

General Manager’s Report – September 2020

A. Regulatory reports

Pages 01-31

1. Discharge Monitoring Reports (DMRs). Discharge Monitoring Reports are the monthly sample reports required by the Department of Environmental Quality on the permitted parameters as defined by the Virginia Pollutant Discharge Elimination System permit for each facility.

Exceedances for calendar year 2020:

Facility Name	# of Exceedances	Month Exceedance Occurred	Permit Limit	Level Reported
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2. Sludge Report: This monthly report provides data relevant to the land application of biosolids to DEQ. Currently all biosolids are being disposed of at the County landfill. The reporting format has changed, the report is now 10 – 12 pages long and will not be included unless the Board requests inclusion in the General Manager’s Report.

3. Virginia Department of Health – Office of Drinking Water – July 14, 2020 – The Ferncliff Well System Sanitary Survey Report. The Survey date was June 12, 2020. Comments on the survey report have been resolved and verified.

4. Virginia Department of Environmental Quality – July 31, 2020 – WQIF Grant Agreement #440-S-10-08; Louisa County Water Authority – Nutrient Reduction Project, Monetary Assessment for 2019 Nutrient Reduction Performance. The upgrade at the Louisa Regional Wastewater Treatment Plant design and installation, was cost-shared under Water Quality Improvement Fund grant in the amount of \$1,830,989. The grant agreement outlines performance requirements and corresponding monetary assessments for exceeding those requirements. The annual performance report for 2019 was submitted and the annual performance limit of 1 mg/L limit was exceeded by .11 mg/L. The resulting fine assessment is \$8,646.

When the new SCADA system was brought online in April of 2019, staff did not realize that the SCADA system was not properly flow pacing the pump speed rate until June once the May DMRs were completed. The SCADA programmer was contacted and scheduled to come to the plant to correct. At that time staff believed all was corrected. Total Phosphorous monthly average numbers declined in June and July, spiked in August. Total Phosphorous monthly average numbers remained higher than normal and staff decided to run the alum feed in hand and continued to make adjustments. Total Phosphorous numbers declined again in September and October. Staff continued to make adjustments, but in November saw a significant increase, the significant increase was recognized with the completion of the November DMR in December. Staff continued to make adjustments to the alum feed and finally in late December discovered that approximately 20 feet of feed line was restricted with an alum build up. Once corrected, the Total Phosphorous monthly average has returned to more normal levels: January 2020 - .44 mg/L; February 2020 - .14 mg/L; March 2020 - .12 mg/L; April 2020 - .07 mg/L; May 2020 - .03 mg/L; June 2020 - .04 mg/L; July 2020 - .05 mg/L. For an average through July 2020 of .12 mg/L.

5. Virginia Department of Environmental Quality – August 27, 2020 – the Application for renewal of the VPDES Permit for the Louisa Regional Wastewater Treatment Plant and related documentation has been submitted and is considered complete by DEQ. They are currently estimating a six month timeframe for completion of their review.

6. Department of Conservation and Recreation – August 31, 2020 – guidance document being developed related to the design and use of devices to lower reservoir levels (low-level outlets). Low-level outlets provide a way to lower reservoirs during high rain events. Bowlers Mill and Northeast Creek Reservoirs both have low-level outlets that have been exercised. Staff will monitor the guidance document to see if modifications to the low-level outlets will be necessary.

B. Construction Reports

1. James River Water Project – August 2020 update: Nothing to update at this time.

C. Self-Inspection

Pages 32-39

1. Self-Inspection Monitor. The monitor contains problems we have identified internally and are taking steps to resolve. There are no particular items of note other than some of the correction items are waiting for other projects to be completed, some are waiting for funding.

2. Green Spring Wells Static Levels. August levels: At the end of August 2020, the static well levels are up ~3.1723 feet from the end of July 31, 2020 levels. From August 31, 2019 to August 31, 2020, the well levels are up ~9.15 feet.

The smaller table shows static well levels located nearer to the production wells. These levels are up ~4.695 feet from the end of July 31, 2020 levels. From August 31, 2019 to August 31, 2020, the well levels are up ~18.3975 feet.

Brent Waters provided the Green Springs Well Water Level Charts. Mr. Waters indicated in his email, *“nice leveling off and stabilization of water levels”*.

As of September 1, 2020, the DEQ Drought Monitoring Report is indicating normal conditions for the Northern Piedmont Region.

D. Correspondence/Information

Page 40

1. August 17, 2020 – Board of Supervisors Meeting – The meeting consisted of mainly County related business. Ms. Baughman provided the quarterly update to the Board of Supervisors.

E. Miscellaneous:

Pages 41-45

1. Article: *“As climate change increases precipitation, Northam aims to replace dam restoration funding”* by Sarah Vogelsong

F. Legislative / Regulatory:

- 1. PFAS (Perfluorinated compounds, perfluoroalkyl acids, synthetic chemicals)
- 2. Safe Yield
- 3. Procurement
- 4. SCC Rule Update Decision
- 5. New Pretreatment for any medical facilities, hazardous waste and reporting directly to EPA.
- 6. Phase Three Watershed Implementation Plan. ****Released by Governor Northam****
- 7. Reassignment of Nitrogen and Phosphorous loading limits.
- 8. Tank painting. (Substantial increase in costs 900%)
- 9. OSHA Guidelines for Fall Protection.
- 10. DOLI Regulation for work place safety due to COVID-19.

G. Personnel Update:

H. General Manager:

- ◆Currently working on re-writing job descriptions to make the formatting uniform
- ◆Meeting to discuss Shannon Hill Business Park wastewater options
- ◆Board of Supervisors meeting including quarterly update for the Authority
- ◆Interview for lab services contract
- ◆Virginia Rural Water Association Board of Directors Meeting
- ◆Working on a pay grade scale for Authority staff and updated organizational chart
- ◆Additional research hydrant sales after hours

- Auditors
- Security camera options for Northeast Creek Water Treatment Plant
- Working on Cost vs. Revenue for FY 2020
- James River Water Authority meeting
- FOIA Training
- Meeting with Ahnaf Choudhury regarding a study related to challenges utilities grapple with
- VAMWA Meeting



COMMONWEALTH of VIRGINIA

M. Norman Oliver, MD, MA
State Health Commissioner

DEPARTMENT OF HEALTH
OFFICE OF DRINKING WATER

Richmond Field Office

Groundwater System
Sanitary Survey Report

Madison Building
109 Governor St., Ste UB23
Richmond, VA 23219
Phone: 804-864-7409
Fax: 804-864-7520

July 14, 2020

To: Ms. Pam Baughman
General Manager, LCWA
P.O. box 9
Louisa, Va. 23093

SUBJECT: LOUISA COUNTY
Waterworks: Ferncliff Business Park
PWSID: 2109624

Survey Date: 06/12/2020

Present at Survey: Pam Baughman, GM and Chris Compton, Operator

Future Sampling Requirements: See attached

As a result of the sanitary survey noted above, the Department offers the following. If you have any questions or would like to discuss our comments, please contact us.

1. **Comments from previous inspections:** None
2. **Comments from this inspection:** None, Comments on survey report have been resolved and verified.

Survey By:

Cody Langridge,
Environmental Health Specialist, Sr.

Enclosure(s):

1. Chemical Schedule
2. Sanitary Survey Report

cc/enc: VDH, ODW - Central Office

cc: Louisa County Health Dept., attn: Environmental Health Manager

cc: Christian Goodwin, Louisa County Administrator

**VIRGINIA DEPARTMENT OF HEALTH - OFFICE OF DRINKING WATER
GROUNDWATER SYSTEM SANITARY SURVEY REPORT**

PART I - SYSTEM BACKGROUND

GENERAL INFORMATION

Owner Name: Louisa County Industrial Development Authority	Waterworks Class: 6
Type of Waterworks: Non-Transient Non-Community	
Contact Name: Pam Baughman, General Manager, LCWA	
Contact Address: P.O. Box 9, Louisa, Va. 23093	
Contact Phone Number: 540-967-1122	

D.O. License Class: 5	D.O. Has Required License: Yes
D.O. Legal Name: Christopher Compton	License No./Exp. Date: 1955006729/02-2021

Inspection By: Cody Langridge	Inspection Date: 06/12/2020
Time Spent: 1 hour	Last Inspection Date: 04/11/2020
Date to Reviewer: 07/02/2020	Reviewed by/Date: <i>AJM / 7-13-2020</i>
Date to Reviewer:	Reviewed by/Date:
Inspection Type: Routine	
Present at Inspection: Pam Baughman and Chris Compton, LCWA	
Facilities Inspected: source, treatment, storage, pumping, and distribution system.	

Operation Permit Effective Date: 07/11/2016	Waterworks Description Sheet Date: 07/11/2016
Permit Up-to-Date? Yes	Description Sheet Up-to-Date? Yes
No. Connections: 2	Population Served: 41
Avg. Daily Production: 1,279 gallons	Operation Permit Capacity: 4,800gpd
Exceeds 80% Operation Permit Capacity? (max. 3 consecutive months): No If yes, explain:	
Treatment Provided: Chlorination and Iron Removal	
SDWIS Inventory Information Current: Yes, verified 06/12/2020	

Comments:

Shaded Boxes	Indicate a potential Significant Deficiency	
REVISED TOTAL COLIFORM & GROUNDWATER RULES		
• BSSP Approved:	Yes	03/30/2016
• # of routine samples/monitoring period & frequency	1RT/MN	
• Is plan current & appropriate for dist. system & pop.?	Yes	
• Is monitoring frequency correct?	Yes	
• Rotates and uses approved sites?	Yes	
• Measures Cl ₂ residual for all samples, if Cl ₂ is added?	Yes	
• RTCR Level 1 or 2 Assessments since last Survey?	No	
• Disinfection required? (adequate contact time)	No, provided for iron oxidation	
• 4-Log virus inactivation required?	No	
• 4-Log virus inactivation provided?	Unknown	
• On-line chlorine analyzers required for chlorine residual?	No	
ROUTINE RAW WATER BACTERIOLOGICAL MONITORING (checked over past 12 months)		
• Required?	Yes	
○ If "Yes", Frequency:	Annual, last sample 08/05/2019	
• # of <i>E. coli</i> positive Samples	0	
• # Samples with Total Coliform >50 CFU/100 mL	0	
GUDI DETERMINATION	RESULT	DATE
• WL001/Drilled Well	Not a GUDI	12/10/2013
SOURCE WATER ASSESSMENT PERFORMED	SUSCEPT.	DATE
• WL001/Drilled Well	High	03/02/2018
SOURCE WATER PROTECTION		
• Written source water protection plan?	N	
DDBP RULES - (Community & NTNC, Disinfectant Used)		Date
• Monitoring Plan approved and current?	Y	05/12/2016
• Monitoring frequency required:	3 years	
• Operational Evaluation Level exceeded?	No	
Comments:		

Y = Yes; N = No; NA = Not Applicable; N/I = Not Inspected; None = None; OK = Acceptable

PHASE II/V RULE		
Waivers current for <u>all</u> entry points?	Y	
LEAD & COPPER RULES (Community & NTNC)		
• Materials Survey/Sampling Plan Approved:	Y	04/29/2014
• Water Quality Parameter (WQP) routine mon. required? (Mandatory for > 50,000 population) ○ If yes, WQPs meet quality and freq req't?		
• Have Action Levels (90%) been exceeded in past? When?	No	
• Public Education requirements met if required?	NA	
• Optimized Corrosion Control Treatment (OCCT) required? ○ If "Yes", is Operational Control Monitoring performed and acceptable?	N	
• All consumer notice requirements met?	09/14/2017	
CROSS-CONNECTION CONTROL PROGRAM		
• Approved:	Y	04/29/2014
• Inspected Records This Visit ○ Program Active	N	
○ Satisfactory	Y	
(MONTHLY) OPERATION REPORTS		
• All submitted for past 12 months?	Yes	
• Operational treatment parameters monitored?	Yes	
• All required data reported?	Yes	
ASSET MANAGEMENT (recommendation)		
• Written Plan Developed?	Yes	
• Routine Maintenance Performed?	Yes	
ENFORCEMENT		DATE
• Administrative/Consent Order in Effect:	No	
• Violations / Enforcement Actions Since Last Survey:	None	
• Owner issued Public Notice as required?	NA	
• Active Corrective Action Plan? ○ If "Yes", is waterworks on schedule?	NA	
• SDWIS Violation & Enforcement Action, Public Notification data current?	Yes; Verified 06/11/2020	
COMPLAINTS SINCE LAST INSPECTION: None		
• If yes, summarize:		
Comments:		

Y = Yes; N = No; NA = Not Applicable; N/I = Not Inspected; None = None; OK = Acceptable

PART II - SYSTEM SURVEY INFORMATION (Field Notes)

Shaded Boxes Indicate a potential Significant Deficiency

A. ERROR! BOOKMARK NOT DEFINED.SOURCE (WL001 / DRILLED WELL)		C. WELL HOUSE		E. DISINFECTION	
Sanitary Casing Seal /Cap	Y	Adequate Protection	Y	Disinfectant	NaOCL
Elbowed Casing Vent/Screened	Pitless Adapter	Proper Storage Only (Non-toxic & Non-explosive)	Y	ANSI Certified/NSF Approved / "GRAS"	GRAS
12" Casing Extension	Y	Cross-Connections Exist?	Ok	Feeder Condition	Y
Concrete Pad (6' Square)	Y ¹	Lighting	Y	Spare Feeder/Repair Parts	Y- On truck
Well Lot Condition (50' rad)	Ok ²	Heating	Y	Room Ventilation	Y
Protected from Flood Waters/Runoff	Y	Electrical Wiring (Safety)	Y	Contact Tank in service	Yes ³
Discharge Check Valve	Pitless Adapter	Floor Drain	Y	Contact Tank Condition	Ok
Discharge Shut-Off Valve	Y	All-Weather Access	Y	Injection Line Condition (Scale Build-Up, etc.)	Ok
Valved Blow-Off	Y	Wellhead Accessible	Outside	Solution Tank Condition	Ok
Raw Water Sample Tap	Y	Locked	Y	Solution Tank Covered	Y
Water Level Gauge or Transducer	N	Clean/Uncluttered	Y	Feeder Activation/Operation	On with well pump
Operable Water Meter/Reading	Y	Emergency Power Available	Y	Volume/Depth (OCI)	15 gal tank x 2 Both full
Permitted Capacity (gpd)	4,800	D. STORAGE – PNEUMATIC TANK(S) (ST001) (85 gal)		Booster Pump(s)	NA
Pumping Rate Observed (gpm)	NI			Residual Test Equipment	Y
Pumping Average hrs/day	1	Type:	Bladder	Free Residual, mg/l	1.63
Permitted Source Capacity Exceeded?	N	Drain Protected from Contamination	Y	Field test ≈ MOR residuals	Y
Discharge Head Observed (psi)	NI	Pressure Gauge/Reading	60 psi	F. CHEM. FEED SYSTEMS SAFETY / GENERAL	
All Weather Access	Y	Pressure Operating Range	55-60 psi		
B. NEW ACTIVITIES OR POLLUTION SOURCES within 1000 ft radius of well that present a significant/acute health risk.		Sight Glass/Level Indicator	NA	Do any facilities offer potential for explosions?	N
		Sample Tap Available	Y	Adequate safety equipment provided for handling	Y
		Pressurizing System	NA	Are Material Data Safety Sheets (MSDS) available?	Y
		Vacuum Relief Valve	NA	Are hazardous chemical containers labeled?	N
		Pressure Relief Valve	NA	Adequate chemical storage area provided?	Y
		Air Relief Valve	NA	Approved backflow devices installed to isolate process water from finished water?	Y
		Exterior Condition	Good	Have adequate employee safety training?	NI
		Normal Pump Cycling	Yes		
		Tank Watertight, Structurally Sound	Yes		
		Flushed/Cleaned Date	Monthly		
		Dept. of Labor & Industry Exp. Date (>120 gal.)	NA		
Comments: 1) There is minor undercutting around the concrete pad. 2) There is a group of trees growing on the well lot, though they don't appear to pose a risk, there is the potential for complications with the roots arising. 3) This contact tank serves to allow oxidation of ferrous Iron for removal by subsequent filtration.					

J. IRON & MANGANESE CONTROL (Oxidation with NaOCl & Removal with Filtration)	CANISTER FILTER
Cross-Connection Protection	Y
Safety Eyewear and Clothing Provided	Y
Material meet ANSI / NSF Standards	Y
Equipment Literature Available	Y-At office
Equipment Condition	Ok
Equipment Operation Adequate	Y
Spare Metering Pump Provided	Y- At office
pH Adjustment	N
If Aeration, How Provided	Aeration pump at contact tank influent
Is Disinfection Provided	Y
Suitable Sampling Taps	Y
Suitable NaOCl Storage (30 days minimum)	Y
Backwash (gravity from system/storage, pumped, other)	From bladder tank
No. Backwash Pumps	1x monthly
Air Wash Provided	N
Disposal of Backwash Waste	Discharge to drain
Appropriate & Operable Testing Equipment	Y
Comments: Raw: pH = 7.0 Fe = .22mg/l Finish pH = 6.6 Fe = ND	

Y = Yes; N = No; NA = Not Applicable; N/I = Not Inspected; None = None; OK = Acceptable

L. DISTRIBUTION SYSTEM EVALUATION	
Pipe Material(s): PVC	
Individual Service Meters provided?	N
o If yes, routine calibration & replacement program in effect?	NA
Flushing Provisions (hydrants, blow-offs, etc.) available?	Y
Routine Flushing Program in practice?	N
Isolation valves exercised?	None
Pressure monitoring of distribution system?	Gauge in pump house
Adequate Pressure Maintained Throughout? (>20 psi @ peak flow)	Y- measured 53psi
Problems/Complaints in past year: Y <input type="checkbox"/> taste & odor <input type="checkbox"/> pressure <input type="checkbox"/> turbidity/sediment <input type="checkbox"/> color <input checked="" type="checkbox"/> service interruptions <input type="checkbox"/> other Describe: Water service was found inoperable. Upon investigation, a toilet was found to have been running which resulted in the low pressure cut-off disabling the well after it had been drawn down too far. Service was restored same day.	
Pipe Repair - proper disinfection/sampling procedures used?	Follows AWWA Guidelines
Re-chlorination practiced? (If yes, see separate Re-Chlorination table in this report.)	N
FIRE PROTECTION PROVIDED?	N
How often are Fire Flow Tests conducted (with fire dept.)?	NA
How often are hydrants checked for operability?	NA
Are fire hydrants "NFPA-coded" to indicate maximum available fire flow?	NA
o If yes, is operator familiar with fire hydrant "code"?	NA
Are operators familiar with tank levels necessary to provide target fire flow for target duration?	NA
Does waterworks have routine procedures for contacting local fire department(s) to verify available fire flow and duration?	NA
MANAGEMENT	
Plans/Sketches/Maps with valve & master meter locations?	Y
Records maintained (should be kept for 3 years minimum): Y <input checked="" type="checkbox"/> Repairs <input type="checkbox"/> Flushing <input type="checkbox"/> Hydrant Testing <input type="checkbox"/> Fire Flow Tests <input type="checkbox"/> Water Audits <input checked="" type="checkbox"/> Complaints	
How often are Water Audits conducted?	NA
Leakage rates > 30%?	N
Explain:	
Comments:	

Y = Yes; N = No; NA = Not Applicable; N/I = Not Inspected; None = None; OK = Acceptable

LOUISA COUNTY

Ferncliff Business Park

2109624

	Well #1			
Pump capacity (gpm)	9			
Permit capacity (gpd)	4,800			
Date	Meter Rdg			
6/12/2020	1,645,300			
4/11/2018	631,300			
793	days			
Total Production (gal)	1,014,000			
Avg. Production (gpd)	1,279			
Pumping Avg (hrs/day)	2			

Total Production (gpd)	Current	Previous Inspection	Percent Change	% Permit Capacity
GPD	1,279	718	78%	27%
GPD/Conn	639			
GPD/Pop	31			

Chemical Schedule for 2109624 FERNCLIFF BUSINESS PARK

EP001 ENTRY POINT TAP
EP001 ENTRY POINT TAP

Group	Last Sample	Freq.	Next Sample	Comments
Nitrate + Nitrite (Combined)	8/14/2019	12	8/14/2020	
VOC	7/31/2018	36	7/31/2021	triennial reduced
Cyanide	2/10/2020	36	2/10/2023	2017 is 2 of 3 for waiver
Inorganics	2/10/2020	36	2/10/2023	
Metals	2/10/2020	36	2/10/2023	

Waivers	Begin	End
SOC-CAH2019_B	1/1/2017	12/31/2019
SOC-CAH2022_B	1/1/2020	12/31/2022
SOC-CAR2019_B	1/1/2017	12/31/2019
SOC-CAR2022_B	1/1/2020	12/31/2022
SOC-DIQ2019_B	1/1/2017	12/31/2019
SOC-DIQ2022_B	1/1/2020	12/31/2022
SOC-SEMI2019_B	1/1/2017	12/31/2019
SOC-SEMI2022_B	1/1/2020	12/31/2022
SOC-VOL2019_B	1/1/2017	12/31/2019
SOC-VOL2022_B	1/1/2020	12/31/2022

DS001 DISTRIBUTION SYSTEM
DBP01 CAVALIER PRODUCE

Group	Last Sample	Freq.	Next Sample	Comments
HAA5	8/14/2019	36	8/14/2022	reduced
TTHM	8/14/2019	36	8/14/2022	reduced

5 Lead and Copper Samples due 8/15/2020

Data on this report is calculated from the date the last sample was collected and does not factor modifications to the monitoring requirements that may have been established since that last collection period. Current and future monitoring schedules should be reviewed in SDWIS to verify the accuracy of this report.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 1111 E. Main Street, Suite 1400, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

**Certified Mail
Return Receipt Requested**

July 31, 2020

Ms. Pamela S. Baughman
General Manager
Louisa County Water Authority
PO Box 9
Louisa, VA 23093

RE: WQIF Grant Agreement #440-S-10-08; Louisa County Water Authority – Nutrient Reduction Project, Monetary Assessment for 2019 Nutrient Reduction Performance

Dear Ms. Baughman:

The design and installation of a nutrient reduction system at the Louisa County Water Authority wastewater treatment plant was cost-shared under the referenced Water Quality Improvement Fund (WQIF) grant agreement in the amount of \$1,830,989. The referenced agreement specifies nutrient performance requirements and corresponding monetary assessments for exceeding those requirements. WQIF staff has reviewed your annual performance report for the 2019 discharge monitoring year. The following table summarizes the findings for Total Phosphorus.

**Table 1: Louisa County Water Authority WWTP –
VPDES #VA0067954, 2019 Total Phosphorus (TP)**

Month	TP (mo. avg; mg/l)
Jan	0.63
Feb	0.74
Mar	0.57
Apr	0.31
May	1.34
Jun	1.19
Jul	1.17
Aug	1.53
Sep	1.11
Oct	1.19
Nov	1.81
Dec	1.70
Annual Avg.	1.11

The performance requirements (Agreement Article V) are annual averages for TN = 8 mg/l; Total Phosphorous (TP) = 1.0 mg/l. Therefore, in accordance with Agreement Article VIII (Material Breach), Section 8.2 (Monetary Assessments for Breach), **the Louisa County Water Authority is required to pay a monetary assessment in the amount of \$8,646 for noncompliance with the TP performance standards in Agreement Article V.**

Following is the monetary assessment calculation using the assessment factors (amount for each tenth of one mg/l exceedance) are per Agreement:

Table 2. 2019 Performance (Agreement #440-S-10-08)	PHOSPHORUS (mg/l)
Annual Average Discharged	1.11
Annual Performance Limit	1.0
Exceedance	0.11

Table 3. Calculation of Monetary Assessment	PHOSPHORUS
Assessment Factor	\$7,860 for each 0.1 mg/l exceedance
Concentration Exceedance	1.1 tenths of one mg/l
Assessment Amount	\$8,646

Payment of the monetary assessment must be made within 90 days of receipt of this written notification, identified for credit to the Water Quality Improvement Fund, Cooperative Point Source Program. If payment is not received by the deadline, then the State will initiate collection actions. The payment should be addressed as follows:

Department of Environmental Quality
Attn: Office of Financial Management
P.O. Box 1105
Richmond, VA 23218

Please copy the DEQ Clean Water Financing and Assistance Program with the transmittal letter accompanying your payment. If you need additional information or clarification, contact Michael Crocker at 804-698-4012 or by email michael.crocker@deq.virginia.gov.

Sincerely,



W. Chris Moore
DEQ Director of Financial Management

- C. Tom Faha – DEQ/NRO Regional Director
Bryant Thomas – DEQ/NRO Water Permits
Michael Crocker – DEQ/CWFAP
Carla Woods – DEQ/Financial Management
Belinda Mayton – DEQ/Financial Management

EXHIBIT F

FORMULA FOR CALCULATING MONETARY ASSESSMENT
FOR EXCEEDANCE OF
NUMERICAL PHOSPHORUS CONCENTRATIONS

Grantee: Louisa County Water Authority
Grant: #440-S-10-08

Section 2: Phosphorus Exceedances

$CP = (TPe/TPr) \times AnPay \times PerGrant$

where:

CP	=	Assessment for Phosphorus Exceedance.
TPe	=	Exceedance in tenths of a milligram per liter.
TPr	=	Expected phosphorus removal (difference between “pre-nutrient removal” annual average concentration and 1.00 mg/l limitation) in tenths of a milligram per liter.
AnPay	=	Annual Payment on grant; assumes principal payments amortized over 20 years and an interest rate of 5 percent. Using these assumed values leads to a “cost recovery factor” of 0.0802. The “cost recovery factor” times the grant amount yields the Annual Payment amount.
PerGrant	=	Percentage of grant received by year of exceedance.

Values used for Grant #440-S-10-08:

Pre-Nutrient Removal TP Concentration	= 2.14 mg/l
Effluent TP Concentration Limitation	= 1.0 mg/l
Total Grant Amount for TP Removal	= \$1,212,889
Useful Service Life	= 20 years
Interest Rate	= 5 percent

Calculated (assumes grant paid 100%):

Expected Removal (TPr)	= 1.14 mg/l
AnPay	= \$97,270
CP	= \$8,530 (for each 0.1 mg/l TP exceedance)

Pam Baughman

From: Zimmerman, Ann <ann.zimmerman@deq.virginia.gov>
Sent: Thursday, August 27, 2020 11:26 AM
To: Wesley Basore; Pam Baughman
Cc: Randy Gray
Subject: Application Complete: VA0067954

CAUTION: External email

Ms. Baughman,

Your application has been reviewed and appears to be complete. Other reviews of the application will be required by State and Federal agencies to ensure that public health and the environment will be protected. These reviews may require that you submit additional information.

The next steps involve assembling the information necessary to develop the permit limitations and then drafting the permit. I expect to have the draft permit prepared in the next 2 to 3 months. Once the draft permit is prepared and the appropriate reviews are performed, I will transmit the draft permit and supporting documentation to you for review.

Please contact me at (703) 583-3805 or ann.zimmerman@deq.virginia.gov if you have questions about our procedures or the status of your draft permit.

Respectfully,
Ann

--

Ann Zimmerman

Environmental Specialist II – Water Permit Writer
Virginia Department of Environmental Quality
Northern Regional Office
13901 Crown Court
Woodbridge, VA 22193
(703) 583 - 3805
ann.zimmerman@deq.virginia.gov
www.deq.virginia.gov

Pam Baughman

From: Geneva Hudgins <geneva.hudgins.vaawwa.org@membernova.email>
Sent: Monday, August 31, 2020 9:52 AM
To: Pam Baughman
Subject: VA AWWA Utility ALERT: DCR Dam Guidance
Attachments: dcr-guidance-reservoir-water-levels.pdf

CAUTION: External email



Utility Alert

Attention VA AWWA Utility Members:

The VA AWWA Board wants to make you aware of the guidance document (attached) that is being developed by the Department of Conservation and Recreation (DCR) and the Virginia Soil and Water Conservation Board related to the design and use of devices to lower reservoir water levels (low-level outlets).

If you own and maintain a dam, we encourage you to carefully review the attached document and comment as you feel appropriate at the link below.

It is notable that the document states existing dams “may need to modify or replace the low-level outlet drain system to meet the requirements established in 4VAC50-20-280 and 4VAC50-20-290.” This could potentially result in the need for very costly and difficult repairs.

Additionally, as noted in the guidance there are numerous potential problems associated with the operation and maintenance of low-level outlets. Other potential concerns that utilities should be aware of include: potential environmental impacts of operating low-level outlets and lowering reservoir levels, the challenges associated with preemptively lowering reservoir levels in anticipation of upcoming storms, among others that are specific to your operations.



**VIRGINIA SOIL AND
WATER CONSERVATION
BOARD GUIDANCE
DOCUMENT ON THE
DESIGN AND USE OF
DEVICES TO LOWER THE
RESERVOIR WATER
LEVEL**

(Approved September XX, 2020)

Summary:

This guidance document provides guidance to dam owners on which devices, methods, or systems may be used to lower the water level in a reservoir created by an impounding structure. Drains and related devices allow lowering of the reservoir ahead of a major precipitation event, during repair or maintenance of the dam, to relieve pressure on the dam as needed in response to an inspection or evaluation by a professional engineer, or in response to other operational and maintenance issues

Electronic Copy:

An electronic copy of this guidance in PDF format is available on the Regulatory TownHall under the Virginia Soil and Water Conservation Board at <http://townhall.virginia.gov/L/GDocs.cfm>.

Contact Information:

Please contact the Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management at dam@dc.virginia.gov or by calling 804-371-6095 with any questions regarding the application of this guidance.

Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the Department of Conservation and Recreation in administering the Dam Safety Program on behalf of the Virginia Soil and Water Conservation Board (Board) in accordance with § 10.1-605.1. This guidance provides a general interpretation of the applicable Code and Regulations but is not meant to be exhaustive in nature. Each situation may differ and may require additional interpretation of the Dam Safety Act and attendant regulations. This is not intended to and cannot be relied on to create any rights, substantive or procedural, on the part of any person or entity.

Devices, Methods and Systems to Lower the Reservoir Water Level

I. Background:

The Virginia Dam Safety Act, §10.1-604 *et seq.*, states that the Virginia Soil and Water Conservation Board (Board) “shall adopt regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated.” Section 4VAC50-20-280 (Drain requirements) of the Virginia Administrative Code states:

“All new impounding structures regardless of their hazard potential classification, shall include a device to permit draining of the impoundment within a reasonable period of time as determined by the owner's licensed professional engineer. Existing drains on impounding structures shall be kept operational. When practicable, existing impounding structures shall be retrofitted with devices to permit draining.”

Additionally, section 4VAC50-20-290 (Life of the Impounding Structure) states that “components of the impounding structure, the outlet works, drain system and appurtenances shall be durable and maintained or replaced in keeping with the design and planned life of the impounding structure.”

The owner's professional engineer has latitude in the design and use of the systems, devices, and methods used to lower the level of water in the reservoir provided the approach “permit[s] draining”, is “operational” and meets all other requirements of the Dam Safety Act and its attendant regulations.

II. Definitions (pursuant to § 10.1-604 and 4VAC50-20-30):

"Alteration" means changes to an impounding structure that could alter or affect its structural integrity. Alterations include, but are not limited to, changing the height or otherwise enlarging the dam, increasing normal pool or principal spillway elevation or physical dimensions, changing the elevation or physical dimensions of the emergency spillway, conducting necessary structural repairs or structural maintenance, or removing the impounding structure. Structural maintenance does not include routine maintenance.

"Alteration permit" means a permit required for any alteration to an impounding structure.

Board means the Virginia Soil and Water Conservation Board

Department means the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management

"Existing impounding structure" means any impounding structure in existence or under a construction permit prior to July 1, 2010.

"Impounding structure" or "dam "means a man-made structure, whether a dam across a watercourse or structure outside a watercourse, used or to be used to retain or store waters or other materials. The term includes: (i) all dams that are 25 feet or greater in height and that create an impoundment capacity of 15 acre-feet or greater, and (ii) all dams that are six feet or greater in height and that create an impoundment capacity of 50 acre-feet or greater. The term "impounding structure" shall not include: (a) dams licensed by the State Corporation

Commission that are subject to a safety inspection program; (b) dams owned or licensed by the United States government; (c) dams operated primarily for agricultural purposes which are less than 25 feet in height or which create a maximum impoundment capacity smaller than 100 acre-feet; (d) water or silt retaining dams approved pursuant to § 45.1-222 or 45.1-225.1 of the Code of Virginia; or (e) obstructions in a canal used to raise or lower water.

Low-level drain system means the devices, methods, or systems that are used to lower the level of water in the reservoir created by an impounding structure.

Practicable means an effective method of retrofitting an existing dam to lower the water level in a reservoir utilizing any of the designs, methods, or systems included in this guidance document or any additional designs, methods, or systems approved by the Department.

III. Authority:

The Dam Safety Act in the Code of Virginia contains the following authorities applicable to this guidance:

§ 10.1-605. Promulgation of regulations by the Board; guidance document. The Board shall adopt regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated...

Appendix 1 contains the Code of Virginia authorities (extended) applicable to this guidance and Appendix 2 contains the Impounding Structure Regulations authorities applicable to this guidance. These include:

§ 10.1-605. Promulgation of regulations by the Board; guidance document.

4VAC50-20-20. General Provisions.

4VAC50-20-30. Definitions.

4VAC50-20-80. Alterations Permits.

4VAC50-20-280. Drain Requirements.

4VAC50-20-290. Life of the Impounding Structure.

4VAC50-20-300. Additional Design Requirements.

4VAC50-20-320. Acceptable Design Procedures and References.

4VAC50-20-330. Other Applicable Dam Safety References.

IV. Discussion and Interpretation

In accordance with 4VAC50-20-280, all impounding structures must have a device, method, or system to lower the level of the reservoir created by the structure. Any dam to be constructed must include an approved low-level drain system designed in accordance with the requirements of the *Impounding Structure* regulations. An existing dam may need to modify or replace the low-level drain system to meet the requirements established in 4VAC50-20-280 and 4VAC50-20-290. Prior to any modification or repairs being conducted to the impounding structure, the Department may need to approve the modification or repair and issue an alteration permit (please

see 4VAC50-20-80 for additional information); dam owners must work with their Department Regional Engineer to ensure that any approvals and permit issuances are received before any work begins on the structure .

The ability to lower the level of a reservoir quickly and safely provides critical protection to the dam. (Also, see Emergency Action Plan (EAP) (PDF) guidance documents for more information on dam emergency planning.) A low-level drain system is usually engaged to address problems posing an immediate threat to the safety of the dam, when performing repairs to spillways, embankments, or other dam appurtenances, when performing maintenance, and when undertaking other efforts to reduce seasonal impacts to the dam. A low-level drain system is also used to control reservoir levels during first filling.

Below are specific examples of when a low-level drain system would be used ; this list does not include all possible scenarios where reservoir lowering may be required.

There is an immediate threat to the dam:

- Extreme floods threatening the safety of the dam and spillway system;
- Clogging of the spillway which may lead to high lake levels and eventual dam overtopping;
- Development of deep slides or cracks in the dam;
- Severe seepage through the dam which may lead to a piping failure of the dam;
- Partial or total collapse of the spillway system; and
- Landslide around reservoir rim.

There are repairs and maintenance needed at the dam:

- Routine maintenance;
- Slope protection repair;
- Spillway repairs;
- Repair and/or installation of docks and other structures along the shoreline; and
- Dredging the lake for application of aquatic herbicide.

There are actions needed to reduce seasonal impacts on the dam:

- To reduce ice damage to structures along the shoreline;
- To provide additional flood storage for upcoming spring rains;
- For periodic fluctuations in the lake level; and
- To discourage muskrat, beaver and other burrowing animal habitation along the shoreline that may lead to costly repairs and clogged spillways.

Acceptable low-level drain systems

Acceptable systems, devices or methods are:

- A valve located in the spillway riser or control structure;

- A conduit through the dam with a valve at either the upstream or downstream end of the conduit;
- A permanently installed siphon system where the siphon hose itself may be stored nearby;
- A permanently installed pumping system where a dedicated pump for this dam may be stored offsite, properly maintained in working order and accessible at all times;
- A gate, valve, or stop logs located in a drain control structure;
- Stop logs across a spillway;
- A combination of the above; or
- Any other effective system approved in writing by the Department prior to installation.

Dam owners are responsible for ensuring the following regarding the design of the low-level drain systems:

- Ensuring access to the low-level drain system is available at all times;
- Considering the possibility for operations to be conducted remotely;
- Coordinating with the Department's Regional Engineer to ensure the following:
 - The design including the hydraulic calculations, for the low-level drain system adheres to all design guidelines as required in 4VAC50-20-320;
 - The design, including the hydraulic calculations, for the low-level drain system is submitted for review even if no alteration to the impounding structure is under consideration; this will prevent unexpected changes to the configuration after installation of the low-level drain system;
 - Any application permit (either alteration or construction) documenting the design, hydraulic calculations, and specifications for the low-level drain system is submitted as required; and
 - A record report is prepared and submitted after installation of the low-level drain system is complete.

Please note: An owner must exercise extreme caution when opening an older low-level drain system. Older systems may become stuck in the open position subsequently draining the lake. Owners whose dam has an older low-level drain system which has not been properly maintained and exercised should consult their professional engineer and have a contingency plan in place to stop an uncontrolled release of water should the valve, gate or other device or system malfunction.

Operation and maintenance of low-level drain systems

All gates, valves, stems and other mechanisms of a low-level drain system should be lubricated, maintained, and tested according to the manufacturer's specifications. If an owner or their professional engineer do not access have a copy of the specifications and the manufacturing company cannot be determined, then a local valve distributor may be able to provide assistance. In most cases, the low-level drain system should be operated at least annually during the required inspection to prevent the inlet from clogging with sediment and debris and to keep all movable parts working easily. Frequent operation will help to ensure that the system will be operable when it is needed. An owner or their representative should contact local environmental officials

and Virginia Department of Environmental Quality regarding permits that may be required for a release of water or sediment.

There are several maintenance problems frequently found with low-level drain systems including:

- Deteriorated and bent control stems and stem guides;
- Deteriorated and separated conduit joints;
- Leaky and rusted control valves and sluice gates;
- Deteriorated ladders and platforms in control structures;
- Deteriorated control structures;
- Clogging of the drain conduit inlet with sediment and debris;
- Inaccessibility of the control mechanism to operate the drain;
- Seepage along the drain conduit;
- Erosion and undermining of the conduit discharge area;
- Vandalism; and
- Development of instability of earthen sections resulting in slides along the upstream slope of the dam and the shoreline caused by lowering the lake level too quickly.

V. Reference Documents related to the Design and Use of Low-Level Drain Systems and Acknowledgment

The documents below provide additional guidance regarding the design and use of low-level drain systems on impounding structures. The Department will utilize these documents when reviewing designs and permit applications that include the use of low-level outlet device systems. The Department acknowledges the utility of the New York Department of Environmental Conservation's website page on low-level outlets in developing this document.

Corps of Engineers Publication EM 1110-2-1602; CECW-EH-D; *Hydraulic Design of Reservoir Outlet Works*; October 15, 1980.

Corps of Engineers Publication ER 1110-2-50; CECW-EH-D; *Low level discharge facilities for drawdown of Impoundments*; August 22, 1975.

US Bureau of Reclamation's (USBR); *Criteria and Guidelines for Evacuating Storage Reservoirs and Sizing Low level Outlet Works* (ACER Technical Memorandum No. 3); 1990.

VI. Adoption, Amendments, and Repeal:

This document shall remain in effect until rescinded or superseded.

Appendix 1
Applicable Code of Virginia Authorities.

The Code of Virginia contains the following authorities applicable to this Guidance:

§ 10.1-605. Promulgation of regulations by the Board; guidance document.

A. The Board shall adopt regulations to ensure that impounding structures in the Commonwealth are properly and safely constructed, maintained and operated. Dam safety regulations promulgated by the State Water Control Board shall remain in full force until amended in accordance with applicable procedures.

B. The Board's Impounding Structure Regulations shall not require any impounding structure in existence or under a construction permit prior to July 1, 2010, that is currently classified as high hazard, or is subsequently found to be high hazard through reclassification, to upgrade its spillway to pass a rainfall event greater than the maximum recorded within the Commonwealth, which shall be deemed to be 90 percent of the probable maximum precipitation.

1. Such an impounding structure shall be determined to be in compliance with the spillway requirements of the regulations provided that (i) the impounding structure will pass two-thirds of the reduced probable maximum precipitation requirement described in this subsection and (ii) the dam owner certifies annually and by January 15 that such impounding structure meets each of the following conditions:

- a. The owner has a current emergency action plan that is approved by the Board and that is developed and updated in accordance with the regulations;
 - b. The owner has exercised the emergency action plan in accordance with the regulations and conducts a table-top exercise at least once every two years;
 - c. The Department has verification that both the local organization for emergency management and the Virginia Department of Emergency Management have on file current emergency action plans and updates for the impounding structure;
 - d. That conditions at the impounding structure are monitored on a daily basis and as dictated by the emergency action plan;
 - e. The impounding structure is inspected at least annually by a professional engineer and all observed deficiencies are addressed within 120 days of such inspection;
 - f. The owner has a dam break inundation zone map developed in accordance with the regulations that is acceptable to the Department;
 - g. The owner is insured in an amount that will substantially cover the costs of downstream property losses to others that may result from a dam failure; and
 - h. The owner shall post the dam's emergency action plan on his website, or upon the request of the owner, the Department or another state agency responsible for providing emergency management services to citizens agrees to post the plan on its website. If the Department or another state agency agrees to post the plan on its website, the owner shall provide the plan in a format suitable for posting.
2. A dam owner who meets the conditions of subdivisions 1 a through 1 h, but has not provided record drawings to the Department for his impounding structure, shall submit a complete record report developed in accordance with the construction permit requirements of the Impounding Structure Regulations, excluding the required submittal of the record drawings.
3. A dam owner who fails to submit certifications required by subdivisions 1 a through 1 h in a timely fashion shall not enjoy the presumption that such impounding structure is deemed to be

in compliance with the spillway requirements of the Board's Impounding Structure Regulations (4VAC50-20).

4. Any dam owner who has submitted the certifications required by subdivisions 1 a through 1 h shall make (i) such certifications, (ii) the emergency action plan required by subdivision 1 a, and (iii) the certificate of insurance required by subdivision 1 g available, upon request and within five business days, to any person. A dam owner may comply with the requirements of this subdivision by providing the same information on a website and directing the requestor to such website. A dam owner who fails to comply with this subdivision shall be subject to a civil penalty pursuant to § 10.1-613.2.

C. The Board's regulations shall establish an incremental damage analysis procedure that permits the spillway design flood requirement for an impounding structure to be reduced to the level at which dam failure shall not significantly increase downstream hazard to life or property, provided that the spillway design flood requirement shall not be reduced to below the 100-year flood event for high or significant hazard impounding structures, or to below the 50-year flood event for low hazard potential impounding structures.

D. The Board shall consider the impact of limited-use or private roadways with low traffic volume and low public safety risk that are downstream from or across an impounding structure in the determination of the hazard potential classification of an impounding structure.

Appendix 2
Applicable Impounding Structure Regulations Authorities.

The *Impounding Structure Regulations* contains the following authorities applicable to this Guidance.

4VAC50-20-20. General Provisions.

A. This chapter provides for the proper and safe design, construction, operation and maintenance of impounding structures to protect public safety. This chapter shall not be construed or interpreted to relieve the owner or operator of any impoundment or impounding structure of any legal duties, obligations or liabilities incident to ownership, design, construction, operation or maintenance.

B. Approval by the board of proposals for an impounding structure shall in no manner be construed or interpreted as approval to capture or store waters. For information concerning approval to capture or store waters, see Chapter 8 (§ 62.1-107) of Title 62.1 of the Code of Virginia, and other provisions of law as may be applicable.

C. In promulgating this chapter, the board recognizes that no impounding structure can ever be completely "fail-safe," because of incomplete understanding of or uncertainties associated with natural (earthquakes and floods) and manmade (sabotage) destructive forces; with material behavior and response to those forces; and with quality control during construction.

D. All engineering analyses required by this chapter, including but not limited to, plans, specifications, hydrology, hydraulics and inspections shall be conducted or overseen by and bear the seal of a professional engineer licensed to practice in Virginia.

E. Design, inspection and maintenance of impounding structures shall be conducted utilizing competent, experienced, engineering judgment that takes into consideration factors including but not limited to local topography and meteorological conditions.

F. The forms noted in this chapter are available from the department at the department's website.

4VAC50-20-30. Definitions.

The following words and terms when used in this chapter shall have the following meanings unless the context clearly indicates otherwise:

"Acre-foot" means a unit of volume equal to 43,560 cubic feet or 325,853 gallons (equivalent to one foot of depth over one acre of area).

"Agricultural purpose" means the production of an agricultural commodity as defined in § 3.2-3900 of the Code of Virginia that requires the use of impounded waters.

"Agricultural purpose dams" means impounding structures which are less than 25 feet in height or which create a maximum impoundment smaller than 100 acre-feet, and operated primarily for agricultural purposes.

"Alteration" means changes to an impounding structure that could alter or affect its structural integrity. Alterations include, but are not limited to, changing the height or otherwise enlarging the dam, increasing normal pool or principal spillway elevation or physical dimensions, changing the elevation or physical dimensions of the emergency spillway, conducting necessary structural

repairs or structural maintenance, or removing the impounding structure. Structural maintenance does not include routine maintenance.

"Alteration permit" means a permit required for any alteration to an impounding structure.

"Annual average daily traffic" or "AADT" means the total volume of vehicle traffic of a highway or road for a year divided by 365 days and is a measure used in transportation planning and transportation engineering of how busy a road is.

"Board" means the Virginia Soil and Water Conservation Board.

"Conditional Operation and Maintenance Certificate" means a certificate required for impounding structures with deficiencies.

"Construction" means the construction of a new impounding structure.

"Construction permit" means a permit required for the construction of a new impounding structure.

"Dam break inundation zone" means the area downstream of a dam that would be inundated or otherwise directly affected by the failure of a dam.

"Department" means the Virginia Department of Conservation and Recreation. "Design flood" means the calculated volume of runoff and the resulting peak discharge utilized in the evaluation, design, construction, operation and maintenance of the impounding structure.

"Director" means the Director of the Department of Conservation and Recreation or his designee.

"Drill" means a type of emergency action plan exercise that tests, develops, or maintains skills in an emergency response procedure. During a drill, participants perform an in-house exercise to verify telephone numbers and other means of communication along with the owner's response. A drill is considered a necessary part of ongoing training.

"Emergency Action Plan or EAP" means a formal document that recognizes potential impounding structure emergency conditions and specifies preplanned actions to be followed to minimize loss of life and property damage. The EAP specifies actions the owner must take to minimize or alleviate emergency conditions at the impounding structure. It contains procedures and information to assist the owner in issuing early warning and notification messages to responsible emergency management authorities. It shall also contain dam break inundation zone maps as required to show emergency management authorities the critical areas for action in case of emergency.

"Emergency Action Plan Exercise" means an activity designed to promote emergency preparedness; test or evaluate EAPs, procedures, or facilities; train personnel in emergency management duties; and demonstrate operational capability. In response to a simulated event, exercises should consist of the performance of duties, tasks, or operations very similar to the way they would be performed in a real emergency. An exercise may include but not be limited to drills and tabletop exercises.

"Emergency Preparedness Plan" means a formal document prepared for Low Hazard impounding structures that provides maps and procedures for notifying owners of downstream property that may be impacted by an emergency situation at an impounding structure.

"Existing impounding structure" means any impounding structure in existence or under a construction permit prior to July 1, 2010.

"Freeboard" means the vertical distance between the maximum water surface elevation associated with the spillway design flood and the top of the impounding structure.

"Height" means the hydraulic height of an impounding structure. If the impounding structure spans a stream or watercourse, height means the vertical distance from the natural bed of the stream or watercourse measured at the downstream toe of the impounding structure to the top of the impounding structure. If the impounding structure does not span a stream or watercourse, height means the vertical distance from the lowest elevation of the downstream limit of the barrier to the top of the impounding structure.

"Impounding structure" or "dam" means a man-made structure, whether a dam across a watercourse or structure outside a watercourse, used or to be used to retain or store waters or other materials. The term includes: (i) all dams that are 25 feet or greater in height and that create an impoundment capacity of 15 acre-feet or greater, and (ii) all dams that are six feet or greater in height and that create an impoundment capacity of 50 acre-feet or greater. The term "impounding structure" shall not include: (a) dams licensed by the State Corporation Commission that are subject to a safety inspection program; (b) dams owned or licensed by the United States government; (c) dams operated primarily for agricultural purposes which are less than 25 feet in height or which create a maximum impoundment capacity smaller than 100 acre-feet; (d) water or silt retaining dams approved pursuant to § 45.1-222 or 45.1-225.1 of the Code of Virginia; or (e) obstructions in a canal used to raise or lower water.

"Impoundment" means a body of water or other materials the storage of which is caused by any impounding structure.

"Life of the impounding structure" and "life of the project" mean that period of time for which the impounding structure is designed and planned to perform effectively, including the time required to remove the structure when it is no longer capable of functioning as planned and designed.

"Maximum impounding capacity" means the volume of water or other materials in acre- feet that is capable of being impounded at the top of the impounding structure.

"New construction" means any impounding structure issued a construction permit or otherwise constructed on or after July 1, 2010.

"Normal or typical water surface elevation" means the water surface elevation at the crest of the lowest ungated outlet from the impoundment or the elevation of the normal pool of the impoundment if different than the water surface elevation at the crest of the lowest ungated outlet. For calculating sunny day failures for flood control impounding structures, stormwater detention impounding structures, and related facilities designed to hold back volumes of water for slow release, the normal or typical water surface elevation shall be measured at the crest of the auxiliary or emergency spillway.

"Operation and Maintenance Certificate" means a certificate required for the operation and maintenance of all impounding structures.

"Owner" means the owner of the land on which an impounding structure is situated, the holder of an easement permitting the construction of an impounding structure and any person or entity agreeing to maintain an impounding structure. The term "owner" may include the Commonwealth or any of its political subdivisions, including but not limited to sanitation district commissions and authorities, any public or private institutions, corporations, associations, firms or companies organized or existing under the laws of this Commonwealth or any other state or country, as well as any person or group of persons acting individually or as a group.

"Planned land use" means land use that has been approved by a locality or included in a master land use plan by a locality, such as in a locality's comprehensive land use plan.

"Spillway" means a structure to provide for the controlled release of flows from the impounding structure into a downstream area.

"Stage I Condition" means a flood watch or heavy continuous rain or excessive flow of water from ice or snow melt.

"Stage II Condition" means a flood watch or emergency spillway activation or impounding structure overtopping where a failure may be possible.

"Stage III Condition" means an emergency spillway activation or impounding structure overtopping where imminent failure is probable.

"Sunny day dam failure" means the failure of an impounding structure with the initial water level at the normal reservoir level, usually at the lowest ungated principal spillway elevation or the typical operating water level.

"Tabletop Exercise" means a type of emergency action plan exercise that involves a meeting of the impounding structure owner and the state and local emergency management officials in a conference room environment. The format is usually informal with minimum stress involved. The exercise begins with the description of a simulated event and proceeds with discussions by the participants to evaluate the EAP and response procedures and to resolve concerns regarding coordination and responsibilities.

"Top of the impounding structure" means the lowest point of the nonoverflow section of the impounding structure.

"Watercourse" means a natural channel having a well-defined bed and banks and in which water normally flows.

4VAC50-20-80. Alteration permits.

A. Alterations which would potentially affect the structural integrity of an impounding structure include, but are not limited to, changing the height or otherwise enlarging the dam, increasing normal pool or principal spillway elevation or physical dimensions, changing the elevation or physical dimensions of the emergency spillway, conducting necessary repairs or structural maintenance, or removing the impounding structure. Structural maintenance does not include routine maintenance.

B. An applicant for an Alteration Permit shall submit a design report. A form for the design report is available from the department (Design Report for the Construction or Alteration of Virginia Regulated Impounding Structures). The design report shall be prepared in accordance with 4VAC50-20-240. The design report shall include, but not be limited to, the following information:

1. Project information including a description and benefits of the proposed alteration, name of the impounding structure, inventory number if available, name of the reservoir, and the purpose of the reservoir.
2. The hazard potential classification in conformance with Table 1 in 4VAC50-20-50.
3. Location of the impounding structure including the city or county, number of feet or miles upstream or downstream of a highway and the highway number, name of the river or the stream, and the latitude and longitude.
4. Owner's name or representative if corporation, mailing address, residential and business telephone numbers, and other means of communication.
5. Owner's engineer's name, firm, professional engineer Virginia number, mailing address, and business telephone number.
6. Impounding structure data including type of material (earth, concrete, masonry or other) and the following configurations (note both existing and design configurations for each):
 - a. Top of impounding structure (elevation);
 - b. Downstream toe – lowest (elevation);

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- c. Height of impounding structure (feet);
- d. Crest length – exclusive of spillway (feet);
- e. Crest width (feet);
- f. Upstream slope (horizontal to vertical); and
- g. Downstream slope (horizontal to vertical).
- 7. Reservoir data including the following (note both existing and design configurations for each):
 - a. Maximum capacity (acre-feet);
 - b. Maximum pool (elevation);
 - c. Maximum pool surface area (acres);
 - d. Normal capacity (acre-feet);
 - e. Normal pool (elevation);
 - f. Normal pool surface area (acres); and
 - g. Freeboard (feet).
- 8. Spillway data including the type, construction material, design configuration, and invert elevation for the low level drain, the principal spillway, and the emergency spillway.
- 9. Watershed data including drainage area (square miles); type and extent of watershed development; time of concentration (hours); routing procedure; spillway design flood used and state source; design inflow hydrograph volume (acre-feet), peak inflow (cfs), and rainfall duration (hours); and freeboard during passage of the spillway design flood (feet).
- 10. Evidence that the local government has been notified of the alteration and repair plan.
- 11. Plans and specifications as required by 4VAC50-20-310. The plan view of the impounding structure site should represent all significant structures and improvements that illustrate the location of all proposed work.
- 12. A report of the geotechnical investigations of the foundation soils, bedrock, or both in the areas affected by the proposed alterations and of the materials to be used to alter the impounding structure.
- 13. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during the alteration of the impounding structure under all conditions of reservoir operations.
- 14. Calculations and assumptions relative to design of the improved spillway or spillways, if applicable.
- 15. Provisions to ensure that the impounding structure and appurtenances during the alteration will be protected against unacceptable deterioration or erosion due to freezing and thawing, wind, wave action and rain or any combination thereof.
- 16. Other pertinent design data, assumptions and analyses commensurate with the nature of the particular impounding structure and specific site conditions, including when required by this chapter, a plan and water surface profile of the dam break inundation zone.
- 17. If applicable, a description of the techniques to be used to divert stream flow during alteration work so as to prevent hazard to life, health and property, including a detailed plan and procedures to maintain a stable impounding structure during storm events, a drawing showing temporary diversion devices, and a description of the potential impoundment during the alteration. Such diversion plans shall be in accordance with the applicable environmental laws.
- 18. A plan for project construction monitoring and quality control testing to confirm that materials used in the alteration work and that performance standards meet the design requirements set forth in the specifications.
- 19. Certification by the owner's engineer that the information provided pursuant to this subsection is true and correct in their professional judgment. Such certification shall include the engineer's signature, printed name, Virginia number, date, and the engineer's Virginia seal.

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20. Owner's signature certifying receipt of the information provided pursuant to this subsection.

C. A plan of construction is a required element of complete permit application and shall include:

1. A construction sequence with milestones.
2. Elements of the work plan that should be considered include, but are not limited to, foundation and abutment treatment, excavation and material fill processes, phased fill and compaction, testing and control procedures, construction of permanent spillway and drainage devices, if applicable.
3. The erosion and sediment control plan, as approved by the local government, which minimizes soil erosion and sedimentation during all phases of construction.

D. Within 120 days of receipt of a complete Alteration Permit Application, the board shall act on the application. If the application is not acceptable, the director shall inform the applicant within 60 days of receipt and shall explain what changes are required for an acceptable application. A complete Alteration Permit Application consists of the following:

1. A final design report with attachments as needed, and certified by the owner;
2. A plan of construction that meets the requirements of subsection C of this section;
3. Any necessary interim provisions to the current Emergency Action Plan or Emergency Preparedness Plan. Interim provisions shall be submitted to the local organization for emergency management, the Virginia Department of Emergency Management, and the department; and
4. If the owner is requesting the deregulation of an impounding structure, the application shall specify whether the impounding structure is to be removed so that the impounding structure is incapable of storing water, either temporarily or permanently; or whether the impounding structure is to be altered in such a manner that either the height or storage capacity of the impounding structure causes the impounding structure to be of less than regulated size.

E. During the alteration work, the owner shall provide the director with any proposed changes from the approved design, plans, specifications, or a plan of construction. Approval shall be obtained from the director prior to the alteration or installation of any changes that will affect the integrity or impounding capacity of the impounding structure.

F. The Alteration Permit shall be valid for the construction sequence with milestones specified in the approved Alteration Permit Application.

G. Work identified in the Alteration Permit must commence within the time frame identified in the Alteration Permit. If work does not commence within the prescribed time frame, the permit shall expire, except that the applicant may petition the board for extension of the prescribed time frame and the board may extend such period for good cause with an updated construction sequence with milestones.

H. The board, the director, or both may take any necessary action consistent with the Dam Safety Act (§ 10.1-604 et seq. of the Code of Virginia) if any terms of this section or of the permit are violated, if the activities of the owner are not in accordance with the approved plans and specifications, if the alteration is conducted in a manner hazardous to downstream life or property, or for other cause as described in the Act.

I. Within 90 days after completion of the alteration of an impounding structure, the owner shall submit a complete Record Report. A form for the Record Report is available from the

(DCR-VSWCB-046) (09/20)

department (Record Report for Virginia Regulated Impounding Structures). The Record Report shall be signed and sealed by a licensed professional engineer and signed by the owner and shall be sent to the department indicating that the modifications made to the structural features of the impounding structure have been completed. This report is not required when the Alteration Permit has been issued for the removal of an impounding structure. The Record Report shall include the following:

1. Project information including the name and inventory number of the structure, name of the reservoir, and whether the report is associated with a new or old structure;
2. Location of the impounding structure including the city or county, number of feet or miles upstream or downstream of a highway and the highway number, name of the river or the stream, and the latitude and longitude;
3. Owner's name or representative if corporation, mailing address, residential and business telephone numbers, and other means of communication;
4. Information on the design report, including who it was prepared by, the date of design report preparation, whether it was for new construction or for an alteration, and the permit issuance date;
5. Owner's engineer's name, firm, professional engineer Virginia number, mailing address, and business telephone number;
6. Impounding structure data including type of material (earth, concrete, masonry or other) and the following configurations:
 - a. Top of impounding structure (elevation);
 - b. Downstream toe – lowest (elevation);
 - c. Height of impounding structure (feet);
 - d. Crest length – exclusive of spillway (feet);
 - e. Crest width (feet);
 - f. Upstream slope (horizontal to vertical); and
 - g. Downstream slope (horizontal to vertical).
7. Reservoir data including the following:
 - a. Maximum capacity (acre-feet);
 - b. Maximum pool (elevation);
 - c. Maximum pool surface area (acres);
 - d. Normal capacity (acre-feet);
 - e. Normal pool (elevation);
 - f. Normal pool surface area (acres); and
 - g. Freeboard (feet).
8. Spillway data including the type, construction material, design configuration, and invert elevation for the low level drain, the principal spillway, and the emergency spillway; a description of the low level drain and principal spillway including dimensions, trash guard information, and orientation of intake and discharge to impounding structure if looking downstream; and a description of the emergency spillway including dimensions and orientation to impounding structure if looking downstream;
9. Watershed data including drainage area (square miles); type and extent of watershed development; time of concentration (hours); routing procedure; spillway design flood used and state source; design inflow hydrograph volume (acre-feet), peak inflow (cfs), and rainfall duration (hours); and freeboard during passage of the spillway design flood (feet);
10. Impounding structure history including the date construction was completed, who it was designed by and the date, who it was built by and the date, who performed inspections and dates,

description of repairs, and confirmation as to whether the impounding structure has ever been overtopped;

11. A narrative describing the impounding structure procedures for operation, maintenance, emergency action plan implementation, and structure evaluation;

12. A narrative describing the hydraulic and hydrologic data on the spillway design flood, hydrologic records, flood experience, flood potential, reservoir regulation, and comments or recommendations regarding these attributes;

13. A narrative describing stability of the foundation and abutments, embankment materials, and a written evaluation of each;

14. A complete set of record drawings signed and sealed by a licensed professional engineer and signed by the owner;

15. Certification by the owner's engineer that the information provided pursuant to this subsection is true and correct in their professional judgment. Such certification shall include the engineer's signature, printed name, Virginia number, date, and the engineer's Virginia seal; and

16. Owner's signature certifying receipt of the information provided pursuant to this subsection.

J. For altered impounding structures, a certification from a licensed professional engineer who has monitored the alteration of the impounding structure that, to the best of the engineer's judgment, knowledge, and belief, the impounding structure and its appurtenances were altered in conformance with the plans, specifications, drawings and other requirements approved by the board.

4VAC50-20-280. Drain Requirements.

All new impounding structures regardless of their hazard potential classification, shall include a device to permit draining of the impoundment within a reasonable period of time as determined by the owner's licensed professional engineer. Existing drains on impounding structures shall be kept operational. When practicable, existing impounding structures shall be retrofitted with devices to permit draining.

4VAC50-20-290. Life of the Impounding Structure.

Components of the impounding structure, the outlet works, drain system and appurtenances shall be durable and maintained or replaced in keeping with the design and planned life of the impounding structure.

4VAC50-20-300. Additional Design Requirements.

A. Flood routings shall start at or above the elevation of the crest of the lowest ungated outlet. Freeboard determination and justification must be addressed by the owner's engineer.

B. All elements of the impounding structure shall conform to sound engineering practice. Safety factors, design standards and design references that are used shall be included with the design report.

C. Inspection devices may be required by the director for use by inspectors, owners or the director in conducting inspections in the interest of structural integrity during and after completion of construction and during the life of the impounding 4VAC50-20-320. Acceptable Design Procedures and References.

4VAC50-20-320. Acceptable Design Procedures and References.

(DCR-VSWCB-046) (09/20)

To ensure consistency of approach, within the major engineering disciplines of hydrology, hydraulics, soils and foundations, structures, and general civil design, criteria and approaches from multiple sources shall not be mixed for developing the design of a given feature or facility without approval of the director. In all cases the owner's engineer shall identify the source of the criteria.

The following are acceptable as design procedures and references:

1. The design procedures, manuals and criteria used by the United States Army Corps of Engineers.
2. The design procedures, manuals and criteria used by the United States Department of Agriculture, Natural Resources Conservation Service.
3. The design procedures, manuals and criteria used by the United States Department of the Interior, Bureau of Reclamation.
4. The design procedures, manuals and criteria used by the United States Department of Commerce, National Weather Service.
5. The design procedures, manuals and criteria used by the United States Federal Energy Regulatory Commission.
6. Other design procedures, manuals and criteria that are accepted as current, sound engineering practices, as approved by the director prior to the design of the impounding structure.

4VAC50-20-330. Other Applicable Dam Safety References.

A. Manuals, guidance, and criteria used by the Federal Emergency Management Agency, including the following:

1. Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners, U.S. Department of Homeland Security, Federal Emergency Management Agency, October 1998, Reprinted January 2004; FEMA 64 or as revised.
2. Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams, U.S. Department of Homeland Security, Federal Emergency Management Agency, October 1998, Reprinted April 2004; FEMA 94 or as revised.

B. Manuals, guidance, and forms provided by the department. Such materials may be located on the department's website at: <http://www.dcr.virginia.gov>.

Green Spring Wells Static Levels

Date	MW1d	MW2d	MW3d	MW4d	MW5s	MW5d	MW6s	MW6d	MW7s	MW7d	MW8s	MW8d	MW9d	Total	Avg.	Avg Gallons
5/30/2018	-71.12	-31.14	-41.93	-21.52	-31.82	-58.24	-31.64	-34.74	-31.78	-39.4	-13.94	-17.6	-43.97	-468.81	-36.0623	156,710
6/30/2018	-76.31	-31.33	-42.5	-18.85	-30.68	-62.58	-31.63	-34.53	-30.41	-38.47	-13.12	-16.6	-45.84	-472.85	-36.3731	164,860
7/31/2018	-77.21	-31.85	-44.43	-22.73	-31.13	-63.14	-31.64	-34.42	-30.41	-40.8	-19.82	-21.2	-47.25	-495.99	-38.1531	197,439
8/31/2018	-100	-34.63	-46.57	-24.28	-31.92	-82.1	-31.63	-34.48	-30.86	-41.98	-19.49	-21.4	-48.93	-548.24	-42.1723	204,275
9/30/2018	-70.2	-30.85	-40	-21.26	-31.91	-57	-31.64	-34.34	-30.04	-37.74	-8.27	-14.1	-48.3	-455.64	-35.0492	155,095
10/31/2018	-76.11	-31.34	-38.22	-18.6	-31.25	-62.13	-31.65	-34.03	-29.41	-36.63	-13.2	-14.9	-46.2	-463.7	-35.6692	157,759
11/30/2018	-70.59	-29.99	-36.78	-16.41	-30.29	-57.2	-32.55	-33.51	-27.7	-35.38	-9.98	-12.4	-45.17	-437.96	-33.6892	176,596
12/31/2018	-77.69	-30.8	-36.55	-15.13	-29.93	-63.26	-31.65	-32.88	-26.27	-34.98	-9.84	-13	-42.91	-444.87	-34.2208	151,904
1/31/2019	-64.75	-27.52	-35.17	-13.22	-29.2	-52.45	-31.66	-32.32	-25.2	-34.1	-9.15	-12.2	-40.62	-407.58	-31.3523	147,962
2/28/2019	-72.65	-28.68	-36.6	-12.67	-28.64	-58.69	-32.25	-31.8	-24.1	-34.3	-8.15	-11.9	-39.97	-420.43	-32.3408	176,465
3/29/2019	-68.51	-27.31	-35.1	-13.7	-28.02	-55.35	-31.12	-31.43	-23.55	-34.11	-10.05	-12.7	-38.86	-409.81	-31.5238	223,102
4/30/2019	-72.96	-27.98	-39.03	-17.07	-27.88	-59.21	-30.48	-30.76	-23.37	-36.35	-14.45	-16.3	-37.4	-433.22	-33.3246	228,011
5/30/2019	-71.82	-28.33	-38.43	-19.82	-28.2	-58.3	-30.02	-30.24	-23.42	-36.87	-18.24	-17.9	-40.15	-441.74	-33.98	196,540
6/30/2019	-89.96	-30.73	-44.32	-22.72	-28.48	-73.6	-29.76	-30.08	-24.57	-39.66	-19.81	-22.1	-47.4	-503.2	-38.7077	221,465
7/31/2019	-81.5	-34.28	-45.79	-25.16	-28.88	-66.62	-29.69	-30.07	-26	-40.89	-19.8	-23.2	-46.19	-498.08	-38.3138	230,709
8/31/2019	-98.7	-33.58	-43.6	-26.45	-29.87	-80.88	-29.69	-30.21	-26.5	-40.47	-19.81	-23.4	-46.19	-529.36	-40.72	207,023
9/30/2019	-93.25	-35.52	-48.16	-30.3	-29.96	-76.59	-30.21	-30.62	-27.71	-44	-19.8	-27.3	-51.38	-544.82	-41.9092	225,283
10/31/2019	-77.68	-33.44	-44.9	-29.35	-30.4	-63.67	-30.73	-31.18	-28.84	-41.82	-18.68	-25	-53.74	-509.46	-39.1892	206,750
11/30/2019	-66.5	-30.81	-36.65	-24.47	-30.66	-54.43	-31.78	-31.33	-28.92	-38.86	-10.38	-20.3	-48.27	-453.4	-34.8769	161,676
12/31/2019	-68.08	-30.51	-35.85	-22.77	-30.47	-55.9	-31.1	-31.39	-28.62	-38.48	-15.28	-18.5	-46.65	-453.56	-34.8892	156,959
1/31/2020	-63.03	-28.77	-30.63	-17.58	-29.87	-51.66	-31.21	-31.52	-27.61	-36	-11	-14.4	-42.63	-415.92	-31.9938	141,074
2/29/2020	-64.98	-28.91	-31.12	-16	-29.08	-57.22	-31.21	-31.52	-26.98	-36.21	-12.13	-14.3	-41.66	-421.34	-32.4108	158,421
3/31/2020	-62.28	-27.58	-30.97	-15.18	-28.88	-51.23	-31.09	-31.4	-26.62	-35.44	-12.87	-14.1	-37.55	-405.17	-31.1669	169,318
4/30/2020	-59.63	-25.61	-27.25	-13.25	-28.82	-48.83	-29.97	-31.34	-26.22	-34.54	-8.63	-11.9	-35.14	-381.11	-29.3162	141,537
5/30/2020	-67.25	-27.42	-30.26	-12.02	-28.04	-55.77	-30.62	-30.88	-25.27	-33.95	-12.35	-13.1	-37.03	-403.96	-31.0738	149,814
6/30/2020	-84.66	-29.94	-33.62	-14.9	-27.82	-70.89	-30.5	-30.85	-25.66	-38.57	-18.22	-18.6	-40.31	-464.57	-35.7362	267,480
7/31/2020	-75.07	-29.69	-37.47	-17.7	-27.89	-61.48	-30.5	-30.82	-26.45	-37.74	-19.79	-18.8	-38.3	-451.65	-34.7423	267,200
8/31/2020	-67.72	-28.11	-34.5	-14.85	-27.6	-55.37	-30.46	-30.74	-25.94	-35	-11.86	-13.7	-34.56	-410.41	-31.57	193,167
*Spring	Well	Startup														
Low for Year																
High for Year																

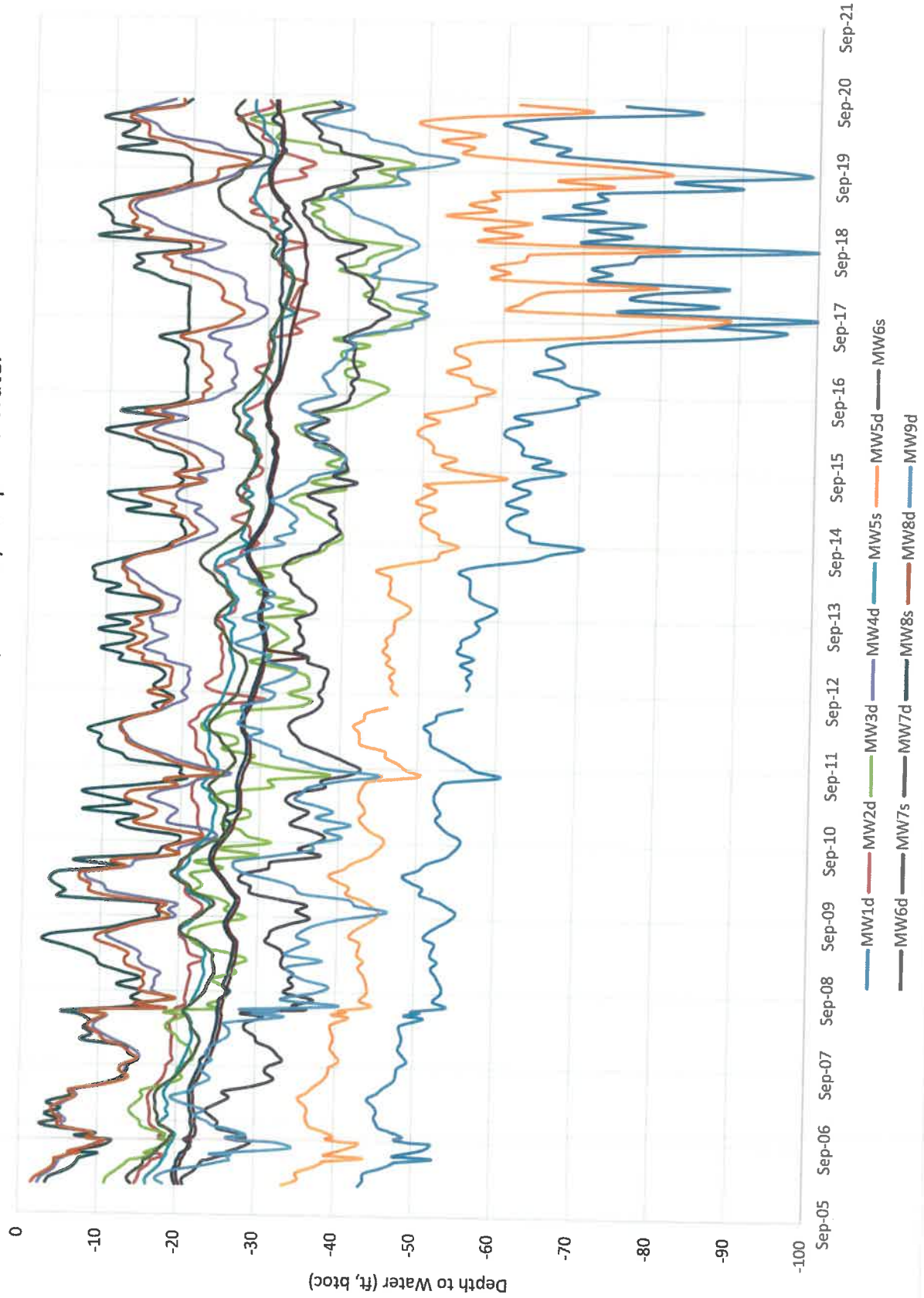
Average well depth 560'

Water zones 150' - 590'

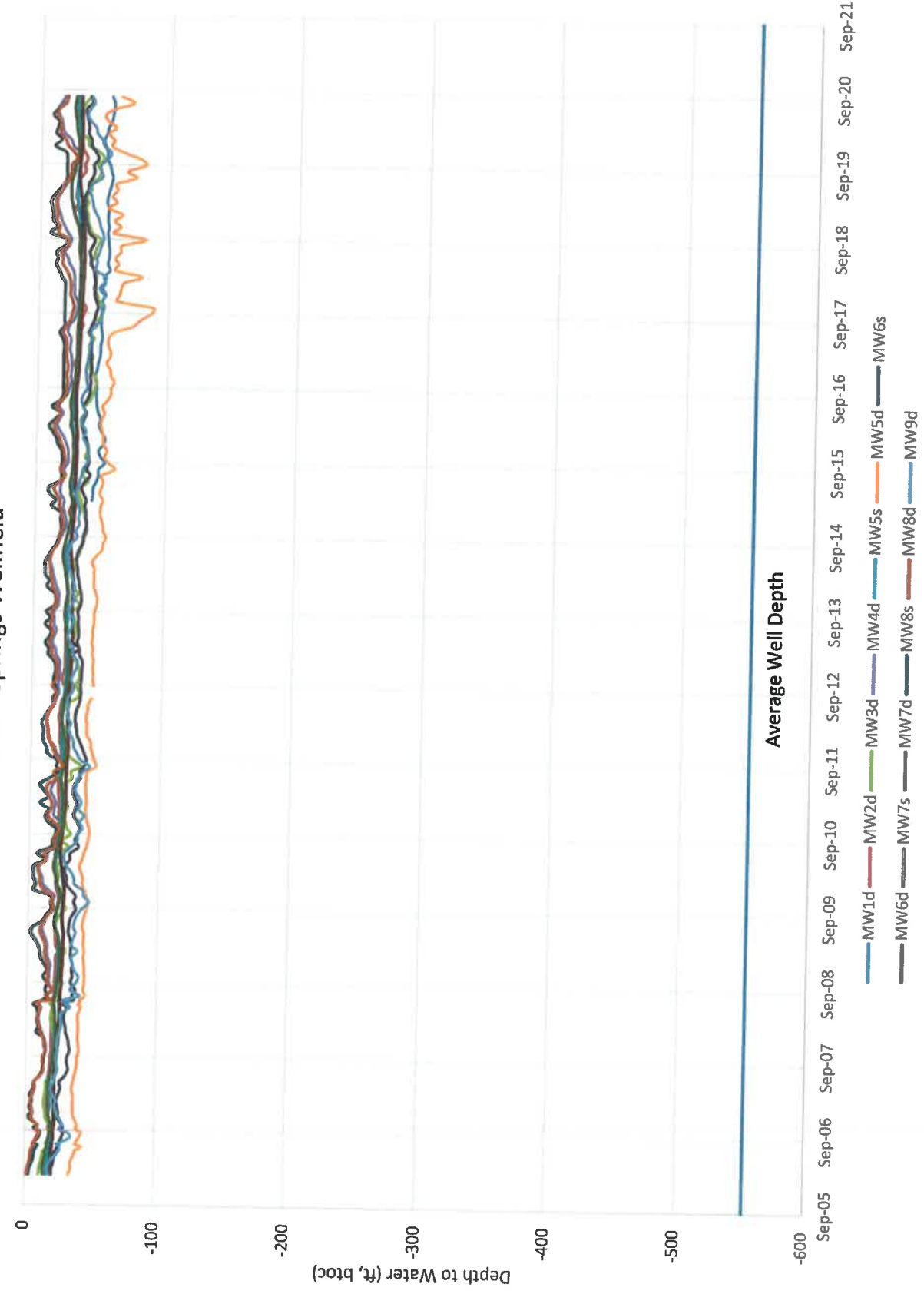
Average water zone 345'

Date	MW1d	MW2d	MW5d	MW9d	Total	Avg.	Avg Gallons
5/30/2018	-71.12	-31.14	-58.24	-43.97	-204.47	-51.1175	156,710
6/30/2018	-76.31	-31.33	-62.58	-45.84	-216.06	-54.015	164,860
7/31/2018	-77.21	-31.85	-63.14	-47.25	-219.45	-54.8625	197,439
8/31/2018	-100	-34.63	-82.1	-48.93	-265.66	-66.415	204,275
9/30/2018	-70.2	-30.85	-57	-48.3	-206.35	-51.5875	155,095
10/30/2018	-76.11	-31.34	-62.13	-46.2	-215.78	-53.945	157,759
11/30/2018	-70.59	-29.99	-57.2	-45.17	-202.95	-50.7375	176,596
12/30/2018	-77.69	-30.8	-63.26	-42.91	-214.66	-53.665	151,904
1/31/2019	-64.75	-27.52	-52.45	-40.62	-185.34	-46.335	147,962
2/28/2019	-72.65	-28.68	-58.69	-39.97	-199.99	-49.9975	176,465
3/29/2019	-68.51	-27.31	-55.35	-38.86	-190.03	-47.5075	223,102
4/30/2019	-72.96	-27.98	-59.21	-37.4	-197.55	-49.3875	228,011
5/31/2019	-71.82	-28.33	-58.3	-40.15	-198.6	-49.65	196,540
6/30/2019	-89.96	-30.73	-73.6	-47.4	-241.69	-60.4225	221,465
7/31/2019	-81.5	-34.28	-66.62	-46.19	-228.59	-57.1475	230,709
8/31/2019	-98.7	-33.58	-80.88	-46.19	-259.35	-64.8375	207,023
9/30/2019	-93.25	-35.52	-76.59	-51.38	-256.74	-64.185	225,283
10/31/2019	-77.68	-33.44	-63.67	-53.74	-228.53	-57.1325	206,750
11/30/2019	-66.5	-30.81	-54.43	-48.27	-200.01	-50.0025	161,676
12/31/2019	-68.08	-30.51	-55.9	-46.65	-201.14	-50.285	156,959
1/31/2020	-63.03	-28.77	-51.66	-42.63	-186.09	-46.5225	141,074
2/29/2020	-64.98	-28.91	-57.22	-41.66	-192.77	-48.1925	158,421
3/31/2020	-62.28	-27.58	-51.23	-37.55	-178.64	-44.66	169,318
4/30/2020	-59.63	-25.61	-48.83	-35.14	-169.21	-42.3025	141,537
5/30/2020	-67.25	-27.42	-55.77	-37.03	-187.47	-46.8675	149,814
6/30/2020	-84.66	-29.94	-70.89	-40.31	-225.8	-56.45	267,480
7/31/2020	-75.07	-29.69	-61.48	-38.3	-204.54	-51.135	267,200
8/31/2020	-67.72	-28.11	-55.37	-34.56	-185.76	-46.44	193,167
*Spring	Well	Startup					
Low for Year							
High for Year							

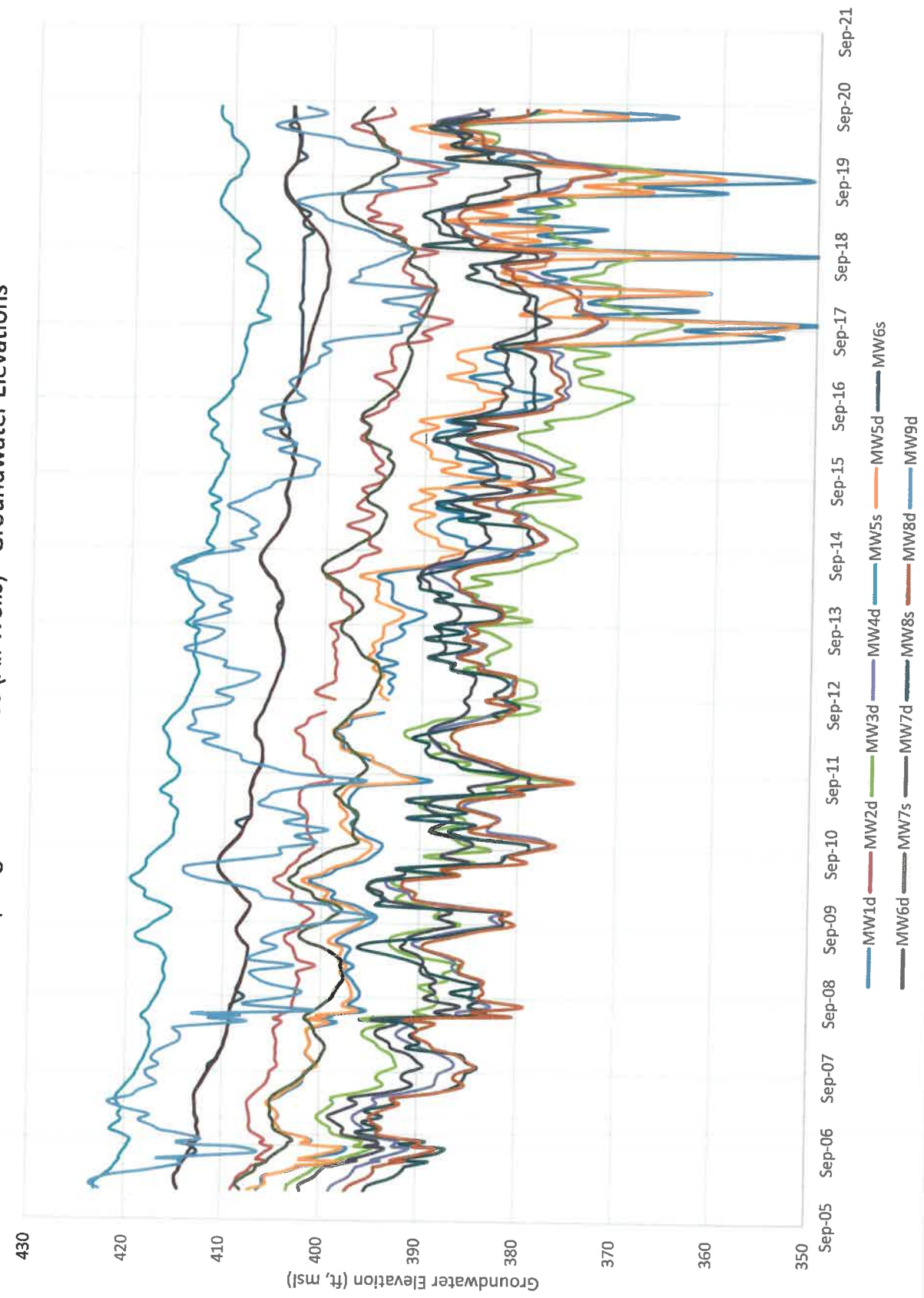
Green Springs Wellfield (All Wells) - Depth to Water



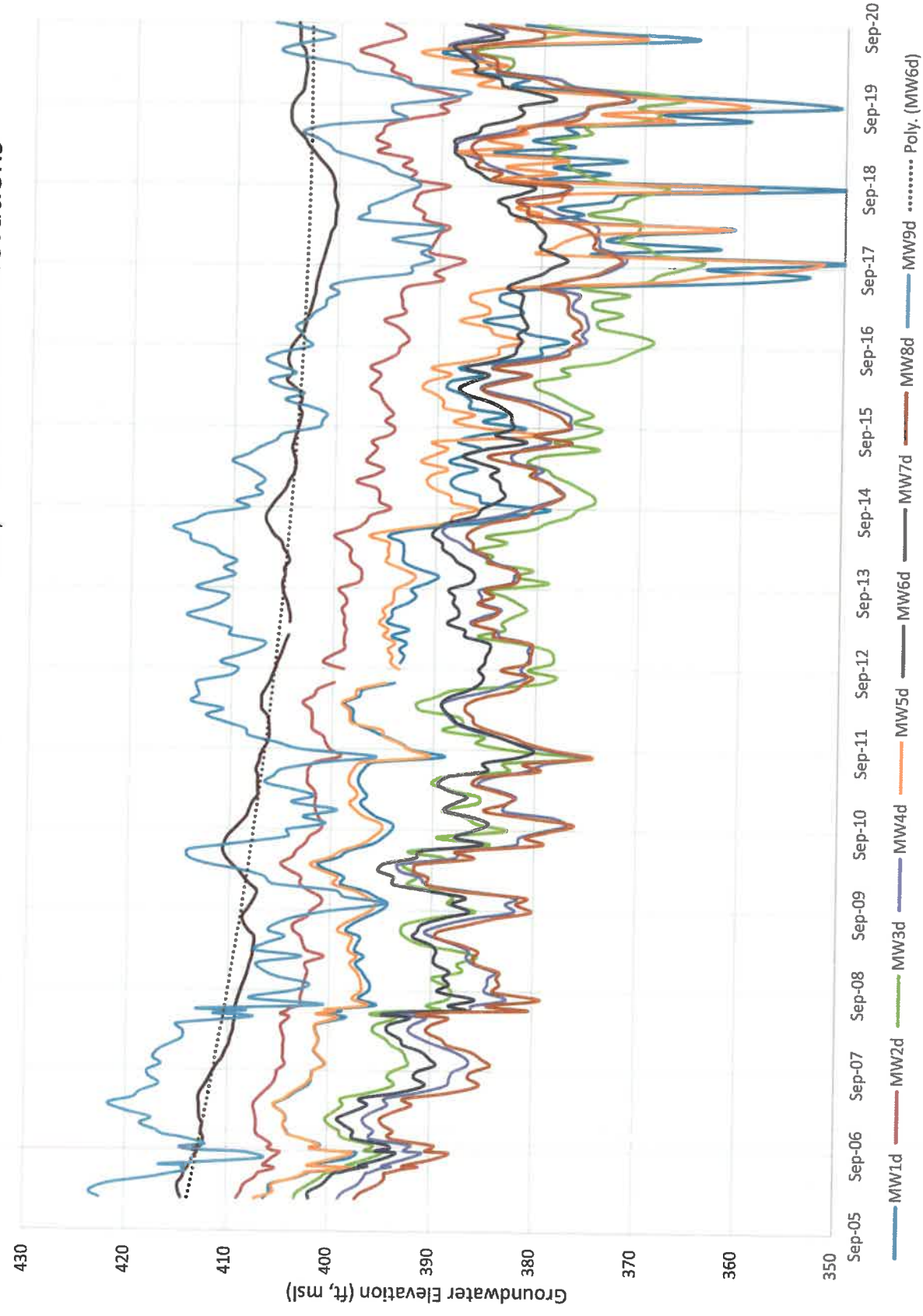
Green Springs Wellfield



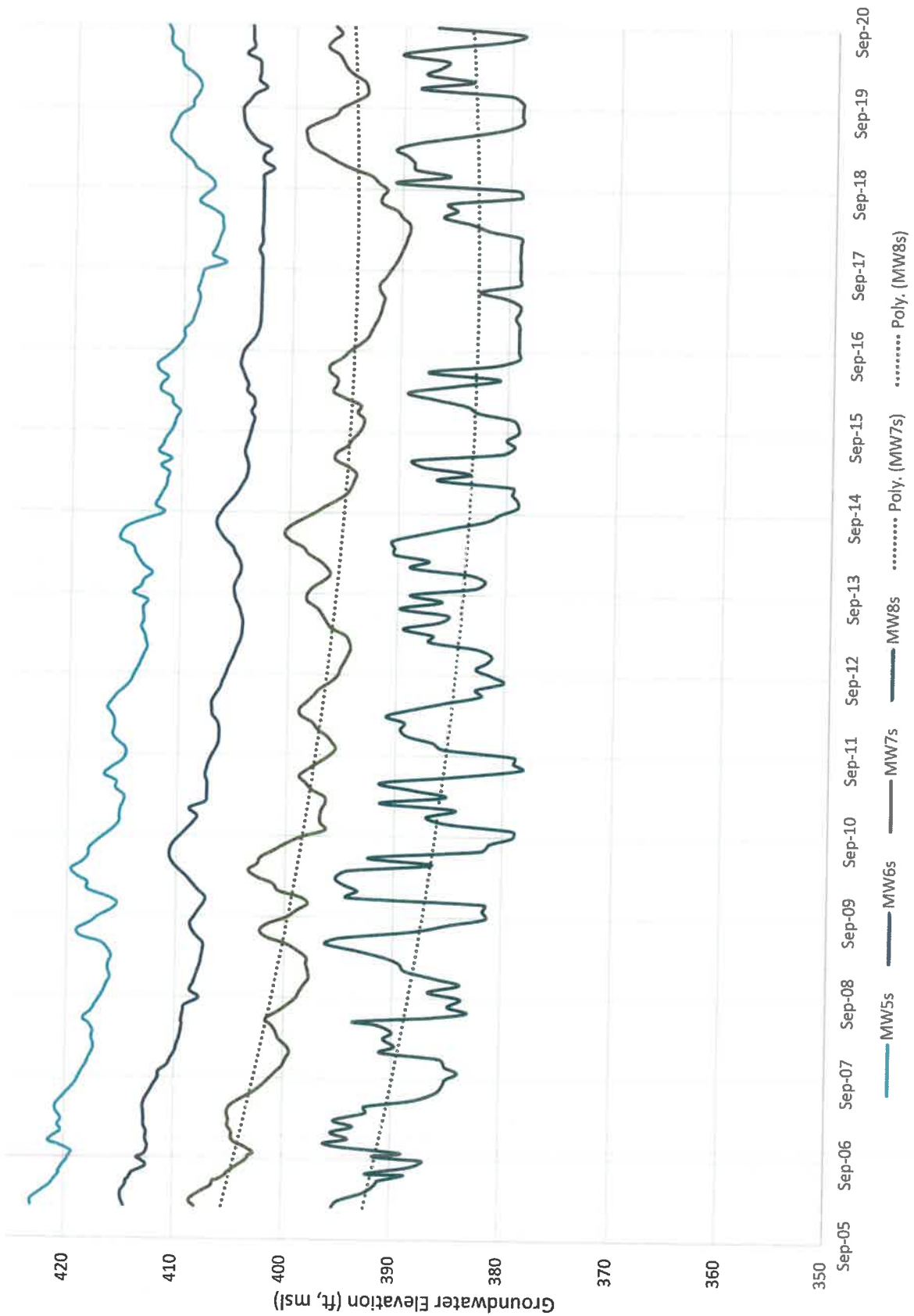
Green Springs Water Source (All Wells) - Groundwater Elevations



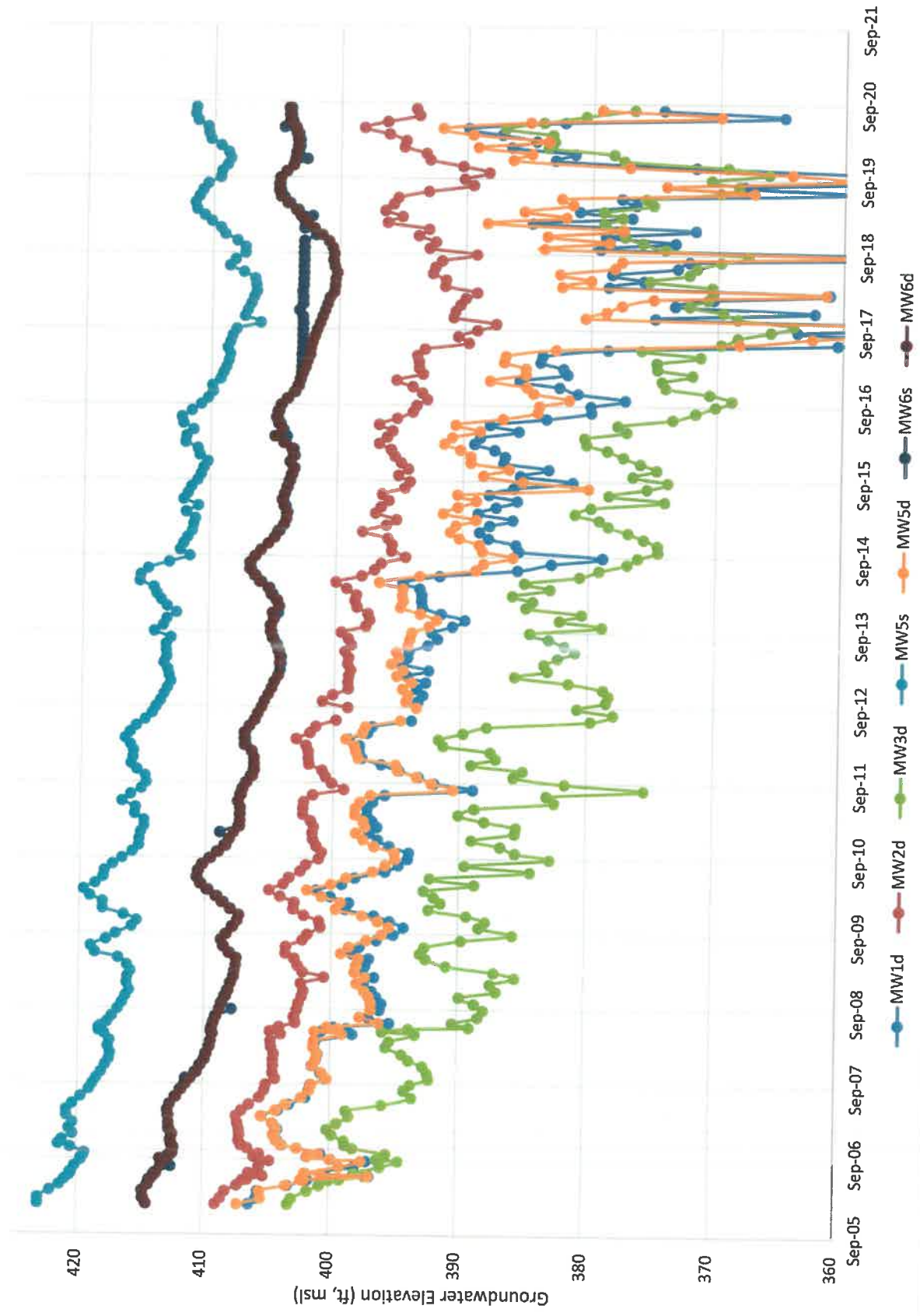
Green Springs Water Source (Bedrock Wells) - Groundwater Elevations



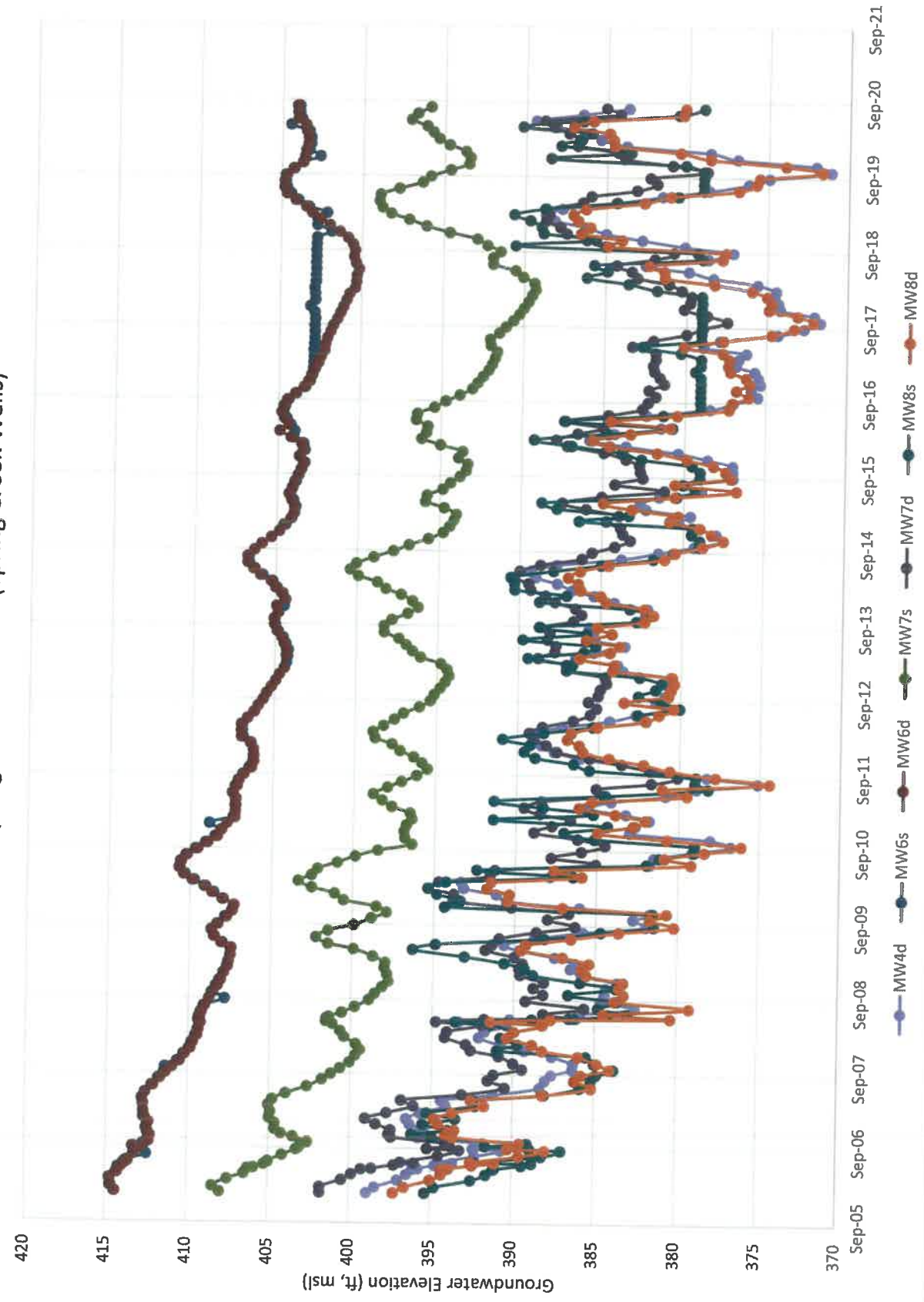
Green Springs Water Source (Saprolite Wells) - Groundwater Elevations



Green Springs Water Source (Green Springs Wells)



Green Springs Water Source (Spring Creek Wells)



Pam Baughman

From: Alexandra McKinley
Sent: Tuesday, August 18, 2020 1:18 PM
To: Alexandra McKinley
Subject: Board Recap - August 17, 2020

Adoption of Agenda (Approved 7-0)

- a. Added a Resolution Appointing a Fire and EMS Chief for Louisa County
- b. Removed A Resolution Granting the Third of November as an Additional Holiday from Consent to Vote on Separately
- c. Removed Trevilian Station Battlefield Foundation's Request for Tax Exemption from Discussion Items

Bills Approval

- a. Resolution – To Approve the Bills for the Month of August (FY20) (Approved 7-0)
- b. Resolution – To Approve the Bills for the Month of August (FY21) (Approved 7-0)

Consent Agenda

- a. Resolution – Posthumously Recognizing John Thomasson for His Service and Contributions to Louisa County (Approved 7-0)
- b. Resolution – Approving Updated Bylaws for the Management Oversight Group (Approved 7-0)
- c. Resolution – Authorizing the Re-Appropriation and Expenditure of FY2020 Capital Funding to the FY2021 Budget (Approved 7-0)

- a. Resolution – Granting the Third of November as an Additional Holiday (The Board directed staff to work with the Personnel Committee and report back at their next meeting.) –

New Business/ Action Items

- a. Action – A Resolution Appointing Robert Dube as the Fire and EMS Chief for Louisa County (Approved 5-1)

Board Appointments

- a. Appointed Mr. Tom Worosz to the Region 10 Board



Alexandra M. McKinley

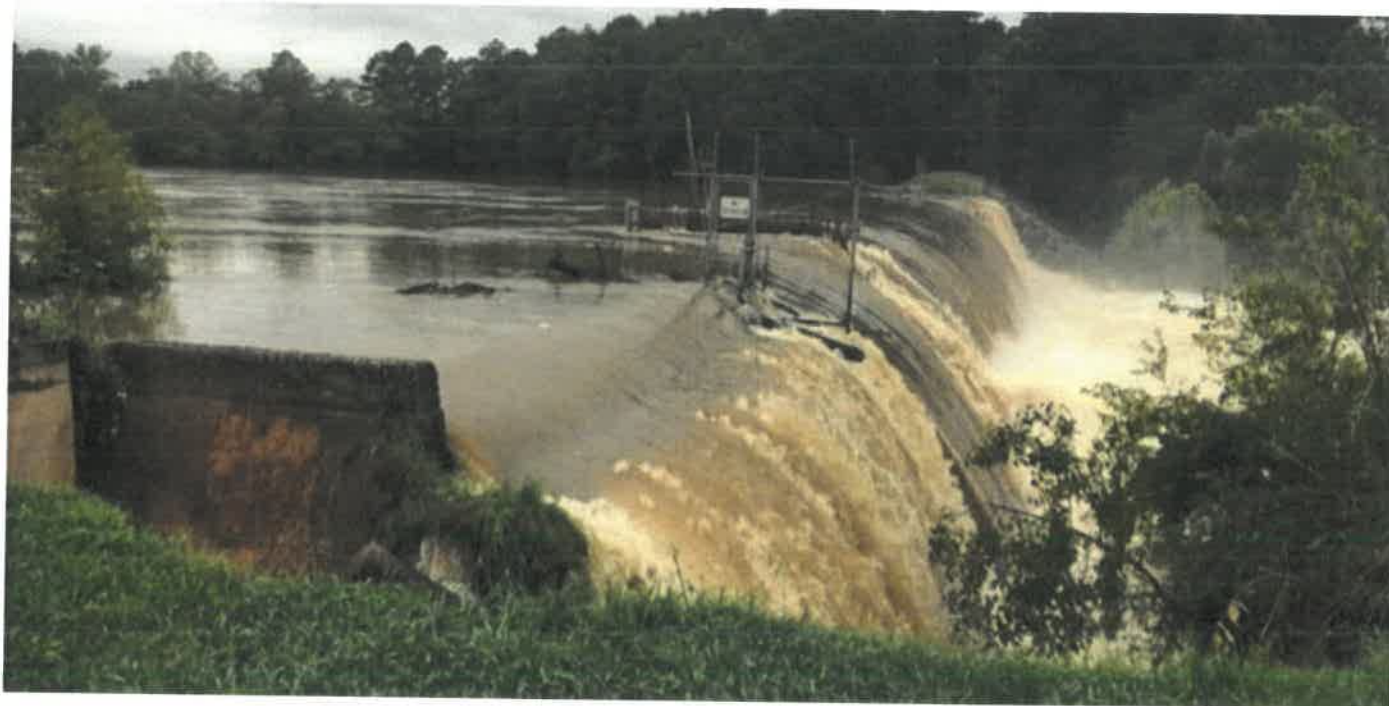
Executive Assistant to the County Administrator | Deputy Clerk to the Board
County of Louisa, Virginia | Office of the County Administrator
1 Woolfolk Avenue | Post Office Box 160 | Louisa, Virginia 23093
Direct Line (540) 967-3499 | General Line (540) 967-0401 | Fax (540) 967-3411 | Toll Free (866) 325-4131
Office Hours: Monday – Friday 8:30 a.m. – 5:00 p.m. | Visit Us Online: www.louisacounty.com

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As climate change increases precipitation, Northam aims to replace dam restoration funding

By
Sarah Vogelsong

September 2, 2020



Flood waters spill over a dam near Swift Creek in Colonial Heights. (NBC12 via Colonial Heights Fire Department)

First came rising waters and flooded roads. Then came evacuations.

An Aug. 15 storm that stalled over Central Virginia and dropped almost 10 inches of rain on parts of Chesterfield County highlighted a threat that the

state has long been aware of but, with climate change, is becoming ever more pressing: dam failures.

In Chesterfield, officials' fears that rising waters would breach the Falling Creek Reservoir Dam led to the evacuation of about 150 homes in the area. Ultimately the dam would hold and residents would return to their houses, but the unusual storm would heighten concerns about the integrity of the commonwealth's more than 3,000 dams.

"These incredibly intense and more frequent precipitation events can be more problematic," said Russ Baxter, deputy director of dam safety and floodplain management with the Virginia Department of Conservation and Recreation. "In heavy rains, tropical storm-type rains, dams are going to fail."

Gov. Ralph Northam would also point to the Chesterfield flooding as justification for restoring \$15 million for rehabilitation of state-owned dams in the budget he presented to the General Assembly when it reconvened for a special session this August. This spending, which legislators had removed from the budget this spring in response to anticipated financial shortfalls due to the COVID-19 pandemic, "can't wait," [the governor said](#).

Other dam-related spending cut by the General Assembly, including funds for the hiring of a dam safety lead engineer and other positions, would not be restored under Northam's proposal.

If approved by the legislature, the \$15 million in funding would be deposited in the Dam Safety, Flood Prevention, and Protection Assistance Fund "to support rehabilitation of aging dams that pose a threat to public safety and the environment," said Northam spokesperson Alena Yarmosky.

Virginia's dams, like those around the country, are showing their years and in many cases are in need of major repairs. About two-thirds of them are regulated by DCR, with the remainder overseen by federal and state institutions like the Federal Energy Regulatory Commission and the State Corporation Commission. Of those inventoried by DCR, only about 15 percent are in compliance with the state's Dam Safety Act requirements, according to Yarmosky.

Complicating matters is the high level of private ownership of these structures. According to 2018 numbers from DCR, more than 1,000 dams regulated by the department are privately owned, a phenomenon that one scholar at Washington and Lee's School of Law [traces back to a colonial-era legal instrument known as the "King's grant."](#)

"A number have been built as amenities for housing developments. ... Some obviously serve public purposes such as impounding water for water supply. Some are built for flood control," said Baxter. "They are infrastructure in a sense, but people can build dams as long as they have the proper permits and can build properly."

Today, some 323 Virginia dams are classified "high hazard," a label that means that in the event of a failure, lives would probably be lost and economic damage would be serious — although Baxter cautioned the actual count could be higher because the state lacks complete information on all the "impounding structures" within its borders. [A 2018 study](#) ordered by the General Assembly that identified 43 of the riskiest dams owned by the state's soil and water conservation district found the top four were all in the Shenandoah Valley and would cost more than \$22 million to rehabilitate.

Climate change has exacerbated the pressure. In 2018, Northam issued Executive Order 24 focusing on increasing Virginia’s resiliency in the face of sea level rise and a changing climate. As part of that, DCR was tasked with reviewing the dam safety and flood protection provisions of state code and making recommendations for how to strengthen them in the face of what DCR Director Clyde Cristman later called “the undeniable changes in climate that have already begun to affect our ability to protect our land, infrastructure, businesses and citizens.”

For dams, changing precipitation patterns are the greatest threat. The U.S.’s [2018 National Climate Assessment](#) found that “in the Southeast, the combined effects of extreme rainfall events and rising sea level are increasing flood frequencies, making coastal and low-lying regions highly vulnerable.” Among the effects of those shifts are “historically high” numbers of days with three or more inches of precipitation. The problem is exacerbated by “aging and deteriorating dams and levees,” the assessment pointed out, which “represent an increasing hazard when exposed to extreme or, in some cases, even moderate rainfall.”

DCR is aware of the additional challenges posed by climate change, Baxter said. Beginning in 2014, the department began working with Colorado firm Applied Weather Associates to obtain state-specific precipitation estimates used in dam failure analyses that project what downstream consequences are likely if a given dam fails. In 2018, DCR used these estimates (formally called probable maximum precipitation estimates) to adopt new models for how rainfall tends to be distributed over time — another tool key to evaluating the safety of dams.

Still, [the 2019 study commissioned by Executive Order 24](#) found, “with the potential for more frequent and heavier precipitation events, the Dam Safety Program must be more robust to protect the lives and property of Virginians.”

Baxter said DCR had hoped to add more personnel to its dam safety and flood management team, which numbers a little more than a dozen people, but “then obviously COVID ran into the budget like a train.”

Neither Democrats nor Republicans in the legislature have indicated any opposition to Northam’s restoration of the \$15 million in dam funding.