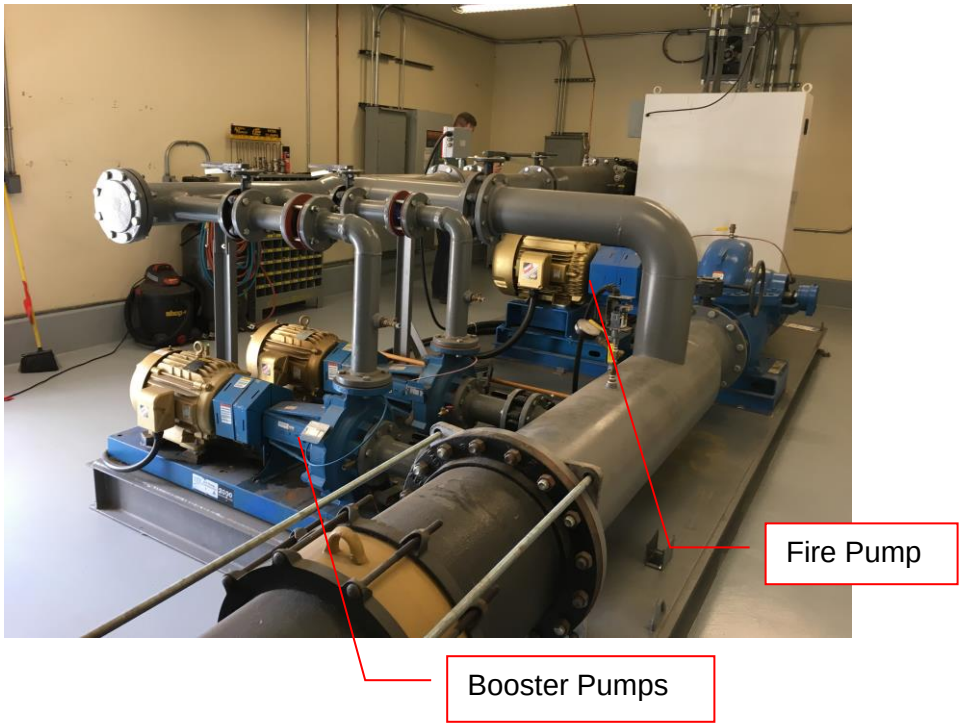
Appendix H: Distribution Pump Station

H.1.1 Site Pictures

H.1.2 Distribution (Booster) Pump Curve



H.1.3 Booster Pumps and Fire Pump



H.1.4 Booster Pump Flow Meter

H.1.5 Generator Nameplates

Appendix I: System Storage

I.1.1 Storage Tank

Appendix J: System Piping and Modeling Scenarios

Max Day Demand - Pressure and Velocity Map – Scenario 1
Max Day Demand +1,500 GPM FF at J-46 - Pressure and Velocity Map – Scenario 2
Max Day Demand +3,500 GPM FF at J-126 - Pressure and Velocity Map – Scenario 3
Max Day Demand +1,500 GPM FF at J-5 - Pressure and Velocity Map – Scenario 4
Peak Hour Demand - Pressure and Velocity Map – Scenario 5

Appendix D

FALCON HIGHLANDS MD 2022 Drinking Water Quality Report
Covering Data For Calendar Year 2021

Public Water System ID: CO0121247

Esta es información importante. Si no la pueden leer, necesitan que alguien se la traduzca.

We are pleased to present to you this year's water quality report. Our constant goal is to provide you with a safe and dependable supply of drinking water. Please contact JOSH MILLER at 719-635-0330 with any questions or for public participation opportunities that may affect water quality.

General Information

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. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791) or by visiting epa.gov/ground-water-and-drinking-water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised 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 (1-800-426-4791).

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:** viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
•**Inorganic contaminants:** salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
•**Pesticides and herbicides:** may come from a variety of sources, such as agriculture, urban storm water runoff, and residential uses.
•**Radioactive contaminants:** can be naturally occurring or be the result of oil and gas production and mining activities.
•**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.

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 Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

Lead in Drinking Water

If present, elevated levels of lead can cause serious health problems (especially for pregnant women and young children). It is possible that lead levels at 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 lead in your water, you may wish to have your water tested. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Additional information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at epa.gov/safewater/lead.

Source Water Assessment and Protection (SWAP)

The Colorado Department of Public Health and Environment may have provided us with a Source Water Assessment Report for our water supply. For general information or to obtain a copy of the report please visit wqcdcompliance.com/ccr. The report is located under "Guidance: Source Water Assessment Reports". Search the table using 121247, FALCON HIGHLANDS MD, or by contacting JOSH MILLER at 719-635-0330. 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 are listed on the next page.

Please contact us to learn more about what you can do to help protect your drinking water sources, any questions about the Drinking Water Quality Report, to learn more about our system, or to attend scheduled public meetings. We want you, our valued customers, to be informed about the services we provide and the quality water we deliver to you every day.

Our Water Sources

Sources (Water Type - Source Type)	Potential Source(s) of Contamination
WELL LFH2 (Groundwater-Well) WELL A1 (Groundwater-Well) WELL LFH1 (Groundwater-Well)	There is no SWAP report, please contact JOSH MILLER at 719-635-0330 with questions regarding potential sources of contamination.

Terms and Abbreviations

- **Maximum Contaminant Level (MCL)** − The highest level of a contaminant allowed in drinking water.
- **Treatment Technique (TT)** − A required process intended to reduce the level of a contaminant in drinking water.
- **Health-Based** − A violation of either a MCL or TT.
- **Non-Health-Based** − A violation that is not a MCL or TT.
- **Action Level (AL)** − The concentration of a contaminant which, if exceeded, triggers treatment and other regulatory requirements.
- **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.
- **Maximum Contaminant Level Goal (MCLG)** − 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 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.
- **Violation (No Abbreviation)** − Failure to meet a Colorado Primary Drinking Water Regulation.
- **Formal Enforcement Action (No Abbreviation)** − Escalated action taken by the State (due to the risk to public health, or number or severity of violations) to bring a non-compliant water system back into compliance.
- **Variance and Exemptions (V/E)** − Department permission not to meet a MCL or treatment technique under certain conditions.
- **Gross Alpha (No Abbreviation)** − Gross alpha particle activity compliance value. It includes radium-226, but excludes radon 222, and uranium.
- **Picocuries per liter (pCi/L)** − Measure of the radioactivity in water.
- **Nephelometric Turbidity Unit (NTU)** − Measure of the clarity or cloudiness of water. Turbidity in excess of 5 NTU is just noticeable to the typical person.
- **Compliance Value (No Abbreviation)** – Single or calculated value used to determine if regulatory contaminant level (e.g. MCL) is met. Examples of calculated values are the 90th Percentile, Running Annual Average (RAA) and Locational Running Annual Average (LRAA).
- **Average (x-bar)** − Typical value.
- **Range (R)** − Lowest value to the highest value.
- **Sample Size (n)** − Number or count of values (i.e. number of water samples collected).
- **Parts per million = Milligrams per liter (ppm = mg/L)** − One part per million corresponds to one minute in two years or a single penny in $10,000.
- **Parts per billion = Micrograms per liter (ppb = ug/L)** − One part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.
- **Not Applicable (N/A)** – Does not apply or not available.
- **Level 1 Assessment** – A study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
- **Level 2 Assessment** – A very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

Detected Contaminants

FALCON HIGHLANDS MD routinely monitors for contaminants in your drinking water according to Federal and State laws. The following table(s) show all detections found in the period of January 1 to December 31, 2020 unless otherwise noted. The State of

Colorado requires us to monitor for certain contaminants less than once per year 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. Therefore, some of our data, though representative, may be more than one year old. Violations and Formal Enforcement Actions, if any, are reported in the next section of this report.

Note: Only detected contaminants sampled within the last 5 years appear in this report. If no tables appear in this section then no contaminants were detected in the last round of monitoring.

Disinfectants Sampled in the Distribution System
TT Requirement: At least 95% of samples per period (month or quarter) must be at least 0.2 ppm ***OR***
If sample size is less than 40 no more than 1 sample is below 0.2 ppm
Typical Sources: Water additive used to control microbes

Disinfectant Name	Time Period	Results	Number of Samples Below Level	Sample Size	TT Violation	MRDL
Chlorine	December, 2021	Lowest period percentage of samples meeting TT requirement: 100%	0	2	No	4.0 ppm

Lead and Copper Sampled in the Distribution System

Contaminant Name	Time Period	90th Percentile	Sample Size	Unit of Measure	90th Percentile AL	Sample Sites Above AL	90th Percentile AL Exceedance	Typical Sources
Copper	08/03/2021 to 08/05/2021	0.049	10	ppm	1.3	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

Disinfection Byproducts Sampled in the Distribution System

Name	Year	Average	Range Low – High	Sample Size	Unit of Measure	MCL	MCLG	MCL Violation	Typical Sources
Total Haloacetic Acids (HAA5)	2021	1.6	1.6 to 1.6	1	ppb	60	N/A	No	Byproduct of drinking water disinfection
Total Trihalomethanes (TTHM)	2021	9.9	9.9 to 9.9	1	ppb	80	N/A	No	Byproduct of drinking water disinfection

Inorganic Contaminants Sampled at the Entry Point to the Distribution System									
Contaminant Name	**Year**	**Average**	**Range Low – High**	**Sample Size**	**Unit of Measure**	**MCL**	**MCLG**	**MCL Violation**	**Typical Sources**
Barium	2017	0.01	0.01 to 0.01	1	ppm	2	2	No	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Fluoride	2017	0.95	0.95 to 0.95	1	ppm	4	4	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate-Nitrite	2017	0.03	0.03 to 0.03	1	ppm	10	10	No	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits

Secondary Contaminants**						
Contaminant Name	**Year**	**Average**	**Range Low – High**	**Sample Size**	**Unit of Measure**	**Secondary Standard**
Sodium	2017	110	110 to 110	1	ppm	N/A

Secondary Contaminants**

**Secondary standards are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin, or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.

Violations, Significant Deficiencies, and Formal Enforcement Actions

No Violations or Formal Enforcement Actions