Russell Gap Stream Mitigation Project
Year 4 (2023) Monitoring Report FINAL

DMS RFP No. 16-006807; Date of Issue: 2/15/2016

DMS Project ID No. 100003, DEQ Contract No. 6980

USACE Action ID No. SAW-2017-00826, DWR# 20150416

Alexander County, North Carolina, Catawba River Basin: 03050101-120010

MY4 Data Collection Period: January – October 2023

Submitted to/Prepared for:

NC Department of Environmental Quality
Division of Mitigation Services (DMS)
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Michael Baker
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Submission Date: January 2024

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January 15, 2024

Matt Reid, PM
NCDEQ, Division of Mitigation Services
Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211

Subject:
Response to DMS Comments (December 15, 2023) for DRAFT Monitoring Year 4 Report.
Russell Gap Mitigation Project, Alexander County
Catawba River Basin: 06010106
DMS Project #100003 DEQ Contract #6980

Dear Mr. Reid,

Please find below our responses to the NC Division of Mitigation Services (DMS) review comments dated December 15, 2023, in reference to the Russel Gap Mitigation Project's DRAFT Monitoring Year 4 Report. We have revised the Draft document in response to review comments as outlined below.

- Please ensure the Monitoring Phase Performance Bond has been updated and approved by Kristie Corson before invoicing for Task 10.
  RESPONSE: The Bond has been submitted and approved to Kristie Corson.

- Please include "DMS RFP No. 16-006807; Date of Issue: 2/15/2016" on the title page.re
  RESPONSE: This line to the title page has been added as requested.

- Report indicates that mid-channel bars were shoveled out and repaired on R1. Please include additional information on what was repaired and how. Please include the location of the work on the CCPV and update Table 2 to include Stream Maintenance.
  RESPONSE: The information has been included in section 1.4 Monitoring Results and Project Performance and the location of the work is shown on the CCPV. Table 2 has been updated as requested.

- A supplemental planting occurred in 2023. Please note in the report that the three species used were from the planting plan in the approved Mitigation Plan. Please include location of supplemental planting on CCPV and update Table 2 to include the 2023 supplemental planting.
  RESPONSE: It has been noted in the report that the planted species are from the planting plan in the approved Mitigation Plan. The CCPV and Table 2 have been updated as requested.

- Approximately how far is the CRONOS station TAYL located from the project site?
  RESPONSE: In Section 1.5 Technical and Methodological Descriptions, it is stated that CRONOS station TAYL is located approximately nine miles south of the project site.

- Table 5 and 6 – Please include the date of the stream and/or vegetation assessment occurred on the table.
  RESPONSE: The dates have been added as requested.

- Table 5, R1 – Table indicates 2 unstable segments totaling 220 feet. The CCPV does not show these segments. DMS assumes this aggradation is a result of the beaver dams. Please include these areas on the CCPV and include a .shp file in the revised submittal for the aggrading length.
  RESPONSE: These stream lengths are associated with the beaver dams and a line showing the approximate hydrologic impact has been added to the CCPVs. A shapefile has been added to the electronic submission files as requested.

- Table 5, R3, R4 and R9 – Same comment as above.
  RESPONSE: See response above.
- Hydrology Gauge Graphs – DMS recommends downloading gauge data after the end of the growing season so the data set includes the entire growing season.
  RESPONSE: We agree with this comment, and we aim to download gauge data as close to the end of the growing season as possible; however, in MY4 our download date of 10-19-23 was sufficient to capture success criteria and a later download date would not have changed the result of any gauges other than to increase the amount of days meeting criteria both consecutively and cumulatively.

- RGAW5 Graph – Is this well functioning correctly? When compared to the other gauge graphs, the 20" drop that occurred around May 23 may indicate gauge failure. Please ensure all gauges are functioning correctly as the project moves into MY5.
  RESPONSE: We agree that the data for RGAW5 appears unusual and we will ensure that the gauges are functioning correctly moving into MY5.

- The abundance of juncus found along R1 has been a concern at the site. Have the planted trees been able to out compete the juncus?
  RESPONSE: In MY4 it was observed that planted stems have begun to reach a height higher than that of the *Juncus* and we expect these stems to continue to perform well. Veg plots in these areas have all met criteria in past monitoring years and we will continue to monitor these areas in MY5.

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- During the 2023 Credit Release Meeting, the IRT requested additional vegetation transects in the juncus area in MY4. Since vegetation data is not collected in MY4, please consider adding transects in MY5 in the requested area.
  RESPONSE: We will continue to include a transect and/or a random veg plot in this area in future monitoring years.

- The IRT requested a camera be installed on R14 during the 2023 Credit Release Meeting. Thank you for installing the camera and providing photos.
  RESPONSE: Thank you. This camera has proven helpful in supplementing our flow data.

- There was confusion with the way gauge labels are shown in the monitoring report, CCPV and graphs. The IRT requested that labeling be reviewed in the future. The report refers to the gauges differently in each section. Report is well 1, CCPV is MW1 and graph is RGAW1. Please be consistent with naming convention and update report as necessary.
  RESPONSE: We apologize for this confusion and have reviewed labeling to ensure consistency between the report, the CCPVs and all tables and figures.

Electronic Deliverables:

- Please submit the location of the area of stream instability noted in the visual assessment table and the location of the beaver dams indicated on the CCPV.
  RESPONSE: Additional shapefiles including the supplemental planting area and the stream instability areas associated with beaver dams have been added to the electronic deliverables.

As requested, Michael Baker has provided an electronic response letter addressing the DMS comments received and two (2) hardcopies of the FINAL report, and the updated e-submission digital files will be sent via secure ftp link. A full final electronic copy with electronic support files have been included on a USB drive. Please do not hesitate to contact me (Jason.york@mbakerintl.com 828-412-6101) should you have any questions regarding our response submittal.

Sincerely,

Jason York

Digitally signed by Jason York
DN: C=US, E=jason.york@mbakerintl.com, O=Michael Baker Intl., CN=Jason York
Date: 2024.01.16 16:09:30-05'00'

Jason York
Environmental Scientist

Enclosure: Final MY4 Report Russell Gap Mitigation Project

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APPENDICES

***Note:** Vegetation data and cross sections are not required in monitoring year 4 and 6 according to DMS requirements. Therefore, data is intentionally left out of the monitoring report. The table of contents remains the same to keep numbering consistent for remaining monitoring years.

1.0 PROJECT SUMMARY

1.1 Project Description

Michael Baker Engineering, Inc. (Michael Baker) restored approximately 4,209 linear feet of existing stream, enhanced 8,857 linear feet of stream along Unnamed Tributaries (UTs) to Davis Creek, the East Prong Lower Little River, and UTs to the East Prong Lower Little River. Michael Baker also restored and/or enhanced approximately 7.3 acres of riparian wetland. The project is located in the Catawba River Basin, within the Hydrologic Unit Code (HUC) 03050101-120010, which is identified as a Targeted Local Watershed (TLW) in the NC Division of Mitigation Services'(DMS) 2009 *Upper Catawba River Basin Restoration Priorities* (RBRP) report.

The Russell Gap Stream Mitigation project is located on an active cattle farm in Alexander County, North Carolina, 10 miles northwest of the Town of Taylorsville as shown on the Project Vicinity Map (Figure 1). Historic agriculture uses on the project site include cattle production, row crops, and apple orchards. These activities had negatively impacted both water quality and streambank stability along the project streams and their tributaries (Table 4). The project is being conducted as part of the NCDMS Full Delivery In-Lieu Fee Program and is anticipated to generate at close-out a total of 9,166.949 stream mitigation credits (contracted for 9,400) and up to 7.053 riparian wetland mitigation units (contracted for 4.0) (Table 1) and is protected by a 35.97-acre permanent conservation easement.

1.2 Goals and Objectives

The goals of this project are identified below:

- Establish geomorphically stable conditions along all project reaches,
- Improvement of water quality by reducing nutrient and sediment inputs,
- Restoration of natural stream and floodplain interactions,
- Restoration and enhancement of riparian wetland functions,
- Restoration and protection of riparian buffer functions and corridor habitat,
- Improvement of in-stream aquatic habitat, and
- Establish a permanent conservation easement on the entire project.

To accomplish these goals, the following objectives were identified:

- To restore appropriate bankfull dimensions, remove spoil berms, and/or raise channel beds, by utilizing either a Priority I Restoration approach or an Enhancement Level I approach.
- To construct streams of appropriate dimensions, pattern, and profile in restored reaches, slope stream banks and provide bankfull benches on enhanced streams and utilize bioengineering to provide long-term stability.
- Construct the correct channel morphology on all streams increasing the number and depths of pools, with structures including geo-lifts with brush toe, log vanes/weirs, root wads, and/or J-hooks.
- Raise ground water levels in delineated hydric soil areas through the implementation of Priority I restoration and the filling of ditches. Wetland vegetation will also be planted.
- Establish riparian buffers at a 50-foot minimum width along all stream reaches, planted with native tree and shrub species.

- Establish a permanent conservation easement restricting land use in perpetuity. This will prevent site disturbance and allow the project to mature and stabilize.

1.3 Project Success Criteria

The success criteria and performance standards for the project will follow the North Carolina Interagency Review Team (NCIRT) guidance document *Wilmington District Stream and Wetland Compensatory Mitigation Update* dated October 24, 2016 and as described in Section 7 of the approved Mitigation Plan. All specific monitoring activities will follow those outlined in detail in Section 8 of the approved Mitigation Plan and will be conducted for a period of seven years unless otherwise noted. Annual monitoring reports will follow the DMS document *Annual Monitoring Report Format, Data Requirements, and Content Guidance* from April 2015. The performance standards for the riparian buffer assets will be held in accordance with 15A NCAC 02B.0295(n)(2)(B) and 15A NCAC 02B.0295(n)(4), and annual monitoring reports will be submitted at the end of each of the seven monitoring years.

1.4 Monitoring Results and Project Performance

During Year 4 monitoring, visual site inspections were conducted throughout the year. Small areas of invasive species (*Ligustrum sp.* and *Rosa multifora*) were treated on R11, R13, R14, R1, R7 and R8 during May and October 2023. Small pockets of rose are scattered throughout R1 and R4 and Michael Baker plans on a follow up treatment in monitoring year 5. Six problem areas were noted, all to beaver dams. The dams have impounded water along R1, R3, R4, and R9. However, the vegetation is still dense and providing channel stability. Michael Baker is planning on hiring a licensed trapper and removing the dams during the winter and spring of 2024. It was reported during monitoring year 3 that mid-channel bars were found on R1. Both of these bars were shoveled out and repaired. Areas impacted by beaver can be found on the CCPV in Appendix B. Additionally, a mixture of 35 *(Betula nigra, Platanus occidentalis, and Quercus phellos)* 1-gal and 3-gal trees were supplementally planted along the right floodplain of R1 in areas of dense Juncus. The planted area is shown on CCPV A. These species are included in the planting list of the approved Mitigation Plan. The mid-channel bars on R1 reported during MY3 were repaired in May 2023. Material forming the bars was shoveled out by hand and deposited along the edge of the channel. The bars had not reformed at the time of reporting and this section of the reach appears stable.

During Year 4 monitoring, one post-construction bankfull event on R1, R4, and R6 was observed (see Table 10 in Appendix E and the Overbank Photographs in Appendix B). Bankfull events are documented using manual cork crest gauge readings and post-flood event site inspection photographs. Rain data and groundwater well inundation is also considered to determine the approximate date of bankfull events. A crest gauge located on R9 did not record an overbank event during MY4.

Figure 7 in Appendix E demonstrates that rainfall since November 2022 has been within average of the historic averages in total with the summer being wetter than average and the winter being dryer than average. A total of 53.59 inches of rainfall was observed at the project site and the annual historic average totals 52.47 inches. All observed project rainfall was collected from the North Carolina Climate Office Weather Climate Database CRONOS station TAYL, located in Taylorsville, NC approximately 9 miles south of the site.

During Year 4 monitoring, 10 of twelve automated groundwater monitoring wells (RGAWs) met or exceeded the minimum hydroperiod performance criteria approved in the Mitigation Plan of 12% of the 227-day growing season (27 or more consecutive days). It was commented during the monitoring year 3 report to add additional monitoring wells in areas that were not preforming. We requested to wait until the end of monitoring year 4 to see if any improvement occurred due to such a dry monitoring year 3. Michael Baker explored other areas around RGAW 1 by auguring test holes for measuring water levels although the test holes showed soils consistent with those soils in the area of RGAW 1, therefore RGAW 1 was not relocated. RGAW 11 did not meet success criteria by only 3 days. The remaining wells showed a positive

trend towards passing this year; along with, exceeding success criteria in both monitoring years 1 and 2 despite drought conditions late in MY4. Impacts of beaver impoundments can be seen in the data for RGAW 7. Four of five automated flow gauges met or exceeded the minimum 30-day performance criteria during MY4. (See Appendix E, Table 12). On June 14th an additional flow camera was installed on R14 to capture regular flow throughout the monitoring year to support the flow gauge data. Both flow cameras on R14 and R11 show consistent flow throughout the year. See Appendix B, Flow Camera Photographs.

Summary information/data related to the Site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan available on the DMS website. Any raw data supporting the tables and figures in the Appendices is available from DMS upon request.

This report documents the successful completion of the Year 4 monitoring activities for the post-construction monitoring period.

1.5 Technical and Methodological Descriptions

Stream survey data was collected to a minimum of Class C Vertical and Class A Horizontal Accuracy using a Leica TS06 Total Station and was georeferenced to the NAD83 State Plane Coordinate System, FIPS3200 in US Survey Feet, which was derived from the MY-1 Survey. The survey data from the permanent project cross-sections were collected and classified using the Rosgen Stream Classification System to confirm design stream type (Rosgen 1994 and 1996). Cross sections are not required in monitoring year 4 and 6 according to DMS requirements.

The twenty permanent and nine annual random vegetation-monitoring quadrants (plots) are installed across the site in accordance with the CVS-DMS Protocol for Recording Vegetation, Version 4.1 (Lee 2007) and the data collected from each was input into the CVS-DMS Data Entry Tool v. 2.3.1 (CVS 2012). Vegetation plot monitoring is not required in monitoring year 4 and 6 according to DMS requirements.

Nine automated groundwater monitoring wells were installed in the floodplain along Reach R1 following USACE protocols (USACE 2005). Three additional groundwater monitoring wells were installed in the floodplain along R9. Flow gauges were installed on R11, R13, R14, R19 and R20 and additional cameras were installed on R11 and R14 to capture pictures of flow. Collective data will document that these intermittent streams continue to exhibit base flow for at least thirty consecutive days throughout each monitoring year. The gauges themselves are all Van Essen DI800 BARO Diver data loggers. Four manual cork crest gauges were installed on R1, R4, R6, and R9.

All observed project rainfall was collected from the North Carolina Climate Office Weather Climate Database CRONOS station TAYL, located in Taylorsville, NC approximately nine miles south of the project at 35.9139, -81.19087.

The specific locations of monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations, and crest gauges, are shown on the CCPV map found in Appendix B.

The conservation easement has been inspected, marking is up to date, fencing is intact, and no encroachments were observed during monitoring year 4.

1.6 References

Carolina Vegetation Survey (CVS) and NC Division of Mitigation Services (DMS). CVS-DMS Data Entry Tool v. 2.3.1. University of North Carolina, Raleigh, NC. 2012.

Lee, M., Peet R., Roberts, S., Wentworth, T. 2007. CVS-DMS Protocol for Recording Vegetation, Version 4.1.

North Carolina Division of Mitigation Services. 2010. Neuse River Basin Restoration Priorities. NC Department of Environmental Quality. Raleigh, NC.

North Carolina Division of Mitigation Services. 2016. Neuse River Basin Restoration Priorities: Neuse-01 Catalog Unit *Update*. NC Department of Environmental Quality. Raleigh, NC.

North Carolina Division of Mitigation Services. 2017. *Annual Monitoring Report Format, Data Requirements, and Content Guidance June 2017.* NC Department of Environmental Quality. Raleigh, NC.

North Carolina Interagency Review Team (NCIRT). 2016. Guidance document "*Wilmington District Stream and Wetland Compensatory Mitigation Update".* October 24, 2016

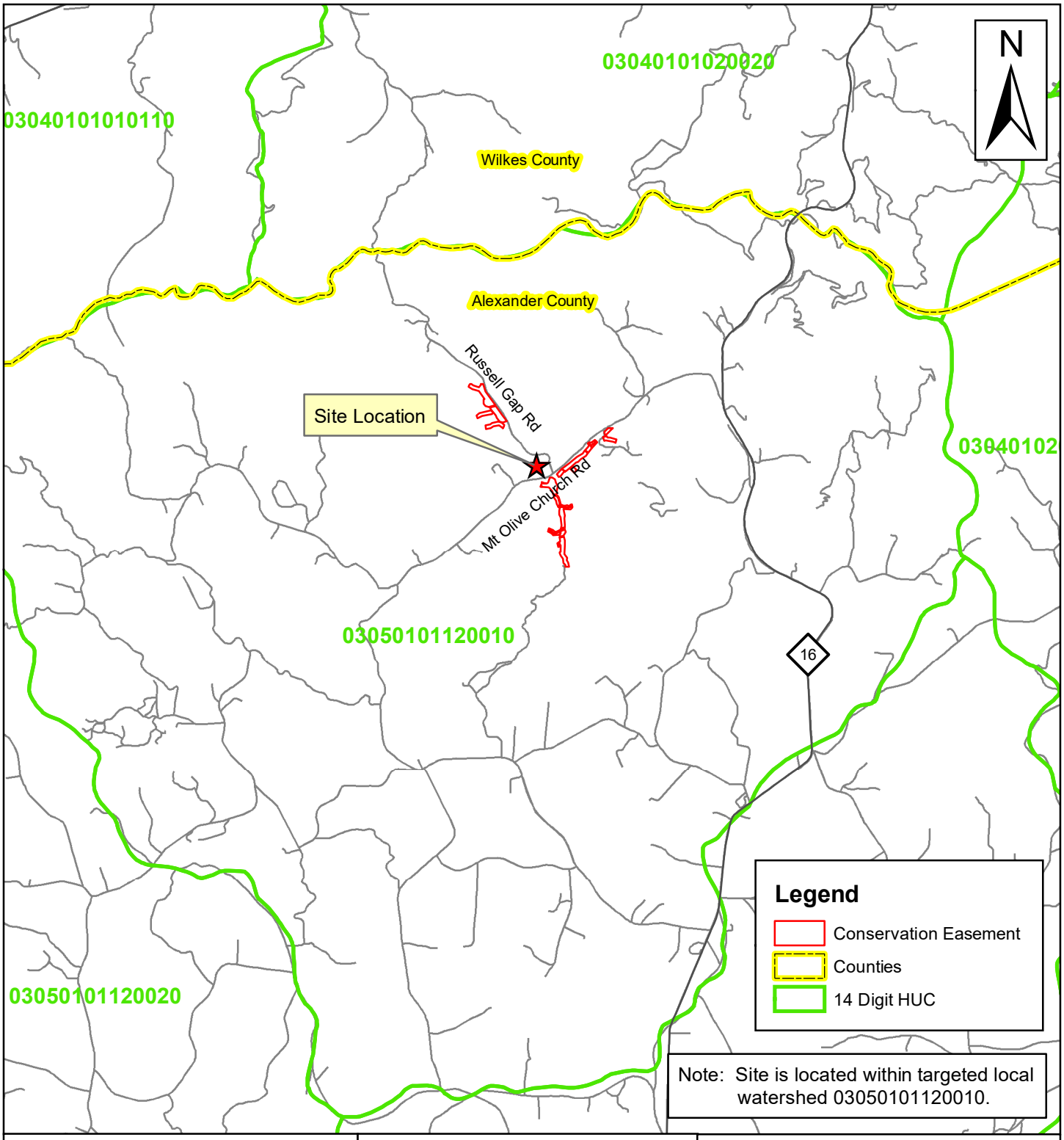
Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena 22:169-199.

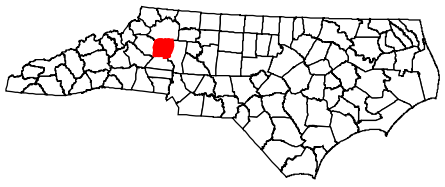
Rosgen, D.L. 1996. Applied River Morphology. Wildlands Hydrology. Pagosa Springs, CO.

United States Army Corps of Engineers (USACE). 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U.S. Army Engineer Research and Development Center. Vicksburg, MS.

APPENDIX A

Background Tables and Figures





Alexander County

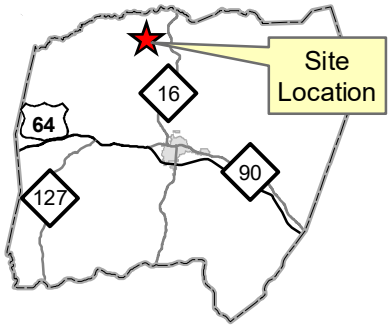


Figure 1
Project Vicinity Map
Russell Gap Project

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0 0.5 1 2 Miles

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Credited Buffer (square feet)	Asset Category		Overall Credits
		Riverine	Non-Riverine					
Restoration	4,063	6.773				Stream		9166.949
Enhancement		0.559				RP Wetland		7.053
Enhancement I	5,760					NR Wetland		
Enhancement II	2,684					Buffer		
Creation								
Preservation								
High Quality Pres								

N

R10a/b
R1
Davis Creek
R11
R12
R13
R14
Russell Gap Rd
R4a
R27
R4
R26
R15
R2
R3
R4
R3
R9
R8
Mt Olive Church Rd
East Prong Little Lower River
R22
R25
R7b
R20
R21
R19
R18
R7a
R17
R6
R5

Russell Gap Stream Centerline

Stream Approach

- Restoration
- Enhancement I
- Enhancement II
- No Credit
- Conservation Easement

Russell Gap Wetland Boundaries

Wetland Type

- Restoration
- Enhancement

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0 500 1,000 Feet

Figure 2
Project Asset Map
Russell Gap Project

rev: 5Dec2016

Table 1. Project Components and Mitigation Credits
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Project Component (reach ID, etc.)	Wetland Position and HydroType	Existing Footage or Acreage	Stationing	As-Built CL Restored Footage, or SF [1]	As-Built CL w/o Xing Footage, or SF [2]	Mitigation Plan Designed Footage	Restoration Level	Approach Priority Level	Mitigation Ratio (X:1)	Mitigation Plan Credits [3]
Reach R1		2,142	10+00 - 29+45.90	1,946	1,910.90	1,841.60	R	PI	1.0	1,841.60
Reach R2		288	10+00 - 11+65.62	166	165.62	174.21	R	P2	1.0	174.21
Reach R3		388	32+28.36 - 36+34.66	406	406.30	388.74	R	P2	1.0	388.74
Reach R4a		299	10+00 - 13+00.00	300	300.00	300.00	EII	-	2.5	120.00
Reach R4		2,245	10+00 - 32+28.36	2,228	2,038.36	2,063.32	EI	-	1.5	1,375.55
Reach R5		256	10+00 - 12+10.00 w/o pipe	193	193.00	193.00	EII	-	2.5	77.20
Reach R5 Pipe Removal		17	10+32 - 10+49 pipe	17	17.00	17.00	R	P1	1.0	17.00
Reach R6		631	12+10.00 - 19+57.36	747	747.36	741.05	R	P1	1.0	741.05
Reach R7a		155	19+57.36- 20+61.17	104	103.81	110.12	EII	-	2.5	44.05
Reach R7b		1,170	20+61.17 - 33+51.48	1,290	1,216.31	1,202.37	EI	-	1.5	801.58
Reach R8		463	33+75.40 - 38+28.55	453	453.15	455.79	EII	-	2.5	182.32
Reach R9		439	38+65.34 - 43+10.91	446	445.57	445.52	R	P1	1.0	445.52
Reach R10a		371	10+08.40 - 13+74.94	367	366.54	376.11	EII		2.0	188.06
Reach R10b		0	13+74.94 - 14+79.77	105	104.83	112.65	R	P1	1.0	112.65
Reach R11		481	10+00 - 17+31.85	732	711.85	725.83	EI	-	1.5	483.89
Reach R12		86	10+00 - 11+01.78	102	101.78	120.02	R	P1	1.0	120.02
Reach R13		124	10+00 - 11+45.00	145	145.00	145.00	EI	-	1.5	96.67
Reach R14		528	11+45.00 - 17+14.80	570	569.80	572.27	R	P1/2	1.0	572.27
Reach R15		226	10+00 - 13+02.77	303	283.77	281.80	EII	-	2.5	112.72
Reach R17		130	10+00 - 11+06.64	107	106.64	104.44	EII	-	2.5	41.78
Reach R18		185	10+00 - 12+03.31	203	176.31	179.01	EII	-	2.5	71.60
Reach R19		481	9+86.00 - 13+75.96	390	352.96	359.49	EI	-	1.5	239.66
Reach R20		206	10+00 - 12+52.61	253	252.61	252.68	R	P1	1.0	252.68
Reach R21		67	10+00 - 10+91.76	92	91.76	89.11	0.+	-	2.5	35.64
Reach R22		161	10+00 - 11+19.46	119	119.46	136.87	EII	-	2.5	54.75
Reach R22a		68	10+60 - 11+28.42	68	68.42	68.42	EII	-	2.5	27.37
Reach R25		422	10+00 - 14+30.52 (w/o pipe)	403	402.52	399.05	EI	-	1.5	266.03
Reach R25 Pipe Removal		28	12+62 - 12+90 pipe	28	28.00	28.00	R	P1	1.0	28.00
Reach R26		548	10+00 - 14+72.96	473	472.96	472.13	EII	-	2.5	188.85
Reach R27		165	10+00 - 11+63.76	164	163.76	163.76	EII	-	2.5	65.50
Wetland Group 1	RR	0		5.285		5.285	Restoration		1.0	5.285
Wetland Group 2	RR	0		1.488		1.488	Restoration		1.0	1.488
Wetland Group 3	RR	0.261		0.261		0.261	Enhancement		2.0	0.131
Wetland Group 4	RR	0.156		0.156		0.156	Enhancement		2.0	0.078
Wetland Group 5	RR	0.034		0.034		0.034	Enhancement		2.0	0.017
Wetland Group 6	RR	0.108		0.108		0.108	Enhancement		2.0	0.054

1 All stream stationing and restored footage numbers reported here, discussed in the report text, and shown in the as-built plan sheets use survey values.

2 The stream footage reported here uses the as-built stream*centerline* survey values and have all easement breaks removed from their totals. Buffer group values reported here are the creditable areas as allowed for each group as described in detail in the mitigation plan.

3 Credits reported here are taken directly from the approved mitigation plan Table 11.1

Table 1.1
As-Built Centerline Length and Area Summations by Mitigation Category

Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Credited Buffer (square feet)
		Riverine	Non-Riverine		
Restoration	4,063	6.773			
Enhancement		0.559			
Enhancement I	5,760				
Enhancement II	2,684				
Creation					
Preservation					
High Quality Pres					

Table 1.2
Overall Assets Summary

Asset Category	Overall Credits
Stream	**9,166.949**
RP Wetland	**7.053**
NR Wetland	
Buffer	

Table 2. Project Activity and Reporting History
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Elapsed Time Since grading complete: **47 months**
Elapsed Time Since planting complete: **46 months**
Number of Reporting Years[1]: **4**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
404 permit date	N/A	Dec-18
Mitigation Plan	N/A	Sep-18
Final Design – Construction Plans	N/A	Sep-18
Construction Grading Completed	N/A	Feb-20
As-Built Survey	May-20	May-20
Livestake and Bareroot Planting Completed	N/A	Mar-20
As-Built Baseline Monitoring Report (MY0)	Mar-20	Sep-20
Year 1 Monitoring	Nov-20	Dec-20
Year 2 Monitoring	Oct-21	Dec-21
Vegetation Monitoring	Oct-21	Dec-21
Stream Survey	Oct-21	Dec-21
Bridge Replacement	May-21	May-21
Maintenance, Repairs, Live Staking	May and Oct-21	Dec-21
Invasive Treatment	June and Oct-21	Dec-21
Year 3 Monitoring	Oct and Nov-22	Feb-23
Vegetation Monitoring	Aug, Oct, Nov-22	Dec-22
Stream Survey	Sep-22	Sep-22
Invasive Treatment and Supplemental Planting	Apr-22	Apr-22
Year 4 Monitoring	Oct-23	Nov-23
Supplemental Planting	N/A	Apr-23
Stream Maintenance	N/A	May-23
Invasive Treatment	May and Oct-2023	Oct-23
Year 5 Monitoring		
Year 6 Monitoring		
Year 7 Monitoring		

[1] = The number of monitoring reports excluding the as-built/baseline report

Table 3. Project Contacts
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Designer	8000 Regency Parkway, Suite 600
Michael Baker Engineering, Inc.	Cary, NC 27518 Contact: Katie McKeithan, Tel. 919-481-5703
Construction Contractor	5616 Coble Church Rd
KBS Earthworks, Inc.	Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Survey Contractor	P.O. Box 148
Turner Land Surveying (As-Built Only)	Swannanoa, NC 28778 Contact: David Turner, Tel. 919-827-0745
Kee Mapping and Surveying (Existing Conditions and Monitoring Survey)	88 Central Avenue Asheville, NC 28801 Contact: Brad Kee, Tel. 828-575-9021
Planting Contractor	5616 Coble Church Rd
KBS Earthworks, Inc.	Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Seeding Contractor	5616 Coble Church Rd
KBS Earthworks, Inc.	Julian, NC 27283 Contact: Kory Strader, Tel. 336-362-0289
Seed Mix Sources	
Green Resources	Telephone: 336-855-6363
Nursery Stock Suppliers	
Mellow Marsh Farm **ArborGen**	Telephone: 919-742-1200 Telephone: 843-528-3204
Monitoring Performers	
Michael Baker Engineering, Inc. Monitoring Point of Contact	797 Haywood Rd. Suite 201. Asheville, NC 28806 Jason York, Tel. 828-380-0118

Table 4. Project Attributes
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Project Name		Russell Gap Stream Mitigation Project			
County		Alexander County			
Project Area (acres)		35.97			
Project Coordinates (latitude and longitude)		36.0091 N, -81.2139 W			
Planted Acreage (Acres of Woody Stems Planted)		29.67			
Project Watershed Summary Information					
Physiographic Province		Peidmont			
River Basin		Catawba			
USGS Hydrologic Unit 8-digit	3050101	USGS Hydrologic Unit 14-digit	03050101-120010		
DWR Sub-basin		03-08-32			
Project Drainage Area (Acres and Square Miles)		2,227 acres / 3.48 square miles (at downstream end of R3)			
Project Drainage Area Percentage of Impervious Area		0.13% impervious area			
CGIA Land Use Classification		82.6% forested, 14.5% agriculture, 1.5% rural residential, 1.4% roadway			
Existing Reach Summary Information					
Parameters		**Reach R1**	**Reach R2**	**Reach R3**	**Reach R4**
Length of reach (linear feet)		2,142	288	388	2,245
Valley confinement (Confined, moderately confined, unconfined)		Unconfined	Unconfined	Unconfined	Unconfined
Drainage area (Acres)		960	1,056	2227	806
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification		C	C	C	C
Stream Classification (existing)		E4 (incised)	E4 (incised)	E4	E4
Stream Classification (proposed)		C4	C4	C4	B4c
Evolutionary trend (Simon)		IV - Degradation and Widening	III - Degradation	III - Degradation	IV - Degradation and Widening
FEMA classification		Zone X	Zone X	Zone X	Zone X
Existing Reach Summary Information					
Parameters		**Reach R4a**	**Reach R5**	**Reach R6**	**Reach R7a**
Length of reach (linear feet)		299	256	631	155
Valley confinement (Confined, moderately confined, unconfined)		Unconfined	Unconfined	Unconfined	Unconfined
Drainage area (Acres)		716	150	154	210
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification		C	C	C	C
Stream Classification (existing)		E4	C4b	G4	E4b
Stream Classification (proposed)		B4c	C4b	B4	E4b
Evolutionary trend (Simon)		I - Stable System	I - Stable System	IV - Degradation and Widening	I - Stable System
FEMA classification		Zone X	Zone X	Zone X	Zone X
Existing Reach Summary Information					
Parameters		**Reach R7b**	**Reach R8**	**Reach R9**	**Reach R10(A/B)**
Length of reach (linear feet)		1,170	463	439	371
Valley confinement (Confined, moderately confined, unconfined)		Unconfined	Unconfined	Unconfined	Unconfined
Drainage area (Acres)		288	333	358	17
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification		C	C	C	C
Stream Classification (existing)		E4b	C4	E4b	E4b
Stream Classification (proposed)		E4b	C4	B4	E4b-C4
Evolutionary trend (Simon)		III - Degradation	I - Stable System	IV - Degradation and Widening	II - Disturbance
FEMA classification		Zone X	Zone X	Zone X	Zone X

Existing Reach Summary Information				
Parameters	**Reach R11**	**Reach R12**	**Reach R13**	**Reach R14**
Length of reach (linear feet)	481	86	124	528
Valley confinement (Confined, moderately confined, unconfined)	Confined	Unconfined	Moderately Confined	Confined (Upper) Unconfined (Lower)
Drainage area (Acres)	17	115	21	22
Perennial, Intermittent, Ephemeral	Intermittent	Perennial	Intermittent	Perennial
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing)	B4a	Eb	C4	A4
Stream Classification (proposed)	B4a	C4b	C4	E4
Evolutionary trend (Simon)	III - Degradation	IV - Degradation and Widening	II - Disurbance	IV - Degradation and Widening
FEMA classification	Zone X	Zone X	Zone X	Zone X

Existing Reach Summary Information				
Parameters	**Reach R15**	**Reach R17**	**Reach R18**	**Reach R19**
Length of reach (linear feet)	226	130	185	481
Valley confinement (Confined, moderately confined, unconfined)	Unconfined	Unconfined	Unconfined	Moderately Confined
Drainage area (Acres)	19	26	24	22
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent	Intermittent	Perennial
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing)	E4b	E4b	E4b	B4a
Stream Classification (proposed)	E4b	E4b	E4b	B4a
Evolutionary trend (Simon)	I - Stable System	I - Stable System	I - Stable System	IV - Degradation and Widening
FEMA classification	Zone X	Zone X	Zone X	Zone X

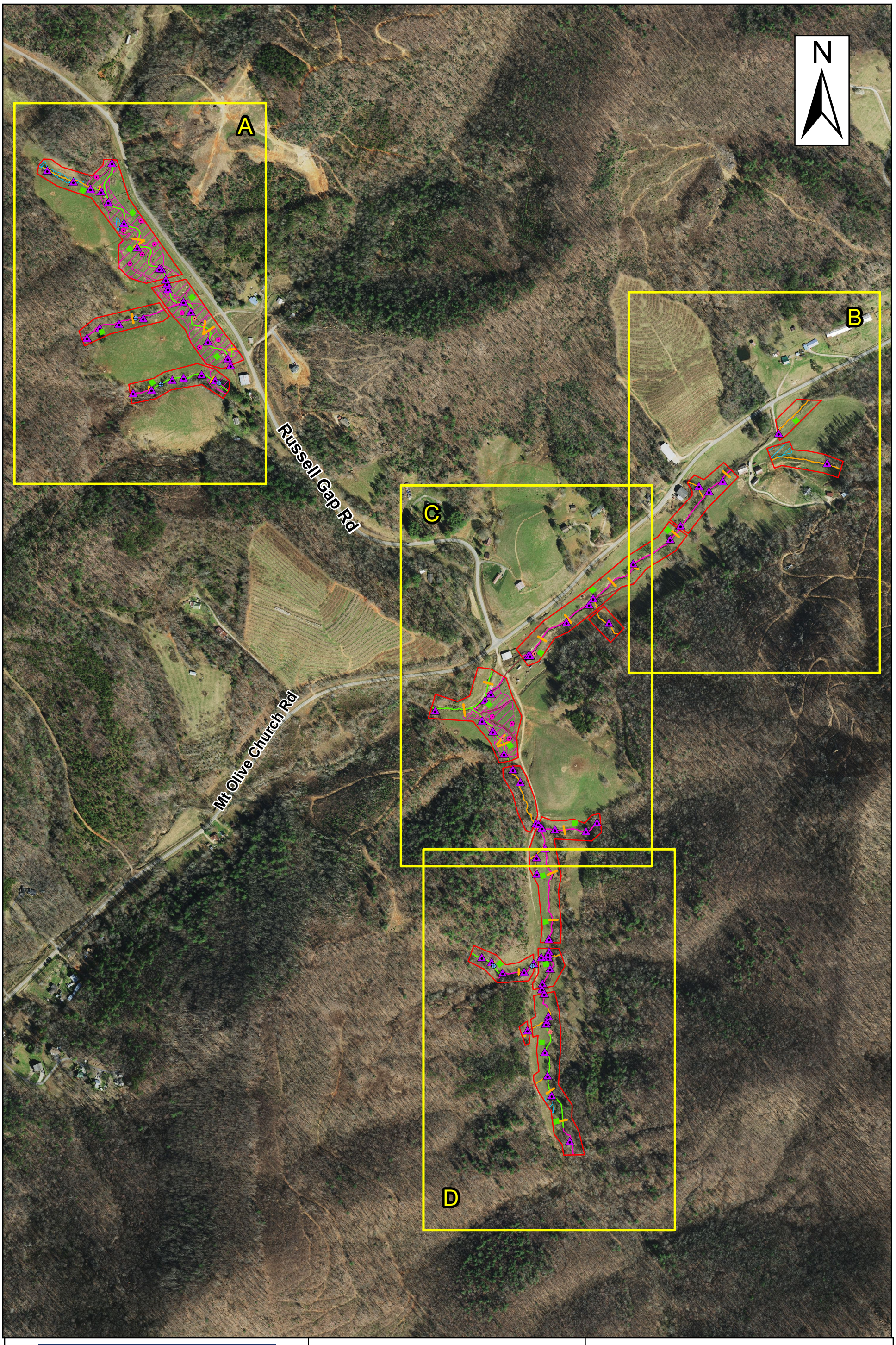
Existing Reach Summary Information				
Parameters	**Reach R20**	**Reach R21**	**Reach R22**	**Reach R22a**
Length of reach (linear feet)	206	67	161	68
Valley confinement (Confined, moderately confined, unconfined)	Confined	Unconfined	Moderately Confined	Moderately Confined
Drainage area (Acres and Square Miles)	9	33	3	3
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C	C	C	C
Stream Classification (existing)	A4a+	B4	B4	B4
Stream Classification (proposed)	A4a+	B4	B4	B4
Evolutionary trend (Simon)	III - Degrading	I - Stable System	II - Channelized	II - Channelized
FEMA classification	Zone X	Zone X	Zone X	Zone X

Existing Reach Summary Information			
Parameters	**Reach R25**	**Reach R26**	**Reach R27**
Length of reach (linear feet)	422	548	165
Valley confinement (Confined, moderately confined, unconfined)	Moderately Confined	Unconfined	Moderately Confined
Drainage area (Acres and Square Miles)	33	32	19
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C	C	C
Stream Classification (existing)	B4a	E4b	E4b
Stream Classification (proposed)	B4a	E4b	E4b
Evolutionary trend (Simon)	III - Degrading	I - Stable System	I - Stable System
FEMA classification	Zone X	Zone X	Zone X

Regulatory Considerations			
Parameters	**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404	Yes	Yes	PCN
Water of the United States - Section 401	Yes	Yes	PCN
Endangered Species Act	Yes	Yes	Categorical Exclusion
Historic Preservation Act	Yes	Yes	Categorical Exclusion
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A

APPENDIX B

Visual Assessment Data



Michael Baker INTERNATIONAL

0 500 1,000 Feet

Figure 3 Overview
Current Conditions Plan View
Russell Gap Project

N

R10A
R10B
R11
R12
R13
R14
R1

Mid-Channel Bar Repaired
Mid-Channel Bar Repaired

7
25
26
RGAW1
XS 24
27
28
8
9
RGAW3
XS 1
XS 2
10
RGAW4
RGAW5
RGAW6
11
12
13
14
15
FC1
16
RGAW7
17
CG 1
XS 3
XS 4
RGAW8
18
RGAW9
19
20
XS 25
XS 18
RGFL1
24
23
22
21
XS 20
FC2
3
4
5
6
RGFL2
RGFL3
1
2
XS 19

Photo Points
Beaver Dams
Aggradation Areas
Fencing
Monitoring Crest Gauges
Vegetation Plots
Supplemental Planting
Cross Sections
Conservation Easement

Monitoring Wells
Fail
Pass

Monitoring Flow Gauges
Fail
Pass

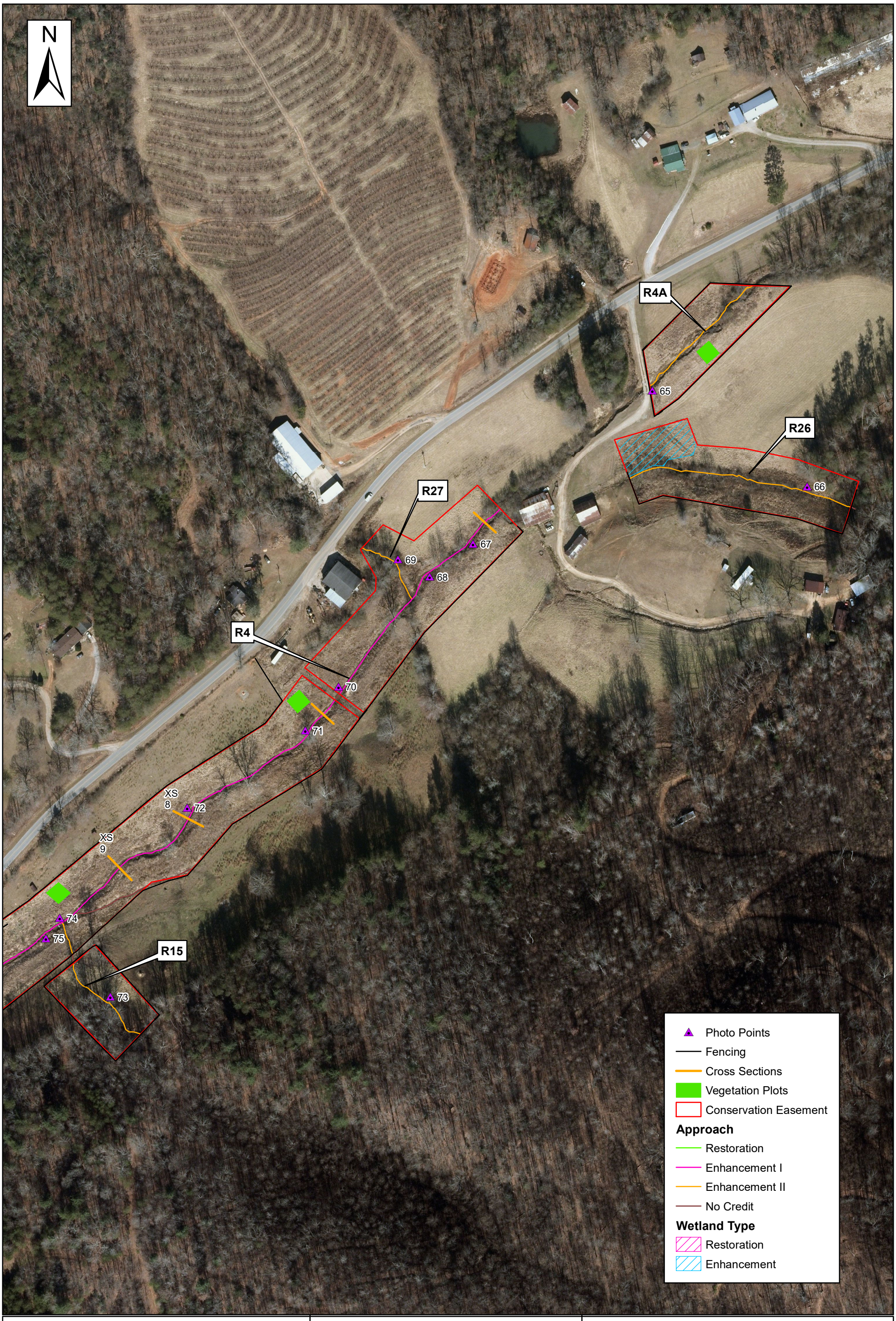
Approach
Restoration
Enhancement I
Enhancement II
No Credit

Wetland Type
Restoration
Enhancement

Michael Baker INTERNATIONAL

0 150 300 Feet

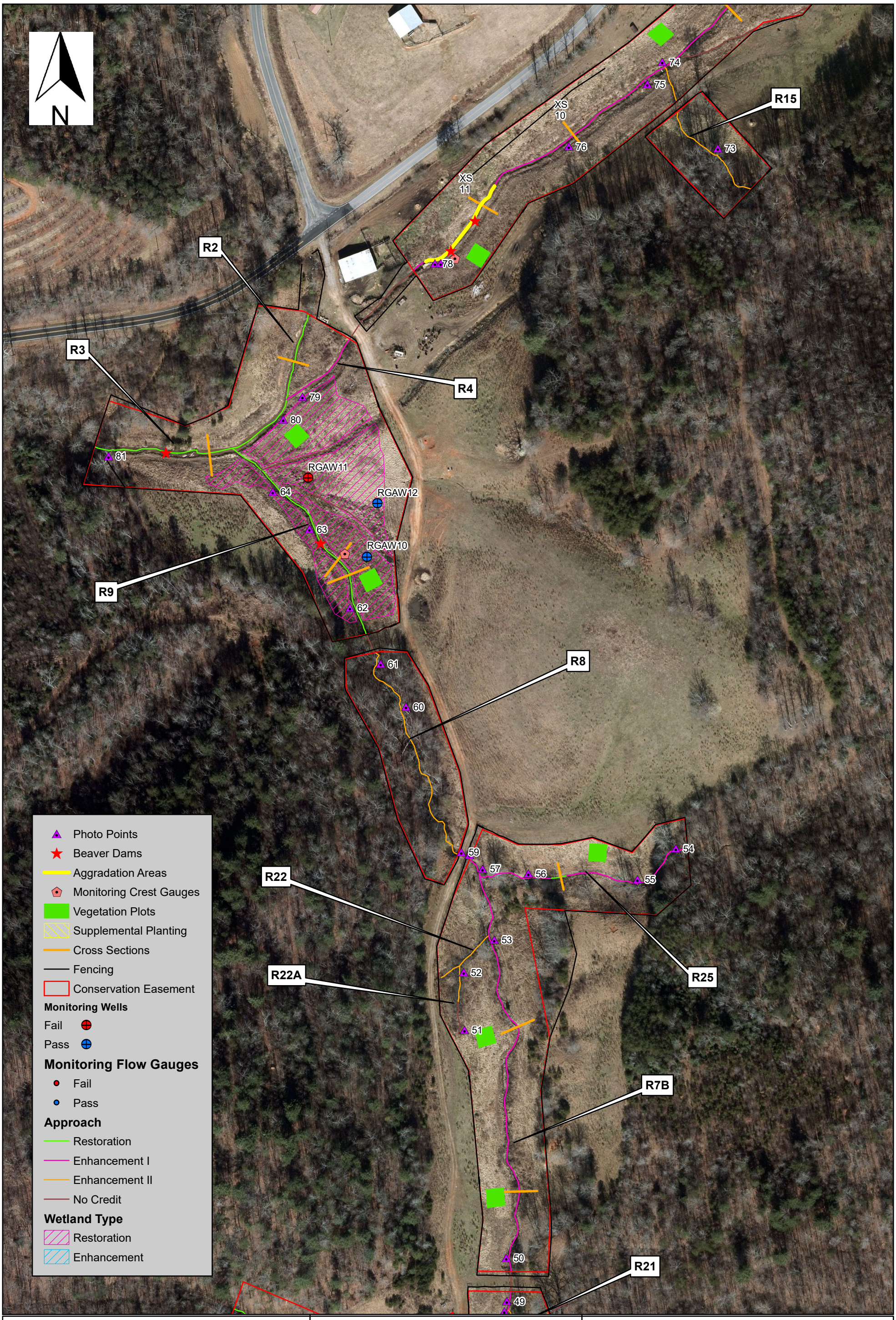
Figure 3A
Current Conditions Plan View
Russell Gap Project



Michael Baker INTERNATIONAL

0 150 300 Feet

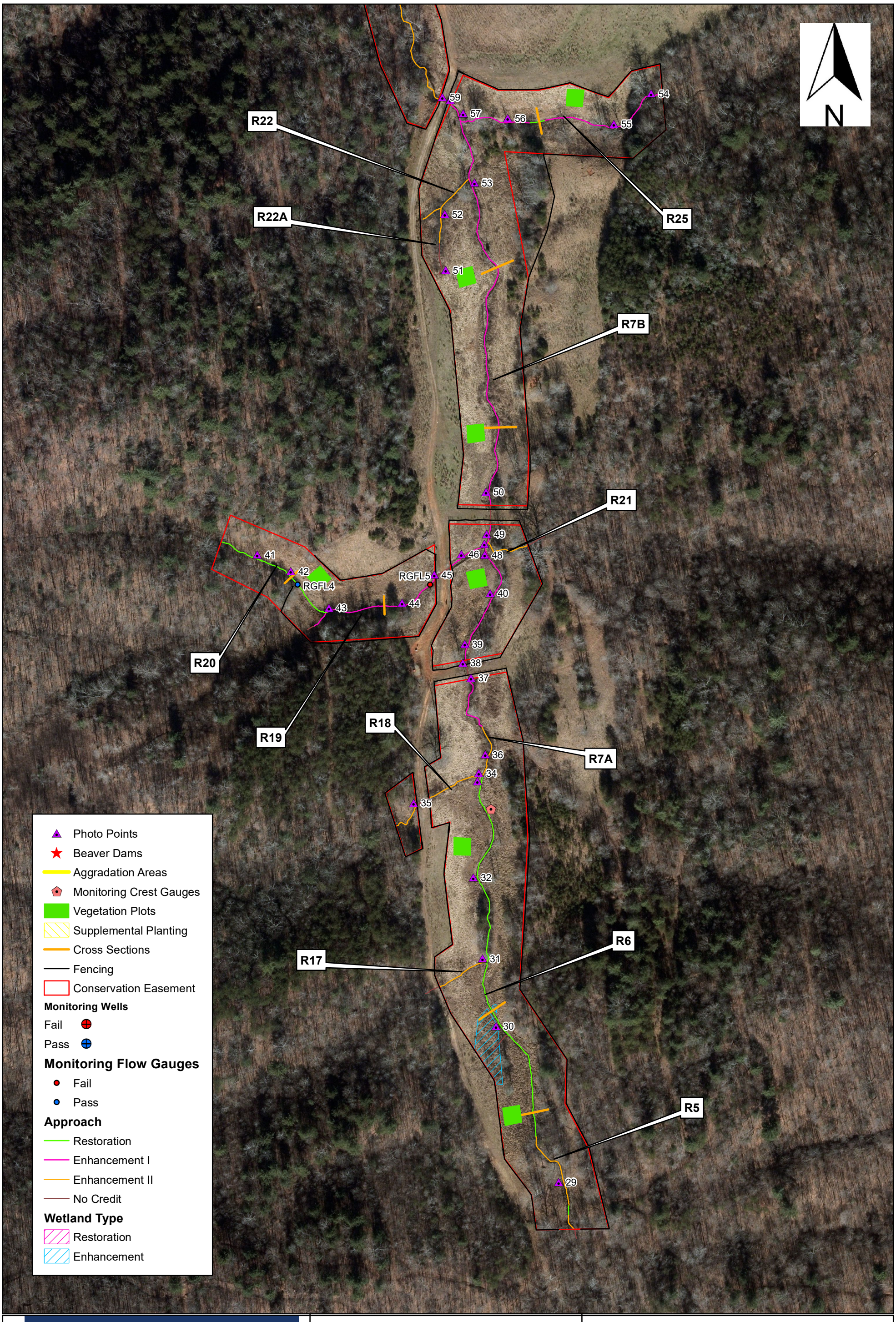
Figure 3B
Current Conditions Plan View
Russell Gap Project



Michael Baker INTERNATIONAL

0 150 300 Feet

Figure 3C
Current Conditions Plan View
Russell Gap Project



Michael Baker INTERNATIONAL

0 150 300 Feet

Figure 3D
Current Conditions Plan View
Russell Gap Project

Table 5. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R1							
Assessed Length (LF):	**1,911**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			2	220	89%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	21	21	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	19	19			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	19	19			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	21	21			100%
		2. Thalweg centering at downstream of meander bend (Glide)	19	19			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion		0	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected		0	0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse		0	0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	27	27			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	27	27			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	27	27			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	27	27			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	24	24			100%

Reach ID: Reach R2							
Assessed Length (LF):	**166**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	1	1	**0.00**	**0.00**	100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	1	1			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	1	1			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	1	1			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	1	1	0	0	100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1	0	0	100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	1	1	0	0	100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	1	1			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	1	1			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R3
Assessed Length (LF): 406

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1.Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			1	50	88%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	1	1			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	1	1			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	1	1			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Reach ID: Reach R4a
Assessed Length (LF): 300

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number per As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended
1. Bed	1.Vertical Stability	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R4							
Assessed Length (LF):	**2,063**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			2	200	91%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	17	17			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	15	15			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	15	15			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	17	17			100%
		2. Thalweg centering at downstream of meander bend (Glide)	15	15			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	20	20			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	20	20			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	20	20			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	20	20			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	15	15			100%

Reach ID: Reach R5							
Assessed Length (LF):	**193**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	1	1			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	8	8			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	1	1			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	1	1			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	1	1			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	1	1			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	1	1			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	8	8			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R6							
Assessed Length (LF):	**747**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	9	9			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	8	8			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	8	8			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	9	9			100%
		2. Thalweg centering at downstream of meander bend (Glide)	8	8			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	8	8			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	8	8			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	8	8			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	8	8			100%

Reach ID: Reach R7a							
Assessed Length (LF):	**104**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R7b							
Assessed Length (LF):	**1,216**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	9	9			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	7	7			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	7	7			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	9	9			100%
		2. Thalweg centering at downstream of meander bend (Glide)	7	7			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs					100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill					100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms					100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%					100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow					100%

Reach ID: Reach R8							
Assessed Length (LF):	**453**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R9							
Assessed Length (LF):	**446**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			1	50	89%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	7	7			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	6	6			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	6	6			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%
		2. Thalweg centering at downstream of meander bend (Glide)	6	6			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	6	6			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	6	6			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	6	6			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	6	6			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	6	6			100%

Reach ID: Reach R10a							
Assessed Length (LF):	**367**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	7	7			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	1	1			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	1	1			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R10b							
Assessed Length (LF):	**105**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	1	1			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	2	2			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	2	2			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	2	2			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Reach ID: Reach R11							
Assessed Length (LF):	**712**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	2	2			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	2	2			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	38	38			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	38	38			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	38	38			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	38	38			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R12							
Assessed Length (LF):	**120**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	2	2			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	1	1			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	1	1			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	2	2			100%
		2. Thalweg centering at downstream of meander bend (Glide)	1	1			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	3	3			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	3	3			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	3	3			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	3	3			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	1	1			100%
Reach ID: Reach R13							
Assessed Length (LF):	**145**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	9	9			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	9	9			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	9	9			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	9	9			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R14							
Assessed Length (LF):	**570**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	2	2			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	26	26			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	26	26			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	26	26			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	26	26			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Reach ID: Reach R15							
Assessed Length (LF):	**284**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	8	8			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	8	8			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	8	8			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	0	0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R17							
Assessed Length (LF):	**107**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Reach ID: Reach R18							
Assessed Length (LF):	**176**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	2	2			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	2	2			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	2	2			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R19							
Assessed Length (LF):	**353**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	1	1			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	1	1			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	26	26			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	26	26			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	26	26			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	26	26			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Reach ID: Reach R20							
Assessed Length (LF):	**253**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	36	36			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	36	36			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	36	36			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	36	36			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R21							
Assessed Length (LF):	**92**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Reach ID: Reach R22, R22a							
Assessed Length (LF):	**187**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate		0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)		0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)		0			100%
		2. Thalweg centering at downstream of meander bend (Glide)		0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs		0			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill		0			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms		0			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%		0			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow		0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R25							
Assessed Length (LF):	**402**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	6	6			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	6	6			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	13	13			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	13	13			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	13	13			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	13	13			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Reach ID: Reach R26							
Assessed Length (LF):	**473**						
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	4	4			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	4	4			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	4	4			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	4	4			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 5, continued. Visual Stream Morphology Stability Assessment
Russell Gap Stream Mitigation Project -NCDMS Project No. 100003 - Assessed October 2023

Reach ID: Reach R27							
Assessed Length (LF):							
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number per As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**
1. Bed	**1.Vertical Stability**	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%
		2. Degradation - Evidence of downcutting			0	0	100%
	2. Riffle Condition	1. Texture Substrate - Riffle maintains coarser substrate	0	0			100%
	3. Meander Pool Condition	1. Depth - Sufficent (Max Pool Depth/Mean Bkf Depth≥ 1.5)	0	0			100%
		2. Length - Sufficent (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	0	0			100%
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	0	0			100%
		2. Thalweg centering at downstream of meander bend (Glide)	0	0			100%
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover due to active scour and erosion			0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting is expected			0	0	100%
	3. Mass Wasting	Banks slumping, caving or collapse			0	0	100%
				Totals	0	0	100%
3. Engineering Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	7	7			100%
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	7	7			100%
	2a. Piping	Structures lacking any substantial flow underneath or around sills or arms	7	7			100%
	3. Bank Position	Bank erosion within the structures extent of influenc**does not** exceed 15%	7	7			100%
	4. Habitat	Pool forming structures maintaining - Max Pool Depth/Mean Bankfull Depth ratio≥ 1.5. Rootwads/logs providing some cover at low flow	0	0			100%

Table 6. Vegetation Conditions Assessment - Assessed Octoberber 2023
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Planted Acreage: 9.8						
Vegetation Category	**Defintions**	**Mapping Threshold (acres)**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas *	Very limited cover both woody and herbaceous material.	0.1 acres	N/A	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
			Total			
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems or a size class that are obviously small given the monitoring year.	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total			
Easement Acreage: 15.8						
Vegetation Category	**Defintions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Points**	**Combined Acreage**	**% of Planted Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale)	1000 ft²	N/A	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale)	577 ft²	Polygon	0	0.00	0.0%

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-1: Reach 13, view upstream Station 10+20.

PP-2: Reach 14, view upstream toward Reach 13 at Station 11+45.

PP-3: Reach 14, view upstream Station 13+00.

PP-4: Reach 14, view upstream Station 13+75.

PP-5: Reach 14, view upstream Station 15+00.

PP-6: Reach 14, end of reach Station 16+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-7: Reach 1, view upstream, at Station 10+20.

PP-8: Reach 1, view upstream Reach 1 at Station 13+00.

PP-9: Reach 1, view upstream at Station 15+00.

PP-10: Reach 1, view upstream at Station 17+25.

PP-11: Reach 1, view upstream at Station 20+00.

PP-12: Reach 1, view downstream at Station 20+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-13: Reach 1, view upstream at Station 20+75.

PP-14: Reach 1, view downstream at Station 20+75.

PP-15: Reach 1, view upstream at Station 21+50.

PP-16: Reach 1, confluence of Reach 1 and Reach 11 at Station 22+75.

PP-17: Reach 1, view upstream at Station 24+20.

PP-18: Reach 1, view of upstream at Station 27+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-19: Reach 1, view upstream Reach 12 at Station 29+10.

PP-20: Reach 1, view upstream at Station 29+20.

PP-21: Reach 11, view upstream at Station 10+20.

PP-22: Reach 11, view upstream at Station 11+50.

PP-23: Reach 11, view upstream at Station 12+75.

PP-24: Reach 11, view upstream at Station 14+50.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-25: Reach 10A, view upstream at Station 10+50.

PP-26: Reach 10A, view upstream at Station 12+50.

PP-27: Reach 10A, view upstream at Station 13+75.

PP-28: Reach 10B, view upstream at Station 14+50.

PP-29: Reach 5, view upstream at Station 11+00.

PP-30: Reach 6, view upstream at Station 14+50.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-31: Reach 17, view upstream at Station 11+00.

PP-32: Reach 6, view upstream at Station 17+50.

PP-33: Reach 6, view upstream at Station 19+50.

PP-34: Reach 18, view upstream at Station 12+00.

PP-35: Reach 18, view upstream at Station 10+60.

PP-36: Reach 7A, view upstream at Station 20+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-37: Reach 7B, view upstream at Station 21+75.

PP-38: Reach7B, view downstream at Station 22+00.

PP-39: Reach 7B, view upstream at Station 22+25.

PP-40: Reach 7B, view upstream at Station 23+50.

PP-41: Reach 20, view upstream at Station 10+80.

PP-42: Reach 20, view upstream at Station 11+50.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-43: Reach 19, view upstream at Station 10+15.

PP-44: Reach 19, view upstream at Station 11+85.

PP-45: Reach 19, view upstream at Station 12+80.

PP-46: Reach 19, view upstream at Station 13+20.

PP-47: Reach 19, view upstream at Station013+80.

PP-48: Reach 7B, view upstream at Station 24+10.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-49: Reach 7B, view downstream at Station 24+60.

PP-50: Reach 7B, view upstream at Station 25+25.

PP-51: Reach 22A, view upstream at Station 10+00.

PP-52: Reach 22A, view of upstream at Station 11+15.

PP-53: Reach 7B, view upstream at Station 32+00.

PP-54: Reach 25, view upstream at Station 10+10.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-55: Reach 25, view upstream at Station 11+20.

PP-56: Reach 25, view upstream at Station 13+40.

PP-57: Reach 7B, view downstream at Station 33+00.

PP-58: Reach 7B, view upstream at Station 33+20.

PP-59: Reach 8, view downstream at Station 34+00.

PP-60: Reach 8, view upstream at Station 37+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-61: Reach 8, view upstream at Station 38+00.

PP-62: Reach 9, view upstream at Station 39+20.

PP-63: Reach 9, view upstream at Station 41+00.

PP-64: Reach 9, view upstream at Station 42+00.

PP-65: Reach 4A, view upstream at Station 13+00.

PP-66: Reach 26, view upstream at Station 11+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-67: Reach 4, view upstream at Station 11+10.

PP-68: Reach 4, view upstream at Station 12+00.

PP-69: Reach 27, view upstream at Station 11+60.

PP-70: Reach 4, view upstream at Station 15+00.

PP-71: Reach 4, view upstream at Station 16+10.

PP-72: Reach 4, view upstream at Station 19+00.

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Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-73: Reach 15, view upstream at Station 11+00.

PP-74: Reach 15, view upstream at Station 13+00.

PP-75: Reach 4, view upstream at Station 23+20.

PP-76: Reach 4, view upstream at Station 25+00.

PP-77: Reach 4, view upstream at Station 28+30.

PP-78: Reach 4, view upstream at Station 28+00.

Russell Gap: MY4 Stream Station Photo-Points. Taken September 20, 2023.

PP-79: Reach 4, view upstream at Station 32+00.

PP-80: Reach 3, view upstream at Station 33+00.

PP-81: Reach 3, view upstream at Station 36+40.

Russell Gap MY4 Monitoring Gauges and Overbank Photographs

Monitoring Well 1. (October 19, 2023)

Monitoring Well 2. (October 19, 2023)

Monitoring Well 3. (October 19, 2023)

Monitoring Well 4. (October 19, 2023)

Monitoring Well 5. (October 19, 2023)

Monitoring Well 6. (October 19, 2023)

Russell Gap MY4 Monitoring Gauges and Overbank Photographs

Monitoring Well 7. (October 19, 2023)

Monitoring Well 8. (October 19, 2023)

Monitoring Well 9. (October 19, 2023)

Monitoring Well 10. (October 19, 2023)

Monitoring Well 11. (October 19, 2023)

Monitoring Well 12. (October 19, 2023)

Russell Gap MY4 Monitoring Gauges and Overbank Photographs

Flow Gauge 1. Reach 11. (October 19, 2023)

Flow Gauge 2. Reach 14. (October 19, 2023)

Flow Gauge 3. Reach 13. (October 19, 2023)

Flow Gauge 4. Reach 19. (October 19, 2023)

Flow Gauge 5. Reach 20. (October 19, 2023)

Crest Gauge 2 Reach 9. (October 19, 2023)

Russell Gap MY4 Monitoring Gauges and Overbank Photographs

Crest Gauge 1 R1.

BKF reading 1.5 ft. (October 19, 2023)

Crest Gauge 1 R1. (October 19, 2023)

Crest Gauge 3 R4. BKF reading at 1.5 ft
(October 19, 2023)

Crest Gauge 3 R4. (October 19, 2023)

Crest Gauge 4 R6 BKF reading at 2 ft.
(October 19, 2023)

Crest Gauge 4 R6. (October 19, 2023)

Flow Camera Photographs

R11 Flow Camera. (January 5, 2023)

R11 Flow Camera. (February 3, 2023)

R11 Flow Camera. (February 17, 2023)

R11 Flow Camera. (March 7, 2023)

R11 Flow Camera. (March 30, 2023)

R11 Flow Camera. (April 16, 2023)

Flow Camera Photographs

R14 Flow Camera. (January 5, 2023)

R14 Flow Camera. (July 16, 2023)

R14 Flow Camera. (August 3, 2023)

R14 Flow Camera. (August 29, 2023)

R14 Flow Camera. (September 10, 2023)

R14 Flow Camera. (September 14, 2023)

Additional Site Photographs

Overbank Wrack Lines (June 14, 2023)

Overbank Wrack Lines (June 14, 2023)

Beaver Dam located on R1 (September 20, 2023)

Beaver Dam located on R3 (September 20, 2023)

R11 Flow Camera. (September 20, 2023)

R14 Flow Camera. (June 14, 2023)

Additional Site Photographs

Invasive Treatment on R14 (June 14, 2023)

Invasive Treatment on R13 (June 14, 2023)

Invasive Treatment on R1 (June 14, 2023)

Invasive Treatment on R9 (June 14, 2023)

Invasive Treatment on R9 (June 14, 2023)

Invasive Treatment on R7 (June 14, 2023)

APPENDIX C

Vegetation Plot Data

*No vegetation plot monitoring was required for Year 4.

APPENDIX D

Stream Geomorphology Data

*No cross-section survey was required for Year 4.

APPENDIX E

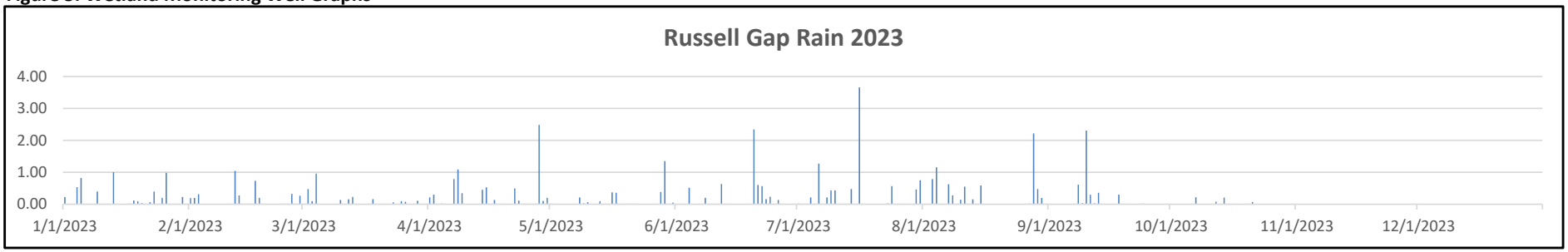
Hydrologic Data

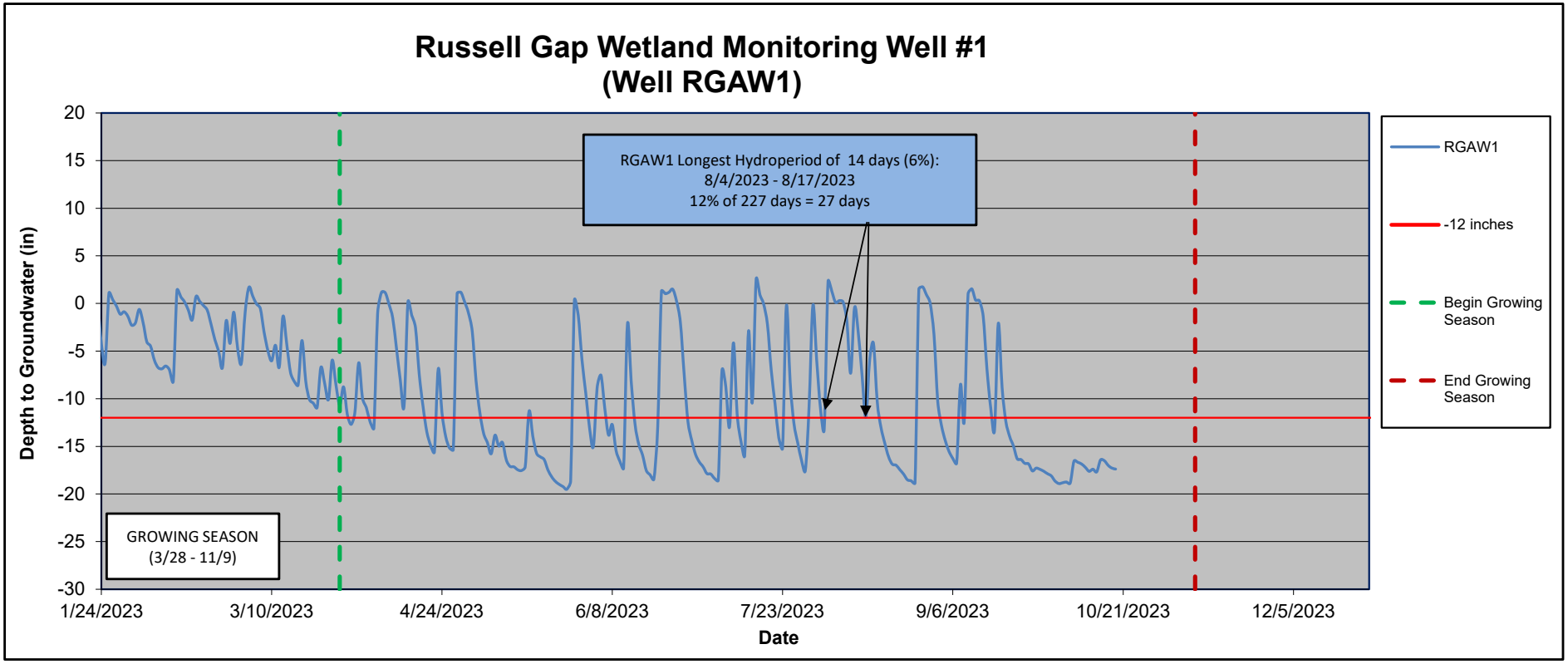
Table 10. Verification of Bankfull Events
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Date of Data Collection	R1 Manual Cork Crest Gauge #1	R9 Manual Cork Crest Gauge #2	R4 Manual Cork Crest Gauge #3	R6 Manual Cork Crest Gauge #4	Date of Bankfull Event Occurrence	Method of Data Collection
Year 1 Monitoring (2020)						
6/1/2020	NA	NA	1.25 ft.	NA	5/28/2020	Manual cork measurement
11/5/2020	1.5 ft.	NA	2.5 ft	NA	10/30/2020	Manual cork measurement
Year 2 Monitoring (2021)						
6/14/2021			7.5 inches and 20.5 inches		3/25/2021 and 5/3/2021	Manual cork measurement
10/19/2021	1.1 ft.				10/7/2021	Manual cork measurement
Year 3 Monitoring (2022)						
10/13/2022		8.25 inches			10/1/2022	Manual cork measurement
Year 4 Monitoring (2023)						
10/19/2023	1.5 ft.	NA	1.5 ft.	2.0 ft.	7/16/2023	Manual cork measurement

Note: Manual cork crest gauge readings were corroborated with associated spikes in the automated Continuous Stage Recorder (see graph in Appendix E) and/or with photographs (Appendix B).

Figure 5. Wetland Monitoring Well Graphs





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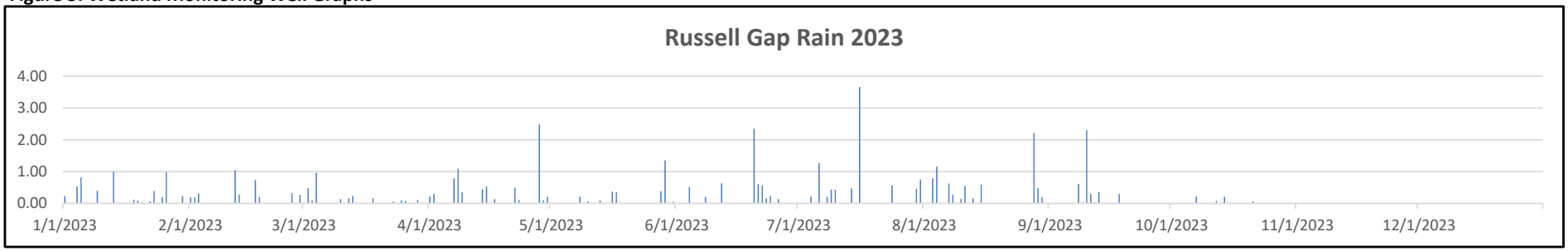

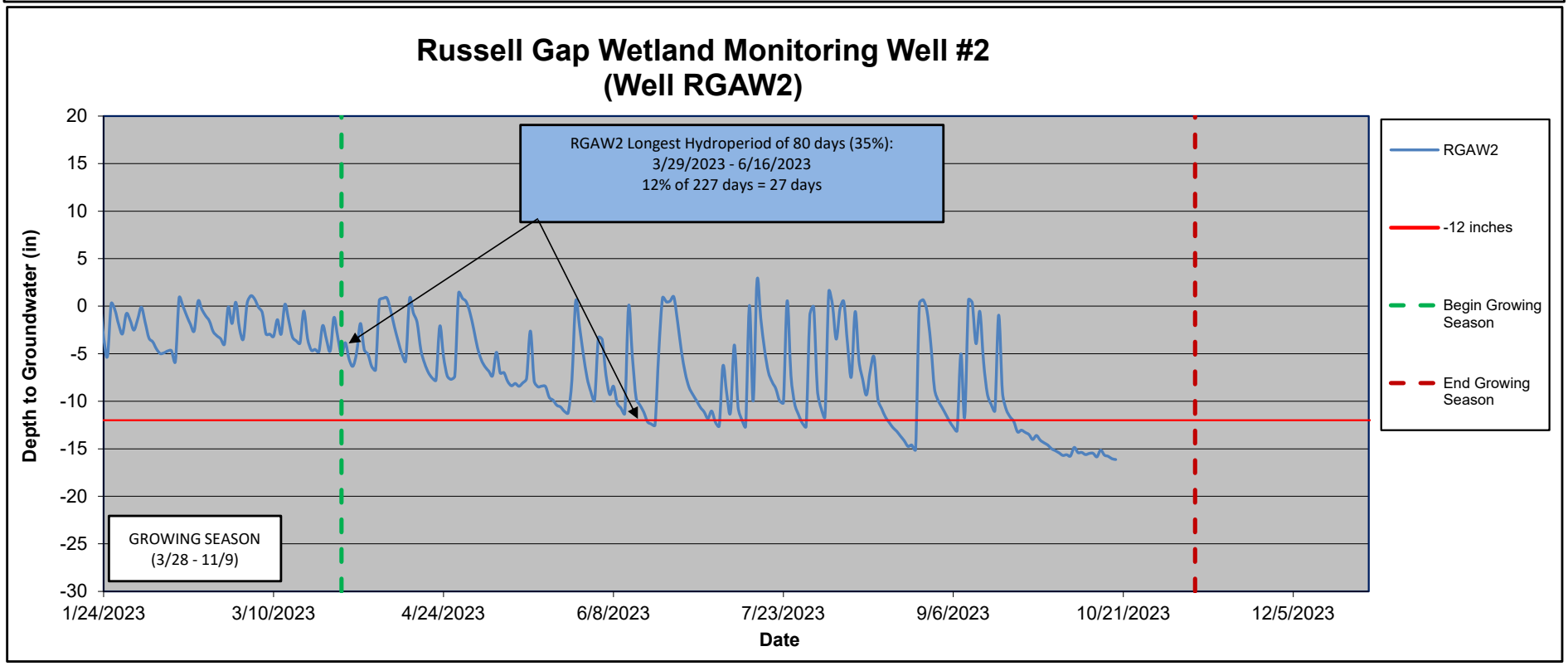

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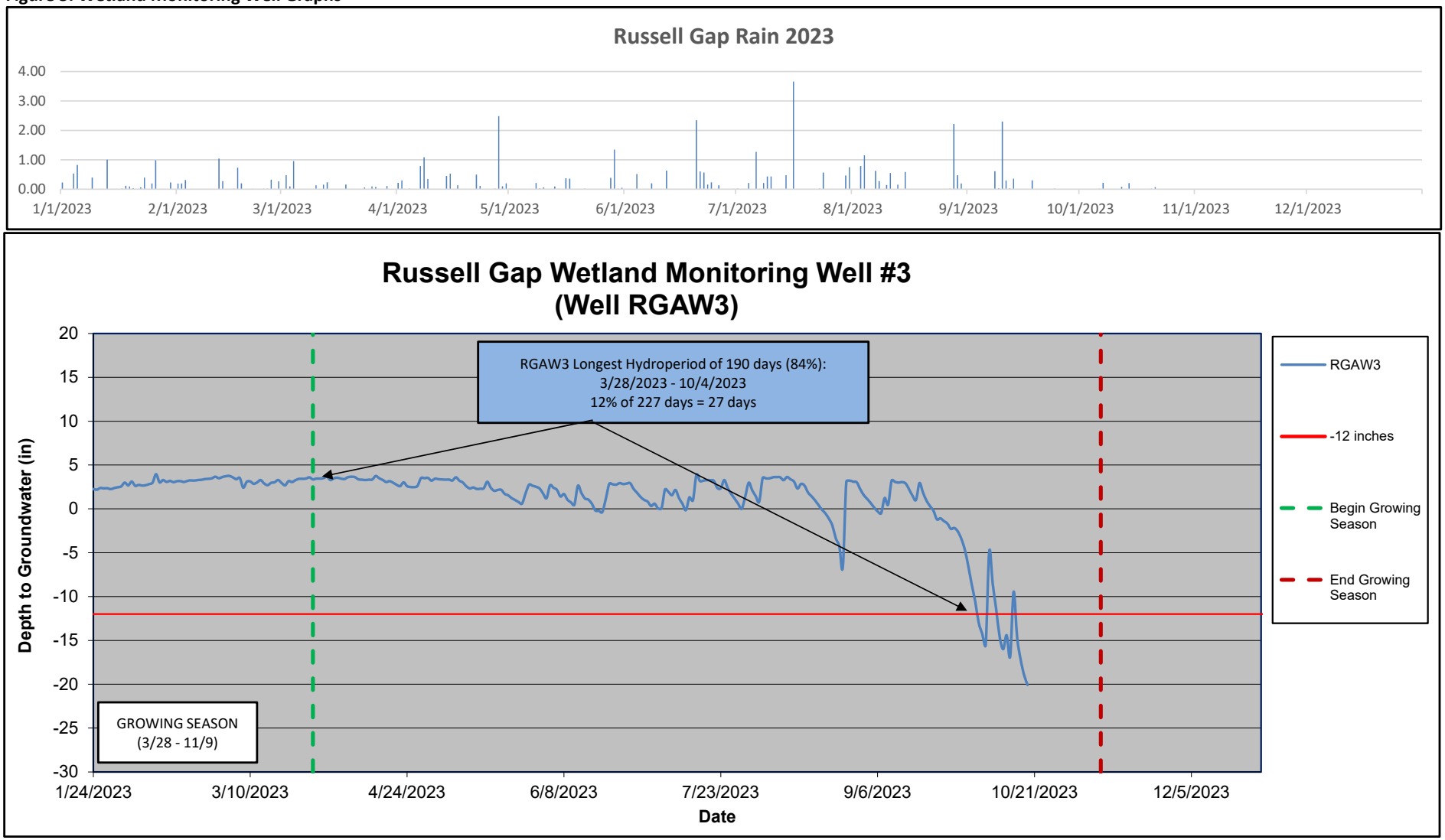

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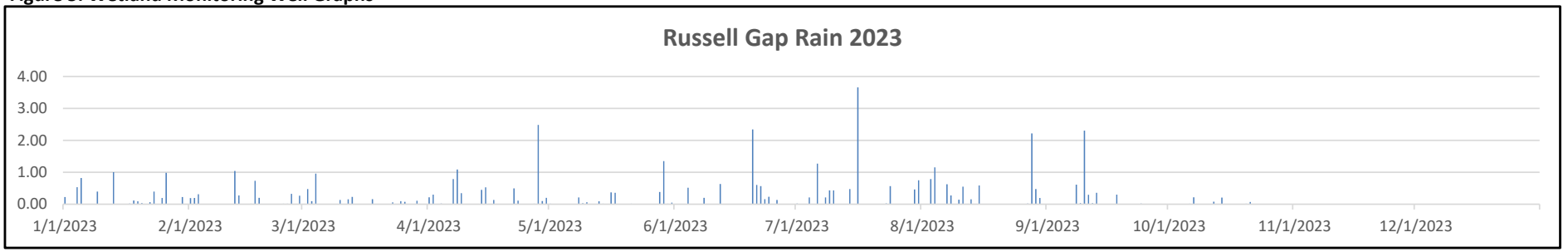

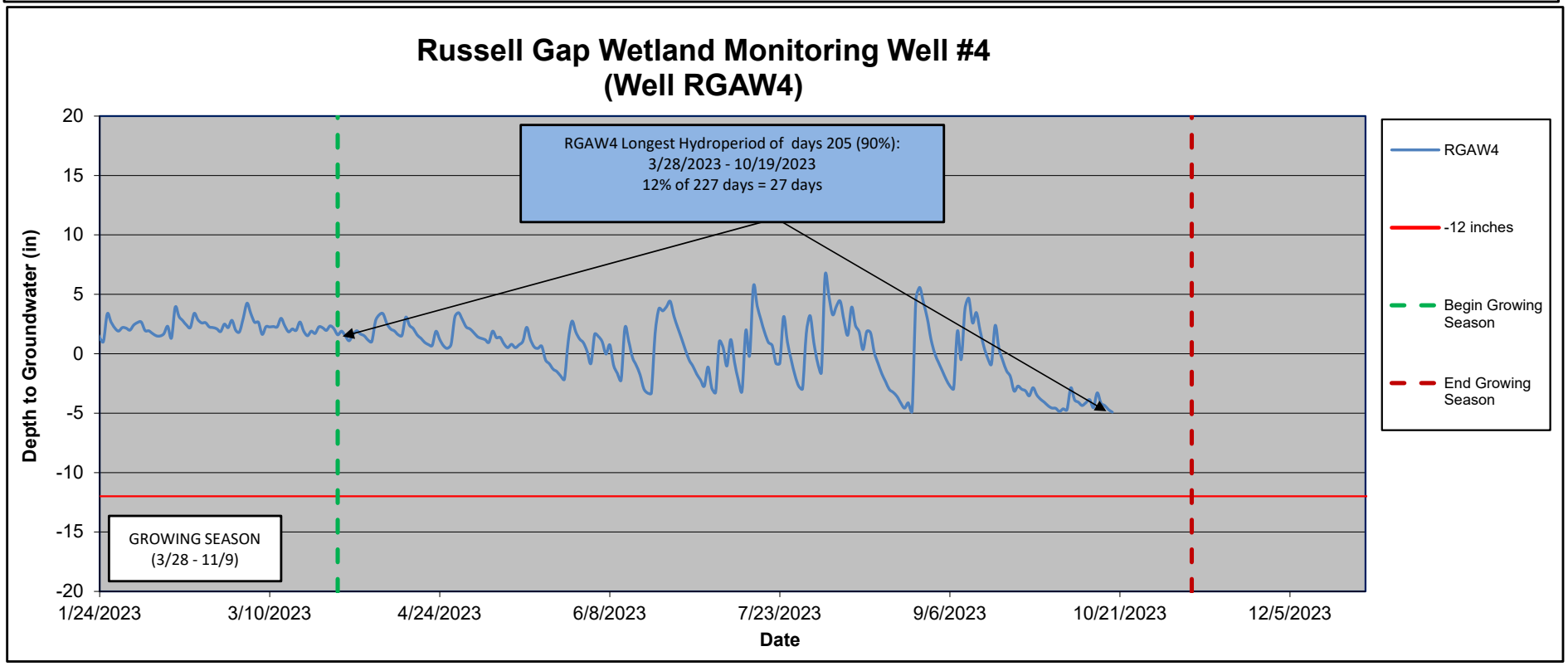

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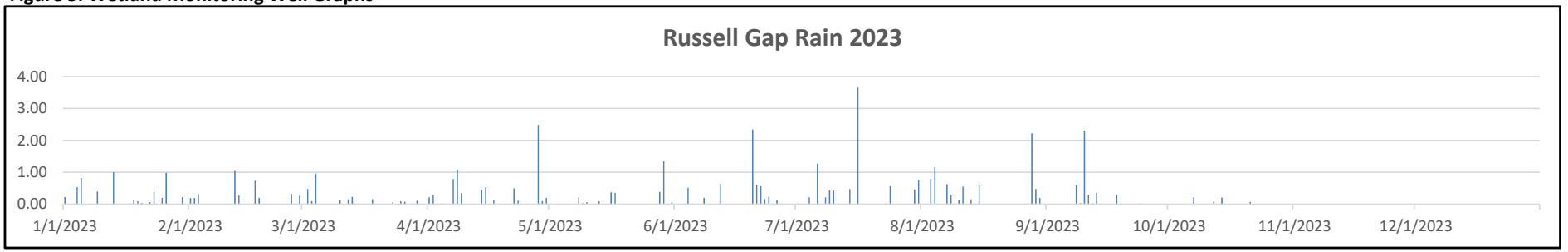

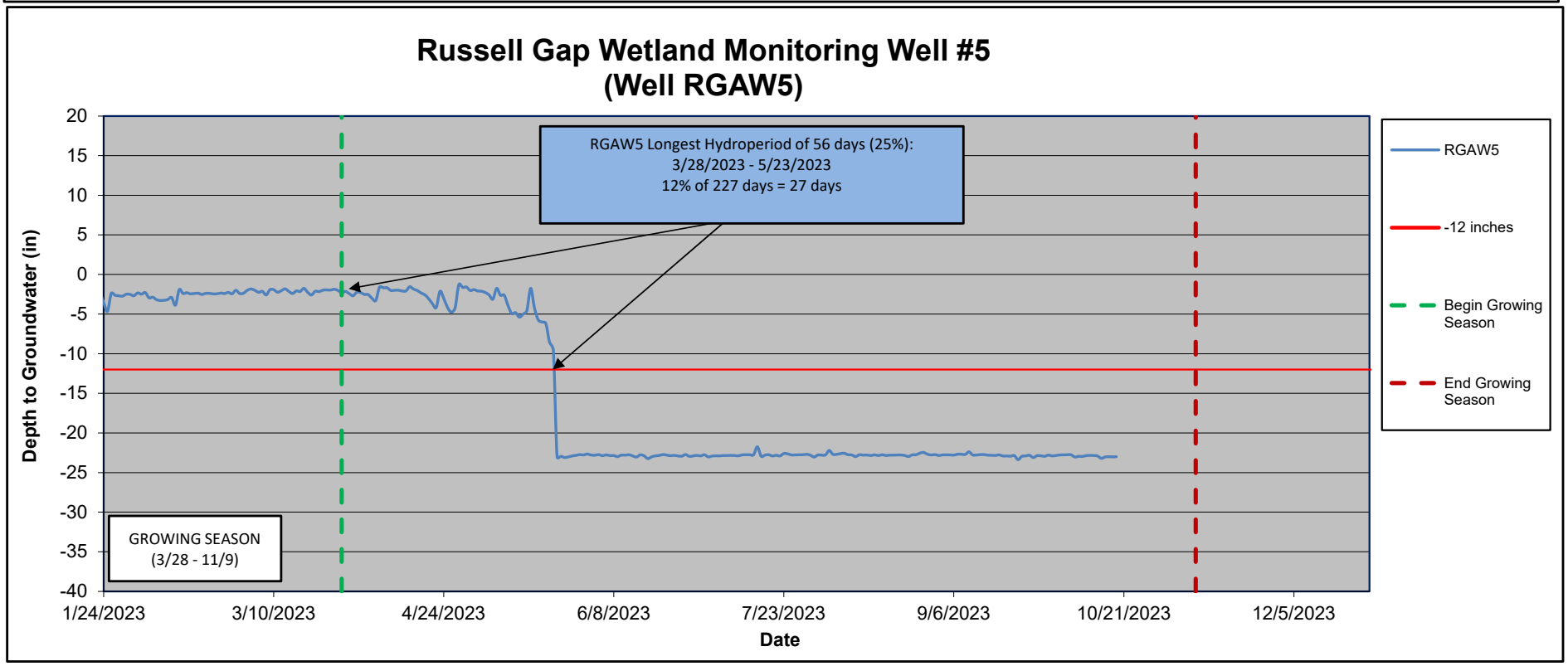

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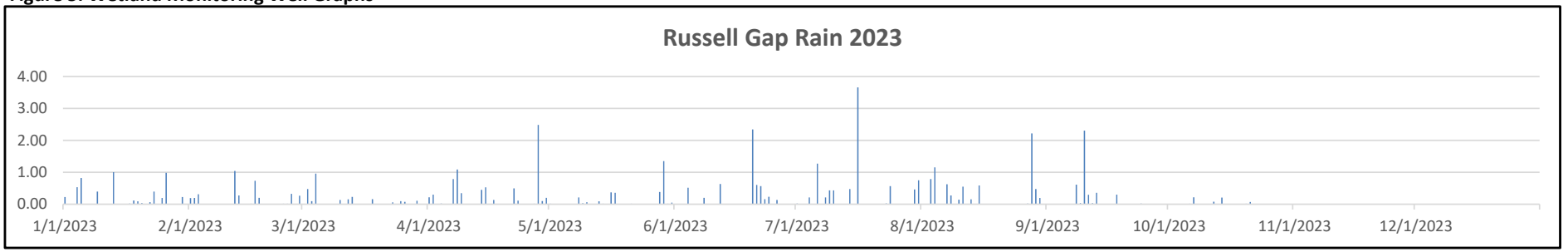

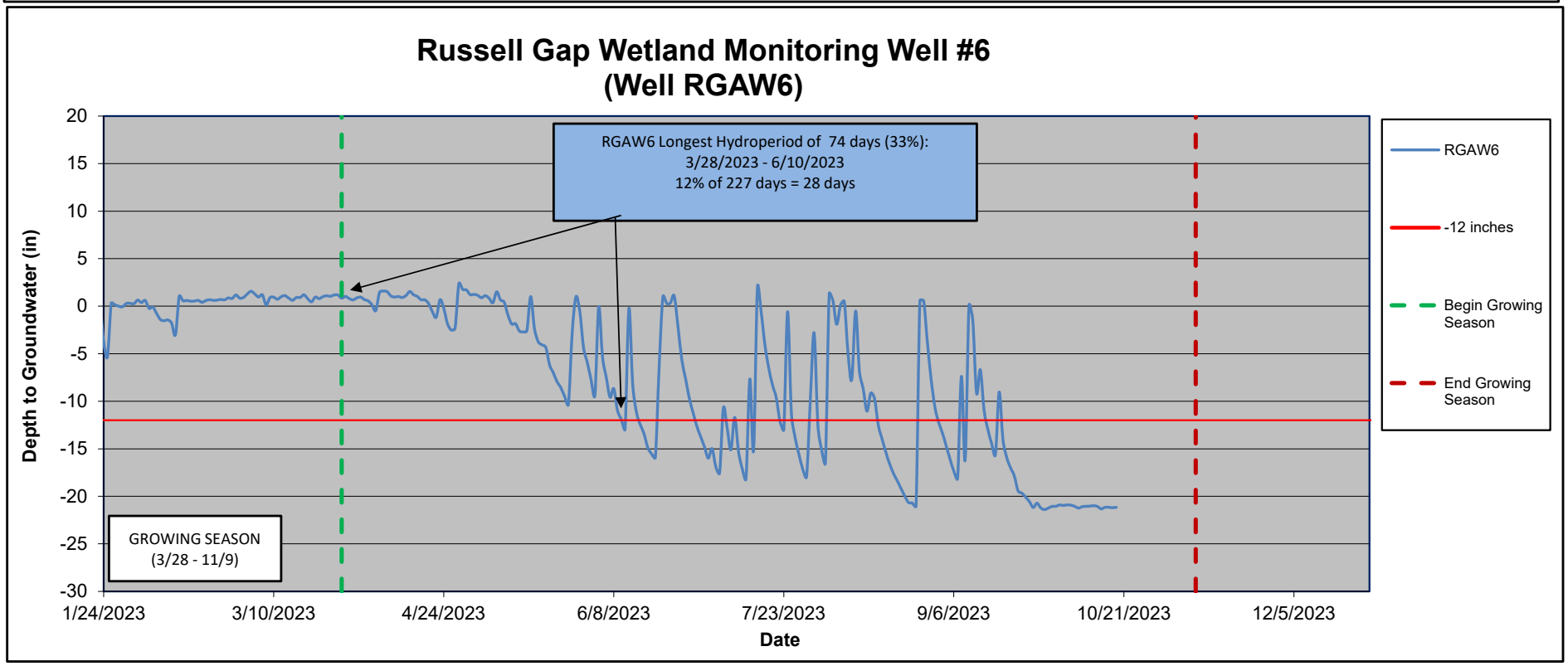

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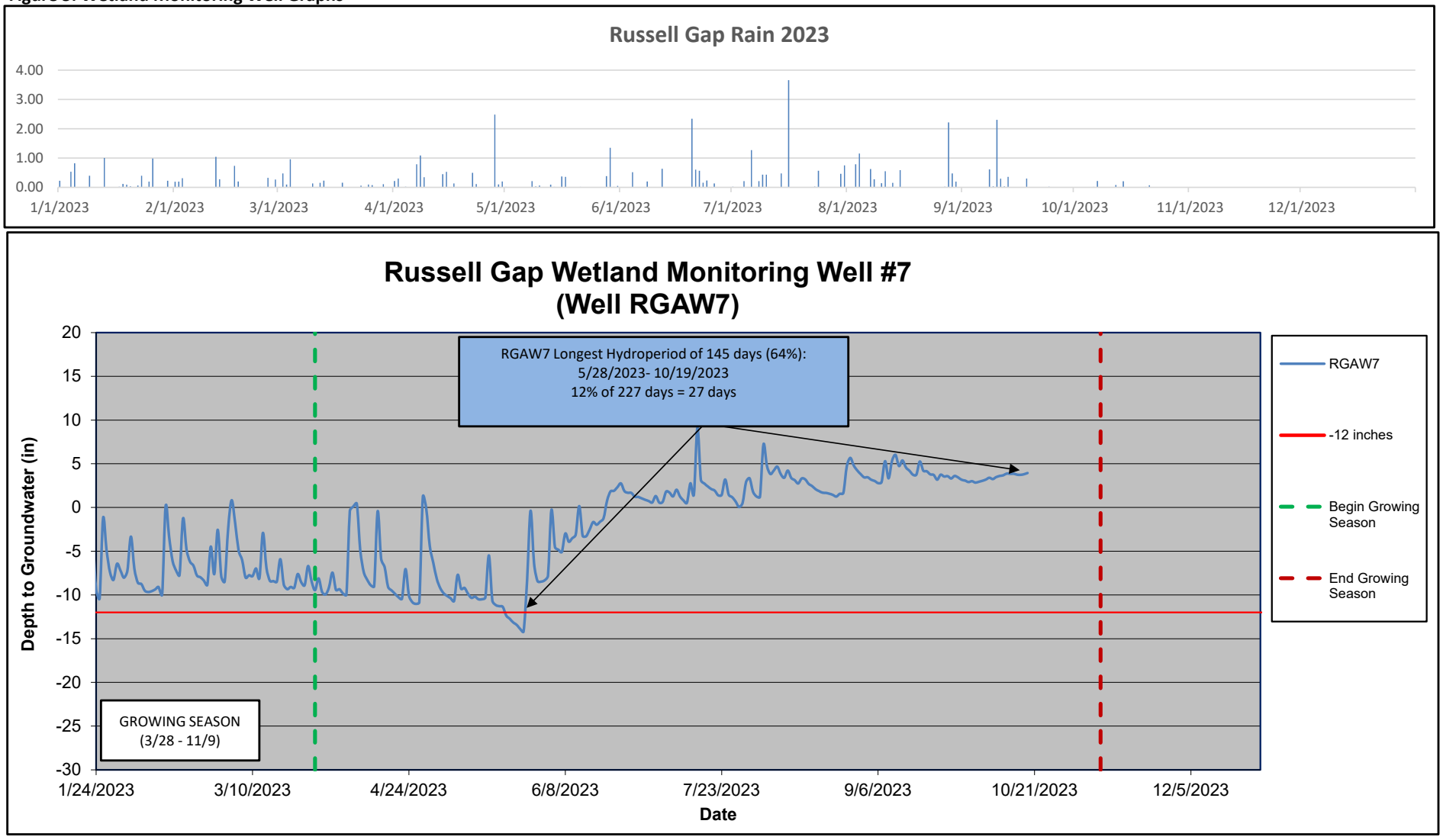

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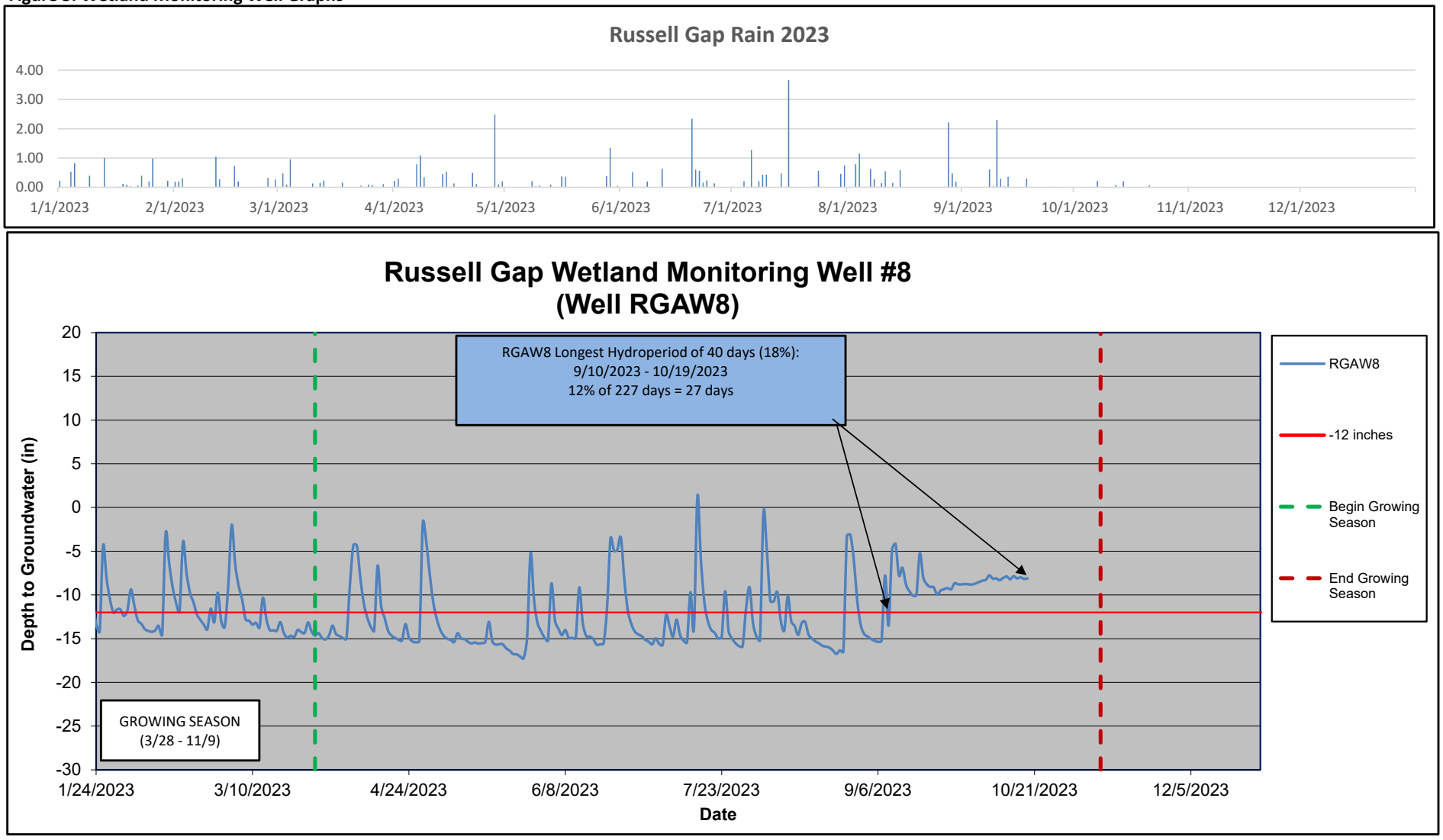

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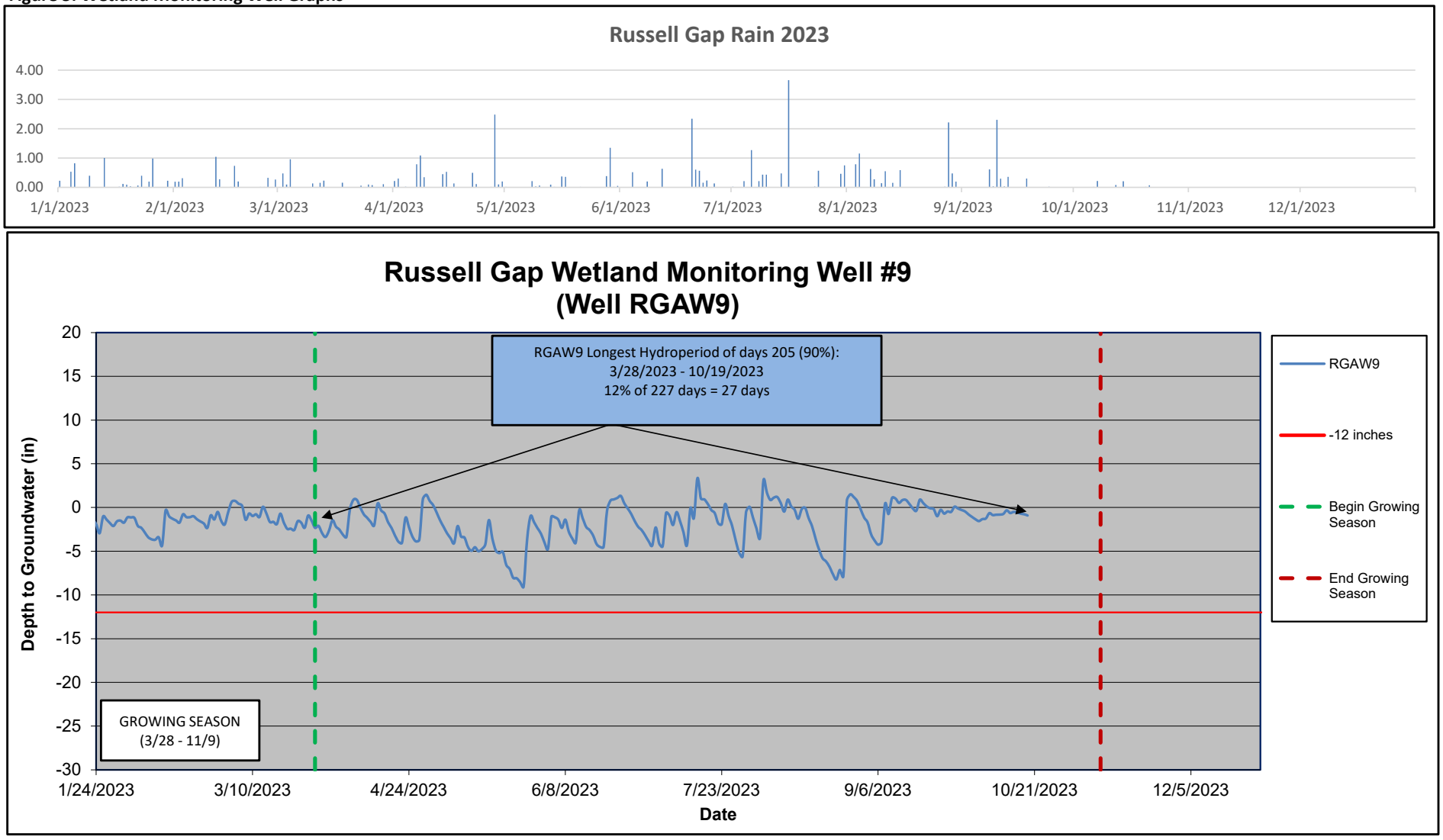

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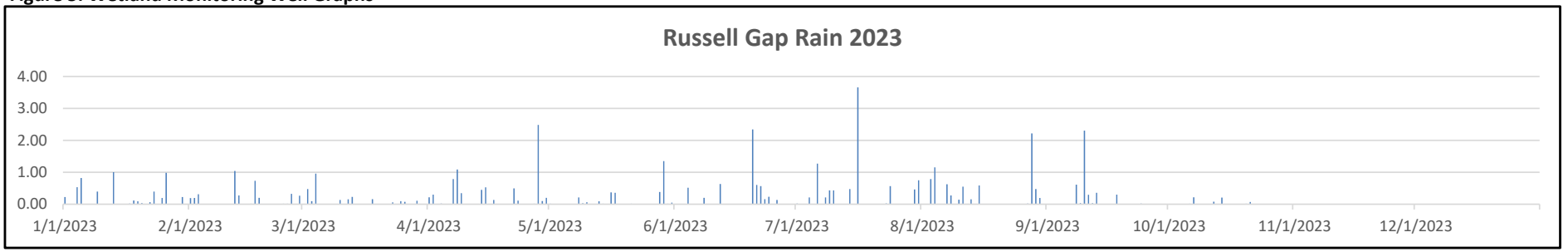

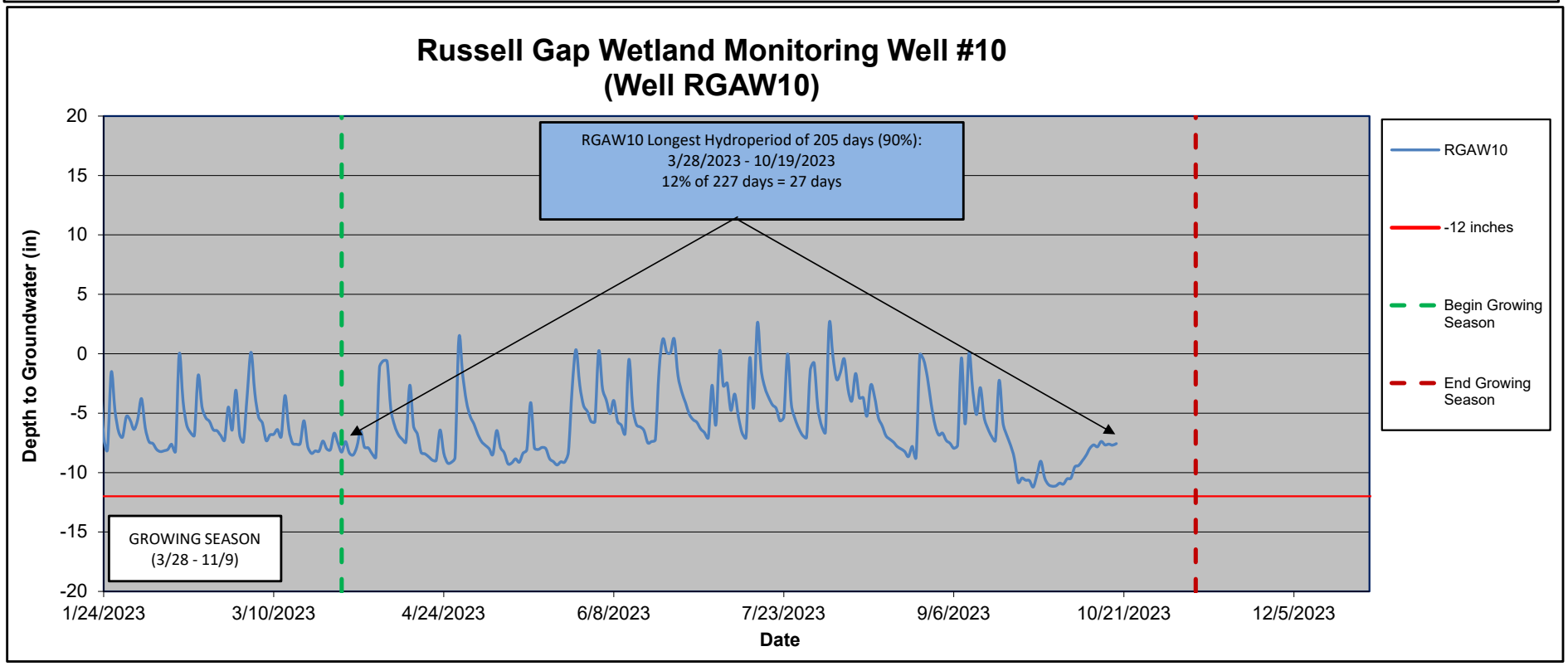

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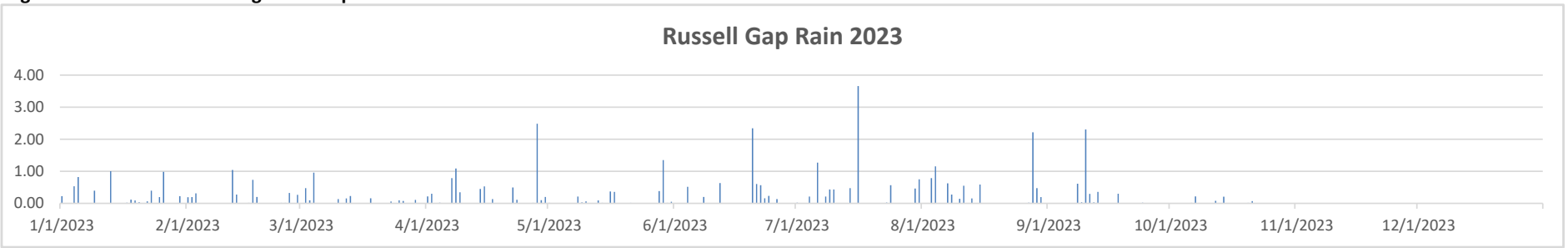

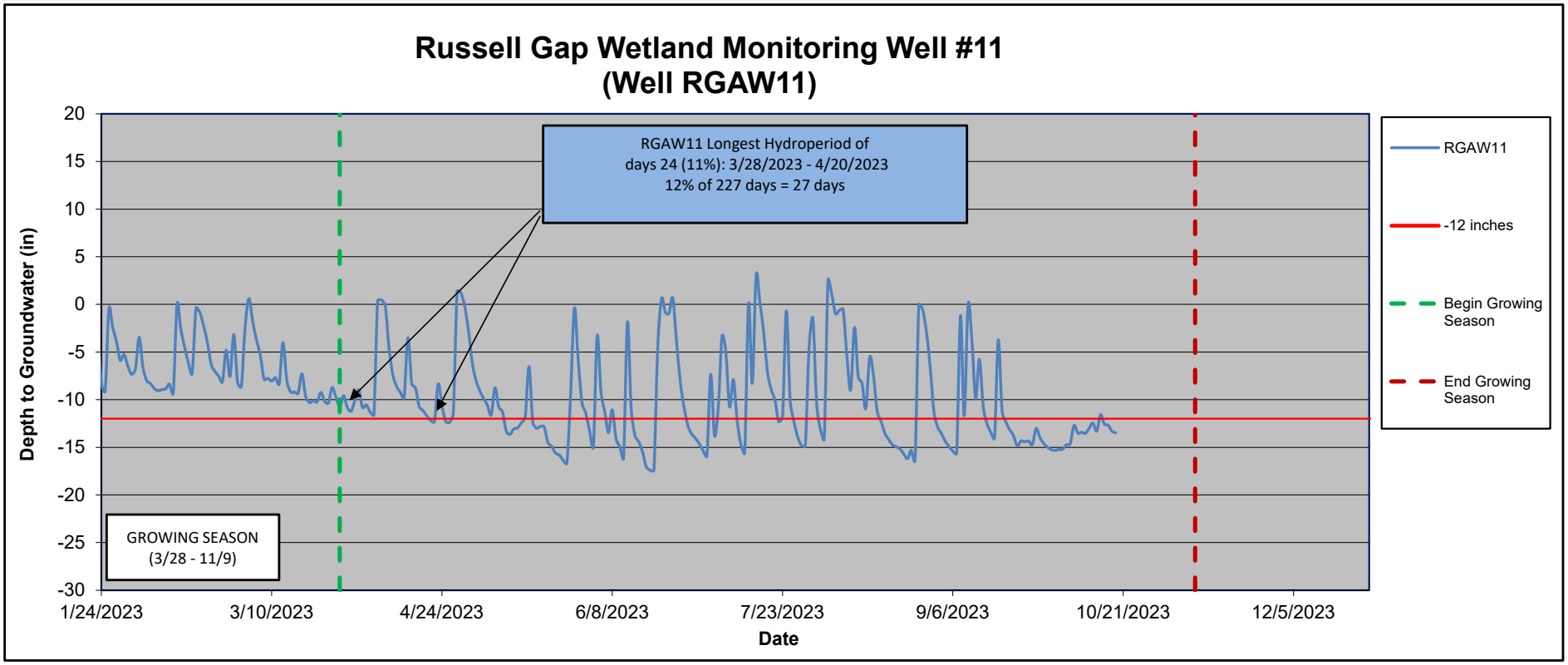

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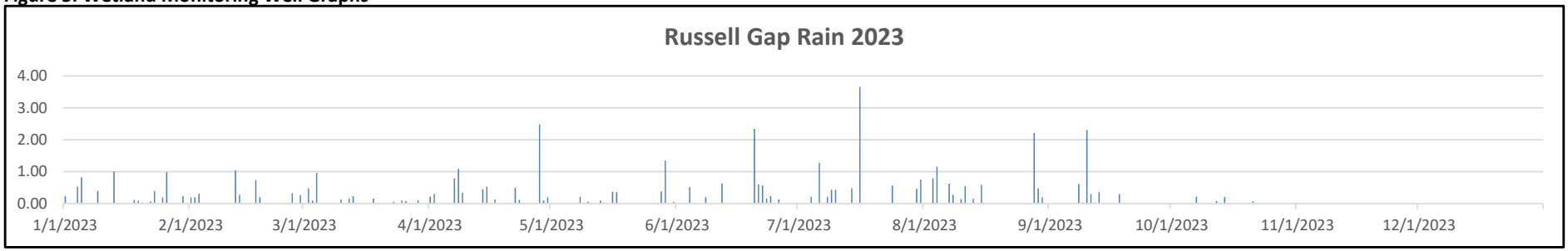


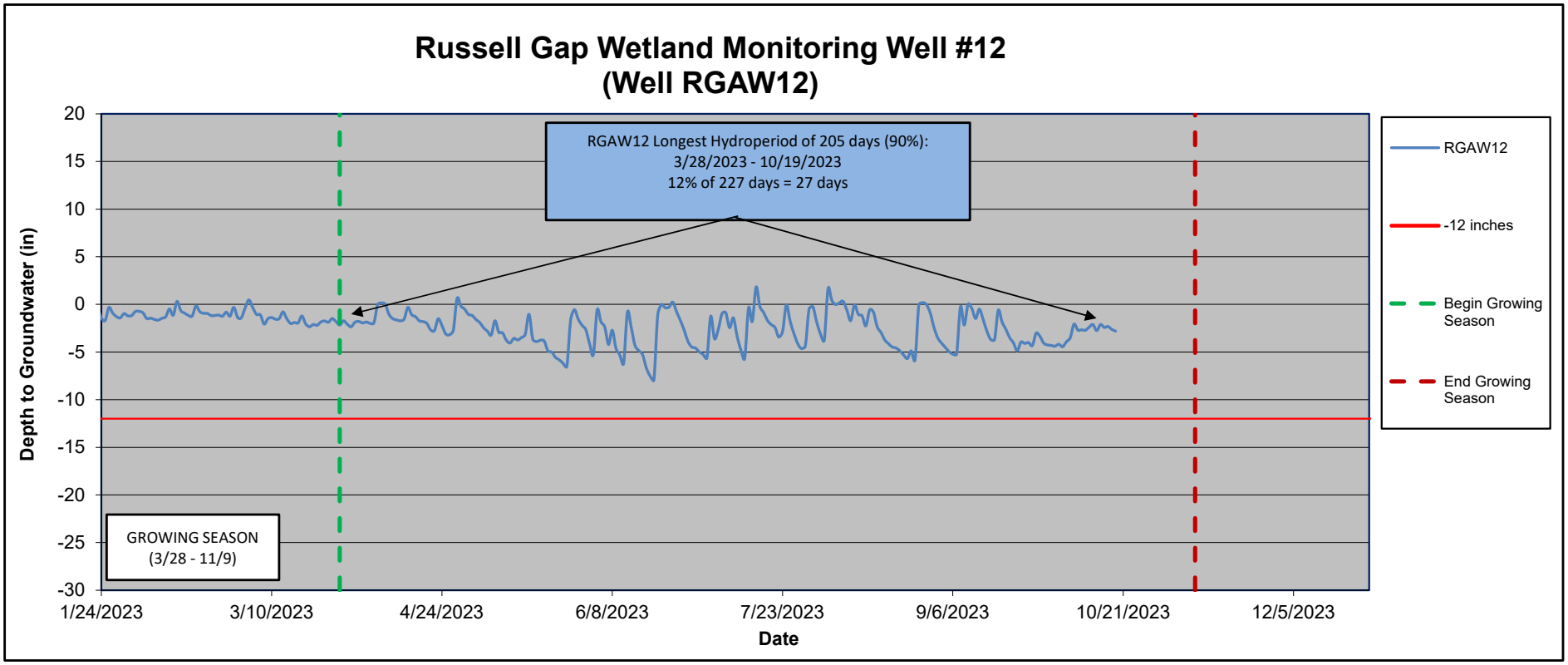
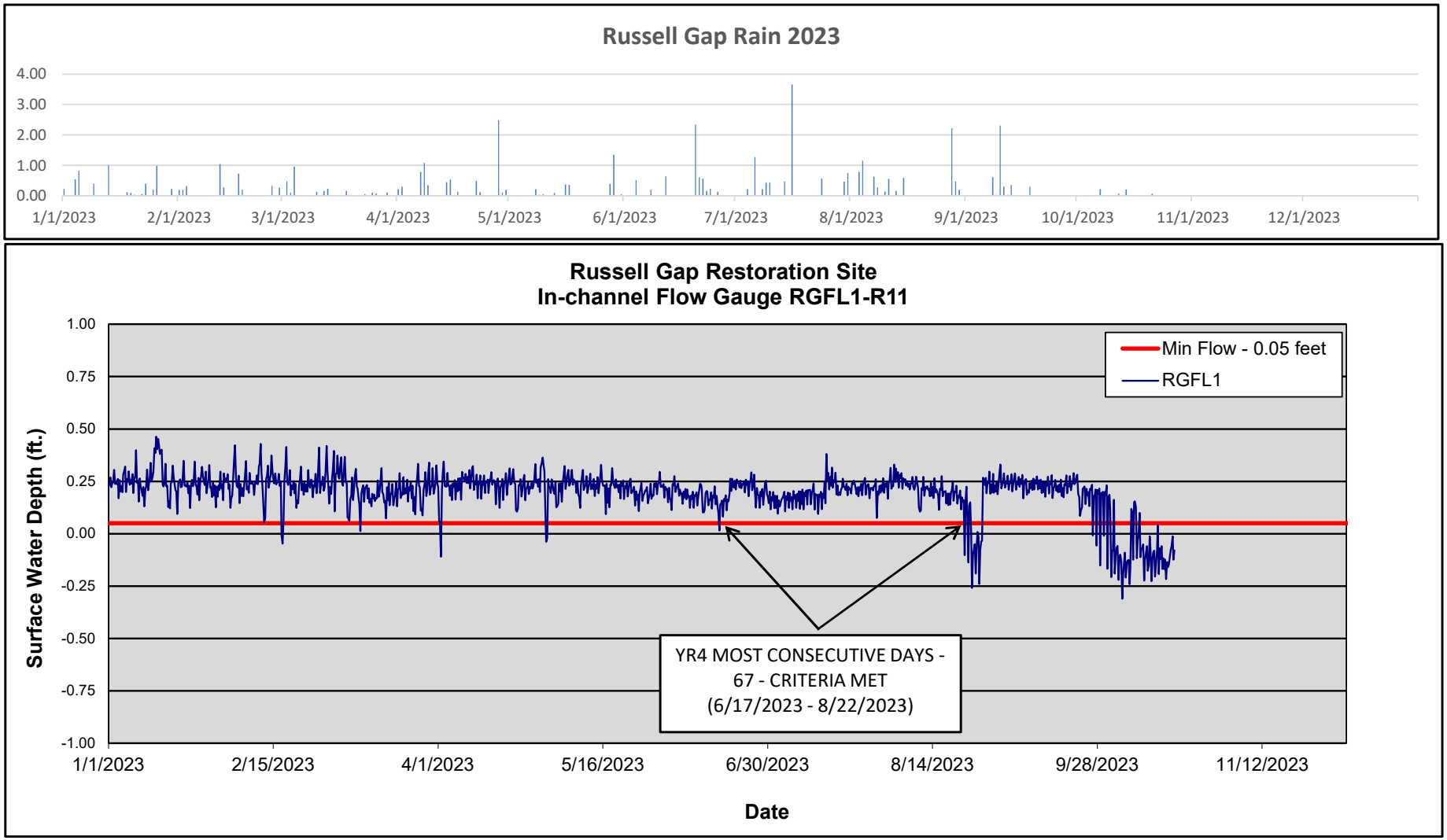


Table 11. Wetland Hydrology Summary Data
Russell Gap Stream Mitigation Project - NCDMS Project No. 100003

Well ID	Percentage of Consecutive Days <12 inches from Ground Surface[1]							Most Consecutive Days Meeting Criteria[2]							Percentage of Cumulative Days <12 inches from Ground Surface							Cumulative Days Meeting Criteria[3]						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Wetland Monitoring Wells (Installed March 2020)																												
RGAW1	16.0	10.0	4.0	6.0				59	22.0	9.0	14.0				66.4	31.0	27.0	41.0				150	71.0	63.0	93.0			
RGAW2	100.0	41.0	8.0	35.0				226	93.0	18.0	80.0				100.0	55.0	29.5	69.0				226	124.0	67.0	158.0			
RGAW3	100.0	49.0	36.0	84.0				226	112.0	81.0	190.0				100.0	64.0	64.0	85.0				226	145.0	146.0	194.0			
RGAW4	100.0	91.0	88.0	90.0				226	206.0	200.0	205.0				100.0	91.0	88.0	90.0				226	205.0	200.0	205.0			
RGAW5	38.0	24.0	0.0	25.0				87	55.0	0.0	56.0				92.0	49.0	0.0	25.0				208	111.0	0.0	56.0			
RGAW6	54.8	30.0	8.0	33.0				124	69.0	19.0	74.0				100.0	41.0	20.0	55.0				226	92.0	45.0	125.0			
RGAW7	100.0	57.0	1.0	64.0				226	130.0	3.0	145.0				100.0	75.0	7.0	88.0				226	169.0	15.0	199.0			
RGAW8	76.5	91.0	3.0	18.0				173	206.0	6.0	40.0				91.6	91.0	13.0	35.0				207	205.0	29.0	80.0			
RGAW9	100.0	56.0	8.0	90.0				226	127.0	19.0	205.0				100.0	68.0	34.0	90.0				226	154.0	77.0	205.0			
RGAW10	100.0	91.0	51.0	90.0				226	206.0	116.0	205.0				100.0	91.0	71.0	90.0				226	205.0	161.0	205.0			
RGAW11	100.0	58.0	6.0	11.0				226	132.0	13.0	24.0				100.0	90.0	24.0	48.0				226	203.0	54.0	109.0			
RGAW12	100.0	91.0	25.0	90.0				226	206.0	56.0	205.0				100.0	91.0	70.0	90.0				226	205.0	160.0	205.0			

[1]Indicates the percentage of the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
[2]Indicates the single greatest consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
[3]Indicates the total number of days within the monitored growing season with a water table 12 inches or less from the soil surface.
Growing season for Alexander County is from March 28 to November 9 and is **227** days long. 12% of the growing season is **27** days.

Figure 6. Flow Gauge Graphs



* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Figure 6. Flow Gauge Graphs

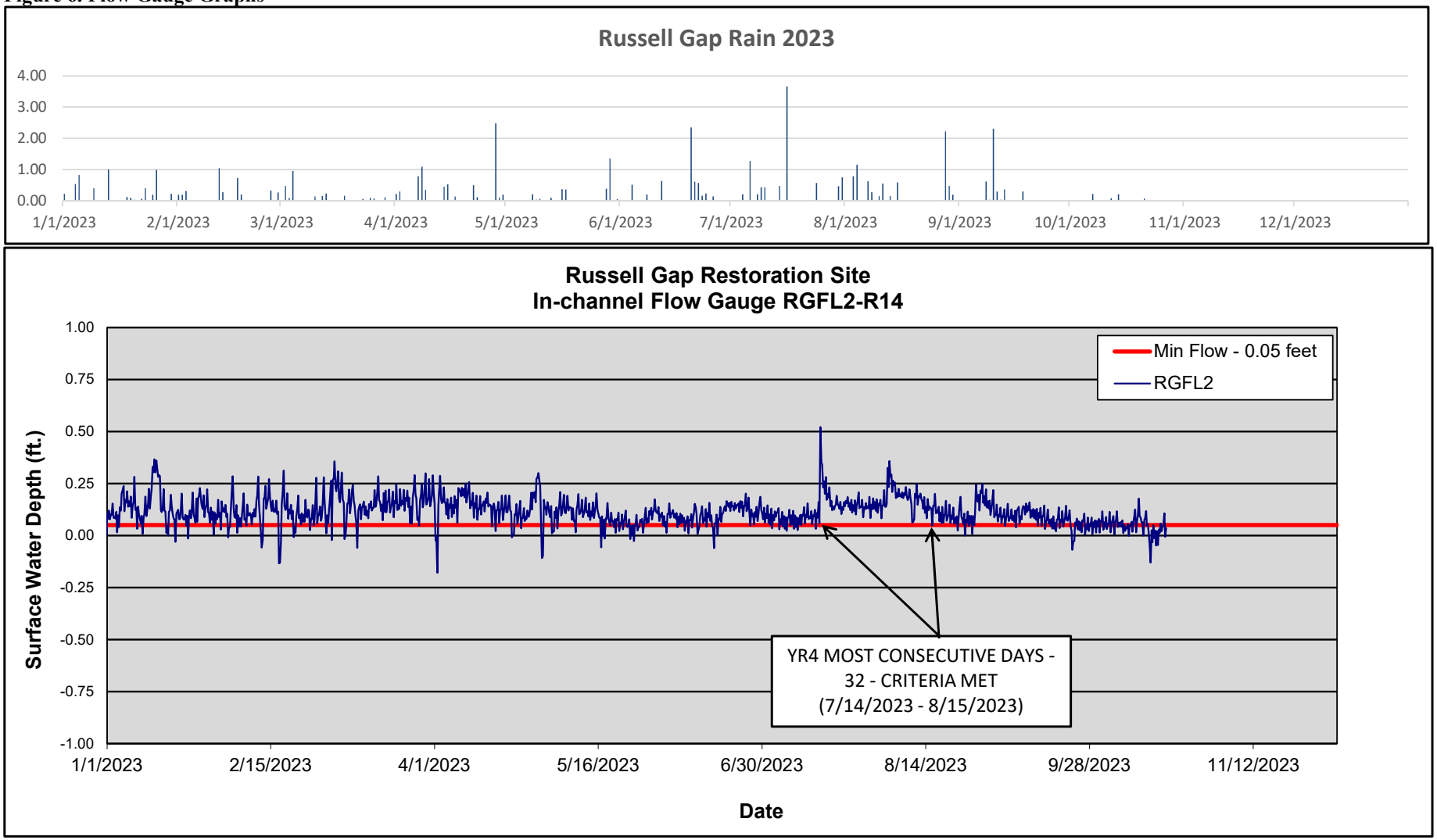


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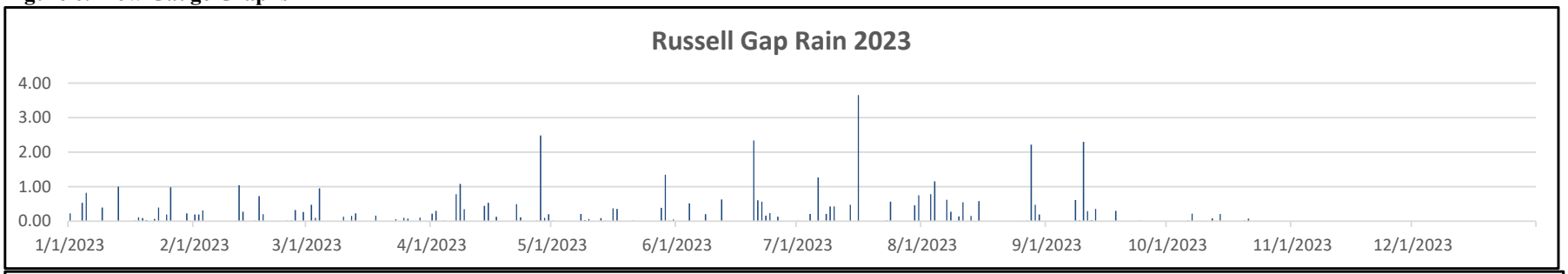
Figure 6. Flow Gauge Graphs



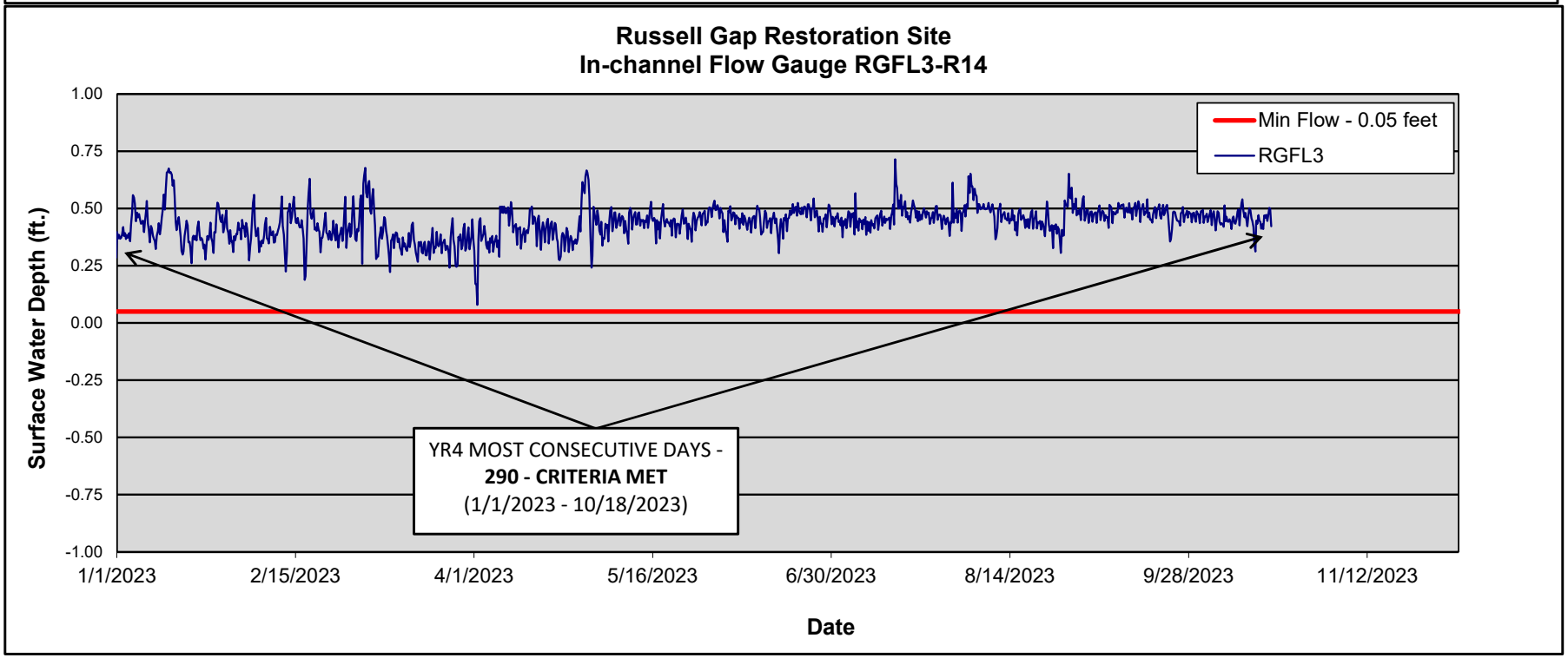


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Figure 6. Flow Gauge Graphs

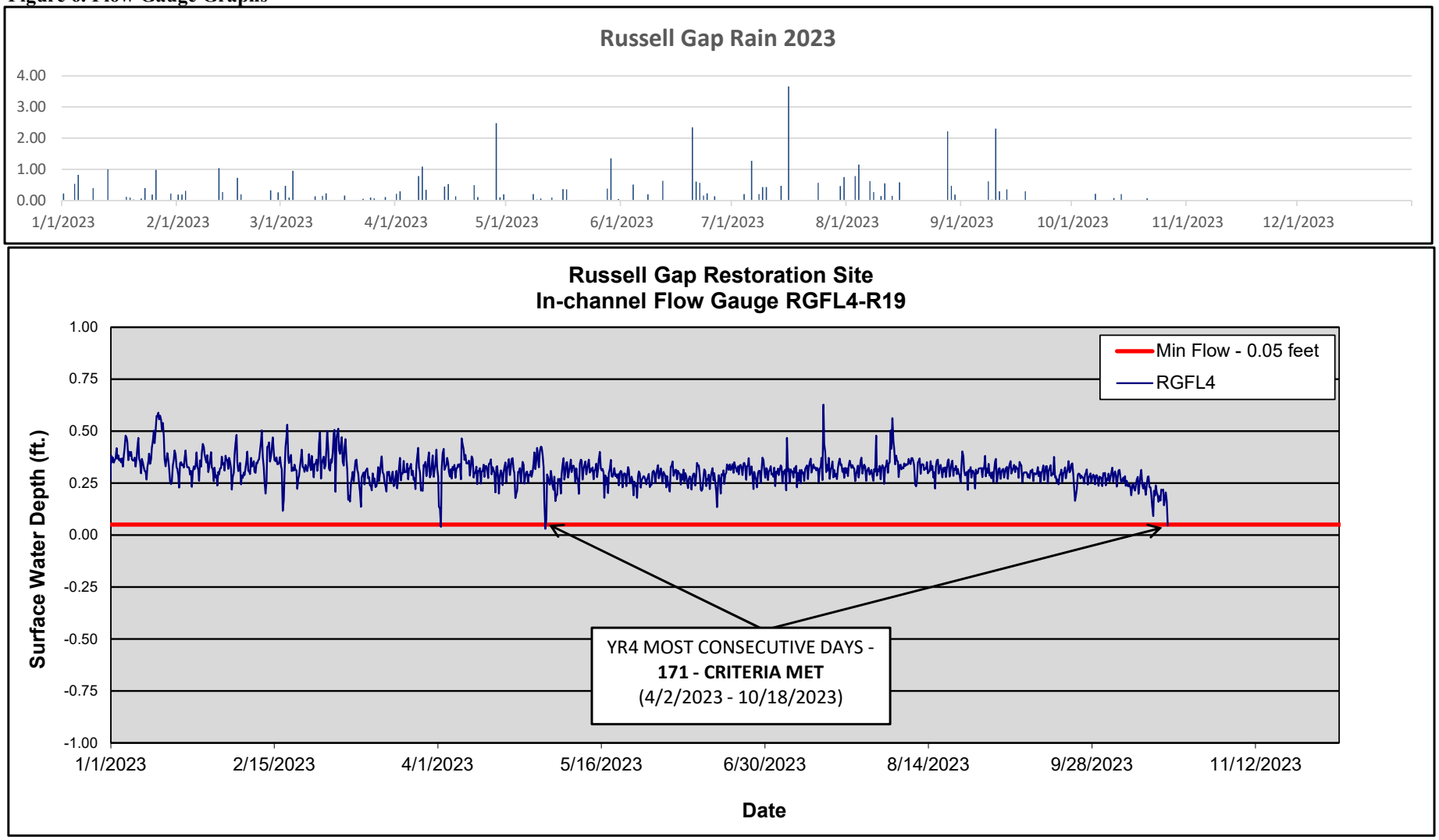

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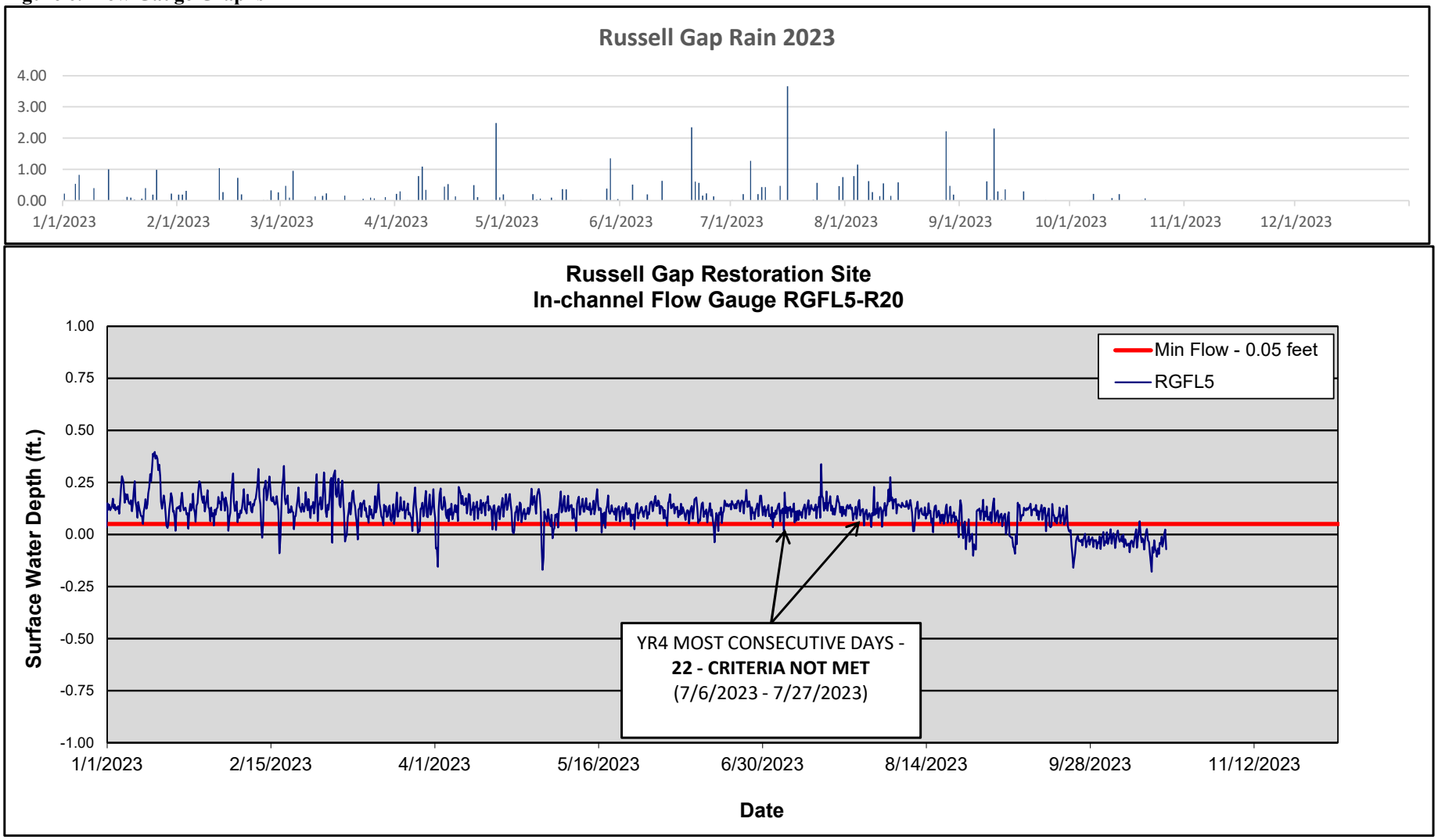
Figure 6. Flow Gauge Graphs



* Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Table 12. All Years Flow Gauge Success
Russell Gap Stream Restoration Project: DMS Project ID No. 100003

Flow Gauge ID	Most Consecutive Days Meeting Criteria[1]							Cumulative Days Meeting Criteria[2]						
	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)	Year 5 (2024)	Year 6 (2025)	Year 7 (2026)
Flow Gauges (Installed March, 2020)														
RGFL1	64.0	103.0	98.0	67.0				209.0	146.0	207.0	257.0			
RGFL2	202.0	3.0	3.0	32.0				222.0	12.0	62.0	181.0			
RGFL3	232.0	42.0	96.0	290.0				232.0	93.0	231.0	290.0			
RGFL4	232.0	76.0	40.0	171.0				232.0	206.0	219.0	288.0			
RGFL5	232.0	38.0	26.0	22.0				232.0	214.0	138.0	206.0			

Notes:

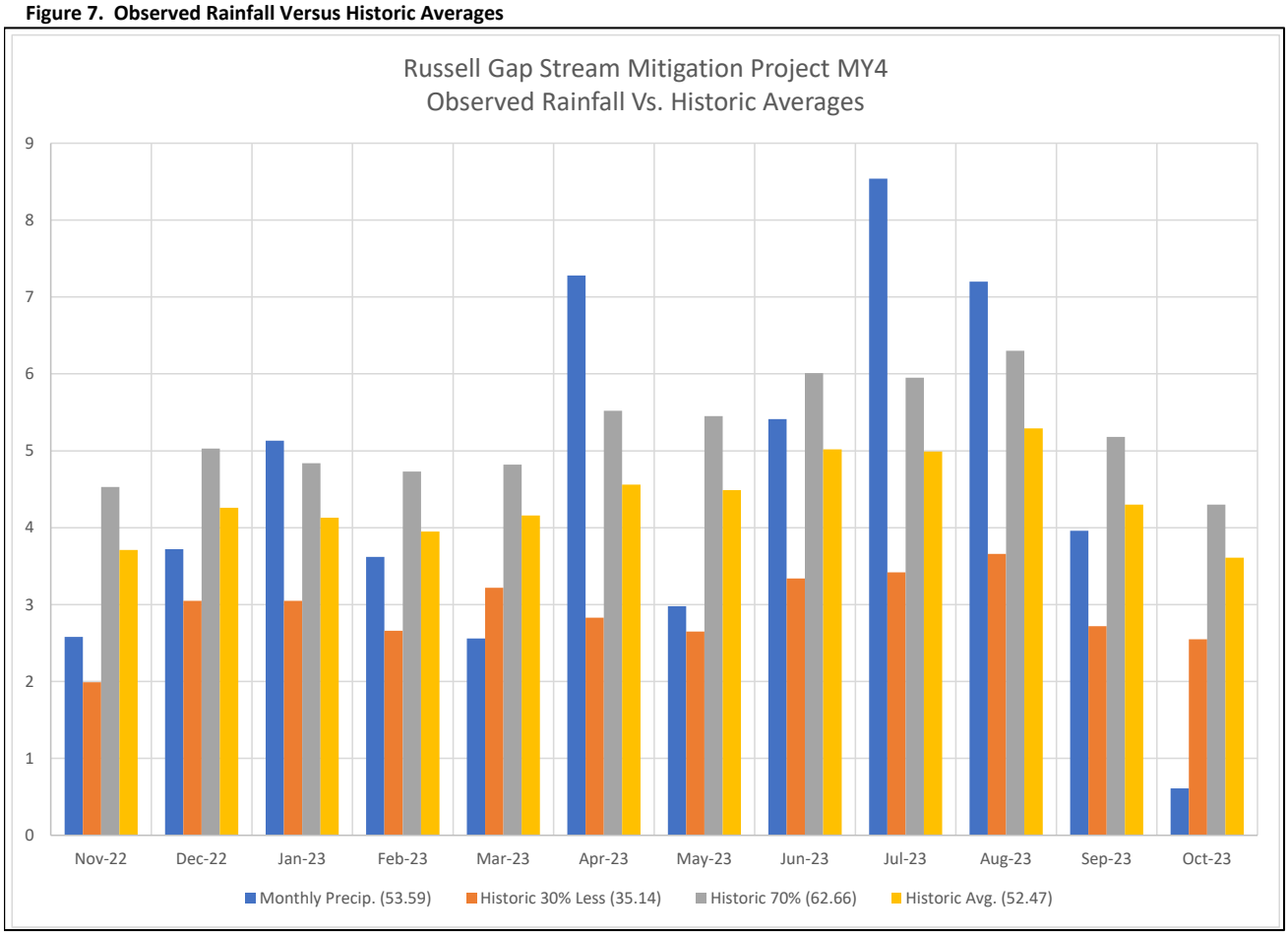
[1]Indicates the number of consecutive days within the monitoring year where flow was measured.

[2]Indicates the number of cumulative days within the monitoring year where flow was measured.

Success criteria will include 30 days of consecutive baseflow for monitoring gauges during a normal rainfall year.

Surface water flow is estimated to have occurred when the pressure transducer reading is equal to or above 0.05 feet in depth.

Figure 7. Observed Rainfall Versus Historic Averages



Note: Historic average annual rainfall for Alexander County, NC is 52.47 inches, while the observed project rainfall recorded a total of 53.59 inches over the previous 12 months (Nov. 22 - Oct. 2023). Project rainfall data was collected from the NC-CRONOS station TAYL.