

RECORD OF PROCEEDINGS

MINUTES OF A SPECIAL MEETING OF THE BOARD OF DIRECTORS OF THE GREATROCK NORTH WATER AND SANITATION DISTRICT HELD JANUARY 5, 2021

A special meeting of the Board of Directors (referred to hereafter as “Board”) of the Greatrock North Water and Sanitation District (referred to hereafter as “District”) was convened on Tuesday, January 5, 2021 at 4:30 P.M. Due to COVID-19, the meeting was conducted via video conference - ZOOM. The meeting was open to the public.

Attendance

Directors in Attendance:

Robert W. Fleck
John D. Wyckoff
Jeffrey Polliard
Brian K. Rogers
Dave Lozano

Also in Attendance Were:

Lisa A. Johnson; CliftonLarsonAllen LLP (“CLA”)
Jennifer Gruber Tanaka, Esq.; White Bear Ankele Tanaka & Waldron, P.C.
Bradley A. Simons P.E.; MMI Water Engineers, LLC (“MMI”)
Chris Sanchez; Bishop Brogden Associates
Matt Poznanovic; Petrock Fendel Poznanovic, P.C.
Nick Marcotte; Element Engineering

Administrative Matters

Disclosure of Potential Conflicts of Interest

Attorney Tanaka advised the Board that, pursuant to Colorado law, certain disclosures may be required prior to taking official action at the meeting. Attorney Tanaka confirmed that disclosures of conflicts of interest were filed with the Secretary of State’s Office and the Board at least 72 hours prior to the meeting for those Directors with potential conflicts of interest. The Board reviewed the Agenda for the meeting, following which, Directors Fleck, Wyckoff, Polliard, Rogers and Lozano each confirmed that they had no additional conflicts of interest in connection with any of the matters listed on the Agenda.

Agenda

Ms. Johnson distributed for the Board’s review and approval a proposed Agenda for the District’s special meeting. Following discussion, upon motion duly made by Director Rogers, seconded by Director Wyckoff and, upon vote, unanimously

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carried, the Board approved the Agenda.

Board of Director's Report

None.

District Manager's Report

The Board reviewed the monthly Manager's Report. There were no questions. A copy of the report is attached hereto and incorporated herein by this reference.

Consent Agenda

The Board considered the following actions:

1. Approve the Minutes of the December 1, 2020 special meeting.
2. Ratify approval of the payment of claims for the period ending December 17, 2020 in the amount of \$204,253.08.
3. Operations and Maintenance Activities Report.
4. Review meter installation report.
5. Acceptance of cash position schedule and unaudited financial statements for the period ending November 30, 2020 and Inclusion Summary.

Following discussion, upon motion duly made by Director Polliard, seconded by Director Wyckoff and, upon vote, unanimously carried, the Board approved the consent agenda items, as presented.

Financial Matters

None.

Engineer's Report

Mr. Simons presented his report. A copy of the report is attached hereto and incorporated herein by this reference.

Capital Projects Updates:

Third Alluvial Well

Mr. Simons and Mr. Sanchez provided an update on the project.

Evaporation Pond

Mr. Simons provided an update to the Board. The Board discussed the delay in obtaining an easement from the property owner on the west side of Hudson Road. The Board determined to allow a two-week time period to the property owner to execute the easement and if not complete by January 18, 2021 to direct staff to meet with condemnation counsel to outline the condemnation process.

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Director Wyckoff asked Mr. Simons to update the cost estimate to construct the evaporation pond.

Reverse Osmosis Treatment Facility

Mr. Marcotte presented his report and provided an update on the project effort.

Water Meter Upgrade Project:

Ms. Johnson shared with the Board a recent conversation she had with a resident in Rocking Horse Farms regarding the project and their dissatisfaction with the notification and the project overall.

a. Update on EyeOnWater Account to Monitor Water Usage

Ms. Johnson solicited feedback from the Board on their experience with EyeOnWater.

b. Resolution No. 2021-01-01 Amending Appendix A of the Rules and Regulations (2019 Issuance)

The Board reviewed the Resolution No. 2021-01-01 and discussed the fee to charge non-compliant residents the monthly fee for meter reading services. Following review and discussion, upon a motion duly made by Director Rogers, seconded by Director Wyckoff and, upon vote, unanimously carried, the Board adopted Resolution No. 2021-01-01 Amending Appendix A of the Rules and Regulations (2019 Issuance) and directed Ms. Johnson to implement the fee once the meter upgrade project is complete.

Operations/ Maintenance Matters

Mr. Murphy presented the Operations and Maintenance Report to the Board. Director Wyckoff shared with Mr. Murphy some concerns he had read on Nextdoor regarding water quality concerns. A copy of the report is attached hereto and incorporated herein by this reference.

Legal Matters

Country Club Ranchettes #2 Inclusion Agreement

Staff presented the draft Inclusion Agreement to the Board. The Board provided comments and asked questions related to the content of the Agreement. A discussion ensued regarding the imposition of the renewable water resource fee.

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Following discussion, upon a motion duly made by Director Wyckoff, seconded by Director Polliard and, upon vote, unanimously carried, the Board determined to not impose a renewable water resource fee to the County Club Ranchettes due to the developer committing to convey sufficient water to serve the property to meet the Adams County 300-year rule, which exceeds those amounts dedicated by previous developers seeking inclusion.

The Board will consider approval of the Inclusion Agreement at their meeting in February. Staff will revise the Inclusion Agreement based on the action above and other comments, and then transmit to the property owner for review prior to action taken by the Board at the February meeting.

Other Business

Status of Homestead Heights/Country Club Ranchettes #1

No new update.

Status of Hayesmount Estates

No new update.

Status of Ridgeview Estates

Mr. Simons provided an update. He has a meeting scheduled with the developer this week to review the system improvements.

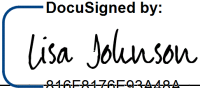
Community Comments

None.

Adjournment

There being no further business to come before the Board at this time, upon motion duly made by Director Wyckoff, seconded by Director Polliard and, upon vote, unanimously carried, the meeting was adjourned at 7:25 p.m.

Respectfully submitted,

By  Secretary for the Meeting
816F8176E93A48A...



Date: January 26, 2021
To: Greatrock North Water and Sanitation District, Board of Directors
From: Lisa A. Johnson, District Manager
Re: February 2, 2021 Manager's Report

Agenda Action Items

II.A. Consent Agenda

1. Approve the Minutes of the January 5, 2021 special meeting.
2. Ratify approval of the payment of claims for the period ending January 22, 2020.
3. Operations and Maintenance Activities Report.
4. Review meter installation report.
5. Acceptance of cash position schedule, property tax schedule and unaudited financial statements for the period ending December 31, 2020 and inclusion summaries.
6. Ratify approval of an engagement letter with White & Jankowski, LLC for water rights legal services.
7. Approve an Independent Contractor Agreement with Martin and Wood related to water rights engineering and hydrogeological services.

I recommend approval of the consent agenda items.

III.A. Delinquent Account List

I will discuss the current delinquent water usage account list with the Board at the meeting.

IV.A.2. Evaporation Pond Easement

Per the Board's direction, I have scheduled a call with Attorney Alderman and Attorney Tanaka regarding condemnation efforts/actions related to final easement needed related to the evaporation pond project. I have also included the memo from Attorney Alderman regarding the condemnation process for the Board's review.

IV.A.4.Meter Upgrade Project

The project is moving along and we are not down to 15 accounts left to complete.

I will share the specific information related to the final 15 accounts at the meeting.

I also wanted to touch base with the Board on the EyeOnWater software. Have you all had a chance to use it now? Are we ready to roll it out to our customers?

VII.A. Homestead Heights/ Country Club Ranchettes #1

Updates provided in the Engineer's Report.

VII.B. Hayesmount Estates

19 System Development Fees have been paid as of February 21, 2020.

VII.C. Ridgeview Estates

Updates provided in the Engineer's Report.

Review of monthly Water Resumes and Other Water Related Matters

Attorney Poznanovic has reviewed the November resume and did not find any cases he recommends the District oppose.

He and Chris Sanchez also provided information on upcoming water case that is being filed by Rangeview MD. They both have conflicts with this case and have recommended the District engage a water rights attorney and engineer to review the case and determine if an objection is warranted. I solicited a new engagement letter from Alan Curtis with White & Jankowski for this work. On the suggestion from Attorney Curtis, I also solicited a proposal from Martin and Wood for water rights engineering services. Both of these are included on the consent agenda.

Update on other District Related Matters and/or Committee Meetings

The Committee did not meet in January.



**GREATROCK NORTH WATER AND SANITATION DISTRICT
ENGINEER'S REPORT
January 24, 2021**

Facility Activities

Box Elder Creek Ranch Subdivision

MMI Water Engineers continues to work with Ramey Environmental Compliance on the operation of the Box Elder Creek Ranch water treatment facility in an effort to improve upon overall water quality.

Rocking Horse Farms Subdivision

Brad Simons and Mike Murphy intend to meet at the Rocking Horse Farms tank site to review yard piping and pump operations in an effort to address water pressure issues.

Greatrock North Subdivision

No activity updates to report.

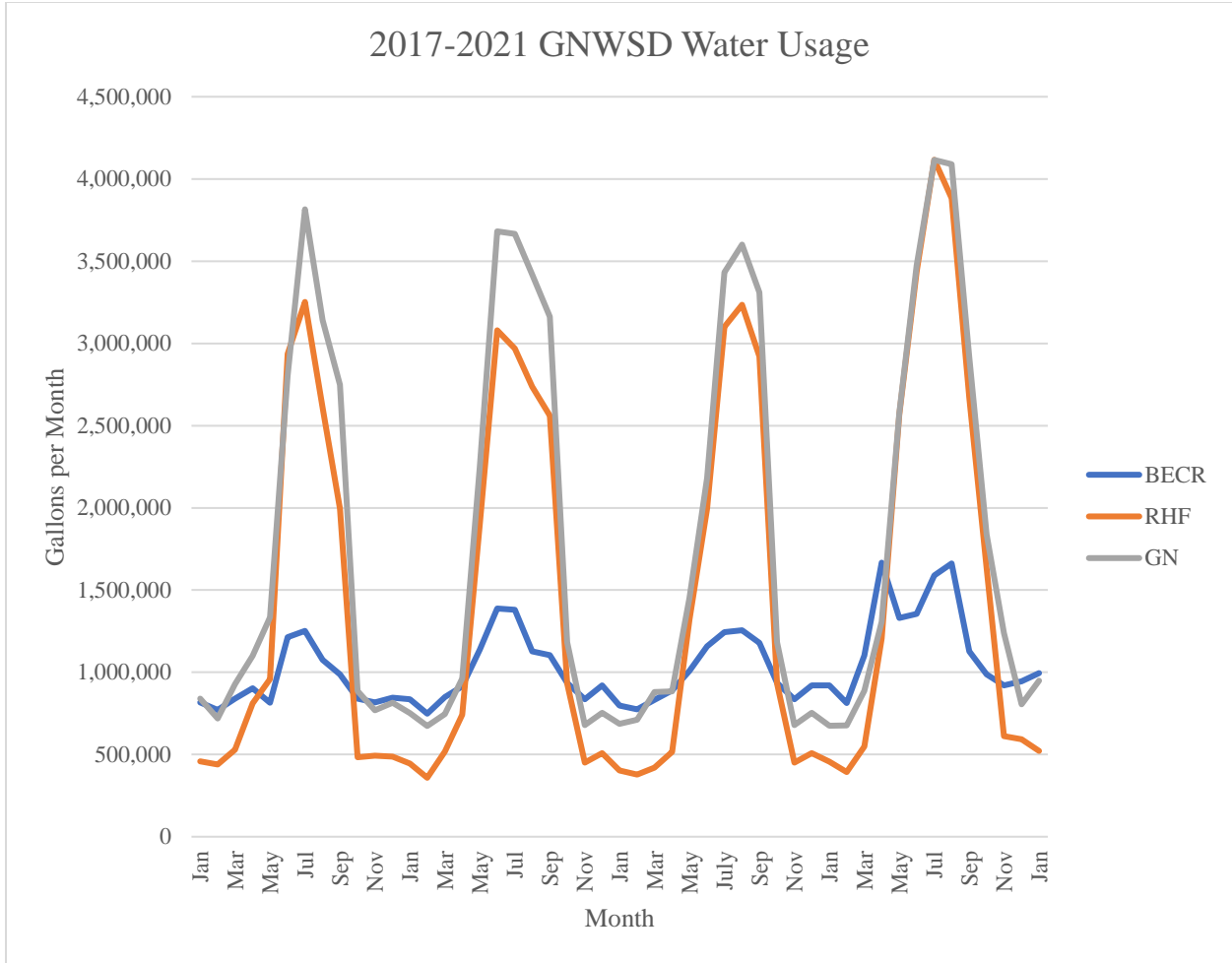
Hayesmount Estates Subdivision

No activity updates to report.

District-wide Activities**General Water Accounting**

Below is a tabulation and graph of water usage (gallons) for each month for each subdivision based upon the daily/monthly SCADA reports.

2018, 2019, & 2020	BECR	RHF	GN
December (2018)	921,072	508,705	754,203
January (2019)	796,883	401,939	686,814
February	774,758	377,806	710,598
March	831,348	420,949	880,730
April (projected)#	888,839	516,644	883,631
May	1,007,538	1,318,466	1,450,327
June	1,158,465	1,995,163	2,181,844
July	1,244,000	3,099,940	3,432,270
August	1,254,862	3,235,914	3,601,755
<i>September (as of 09/22/19)</i>	<i>864,337</i>	<i>2,141,286</i>	<i>2,427,177</i>
<i>September (projected)</i>	<i>1,178,641</i>	<i>2,919,936</i>	<i>3,309,787</i>
October	DATA NOT AVAILABLE		
November	DATA NOT AVAILABLE		
December (2019)	DATA NOT AVAILABLE		
January (2020)	920,151	456,104	674,231
February (2020)	813,103	393,499	677,324
March (extrapolated)	1,102,947	548,954	887,770
April (2020)	1,666,738	1,205,597	1,308,247
May (2020)	1,329,794	2,567,558	2,577,018
June (2020)	1,354,490	3,436,038	3,474,282
July (2020)	1,589,929	4,116,479	4,115,786
August (2020)	1,661,503	3,883,490	4,088,931
September (2020)	1,127,211	2,670,221	2,915,935
October (2020)	987,550	1,633,776	1,838,619
November (2020)	920,123	612,126	1,238,940
December (2020)	946,004	592,328	805,340
January (through 01/23/21)	737,849	386,390	703,649
<i>January (projected)</i>	<i>994,492</i>	<i>520,787</i>	<i>948,396</i>



Water Quality Tracking

Below are tables summarizing water quality, pond levels, and electricity usage. On September 11, 2020, REC removed the reverse osmosis runtime restrictions.

Sample Date	TDS (mg/l)			Hardness (mg/l)		
	BECR	RHF	GN	BECR	RHF	GN
January 8, 2021	541	552	549	190.1	197.5	197.4
December 9, 2020	638	619	556	198.0	211.3	202.6
November 17, 2020	608	731	696	207.5	263.1	240.5
October 27, 2020	769	594	613	285.2	186.9	199.3
September 16, 2020	731	685	656	344.0	322.1	318.6
August 19, 2020	735	731	700	335.6	328.6	332.6
July 22, 2020	709	689	684	264.8	265.3	265.9
June 29, 2020	680	703	699	303.1	293.2	294.9
May 15, 2020	660	664	670	252.3	264.4	267.6
April 15, 2020	562	530	527	207.3	197.1	203.9
March 18, 2020	474	459	461	166.8	152.6	153.4
February 26, 2020	484	485	493	160.2	158.6	171.2
January 15, 2020	435	426	464	147.0	146.9	157.2
December 13, 2019	403	358	361	128.0	109.6	115.3
November 27, 2019	432	339	395	117.1	88.7	91.3
October 16, 2019	340	452	415	79.6	129.2	117.8
September 25, 2019	495	497	485	165.5	177.9	174.9
August 14, 2019	565	520	546	213.3	195.8	194.7
July 17, 2019	464	437	513	193.2	186.3	190.6
June 5, 2019	511	557	544	132.2	173.7	154.8
May 22, 2019	665	650	645	262.3	263.3	271.7
April 24, 2019	490	451	459	170.9	141.1	149.1
March 20, 2019	437	429	419	162.0	153.2	159.2
February 28, 2019	352	404	334	112.9	136.8	110.4
January 16, 2019	657	510	590	261.9	182.4	226.2
December 5, 2018	292	318	328	62.1	66.8	66.0
November 7, 2018	283	305	290	72.0	88.6	81.0
October 11, 2018	292	347	346	90.9	128.6	121.6
September 14, 2018	434	442	444	167.1	167.4	164.6
August 31, 2018	467	481	338	173.5	168.2	138.3

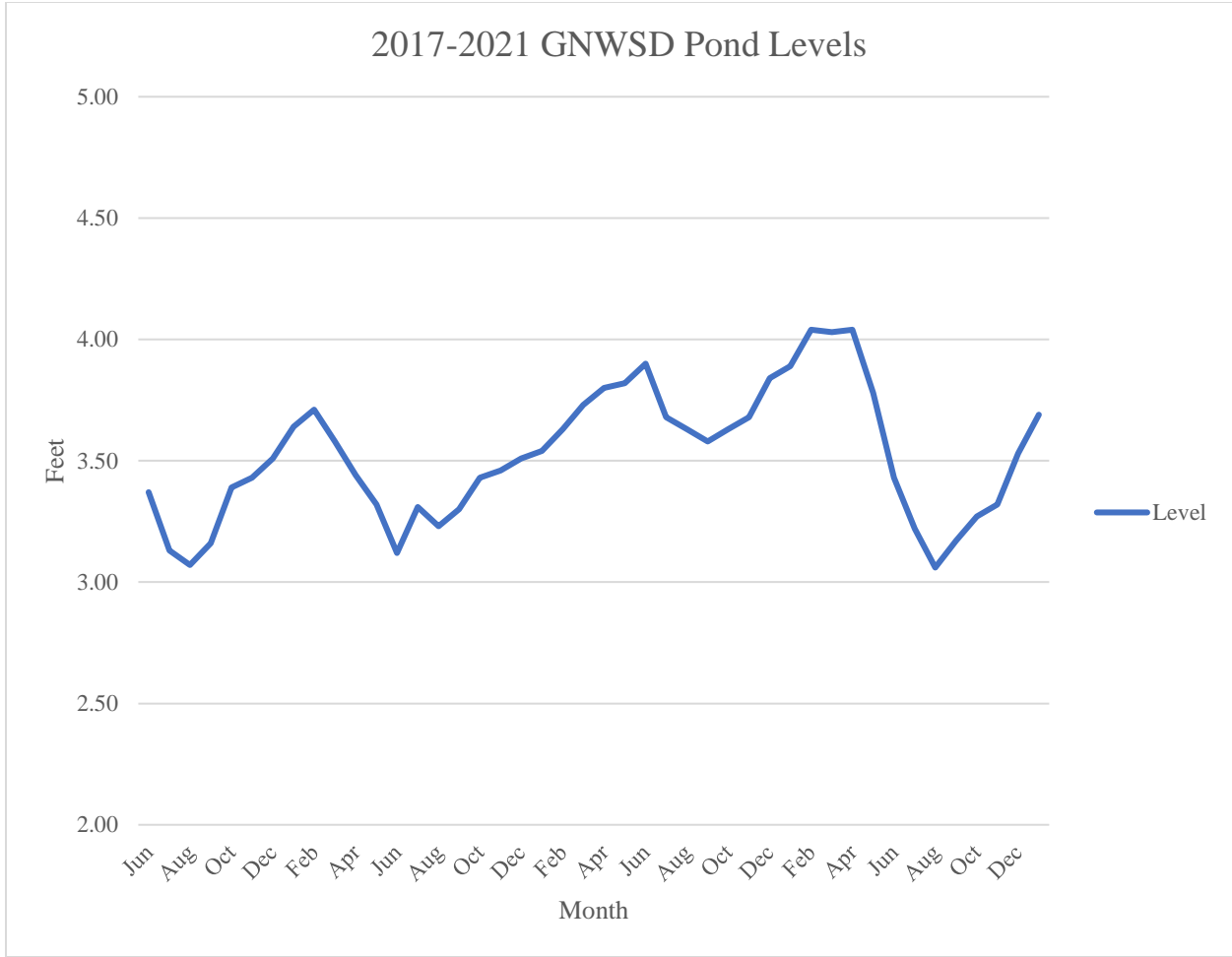
* Any projections are based upon benchtop data presented by Mike Atwood if laboratory results are unavailable.

Pond Level Management

There are approximately 11 inches of capacity available in the ponds and we will continue to monitor this data as evaporative rates and daily water usage change.

Date	South Pond Level Reading
March 25, 2018	3.58
June 30, 2018	3.12
September 23, 2018	3.30
December 31, 2018	3.51
February 21, 2019	3.63
March 22, 2019	3.73
June 23, 2019	3.90
September 22, 2019	3.58
November 11, 2019	3.68
December 18, 2019#	3.80
January 1, 2020	3.84
January 31, 2020	3.92
February 20, 2020	4.04
March 18, 2020	4.03
April 25, 2020	4.04
May 24, 2020	3.78
June 27, 2020	3.43
July 25, 2020	3.22
August 31, 2020	3.06
September 11, 2020	3.14
September 30, 2020	3.17
October 4, 2020	3.21
October 24, 2020	3.27
November 20, 2020	3.32
December 26, 2020	3.53
January 23, 2021	3.69

Data may not be accurate since the daily reporting function had not been reliably restored.



United Power Billings (NO CHANGE FROM JANUARY REPORT)

Below is tracking of the annual electrical usage and billings for five consecutive 12-month periods. Effective March of 2020, United Power began billing on calendar month cycles reflecting usage from the first to last day of the month.

12-Month Comparisons – Energy Usage (KWH)					
2016	41,650	276,080	54,440	93,880	466,050
2017	46,917	261,160	79,360	96,880	484,317
2018	49,690	236,640	120,480	97,040	503,850
2019	49,710	265,400	51,360	84,160	450,630
2020	67,377	276,240	120,320	112,400	576,337

12-Month Comparisons – Billing Amount					
2016	\$4,684.06	\$22,276.78	\$4,910.30	\$7,705.29	\$39,576.43
2017	\$5,488.99	\$21,895.19	\$7,296.10	\$8,548.16	\$43,228.44
2018	\$5,795.20	\$19,377.87	\$10,946.48	\$8,394.95	\$44,514.50
2019	\$5,789.98	\$22,400.29	\$4,790.39	\$7,515.75	\$40,496.41
2020	\$7,521.68	\$23,141.47	\$10,608.11	\$9,673.29	\$50,944.55

NOTE: United Power's energy rates changed in the billings issued on February 25, 2020.

Energy Category	2017 Rates	2018 Rates	2019 Rates	2020 Rates
C1 (Energy)	\$0.11219 / KWH	\$0.1122 / KWH	\$0.1078 / KWH	\$0.1031 / KWH
C1 (Demand)	-	-	\$1.00 / KW	\$1.50 / KW
CTD1 (On Peak)	\$0.15932 / KWH	\$0.1594 / KWH	\$0.1594 / KWH	\$0.1594 / KWH
CTD1 (Demand)	-	-	\$1.00 / KW	\$1.50 / KW
CTD2 (Off Peak)	\$0.06177 / KWH	\$0.0618 / KWH	\$0.0554 / KWH	\$0.052 / KWH

Development Activities**Hayesmount Estates**

No engineering activity.

Country Club Ranchettes, Filing 1

MMI Water Engineers continues to review materials submittals from the water system improvements contractor (Blanco, Inc.) and communicate with the developer (Jay Scolnick) and the design engineer (Manhard Consulting). The developer has not provided a schedule for construction of the offsite water system improvements.

Ridgeview Estates (PLT2019-00026)

The pre-construction meeting was conducted on November 3, 2020.

The water system tie-ins at the Greatrock North tank site and in Great Rock Way were performed on January 13, 2021.

Country Club Ranchettes Filing No. 2

On December 22, District staff completed another round of revisions to the inclusion agreement for Country Club Ranchettes Filing No. 2 and associated property. On December 23, the developer (Jay Scolnick) indicated he is analyzing development possibilities for the land adjacent to Hudson Mile Road with an engineer (Matrix Design). MMI Water Engineers is reviewing the inclusion agreement easement exhibits prepared by Manhard Consulting's surveyor.

Capital Projects

Third Alluvial Well

Attached to this Engineer's Report is BBA Water Consultants' report regarding the ALV-5 summarizing recent pump testing of an existing irrigation well near the decreed location of Alluvial Well No. 5.

On January 11, 2021, District staff met with Mr. Tony Lopez, the owner of Parcel 3, regarding a well site easement and a pipeline easement for the Alluvial Well No. 5 infrastructure. MMI Water Engineers is working with Manhard Consulting's surveyor to create the exhibits necessary for the easements.

Reverse Osmosis Water Treatment Facility

MMI Water Engineers will defer to Element Engineering on the status of the Reverse Osmosis Water Treatment Facility project.

Concentrate Evaporation Pond

MMI Water Engineers presented the landowner (Jay Scolnick) an alternative concentrate line alignment on December 14. The alternative alignment routes the concentrate line north of the conceptual Sierra Vista Ranchettes Filing No. 1 and crosses in a diagonal path to the proposed concentrate evaporation pond. On December 23, Mr. Scolnick contacted MMI and indicated he is analyzing development possibilities for this land adjacent to Hudson Mile Road with an engineer (Matrix Design). MMI Water Engineers is working with Lisa Johnson on a plan to acquire the easement given the developer's recent communications regarding land platting concepts.

MEMORANDUM



To: Brad Simons
From: Tim Crawford
Subject: Greatrock North WSD – Alluvial Decreed Water Right Location Pump Testing Investigation and Comparison Summary
Job: 0908.10
Date: January 7, 2021

This memorandum presents a summary of the recent pumping test investigation of an existing irrigation production well (Permit No. 20094-R) near the decreed ALV-5 alluvial water right (ALV-5) location on behalf of the Greatrock North Water and Sanitation District (District). This effort was performed to provide a greater understanding of potential yields from the decreed alluvial well sites, including ALV-5.

Background

The District owns and operates water rights in Court Case Nos. 04CW247 and 08CW66, which include 5 decreed alluvial water right locations (ALV-1, ALV-2, ALV-3, ALV-4 and ALV-5). Production wells have been constructed and are currently operated at the ALV-1 and ALV-2 locations, but not at the locations of the other alluvial water rights. Monitoring wells were constructed at ALV-3, ALV-4 and ALV-5 to investigate hydrogeologic conditions including depth to bedrock, depth to water level, aquifer lithology and water quality.

Previous test drilling and sampling efforts indicated that the aquifer saturated thickness at ALV-5 is greater than at ALV-3 and ALV-4, and therefore, there is higher yield potential at ALV-5 compared to the other two locations. Previous water quality testing, however, indicated that ALV-5 had relatively unfavorable water quality. We note that the previous yield potential estimates based on test drilling efforts can provide only relative conditions for comparison. This testing program was completed to provide a more quantitative yield estimate at ALV-5, and to provide additional information for comparison of the decreed locations.

Pump Testing Summary

On October 24, 2020, Colorado Water Well removed the original pump equipment from the production well (Permit No. 20094-R) and installed temporary submersible pump equipment capable of producing up to approximately 750 gallons per minute. A pressure transducer and measurement tube were installed with the pumping equipment. A variable frequency drive was installed to control the pumping rate. The discharge of the well was equipped with a totalizing flow meter. To assess the impact of well pumping on the local aquifer, pressure transducers were installed in two nearby wells as monitoring wells, including the irrigation production well (Permit No. 20094-S) and the ALV-5 monitoring well. This allowed for the collection of monitoring well water level data. Discharge from the testing was piped to the Denver-Hudson Canal which was not flowing. The discharge of water during the test did cause the ditch to flow locally during the testing period. No flow was observed in any local drainage either before or during the testing.

Colorado Water Well completed a step-test on November 18, 2020. Prior to the step-test, the static water level in the pumping well was measured at approximately 20.31 feet below the ground

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surface. During the step-test, the pumping well was operated at rates of approximately 183, 305, 486, 617 and 698 gallons per minute for 60 minutes each. At the end of the step-test, the pumping water level in the pumping well was approximately 32.71 feet below the ground surface. There was a total of 12.40 feet of drawdown observed in the pumping well during the step-test. The specific capacity (a relative measure of well performance based on the pumping rate and drawdown) of the pumping well at the end of each step was 76.3, 64.2, 63.5, 57.9, and 56.3 gallons per minute per foot, respectively. These results indicate that the well operates more efficiently at lower pumping rates, as expected. Based on the step-test, a pumping rate of 575 gallons per minute was chosen for the constant discharge test. The data from the pumping well for the step-test are summarized in Table 1. To put the tested pumping rates into context, the operational flow rates of ALV-1 and ALV-2 are approximately 300 and 125 gallons per minute, respectively.

On November 19 - 20, 2020, Colorado Water Well completed a 24-hour, constant discharge test. Prior to the constant discharge test, the water level in the pumping well was measured at approximately 20.59 feet below the ground surface. The well was pumped at an average rate of approximately 575 gallons per minute for the full 24-hour pumping period. At the end of the constant discharge test, the pumping water level in the pumping well was approximately 33.91 feet below the ground surface, resulting in a total drawdown of 13.32 feet. The specific capacity of the well after 60 minutes of pumping was 63.4 gallons per minute per foot, which generally confirms the specific capacity values determined during the step-test. At the end of the constant discharge test, the pumping water level in the well was above approximately 64% of the available drawdown and above 59% of the well screens. The data from the constant discharge test are summarized in Table 2.

At the end of the 24-hour pumping period, the specific capacity in the pumping well was 43.2 gallons per minute per foot, which represents conditions during long-term well operation. Approximately 830,000 gallons were produced from the well during all the testing. Recovery data were collected after the 24-hour pumping period.

Water level data were collected in the two monitoring wells (Permit No. 20094-S and ALV-5) during the test. Initially, water levels in both wells declined, but then recovered and increased later in the test likely due to the discharge water directed into the Denver-Hudson Canal. Due to this observation, the monitoring data could not be analyzed as part of this effort.

Pumping Test Aquifer Characteristic Analyses

The pumping test data from the pumping well were analyzed to determine aquifer characteristics and to identify boundary conditions in the aquifer using the Theis type-curve method to provide well-specific aquifer information. The drawdown data was not corrected for declining transmissivity as the water level changed. The analysis and aquifer characteristics determined from the test data are representative of operating conditions in the well and are effective for the purposes of projecting well performance at this location but may not be representative of actual aquifer characteristics. The specific capacity approach was used to help compare relative yields at the decreed alluvial water right locations.

Analysis of the drawdown data using the Theis method indicated an aquifer transmissivity of approximately 75,374 gallons per day per foot and a storage coefficient (representative of

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conditions in the pumping well) of approximately 0.045, as presented in Figure 1. Analysis of the recovery data indicated a transmissivity of approximately 79,894 gallons per day per foot which generally confirms the analysis of the drawdown data.

Review of the pumping test data indicated there was delayed yield during the early portion of testing. Later, a negative ground water boundary was encountered, resulting in greater drawdown than expected. The negative boundary encountered in the pumping well was evidenced by the departure of observed drawdowns from the Theis match after approximately 300 minutes of pumping. The negative ground water boundary likely occurred due to the interaction of well pumping with the edge of the alluvial aquifer or with some zone of lower aquifer permeability. The presence of the negative boundary could not be confirmed with the monitoring well data due to the observed trends in that data.

Well Yield Projections

Well yield projections were made specifically for ALV-5 based on the pumping test data from Permit No. 20094-R and the Theis approach and then well yields were compared between the 3 undeveloped, decreed alluvial water right locations using the specific capacity approach from the Permit No. 20094-R pumping data in combination with pumping data from the District's existing production wells.

Potential well yields for multiple, shorter pumping periods were analyzed for the ALV-5 decreed alluvial water right location using the Theis equation. As mentioned, the negative ground water boundary caused additional drawdown beyond the drawdown determined from the Theis equation. Consequently, estimated well yields are presented for periods shorter than the 24-hour constant discharge test.

ALV-5 Yield Projections			
Pumping Period	6 Hours	12 Hours	18 Hours
Rate (gpm)	1,202	1,138	1,103

The above well yield projections were based on the aquifer characteristics presented above, the Theis equation and the maintenance of a pumping water level above 1/3 of the saturated thickness in the well. We note that submersible pump equipment may limit the amount of allowable drawdown in the well due to the length of the motor portion of the equipment as well as the net positive suction head requirement. Accordingly, the drawdown assumptions and yield projections summarized above may not be achievable for all pump and motor assemblies or pump settings. We note that the projected rates are higher than those achieved during pumping and that the higher rates presented should be considered preliminary. They should be confirmed if and when a production well is constructed at the location of ALV-5.

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Comparison of Decreed Well Locations

Summarized below is a comparison of potential yields projected at all three of the decreed, undeveloped alluvial water right locations based on the specific capacity approach and the existing production well locations.

Location	ALV-1	ALV-2	ALV-3	ALV-4	ALV-5
Saturated Thickness (ft)	31	36	34.6	45.7+	33.7
Operational Drawdown (ft)	20.5	23.8	23.1	30.5+	22.5
Projected Specific Capacity (gpm/ft)	17.9*	7.0*	13.3	17.6	45.0
Projected Yield (gpm)	370 (300*)	166 (125*)	307	536	1,010

* Based on operational data from the existing production wells.

The projected specific capacities presented above for ALV-3 and ALV-4 are based on an average of the specific capacities determined from the ALV-1 and ALV-2 prorated for saturated thickness conditions at the ALV-3 and ALV-4 sites based on the location, geology and lithology observed at those 4 decreed alluvial water right locations. The projected specific capacity presented above for ALV-5 is based on the specific capacity determined from Permit No. 20094-R and projected for the ALV-5 location prorated for saturated thickness.

As summarized in the table above and confirmed by the Theis projections, the location of ALV-5 is prolific and capable of significantly high instantaneous pumping rates. The observed negative boundary will limit long-term operational flow rates at ALV-5. We note that the projected rates are higher than the maximum rate achieved during the step-testing, approximately 700 gallons per minute. The specific capacity projections confirmed that the ALV-5 water right location has more production potential than the ALV-3 or ALV-4 water rights locations.

Water Quality

At the end of the 24-hour pumping period, a water quality sample was collected from the pumping well discharge and delivered to a water quality laboratory for analysis of a limited suite of parameters. The purpose of the sampling and analysis was to confirm the water quality indicated by samples previously collected from the ALV-5 monitoring well. Previous sampling of ALV-5 indicated that Chloride (273.7 mg/l), Fluoride (3.81 mg/l), Nitrate (27.88 mg/l), Sulfate (1,287.8 mg/l) and Total Dissolved Solids (2,641 mg/l) all exceeded the MCL for those parameters. The sampling from the end of the pumping test for Permit No. 20094-R exceeded the MCL for Nitrate (23.06 mg/l), Sulfate (845.7 mg/l) and Total Dissolved Solids (1,637 mg/l), but at lower levels than the ALV-5 sample. The results of the water quality testing are attached for reference and summarized with the previous water quality analyses in Table 3. The water quality data continue

Brad Simons
January 7, 2021
Page 5

to indicate that the ALV-5 location exhibits the least favorable water quality based on the number of exceedances of State drinking water standards,

Conclusions

- A production well constructed at the decreed location of the ALV-5 alluvial water right is projected to be capable of producing significantly high pumping rates, up to approximately 1,000 gallons per minute over shorter pumping periods.
- The available information suggests that the alluvial material at the location of ALV-5 is more productive than the locations of ALV-1 and ALV-2 in terms of specific capacity.
- Projection of potential well yields indicates that the ALV-5 location is more productive than both the ALV-3 and ALV-4 locations.
- Water quality testing confirms that raw water quality conditions at the ALV-5 location are relatively unfavorable and will require treatment for use, as expected.

Table 1

Greatrock North Water and Sanitation District

Genereux Irrigation Well (Permit No. 20094-R)

Step-Test Data

	Time Since Pumping Began (min)	M-scope Data			Transducer Data		
		Water Level below Top of Casing (ft)	Water Level below Ground Surface (ft)	Drawdown (ft)	Water Level below Top of Casing (ft)	Water Level below Ground Surface (ft)	Drawdown (ft)
Step 1	0	22.30	20.31	0.00	22.30	20.31	0.00
Q = 183 gpm	0.5	22.83	20.84				
	1	22.99	21.00	0.69	22.45	20.46	0.15
	2	23.18	21.19	0.88	22.69	20.70	0.39
	3	23.70	21.71	1.40	23.05	21.06	0.75
	4	23.85	21.86	1.55	23.26	21.27	0.96
	5	23.97	21.98	1.67	23.36	21.37	1.06
	6	24.06	22.07	1.76	23.43	21.44	1.13
	7	24.11	22.12	1.81	23.49	21.50	1.19
	8	24.16	22.17	1.86	23.54	21.55	1.24
	9	24.20	22.21	1.90	23.55	21.56	1.25
	10	24.25	22.26	1.95	23.60	21.61	1.30
	12	24.27	22.28	1.97	23.63	21.64	1.33
	14	24.29	22.30	1.99	23.65	21.66	1.35
	16	24.33	22.34	2.03	23.70	21.71	1.40
	18	24.39	22.40	2.09	23.75	21.76	1.45
	20	24.40	22.41	2.10	23.75	21.76	1.45
	25	24.43	22.44	2.13	23.79	21.80	1.49
	30	24.47	22.48	2.17	23.84	21.85	1.54
	35				23.89	21.90	1.59
	40	24.56	22.57	2.26	23.95	21.96	1.65
	45	24.60	22.61	2.30	24.02	22.03	1.72
	50				24.06	22.07	1.76
	55	24.65	22.66	2.35	24.12	22.13	1.82
Q/s = 76.3	60	24.70	22.71	2.40	24.25	22.26	1.95
Step 2	60.5						
Q = 305 gpm	61	25.65	23.66	3.35	25.13	23.14	2.83
	62	25.68	23.69	3.38	25.42	23.43	3.12
	63	26.17	24.18	3.87	25.64	23.65	3.34
	64	26.25	24.26	3.95	25.75	23.76	3.45
	65	26.35	24.36	4.05	25.85	23.86	3.55
	66	26.41	24.42	4.11	25.89	23.90	3.59
	67	26.50	24.51	4.20	25.94	23.95	3.64
	68	26.55	24.56	4.25	25.99	24.00	3.69
	69	26.57	24.58	4.27	26.02	24.03	3.72
	70	26.54	24.55	4.24	26.04	24.05	3.74
	72	26.57	24.58	4.27	26.08	24.09	3.78
	74	26.67	24.68	4.37	26.12	24.13	3.82
	76	26.72	24.73	4.42	26.15	24.16	3.85
	78	26.72	24.73	4.42	26.18	24.19	3.88
	80	26.82	24.83	4.52	26.21	24.22	3.91
	85	26.82	24.83	4.52	26.28	24.29	3.98
	90	26.82	24.83	4.52	26.31	24.32	4.01
	95				26.36	24.37	4.06
	100				26.38	24.39	4.08
	105				26.40	24.41	4.10
	110				26.46	24.47	4.16
	115	26.98	24.99	4.68	26.50	24.51	4.20
Q/s = 64.2	120	27.05	25.06	4.75	26.88	24.89	4.58
Step 3	120	27.05	25.06	4.75	26.88	24.89	4.58
Q = 486 gpm	120.5						
	121	27.84	25.85	5.54	27.49	25.50	5.19
	122	28.36	26.37	6.06	27.82	25.83	5.52
	123	28.33	26.34	6.03	28.10	26.11	5.80
	124	28.44	26.45	6.14	28.28	26.29	5.98
	125				28.37	26.38	6.07
	126				28.45	26.46	6.15
	127				28.49	26.50	6.19
	128	28.50	26.51	6.20	28.55	26.56	6.25
	129				28.57	26.58	6.27
	130	28.82	26.83	6.52	28.59	26.60	6.29
	132	28.49	26.50	6.19	28.66	26.67	6.36
	134	28.44	26.45	6.14	28.72	26.73	6.42
	136	28.70	26.71	6.40	28.76	26.77	6.46
	138	28.69	26.70	6.39	28.80	26.81	6.50
	140				28.82	26.83	6.52
	145	29.35	27.36	7.05	28.87	26.88	6.57
	150	29.40	27.41	7.10	28.92	26.93	6.62
	155	29.63	27.64	7.33	28.93	26.94	6.63
	160				29.02	27.03	6.72
	165				29.10	27.11	6.80
	170				29.12	27.13	6.82
	175				29.20	27.21	6.90
Q/s = 63.5	180	29.95	27.96	7.65	29.60	27.61	7.30

Table 1 (cont)

Greatrock North Water and Sanitation District

Genereux Irrigation Well (Permit No. 20094-R)

Step-Test Data

	Time Since Pumping Began (min)	M-scope Data			Transducer Data		
		Water Level below Top of Casing (ft)	Water Level below Ground Surface (ft)	Drawdown (ft)	Water Level below Top of Casing (ft)	Water Level below Ground Surface (ft)	Drawdown (ft)
Step 4	180.5						
Q = 617 gpm	181				29.92	27.93	7.62
	182				30.17	28.18	7.87
	183				30.31	28.32	8.01
	184				30.40	28.41	8.10
	185	31.30	29.31	9.00	30.43	28.44	8.13
	186	32.01	30.02	9.71	30.72	28.73	8.42
	187	31.77	29.78	9.47	30.95	28.96	8.65
	188				31.06	29.07	8.76
	189	31.72	29.73	9.42	31.15	29.16	8.85
	190	31.85	29.86	9.55	31.22	29.23	8.92
	192	32.10	30.11	9.80	31.31	29.32	9.01
	194	31.96	29.97	9.66	31.41	29.42	9.11
	196	32.20	30.21	9.90	31.47	29.48	9.17
	198	32.13	30.14	9.83	31.51	29.52	9.21
	200	32.21	30.22	9.91	31.58	29.59	9.28
	205	32.34	30.35	10.04	31.64	29.65	9.34
	210	32.51	30.52	10.21	31.74	29.75	9.44
	215	32.72	30.73	10.42	31.86	29.87	9.56
	220	32.70	30.71	10.40	31.88	29.89	9.58
	225				31.96	29.97	9.66
	230				32.08	30.09	9.78
	235				32.13	30.14	9.83
Q/s = 57.9	240	32.95	30.96	10.65	32.71	30.72	10.41
Step 5	240.5	33.85	31.86	11.55			
Q = 698 gpm	241	33.73	31.74	11.43	33.42	31.43	11.12
	242				33.55	31.56	11.25
	243	34.15	32.16	11.85	33.67	31.68	11.37
	244	34.23	32.24	11.93	33.79	31.80	11.49
	245	34.52	32.53	12.22	33.84	31.85	11.54
	246	34.00	32.01	11.70	33.87	31.88	11.57
	247				33.93	31.94	11.63
	248	34.52	32.53		33.98	31.99	11.68
	249	34.45	32.46	12.15	34.01	32.02	11.71
	250	34.25	32.26	11.95	34.02	32.03	11.72
	252				33.97	31.98	11.67
	254				34.00	32.01	11.70
	256				34.07	32.08	11.77
	258				34.13	32.14	11.83
	260				34.15	32.16	11.85
	265				34.30	32.31	12.00
	270	34.87	32.88	12.57	34.34	32.35	12.04
	275	34.53	32.54	12.23	34.42	32.43	12.12
	280	34.52	32.53	12.22	34.38	32.39	12.08
	285	34.60	32.61	12.30	34.58	32.59	12.28
	290	34.93	32.94	12.63	34.61	32.62	12.31
	295	34.97	32.98	12.67	34.68	32.69	12.38
Q/s = 56.3	300	34.70	32.71	12.40	34.71	32.72	12.41

Notes:

Step-test completed on November 18, 2020.

Water levels measured with an M-scope and a pressure transducer.

Pumping rates measured using a totalizing flow meter.

min = minutes.

ft = feet.

gpm = gallons per minute.

Q/s = specific capacity.

Table 2

Greatrock North Water and Sanitation District

Long-Term, Constant Discharge Pumping Test
Genereux Irrigation Well (Permit No. 20094-R)

Time Since Pumping Began (min)	M-Scope Data			Pressure Transducer Data			Totalizing Flow Meter Data	
	Water Level Data below Top of Casing (ft)	Water Level Data below Ground Surface (ft)	Drawdown (ft)	Transducer Reading (ft)	Water Level bgs (ft)	Drawdown (ft)	Reading (gals)	Average Discharge Rate (gpm)
0	22.58	20.59	0.00	20.03	20.59	0.00	1352556	600
1	24.75	22.76	2.17	18.75	21.87	1.28	1352680	124
2	25.83	23.84	3.25	17.23	23.39	2.80	1352975	210
3	26.97	24.98	4.39	15.98	24.64	4.05	1353690	378
4	28.01	26.02	5.43	14.89	25.73	5.14	1353825	317
5	28.76	26.77	6.18	14.07	26.55	5.96	1354312	351
6	29.03	27.04	6.45	13.50	27.12	6.53	1354830	379
7	29.67	27.68	7.09	13.05	27.57	6.98	1355372	402
8	29.95	27.96	7.37	12.71	27.91	7.32	1355925	421
9	30.33	28.34	7.75	12.41	28.21	7.62	1356493	437
10	30.52	28.53	7.94	12.27	28.35	7.76	1357058	450
12	30.62	28.63	8.04	12.07	28.55	7.96	1358198	470
14	30.87	28.88	8.29	11.96	28.66	8.07	1359347	485
16	30.72	28.73	8.14	11.86	28.76	8.17		
18	30.97	28.98	8.39	11.77	28.84	8.25		
20	30.76	28.77	8.18	11.72	28.90	8.31	1362805	512
25	30.98	28.99	8.40	11.56	29.06	8.47	1365685	525
30	31.13	29.14	8.55	11.45	29.17	8.58	1368575	534
35	31.20	29.21	8.62	11.28	29.33	8.74	1371453	540
40	31.34	29.35	8.76	11.19	29.43	8.84	1374344	545
45	31.40	29.41	8.82	11.09	29.53	8.94	1377222	548
50	31.51	29.52	8.93	11.01	29.60	9.01	1380100	551
55	31.72	29.73	9.14	10.95	29.66	9.07	1382972	553
60	31.65	29.66	9.07	10.88	29.74	9.15	1385875	555
80	31.88	29.89	9.30	10.60	30.02	9.43		
102	32.13	30.14	9.55	10.34	30.27	9.68		
120	32.40	30.41	9.82	10.18	30.44	9.85	1420498	566
180				9.74	30.88	10.29	1455079	570
240				9.44	31.18	10.59	1490150	573
300				9.16	31.46	10.87	1524420	573
360				8.90	31.72	11.13	1558744	573
420				8.71	31.90	11.31	1593312	573
444	33.60	31.61	11.02	8.61	32.01	11.42		
480				8.43	32.19	11.60	1627973	574
540				8.19	32.42	11.83	1662773	574
600				7.96	32.66	12.07	1697438	575
660				7.78	32.84	12.25	1730855	573
720				7.59	33.03	12.44	1765400	573
780	34.80	32.81	12.22	7.48	33.13	12.54	1800100	574
805	34.75	32.76	12.17	7.46	33.16	12.57		
840	34.00	32.01	11.42	7.33	33.29	12.70		
900	35.00	33.01	12.42	7.19	33.42	12.83	1868580	573
960	35.10	33.11	12.52	7.04	33.58	12.99	1904368	575
1020	35.20	33.21	12.62	6.91	33.71	13.12	1938816	575
1080	35.40	33.41	12.82	6.79	33.83	13.24	1973295	575
1140	35.70	33.71	13.12	6.47	34.14	13.55	2007895	575
1200	35.70	33.71	13.12	6.41	34.21	13.62	2042573	575
1260	35.70	33.71	13.12	6.36	34.26	13.67	2077365	575
1320	35.80	33.81	13.22	6.30	34.32	13.73	2111880	575
1380	35.85	33.86	13.27	6.20	34.42	13.83	2146298	575
1440	35.90	33.91	13.32	5.89	34.72	14.13	2181245	575

Notes:

Constant discharge test completed on November 19, 2020.

Water levels measured with an M-scope and a pressure transducer.

Pumping rates measured using a totalizing flow meter.

The pumping rate during the test averaged 575 gallons per minute.

min = minutes.

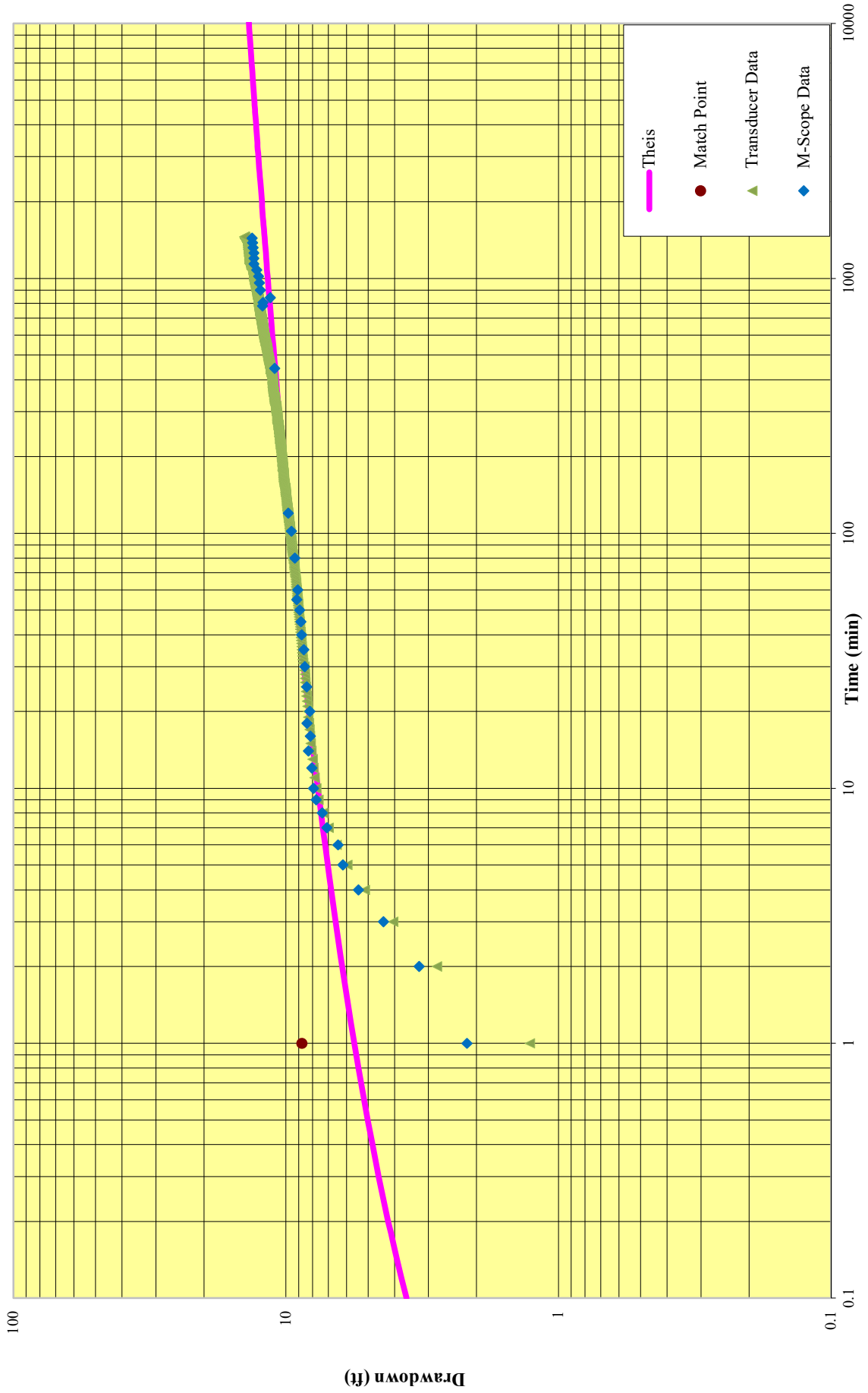
ft = feet.

Figure 1
Greatrock North Water and Sanitation District
Long-Term, Constant Discharge Test (Permit No. 20094-R)

Pumping Well:
 Borehole Diameter = 48 in
 Casing Diameter = 18 in
 Screen Diameter = 18 in

$1/u = 1100$
 $W(u) = 10$
 $t = 1$ min
 $s = 8.75$ feet

Pumping Rate = 575.5 gpm
 Effective Well Radius = 0.75 feet
 Transmissivity = 75374 gpd/ft
 Storage Coefficient = 0.0452379



** The drawdown data were not corrected for declining saturated thickness and are representative of operating conditions in the well.

Table 3
Greatrock North Water and Sanitation District
Alluvial Well Water Quality Analysis Results

Parameter	Sample Date	11/19/2018	11/21/2018	11/20/2018	2/27/2020	11/20/2018	11/20/2020	MCL ⁽²⁾	SMCL ⁽²⁾
		ALV-1	ALV-2	ALV-3 ⁽¹⁾	ALV-4 ⁽¹⁾	ALV-5 ⁽¹⁾	ALV-5		
Aluminum (mg/l)		0.001	0.001	0.002	0.015	0.002	n/a		0.05 to 0.2
Ammonia Nitrogen (mg/L)		<0.03	<0.03	0.08	<0.03	0.05	n/a		
Arsenic (mg/L)		<0.0006	<0.0006	<0.0006	0.0015	0.0009	n/a	0.010	
Barium (mg/L)		0.0938	0.0585	0.0285	0.0826	0.0333	n/a	2	
Bicarbonate (mg/L as CaCO ₃)		182.6	190.8	213	208.2	246.9	228.7		
Boron (mg/L)		0.2	0.07	0.03	0.19	0.14	n/a		
Calcium (mg/L)		117.1	120.2	181.9	109.4	545.3	317.9		
Carbonate (mg/L as CaCO ₃)		<0.1	<0.1	<0.1	<0.1	<0.1	<4		
Chloride (mg/)		148.72	116.34	63.2	142.62	273.7	173.6		250
Fluoride (mg/L)		1.23	1.02	0.9	0.74	3.81	0.42	4	2
Hydroxide (mg/L as CaCO ₃)		<0.1	<0.1	<0.1	<0.1	<0.1	<4		
Iron (mg/L)		<0.005	<0.005	<0.005	0.021	<0.005	0.027		0.3
Magnesium (mg/L)		22.15	23.03	36.43	23.82	75.26	49.65		
Nitrate Nitrogen (mg/L)		3.92	4.93	6.73	5.19	27.88	23.06	10	
pH (units)		7.89	7.09	7.47	7.24	7.17	7.4		6.5-8.5
Phosphate - Ortho (as PO ₄) (mg/L)		<0.01	<0.01	<0.01	<0.01	<0.01	n/a		
Potassium (mg/L)		6.5	5.5	5.2	4.9	9.2	8.6		
Silica - Dissolved (as Si) (mg/L)		9.7	8	11.3	10	14	n/a		
Sodium (mg/L)		99.8	109.6	113.7	108.5	230.5	183.1		
Strontium (mg/L)		1.247	1.468	2.19	1.278	4.162	n/a		
Sulfate (mg/L)		208.97	239.63	519.5	151.41	1287.8	845.7		250
Total Alkalinity (mg/L as CaCO ₃)		182.6	190.8	213	208.2	246.9	228.7		
Total Dissolved Solids (mg/L)		819	780	1247	738	2641	1637		500
Vanadium (mg/L)		0.001	0.001	<0.001	0.003	0.001	n/a		

Notes:

1. ALV-3, ALV-4, and ALV-5 are also named MW-3, MW-4, and MW-5 respectively.
2. MCL is the Maximum Contaminant Level and SMCL is the Secondary MCL established by the Colorado Department of Health and the Environment (CDPHE). Parameters that exceed the standards are bolded.
3. Results provided by Greatrock North Water and Sanitation District and Colorado Analytical Laboratory.



Analytical Results

Domestic Water Quality

TASK NO: 201204078

Report To: Tim Crawford

Company: BBA Water Consultants Bishop-Brogden Assoc.,
333 W. Hampden Ave.
Suite 1050
Englewood CO 80110

Bill To: Tim Crawford

Company: BBA Water Consultants Bishop-Brogde
333 W. Hampden Ave.
Suite 1050
Englewood CO 80110

Task No.: 201204078	Date Received: 12/4/20
Client PO:	Date Reported: 12/15/20
Client Project:	Matrix: Water - Drinking

Customer Sample ID Greatrock 20094

Sample Date/Time: 11/20/20 9:30 AM

Lab No. 201204078-01

Test (units)	Sample Result	Suggested Maximum	Comments
Total Alkalinity (mg/L as CaCO3)	228.7	250	
Bicarbonate (mg/L as CaCO3)	228.7	250	
Carbonate (mg/L as CaCO3)	< 4		
Hydroxide (mg/L as CaCO3)	< 4		
Chloride (mg/L)	173.6	250	
Iron (mg/L)	0.027	0.3	
Fluoride (mg/L)	0.42	4	
Potassium (mg/L)	8.6	50	
Nitrate Nitrogen (mg/L)	23.06	10	High Nitrates indicates this water is not safe for human consumption.
pH (units)	7.40	8.5	
Calcium (mg/L)	317.9	200	
Magnesium (mg/L)	49.65	125	
Sodium (mg/L)	183.1	100	High Sodium may be of concern for health reasons.
Sodium Adsorption Ratio (units)	2.5	4	
Total Hardness (mg/L as CaCO3)	998.1	500	
Sulfate (mg/L)	845.7	250	
Total Dissolved Solids (mg/L)	1637	500	High Total Dissolved Solids may affect taste.

Abbreviations:

mg/L = Milligrams Per Liter or PPM

mpn/100 mls = Most Probable Number Index/ 100 mls

Suggested maximum levels for Nitrate Nitrogen and Fluoride are mandatory maximums set by The Colorado Department of Public Health and Environment.

10411 Heinz Way / Commerce City, CO 80640 / 303-659-2313

Mailing Address: P.O. Box 507 / Brighton, CO 80601-0507

201204078

1/1



Ramey Environmental Compliance, Inc.
Management and Operation Solutions for
Water and Wastewater Treatment
303-833-5505

PO Box 99, Firestone, Colorado 80520
email: contact.us@RECinc.net
www.RECinc.net

Greatrock North Water & Sewer District

ORC Report

February 2nd, 2021

Additional Services

Valve Exercising

REC is completing curb stop exercising at BECR working from list provided by Dan C.

Ridgeview Estates

New water in tie in completed at Ridgeview estates on 1/13/21. REC onsite to assist with water line isolations and post tie in flushing. Received multiple dirty water notifications after water line was repressurized. Additional was completed with no other dirty water notifications received since.

Water Quality

RO systems bypass PRV found to be sticking open at times. REC ESD serviced the PRV and adjusted pressure setpoints up to prevent water from bypassing the RO system. Additional samples collected to evaluate the performance of the RO system.

Water Augmentation

Augmentation started at 35 gpm using the LFH 1 and LFH 2 wells on 12/18/20. LFH1 meter lost flow total display total from 1/12/21-1/14/21. Meter was torn down for inspection and multiple loose wires were found with in the control board. Once all connections were tightening totalize flow began to display again. Flow data was averaged for the missing days.

Certificate Of Completion

Envelope Id: 75107EE97FC8486A886026DA3E71537E	Status: Completed
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