Year 2 Monitoring Report

FINAL

MONKEY WALL PROJECT

NCDMS Project #100069 (Contract #7536)
USACE Action ID: 2018-01162
DWR Project #20181029

Mitchell County, North Carolina
French Broad River Basin
HUC 06010108

Provided by:

Resource Environmental Solutions, LLC
For Environmental Banc & Exchange, LLC

Provided for:

NC Department of Environmental Quality
Division of Mitigation Services

January 2024

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January 26, 2024

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RE: Monkey Wall Site: Year 2 Monitoring Report (NCDMS ID 100069)

Listed below are comments provided by DMS on January 5, 2024 regarding the Monkey Wall Site: Year 2 Report and RES' responses.

Comments:

- If possible, can the project performance table (page 4) be updated to include cumulative monitoring results (to match the current guidance/standard)?
  The project performance table has been updated to include the site's cumulative monitoring metrics, this data can also be found in **Table 2** of **Appendix A**.
- DMS recommends additional random plots to the northwest of tributary G1. This area has look like a large area with low stem density as distance from the stream channel increases on recent site visits.
  RES will conduct their MY3 random vegetation monitoring plots in this area to ensure the site is on track to meet vegetation success criteria.
- Some boundary marking adjustments/ improvements were requested following a DMS site visit for the MY0 baseline field review in July 2022; can RES verify that the additional marking and fence/gate alignments concerns were addressed, and if not, what is their current status?
  - The sitewide action items resulting from DMS's 10/23/2023 boundary inspection are as follows (as related by email on 10/27/2023); please provide a response and status update for each item:

    1. The rebar appears to be #4 which is ½ inch diameter, 18" long, and is causing the monument caps to be loose and easily dislodged. The RFP indicates "The Vendor shall set 5/8" rebar 30" in length with 3-1/4" aluminum caps on all easement corners. Caps shall meet DMS specifications (Berntsen RBD5325, imprinted with NC State Logo # B9087 or equivalent). After installation, caps shall be stamped with the corresponding number from the table of coordinates on the survey." Please rectify this.
       RES is currently scheduling the originally hired licensed surveyor to rectify this situation.
    2. Some of the numbering on the monument caps was not legible due to faint strike marks. Numbering on the monument caps needs to be made legible.
       RES is currently scheduling the originally hired licensed surveyor to rectify this situation.

3. In-line marking (maximum spacing of 200 feet) was absent along many of the longer line segments. Install in-line marking at each of these segments.
   RES will add additional signage where required, and in areas where even further signage would be beneficial.

4. Signs attached to trees must be fastened with 16d aluminum nails and the steel fasteners must be replaced.
   RES will switch signs to t-posts where possible; for signs that need to be attached to trees due to poor field conditions, RES will follow NCDMS long term easement marking guidance.

5. Signs at corners must be located near the monuments. Signs positioned too far from the corners were discussed during the site walk and must be addressed.
   Signs will be moved within the appropriate distance of the monumented corners.

6. One corner cap was missing, that is located within a large boulder. DMS can provide information for installing corner monuments located on bedrock, if needed.
   RES is currently scheduling the originally hired licensed surveyor to go through all corner caps and bring them up to standard.

Digital Support Files

- No comments, looks good.

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1.0 Project Summary

1.1 Project Location and Description

The Monkey Wall Project ("Project") is located within a rural watershed in Mitchell County, North Carolina approximately two miles northwest of Bakersville, NC. Water quality stressors affecting the Project included livestock production, agricultural practices, and lack of riparian buffer. The Project presents stream restoration, enhancement, and preservation generating 4,115.930 Cold Stream Mitigation Units (SMU).

The Project's total easement area is 25.28 acres within the overall drainage area of 87 acres. Grazing livestock historically had complete access to both the stream reaches, resulting in bank erosion, sediment deposition, and channel incision. The lack of riparian buffer vegetation, deep-rooted vegetation, and unstable channel characteristics contributed to the degradation of stream banks and surrounding floodplain area.

The stream design approach for the Project was to combine the analog method of natural channel design with analytical methods to evaluate stream flows and hydraulic performance of the channel and floodplain. The analog method involved the use of a reference reach, or "template" stream, adjacent to, nearby, or previously in the same location as the design reach. The template parameters of the analog reach were replicated to create the features of the design reach. The analog approach is useful when watershed and boundary conditions are similar between the design and analog reaches. Hydraulic geometry was developed using analytical methods to identify the design discharge. The wetland approach was closely tied to the stream restoration in that wetland hydrology and vegetation have been re-established as a product of restoring the natural stream system and riparian area along with other hydrologic improvement activities.

The Project has been constructed and planted and will be monitored on a regular basis throughout the seven-year post-construction monitoring period, or until performance standards are met. The Project will be transferred to the NCDEQ Stewardship Program. This party shall serve as conservation easement holder and long-term steward for the property and will conduct periodic inspection of the site to ensure that restrictions required in the conservation easement are upheld. Funding will be supplied by the responsible party on a yearly basis until such time an endowment is established.

1.2 Project Goals and Objectives

Through the comprehensive analysis of the Project's maximum functional uplift using the Stream Functions Pyramid Framework, specific, attainable goals and objectives will be realized by the Project. These goals clearly address the degraded water quality and nutrient input from farming that were identified as major watershed stressors in the 2009 French Broad River RBRP. These goals and objectives reflect those stated in the Monkey Wall Project Final Mitigation Plan.

The Project goals are:

- Improve water transport from watershed to the channel in a non-erosive manner in a stable channel;
- Improve flood flow attenuation on-site and downstream by allowing for overbank flows and connection to the floodplain;
- Restore native floodplain and riparian vegetation; and
- Improve instream habitat;
- Reduce sediment, nutrient, and fecal coliform inputs into stream system;
- Indirectly support the goals of the 2009 French Broad RBRP to improve water quality and to reduce sediment and nutrient loads, especially in the Big Rock Creek watershed.

The Project goals were addressed through the following project objectives:

- Designed and reconstructed the stream channel to convey bankfull flows while maintaining stable dimension, profile, and planform;
- Added in-stream structures and bank stabilization measures to protect the restored stream;
- Installed habitat features such as brush toes, woody materials, and pools of varying depths to the restored stream;
- Removed the 268-linear foot rock wall located on the most upstream portion of G2 which daylighted the existing stream and restored the natural profile of the channel;
- Increased forested riparian buffers to at least 30 feet on both sides of the channel along the Project reach with a hardwood riparian plant community;
- Treated exotic invasive species; and
- Established a permanent conservation easement on the Project that excludes future livestock from the stream channel and its associated buffers and prevent future land-use changes.

Functional uplift, benefits, and improvements within the Project area, as based on the Function Based Framework, are outlined in the Final Mitigation Plan**.**

1.3 Project Success Criteria

The success criteria for the Project follows the 2016 USACE Wilmington District Stream and Wetland Compensatory Mitigation Update, the Monkey Wall Project Final Mitigation Plan, and subsequent agency guidance. Cross section and vegetation plot monitoring takes place in Years 0, 1, 2, 3, 5, and 7. Stream hydrology and visual monitoring takes place annually. Specific success criteria components are presented below.

Stream Restoration Success Criteria

Four bankfull flow events must be documented within the seven-year monitoring period. The bankfull events must occur in separate years. Otherwise, the stream monitoring will continue until four bankfull events have been documented in separate years.

There should be little change in as-built cross sections. If changes do take place, they should be evaluated to determine if they represent a movement toward a less stable condition (for example down-cutting or erosion) or are minor changes that represent an increase in stability (for example settling, vegetative changes, deposition along the banks, or decrease in width/depth ratio). Cross sections shall be classified using the Rosgen stream classification method, and all monitored cross sections should fall within the quantitative parameters defined for channels of the design stream type. Bank height ratio shall not exceed 1.2, and the entrenchment ratio shall be above 2.2 within restored riffle cross sections. Channel stability should be demonstrated through a minimum of four bankfull events documented in the seven-year monitoring period.

Digital images are used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures. Longitudinal images should not indicate the absence of developing bars within the channel or an excessive increase in channel depth. Lateral images should not indicate excessive erosion or continuing degradation of the banks over time. A series of images over time should indicate successional maturation of riparian vegetation.

Vegetation Success Criteria

Specific and measurable success criteria for plant density within the riparian buffers on the Project follow IRT Guidance. The interim measures of vegetative success for the Project is the survival of at least 320 planted three-year old trees per acre at the end of Year 3, 260 trees per acre with an average height of six feet at the end of Year 5, and the final vegetative success criteria is 210 trees per acre with an average height of eight feet at the end of Year 7. Volunteer trees are counted, identified to species, and included in the yearly monitoring reports, but are not included in the success criteria of total planted stems until they are present in the plot for greater than two seasons. Moreover, any single species can only account for up to 50 percent of the required number of stems within any vegetation plot. Any stems in excess of 50 percent will be shown in the monitoring table but will not be used to demonstrate success. The target natural community for this Project is a montane oak-hickory forest.

Level	Treatment	Objective	Monitoring Metric	Performance Standard	Cumulative Monitoring Results
1 ***Hydrology***	Convert the land-use of streams and their watersheds from pasture to riparian forest	To transport water from the watershed to the channel in a non-erosive manner	Percent Project drainage area converted to riparian forest (indirect measurement)	NA	47 flow days - MY1 93 flow days - MY2
2 ***Hydraulic***	Reduce bank height ratios and increase entrenchment ratios by reconstructing the channel to mimic reference reach conditions	Improve flood bank connectivity by reducing bank height ratios and increasing entrenchment ratios	Pressure transducer flow and bankfull monitoring gauge: Inspected quarterly	Four bankfull events occurring in separate years	4 BF - MY1 2 BF - MY2
			Cross sections: Surveyed in Years 1, 2, 3, 5 and 7	Entrenchment ratio shall be above 2.2 within the restored reach	
				Bank height ratio shall not exceed 1.2	
3 ***Geomorphology***	Establish a riparian buffer to reduce erosion and sediment transport into the project stream. Establish stable banks with livestakes, erosion control matting, and other in stream structures.	Reduce erosion rates and channel stability to reference reach conditions Improve bedform diversity (pool spacing, percent riffles, etc.) Increase buffer width to a minimum 30 feet	As-built stream profile	NA	**12/12 with BHR<1.2 - MY1** **12/12 with BHR<1.2 - MY2**
			Cross sections: Surveyed in Years 1, 2, 3, 5 and 7	Entrenchment ratio shall be no less than 2.2 within restored the reach	
				Bank height ratio shall not exceed 1.2	
			Visual monitoring: Performed at least semiannually	Identify and document significant stream problem areas; i.e. erosion, degradation, aggradation, etc.	
			Vegetation plots: Surveyed in Years 1, 2, 3, 5 and 7	MY 1-3: 320 trees/acre MY 5: 260 trees/acre (6 ft tall) MY 7: 210 trees/acre (8 ft tall)	
4 ***Physicochemical***	Exclude livestock from riparian areas with exclusion fence or conservation easement, and plant a riparian buffer	*Unmeasurable Objective/Expected Benefit* Establish native hardwood riparian buffer and exclude livestock. To achieve appropriate levels for water temperature, dissolved oxygen concentration, and other important nutrients including but not limited to nitrogen and Phosphorus through buffer planting	Vegetation plots: Surveyed in Years 1, 2, 3, 5 and 7 (*indirect measurement*)	MY 1-3: 320 trees/acre MY 5: 260 trees/acre (6 ft tall) MY 7: 210 trees/acre (8 ft tall)	**15/16 passed - MY1** **16/16 passed - MY2**
			Visual assessment of established fencing and conservation signage: Performed at least semiannually (*indirect measurement*)	Inspect fencing and signage. Identify and document any damaged or missing fencing and/or signs	

1.4 Project Components

The Project area is comprised of a contiguous 25.28-acre easement involving two unnamed tributaries (G1 and G2) totaling 3,384 existing linear feet (LF), which drain into Big Rock Creek, a tributary of the French Broad River. There are also three existing wetlands within the easement area: Wetland A, Wetland B, and Wetland C (WA, WB, and WC, respectively); no wetland mitigation work was completed at the Monkey Wall site.

The Project presents 3,227 LF of stream restoration, 120 LF of stream enhancement, and 278 LF of stream preservation, generating 4,115.930 Cold SMUs. To account for areas of more or less than minimum 30-foot buffer widths, credits were adjusted using the USACE Wilmington District Stream Buffer Credit Calculator. The stream mitigation components are summarized below. Mitigation credits are based on the Mitigation Plan Addendum.

Stream Mitigation				
Reach	**Treatment**	**Linear Feet**	**Ratio**	**Cold SMU**
G1-A	Preservation	278	10	27.800
G1-B	Enhancement II	120	5	24.000
G1-C	Restoration	1,517	1	1,517.000
G2	Restoration	1,710	1	1,710.000
Total	**-**	**3,625**	**-**	**3,278.800**
	Non-standard Buffer Width Adjustment			**837.130***
	Total Adjusted SMUs			**4,115.930**

* Credit adjustment for Non-standard Buffer Width calculation using the Wilmington District Stream Buffer Credit Calculator issued by the USACE in January 2018.

1.5 Stream Design/Approach

The stream component of the Project included a combination of priority I and priority II restoration, enhancement II, and preservation. Stream restoration incorporated the design of a single-thread, high gradient, cascade and step-pool channel system, with parameters based on cascade and step-pool morphology and reference conditions along the representative reaches within the Monkey Wall site. A combination of analog, empirical, and analytical design techniques were used to determine the design discharge and to verify design stability.

Reaches G1 and G2 were designed specific to cascade and step-pool systems for treatment mitigation goals for the site and include a series of cascades and pools connected by riffles and/or boulder and log steps that restore floodplain connectivity to the site. The riffles, steps, and pools provide grade control, energy dissipation and bedform diversity to restore high gradient systems.

The following stream treatment was performed on the Project reaches:

Reach G1-A

A Preservation approach was used for this reach, due to its high quality, wide riparian buffers, and terrain. Preservation activities included:

- Minimal buffer planting on the right bank, to increase riparian buffer beyond 75 feet;
- Livestock exclusion; and
- Establishing a conservation easement to be protected in perpetuity.

Reach G1-B

An Enhancement II approach was used for the reach to address eroding banks and channel entrenchment. Enhancement activities included:

- Livestock exclusion; and
- Riparian buffer planting to 150-feet.

Reach G1-C

A combination of Priority I and Priority II restoration was used for this reach to address eroding banks, channel incision, bed degradation and floodplain connectivity.
Restoration activities included:

- Constructing a new single thread channel and floodplain benches in the existing floodplain;
- Installing log and rock structures to provide grade control with drops no greater than 1.25 feet;
- Establishing a cascade, step-pool or riffle-pool sequence throughout the reach;
- Filling the existing channel;
- Creating floodplain to reduce shear stresses at higher flows;
- Livestock exclusion; and
- Riparian buffer planting to a minimum of 30-feet at the downstream end and out to 150-feet everywhere else

Reach G2

A combination of Priority I and Priority II restoration was used for this reach to address eroding banks, channel incision, bed degradation, and floodplain connectivity.
Restoration activities included:

- Removing the culvert and associated road at the upstream portion of the reach and tying the channel into a seep located above the culvert;
- Removing the rock wall, and daylighting the channel, present on the upper portion of the reach;
- Constructing a new single thread channel and floodplain benches in the existing floodplain;
- Installing log and rock structures to provide grade control with drops no greater than 1.25 feet;
- Establishing a cascade, step-pool or riffle-pool sequence throughout the reach;
- Filling the existing channel;
- Creating floodplain to reduce shear stresses at higher flows;
- Livestock exclusion; and

- Riparian buffer planting to 150-feet on both sides of the stream.

One wetland gauge was installed on the right floodplain of G1-C in WA to monitor wetland hydrology. This data will be reported in yearly monitoring reports. No wetland credits are to be generated on WA; thus, wetland success criteria will not need to be met during the monitoring period.

1.6 Construction and As-Built Conditions

Stream construction was completed in October 2021 and planting was completed on March 10, 2022. The Monkey Wall Project was built to design plans and guidelines. The as-built stream length was exactly the same as proposed in the mitigation plan plus the stream length that was originally removed under the utility lines; however, the total SMUs for the project increased from 3,874.469 SMUs to 4,115.930 SMUs. This change was due to the relocation of utility lines that were previously within the conservation easement. French Broad Electric relocated the powerline in April 2022 and Country Cable (Zito Media) moved the fiberoptic cable line in October 2022. RES also took down the old utility poles in October 2022. More information regarding this is included in the Mitigation Plan Addendum. Swales were added to address small erosional areas that formed as a result of stormwater runoff and seeps encountered during construction. Swale locations are shown on the record drawings included in the As-Built Monitoring Report.

Minor monitoring device location changes were made during as-built installation; however, the quantities remained as proposed in the Final Mitigation Plan. Vegetation Plot 10 was moved downslope due to slippery, steep conditions during installation; vegetation plot 8 was also moved slightly downslope, due to extremely steep conditions, but is still very much on the slope. The original installation of two fixed vegetation plots, 6 and 7, interfered with the relocated powerline easement and were therefore shifted outside of the right-of-way on May 3, 2022. There were no changes made to the planting plan between Final Mitigation Plan and planting. However, in response to IRT comments on the Draft Mitigation Plan, understory species were added to the proposed planting plan.

1.7 Year 2 Monitoring Performance (MY2)

The Monkey Wall Year 2 monitoring activities were performed in July and October 2023. All MY2 data is present below and in the appendices. The Project is on track to meet interim success criteria and the easement boundary has been walked in it's entirety and no known encroachments are present.

Vegetation

Monitoring of 13 fixed vegetation plots and three random vegetation plots was completed on October 11th, 2023. Vegetation data are in **Appendix C**, associated photos are in **Appendix B,** and plot locations are in **Appendix B**. MY2 monitoring data indicates that 16 out of 16 plots are exceeding the interim success criteria of 320 planted stems per acre. In MY2, RVP2 was placed in

the vicinity of MY1 random plot one (RVP1) to determine whether needed supplemental planting was warranted. With the higher detection rate of trees beginning to outgrow herbaceous cover of RVP2, RES is not currently scheduling supplemental planting in this area, however will continue to monitor vegetative succession and implement additional plantings when found beneficial. Planted stem densities ranged from 405 to 688 planted stems per acre with an average of 483 planted stems per acre across all plots. A total of 12 species were documented within the plots. Volunteer species were not noted during MY2 but are expected to establish in upcoming years. The average stem height in the plots was 1.9 feet.

Visual assessment of vegetation outside of the monitoring plots indicates that the herbaceous vegetation is becoming well established throughout most of the Project. The two bare areas were noted during MY1, along the floodplain, and were reseeded with a riparian seed mix during MY2 in February 2023. Invasive species, mainly multiflora rose (*Rosa multiflora*), and autumn olive (*Elaeagnus umbellata*), were treated, via foliar spray, in February 2023. A few remaining small, isolated individuals of invasive species were observed throughout the site in October 2023. These areas will be treated, both manually and with chemical herbicide during 2024.

No boundary encroachments were noted during MY2, and an additional gate was added to an access road adjacent to the easement to prevent future encroachments. There are several places along the boundary of the easement that will need further marking and boundary work to make sure the easements integrity is up to standards.

Stream Geomorphology

Cross section and geomorphology data collection for MY2 was collected in July 2023. Summary tables and cross section plots are in **Appendix D**. Overall the MY2 sections and profile relatively match the proposed design. The current conditions indicate that shear stress and velocities have been reduced for the restoration reaches. The reaches were designed as a natural mountain cobble-bed channel and remain classified as a mountain cobble-bed channel post-construction.

Visual assessment of the stream channel was performed to document signs of instability, such as eroding banks, structural instability, or excessive sedimentation. The channel is transporting sediment as designed and will continue to be monitored for aggradation and degradation. Both channels exhibited visible flow throughout the Project. Previously, in MY1, monitoring in December 2022 noted two areas where flow had temporarily disappeared, presumably moving subterranean, and then reemerging further downstream. One area was near the flow gauge on G2 and the other was just downstream of cross section 10 on G1-C. There are still no signs of piping or erosion. We believe this is contributing to the low flow data on G2, this will be investigated, and solutions taken to ensure accurate data.

Stream Hydrology

Two stage recorders and two flow gauges were installed on March 24, 2022 to document bankfull events and flow days, respectively. The stage recorder on G2 documented one bankfull event in

MY2; however the stage recorder on G1 did not experience any out of bank events. Reaches G1 and G2, above the confluence, have slopes between 12-14%. Overbank events at these slopes are far more likely to cause significant erosion due to increased flow velocities. With this in mind, these reaches were not designed to reach bankfull stage as often as below the confluence (8% slope). This is particularly true in the early stages of the Project where channel roughness is lower and floodplain vegetation/stability has not fully developed. RES has installed an additional stage recorder below the confluence to support evidence of out of bank events, however, does not have enough data to present yet. The flow gauge on G1-C recorded one event, which lasted 278 days. The flow gauge on G2 recorded 2 events, lasting three days. We believe this level of flow tracking is due to the subsurface flow path and will be investigated and remedied. Stream hydrology data is included in **Appendix E**. Gauge locations can be found on **Figure 2** and photos are in **Appendix B**.

Wetland Hydrology

One groundwater well was installed on the right floodplain of G1-C in Wetland A (WA) to monitor wetland hydrology and will record water table depths at a frequency of twice per day. The goal of this well is to track the hydrology of this jurisdictional wetland on site post-stream construction. No wetland credits are to be generated on WA; thus, there is no hydroperiod success criteria for this groundwater well. In MY2, GW1 recorded a consecutive hydroperiod of 93 percent of the growing season. Wetland hydrology data is included in **Appendix E** and GW1's location can be found on **Figure 2**.

2.0 Methods

Stream cross section monitoring was conducted using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with cross-section data were collected in the field (NAD83 State Plane feet FIPS 3200). Morphological data were collected at eight cross-sections. Survey data were imported into CAD, ArcGIS®, and Microsoft Excel® for data processing and analysis. The stage recorders include an automatic pressure transducer placed in PVC casing in a pool at the downstream end of each reach. The elevation of the bed and top of bank at each stage recorder are used to detect bankfull events. The flow gauges also include an automatic pressure transducer placed in a PVC casing in a pool, at the upstream end of each reach. The elevations of the bed, water surface, and immediate downstream riffle are used to determine stream flow.

Vegetation success is being monitored at 13 fixed monitoring plots and three random monitoring plots. Vegetation plot monitoring follows the CVS-EEP Level 2 Protocol for Recording Vegetation, version 4.2 (Lee et al. 2008) and includes analysis of species composition and density of planted species. Data are processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with PVC at the origin and metal conduit at the other corners. Photos of each plot are to be taken from the origin each monitoring year. The random plots are to be collected in locations where there are no permanent vegetation plots. Random plots will most likely be collected in the form of 100 square meter belt transects with variable dimensions.

Tree species and height will be recorded for each planted stem and the transects will be mapped and new locations will be monitored in subsequent years.

Wetland hydrology is monitored to track the hydrology of the jurisdictional wetland (WA) on site post-stream construction. This is accomplished with one automatic pressure transducer gauge (located in the groundwater well) that will record daily groundwater levels. One automatic pressure transducer is installed above ground for use as a barometric reference. The gauge is downloaded quarterly and wetland hydroperiod is calculated during the growing season. Gauge installation followed current regulatory guidance. Visual observations of primary and secondary wetland hydrology indicators are also recorded during quarterly site visits.

3.0 References

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Schafale, M.P. 2012. Guide to the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDENR, Raleigh, NC.

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Appendix A

Background Tables

Table 1. Monkey Wall Project (ID-100069) - Mitigation Assets and Components

Project Segment	Existing Footage or Acreage	Mitigation Plan Footage or Acreage	Mitigation Plan Addendum Footage or Acreage	Migitation Category	Restoration Level	Priority Level	Mitigation Ratio (X:1)	Mitigation Plan Credits	Mitigation Plan Addendum Credits		As-Built Footage or Acreage	Comments
G1-A	278	278	278	Cold	P	-	10.00000	27.800	27.800		278	Extend riparian buffer to at least 30-feet, livestock exclusion, and conservation easement establishment
G1-B	120	120	120	Cold	EII	-	5.00000	24.000	24.000		120	Extend riparian buffer to at least 30-feet, minor bank stability work, livestock exclusion, and conservation easement establishment
G1-C	1,521	1,453	1,517	Cold	R	1	1.00000	1,453.000	1,517.000		1,517	Full channel restoration, establish a riparian buffer to at least 30-feet, livestock exclusion, and conservation easement establishment
G2	1,595	1,663	1,710	Cold	R	1	1.00000	1,663.000	1,710.000		1,710	Full channel restoration, establish a riparian buffer to at least 30-feet, livestock exclusion, and conservation easement establishment

Note: Project credits were recalculated in a Mitigation Plan Addendum submitted with the As-Built Report; stream length differences are due to the relocation of the utility line that intersected the easement

Project Credits

Restoration Level	Stream				Riparian Wetland	Non-rip Wetland	Coastal Marsh
	Warm	Cool		Cold			
Restoration				3,227.000			
Re-establishment							
Rehabilitation							
Enhancement							
Enhancement I							
Enhancement II				24.000			
Creation							
Preservation				27.800			
Base Credits				3278.800			
NSBW				837.130			
TOTALS				**4,115.930**			

Table 2: Summary: Goals, Performance, and Results					
Goal	**Objective/Treatment**	**Likely Functional Uplift**	**Performance Criteria**	**Measurement**	**Cumulative Monitoring Results**
Reconnect channels with floodplains and riparian wetlands to allow a natural flooding regime and mimic reference reach conditions.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to the existing floodplain. Remove overburden to reconnect with adjacent wetlands.	Dispersion of high flows on the floodplain, increase in biogeochemical cycling within the system, and recharging of riparian wetlands.	Four bankfull events and within monitoring period. At least 30 days of continuous flow each year	Two Flow Gauges at upstream ends of G1-C and G2. Two Stage Recorders at downstream ends of G1-C and G2.	**4 BF - MY1** **2 BF - MY2** **47 flow days - MY1** **93 flow days - MY2**
Improve water transport from watershed to the channel in a non-erosive manner in a stable channel	Construct stream channels that will maintain stable cross- sections, patterns, and profiles over time.	Reduction in sediment inputs from bank erosion, reduction of shear stress, and improved overall hydraulic function.	Bank height ratios remain below 1.2 over the monitoring period. Entrenchment ratio shall be no less than 1.4 within restored B channels, and 2.2 for C/E channels. Visual assessments showing progression towards stability.	Cross Sections surveyed in years 1, 2, 3, 5 and 7	**12/12 with BHR<1.2 - MY1** **12/12 with BHR<1.2 - MY2**
Restore and enhance native floodplain and streambank vegetation.	Plant native tree and understory species in riparian zones and plant appropriate species on streambanks.	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD and organic material in streams, increased	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre at MY5, and 210 stems per acre at MY7.	13 Fixed Vegetation Plots and three random Vegetation Plots.	**15/16 passed - MY1** **16/16 passed - MY2**

Table 3. Project Background Information				
Project Name	Monkey Wall Project			
County	Mitchell			
Project Area (acres)	24.42			
Project Coordinates (latitude and longitude)	36.0559, -82.2067			
Planted Acreage (Acres of Woody Stems Planted)	19.05			
Project Watershed Summary Information				
Physiographic Province	66d - Southern Crystalline Ridges and Mountains			
River Basin	French Broad			
USGS Hydrologic Unit 8-digit	06010108	USGS Hydrologic Unit 14-digit	06010108060010	
DWR Sub-basin	04-03-06			
Project Drainage Area (Acres)	86.6			
Project Drainage Area Percentage of Impervious Area	<1%			
CGIA Land Use Classification	Mixed hardwoods/Conifers, Managed Herbaceous Cover, Unmanaged Herbaceous Cover-Upland, & Mixed Upland Hardwoods			
Reach Summary Information				
Parameters	**G1-A**	**G1-B**	**G1-C**	**G2**
Length of reach (linear feet)	278	120	1517	1710
Valley confinement (Confined, moderately confined, unconfined)	Confined	Confined	Confined	Confined
Drainage area (Acres)	11.83	14.23	86.60	55.09
Perennial, Intermittent, Ephemeral	Intermittent	Intermittent	Intermittent	Intermittent
NCDWR Water Quality Classification	C, Tr	C, Tr	C, Tr	C, Tr
Stream Classification (existing)	A	A	A	A
Stream Classification (proposed)	B	B	B	B
Evolutionary trend (Simon)	II	II	II	II
FEMA classification	Zone X	Zone X	Zone X	Zone X
Wetland Summary Information				
Parameters	**Wetland A**	**Wetland B**	**Wetland C**	
Size of Wetland (acres)	0.24	0.02	0.01	
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	Riparian riverine	Riparian riverine	Riparian riverine	
Mapped Soil Series	TsC	BtF	TsD	
Drainage class	Well Drained	Well Drained	Well Drained	
Soil Hydric Status	Non-hydric	Non-hydric	Non-hydric	
Source of Hydrology	Groundwater, surface hydrology	Groundwater	Groundwater	
Restoration or enhancement method (hydrologic, vegetative etc.)	NA	NA	NA	

Table 4. Project Timeline and Contacts Table
Monkey Wall Project

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Mitigation Plan	NA	Jun-20
Final Design – Construction Plans	NA	Jun-21
Stream Construction	NA	Oct-21
Site Planting	NA	Mar-22
As-built (Year 0 Monitoring – baseline)	Apr-22	Oct-22
Invasive Treatment	NA	Jun-22
Year 1 Monitoring	Dec-22	Dec-22
Invasive Species Treatment	NA	Feb-23
Gate Installation	NA	Feb-23
Year 2 Monitoring	XS - July 2023 VP - October 2023	Dec-23
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		
Year 6 Monitoring		
Year 7 Monitoring		

Designer Primary project design POC	RES / 3600 Glenwood Ave., Suite 100, Raleigh, NC 27612 Frasier Mullen, PE
Construction Contractor Construction contractor POC	Baker Grading & Landscaping, Inc. / 1000 Bat Cave Road, Old Fort, NC 28762 Charles Baker
Survey Contractor Survey contractor POC	RES / 3600 Glenwood Ave., Suite 100, Raleigh, NC 27612 Brian Hockett, PLS
Planting Contractor Planting contractor POC	Shenandoah Habitats David Coleman
Monitoring Performers Monitoring POC	RES / 401 Charles Avenue, Charlotte NC 28205 Daniel Dixon (864) 567-7761

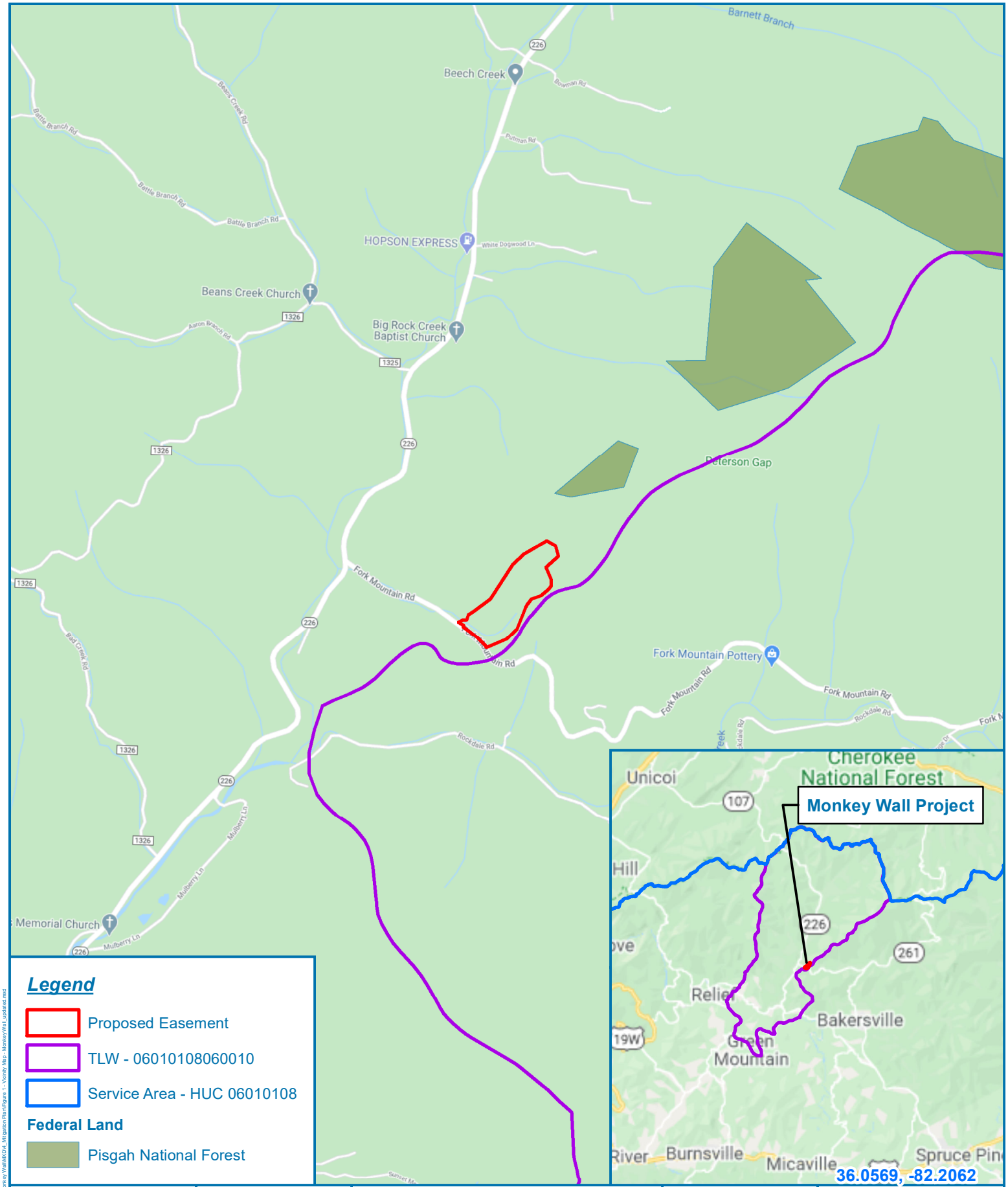


Figure 1 - Site Location Map

Monkey Wall Mitigation Project

Mitchell County, North Carolina

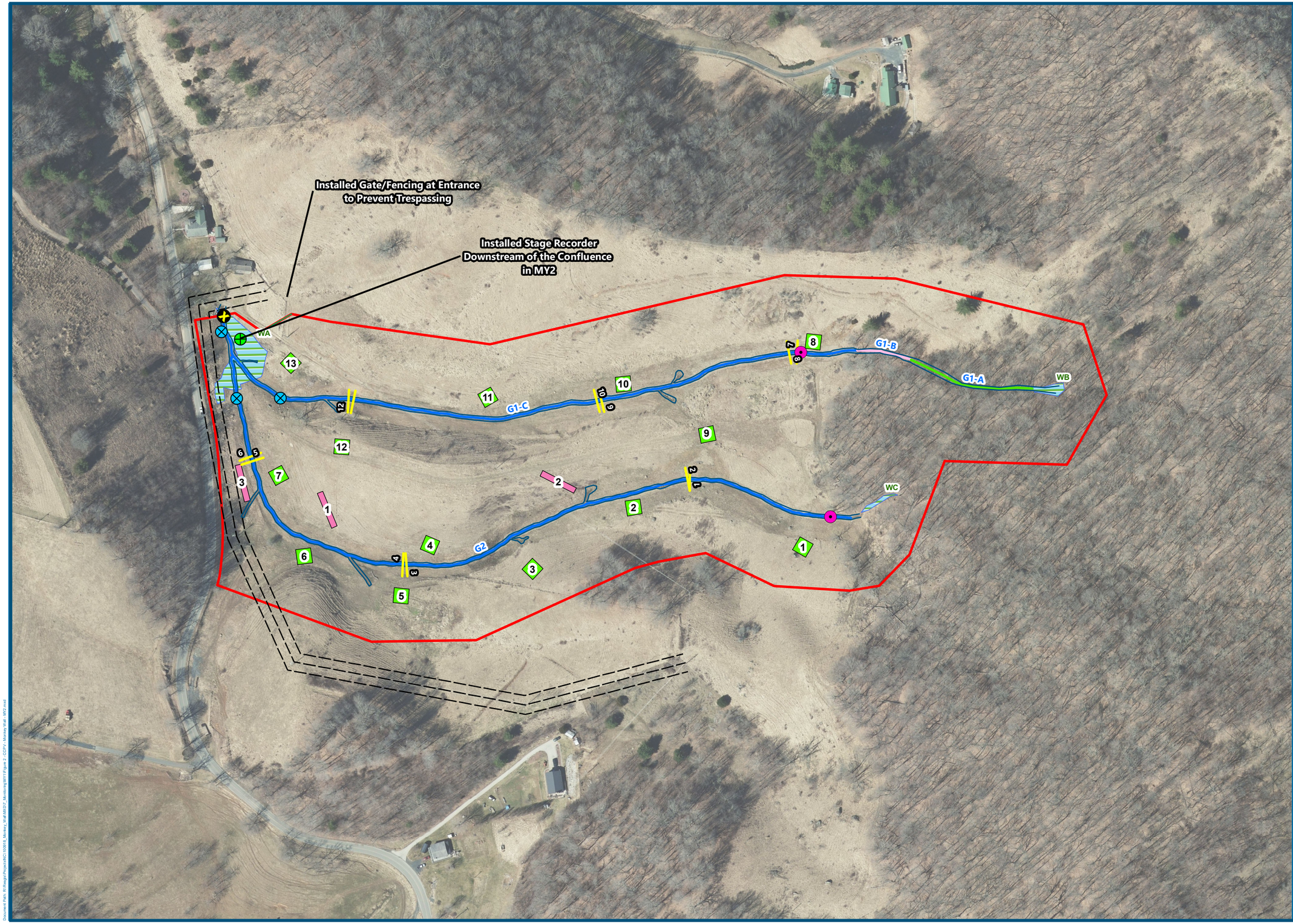
Date:	2/27/2020
Drawn by:	EJU
Checked by:	MDE
	1 inch = 2,000 feet

res

Document Path: R:\Regional\projects\NC\Monkey Wall\MX014_Mitigation Plan\Figure 1 - Vicinity Map - MonkeyWall_updated.mxd

Appendix B

Visual Assessment Data



res
Restoring a resilient earth for a modern world

N
W
E
S

0 75 150
Feet

Figure 2 - Current Conditions Plan View

MY2 2023

Monkey Wall Project

Mitchell County, North Carolina

Date: 12/18/2023	Drawn by: DGD
Checked by: RTM	1 in = 200 feet

Legend

- Conservation Easement
- Existing
- Installed_Gate_...
- Surveyed Top of Bank
- Stream
- Restoration (1:1)
- Enhancement II (5:1)
- Preservation (10:1)
- Type
- Fixed Vegetation Plot (>320 Stems/Acre)
- Random Vegetation Plot (>320 Stems/Acre)
- Cross
- Relocated Utility
- Line
- type
- Flow Gauge
- Groundwater
- Stage

Document Path: R:\Reggio\Projects\NC\100918_Monkey_Wall\MY2\Monitoring\MY1\Figure 2- CCPV - Monkey Wall - MY2.mxd

Table 5. Visual Stream Stability Assessment

Assessment Date: **10/11/2023**

Reach G1-C

Assessed Stream Length 1517

Assessed Bank Length 3034

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	95	95		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	NA	NA		NA

Table 5. Visual Stream Stability Assessment

Assessment Date: **10/11/2023**

Reach G2

Assessed Stream Length 1710

Assessed Bank Length 3420

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-built	Amount of Unstable Footage	% Stable, Performing as Intended
Bank	**Surface Scour/Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse			0	100%
Totals					0	100%
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	106	106		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in DMS monitoring guidance document)	NA	NA		NA

Table 6 Vegetation Condition Assessment

Assessment Date: 10/11/2023

Planted Acreage[1] 19.85

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Red Simple Hatch	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	Orange Simple Hatch	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Orange Simple Hatch	0	0.00	0.0%
			Cumulative Total			0.0%

Easement Acreage[2] 24.28

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Yellow Crosshatch	0	0.00	0.0%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Red Simple Hatch	0	0.00	0.0%

1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

Monkey Wall MY2 Vegetation Monitoring Plot Photos – October 2023

Vegetation Plot 1

Vegetation Plot 2

Vegetation Plot 3

Vegetation Plot 4

Vegetation Plot 5

Vegetation Plot 6

Vegetation Plot 7

Vegetation Plot 8

Vegetation Plot 9

Vegetation Plot 10

Vegetation Plot 11

Vegetation Plot 12

Vegetation Plot 13

Random Vegetation Plot 1

Random Vegetation Plot 2

Random Vegetation Plot 3

Monkey Wall Monitoring Device Photos – October 2023

Flow Gauge G1-C

Flow Gauge G2

Stage Recorder G1-C

Stage Recorder G2

Groundwater Well 1

Culvert Looking Downstream

Stage Recorder G1C (Below Confluence)

Appendix C

Vegetation Plot Data

Table 7. Planted Species Summary

Common Name	Scientific Name	Mitigation Plan %	As-Built %	Total Stems Planted
River Birch	*Betula nigra*	15	15	2,300
Tulip Poplar	*Liriodendron tulipifera*	15	15	2,300
Sycamore	*Platanus occidentalis*	15	15	2,300
Shagbark Hickory	*Carya ovata*	10	10	1,500
White Oak	*Quercus alba*	10	10	1,500
Chestnut Oak	*Quercus montana*	10	10	1,500
Northern Red Oak	*Quercus rubra*	5	5	800
Red Mulberry	*Morus rubra*	5	5	800
Eastern Redbud	*Cercis canadensis*	5	5	800
Flowering Dogwood	*Cornus florida*	5	5	800
Tag Alder	*Alnus serrulata*	5	5	800
			Total	15,400
			Planted Area	19.85
			As-built Planted Stems/Acre	776

Table 8. Vegetation Plot Mitigation Success Summary

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height
1	567	40	607	Yes	1.7
2	445	0	445	Yes	1.5
3	405	0	405	Yes	1.5
4	567	0	567	Yes	1.8
5	486	0	486	Yes	1.6
6	405	0	405	Yes	2.3
7	405	40	445	Yes	2.3
8	405	202	607	Yes	1.7
9	405	40	445	Yes	1.9
10	688	0	688	Yes	1.9
11	486	0	486	Yes	1.6
12	445	81	526	Yes	1.5
13	405	0	405	Yes	2.6
R1	445	0	445	Yes	2.1
R2	607	0	607	Yes	1.8
R3	567	0	567	Yes	2.6
Project Avg	**483**	**25**	**509**	**Yes**	**1.9**

Table 9. Stem Count Total and Planted by Plot Species

			Current Plot Data (MY2 2023)																												
			100918-01-0001			100918-01-0002			100918-01-0003			100918-01-0004			100918-01-0005			100918-01-0006			100918-01-0007			100918-01-0008			100918-01-0009			100918-01-0010		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Alnus serrulata	hazel alder	Shrub																2	2	2											
Betula nigra	river birch	Tree				3	3	3										6	6	6	1	1	1	4	4	4				5	5	5
Carya ovata	shagbark hickory	Tree										2	2	2																	
Cercis canadensis	eastern redbud	Tree							1	1	1																2	2	2			
Cornus florida	flowering dogwood	Tree										1	1	1													2	2	2	1	1	1
Gleditsia triacanthos	honeylocust	Tree																					1			2						
Liriodendron tulipifera	tuliptree	Tree	4	4	5	2	2	2	1	1	1	3	3	3	4	4	4				1	1	1	2	2	5	3	3	4			
Morus rubra	red mulberry	Tree				1	1	1							1	1	1													2	2	2
Platanus occidentalis	American sycamore	Tree	2	2	2							3	3	3				2	2	2	2	2	2	2	2	2	1	1	1	9	9	9
Quercus alba	white oak	Tree	3	3	3				1	1	1	4	4	4	3	3	3				4	4	4	1	1	1	1	1	1			
Quercus montana		Tree							3	3	3				3	3	3				1	1	1									
Quercus rubra	northern red oak	Tree	5	5	5	5	5	5	4	4	4	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1			
		Stem count	14	14	15	11	11	11	10	10	10	14	14	14	12	12	12	10	10	10	10	10	11	10	10	15	10	10	11	17	17	17
		size (ares)	1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	4	4	4	4	5	5	5	6	6	6	5	5	5	3	3	3	6	6	7	5	5	6	6	6	6	4	4	4
		Stems per ACRE	567	567	607	445	445	445	405	405	405	567	567	567	486	486	486	405	405	405	405	405	445	405	405	607	405	405	445	688	688	688

			Current Plot Data (MY2 2023)																Annual Means								
			100918-01-0011			100918-01-0012			100918-01-0013			R1			R2			R3			MY2 (2023)			MY1 (2022)			MY0 (2022)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Alnus serrulata	hazel alder	Shrub				1	1	1	1	1	1				2	2	2				6	6	6	13	13	13	11	11	11
Betula nigra	river birch	Tree	1	1	1				2	2	2							1	1	1	23	23	23	26	26	26	38	38	38
Carya ovata	shagbark hickory	Tree										1	1	1							3	3	3	1	1	1	2	2	2
Cercis canadensis	eastern redbud	Tree										1	1	1	2	2	2	2	2	2	8	8	8	5	5	5	5	5	5
Cornus florida	flowering dogwood	Tree	1	1	1																5	5	5	9	9	9	9	9	9
Gleditsia triacanthos	honeylocust	Tree																					3						
Liriodendron tulipifera	tuliptree	Tree						2				3	3	3	1	1	1				24	24	31	30	30	30	34	34	34
Morus rubra	red mulberry	Tree							5	5	5	1	1	1	1	1	1	3	3	3	14	14	14	12	12	12	12	12	12
Platanus occidentalis	American sycamore	Tree	3	3	3	2	2	2	2	2	2	3	3	3	7	7	7	4	4	4	42	42	42	29	29	29	37	37	37
Quercus alba	white oak	Tree	2	2	2	4	4	4				2	2	2	1	1	1	3	3	3	29	29	29	24	24	24	27	27	27
Quercus montana		Tree	1	1	1										1	1	1	1	1	1	10	10	10	12	12	12	15	15	15
Quercus rubra	northern red oak	Tree	4	4	4	4	4	4													27	27	27	35	35	35	47	47	47
		Stem count	12	12	12	11	11	13	10	10	10	11	11	11	15	15	15	14	14	14	191	191	201	196	196	196	237	237	237
		size (ares)	1			1			1			1			1			1			16			16			16		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.40			0.40			0.40		
		Species count	6	6	6	4	4	5	4	4	4	6	6	6	7	7	7	6	6	6	11	11	12	11	11	11	11	11	11
		Stems per ACRE	486	486	486	445	445	526	405	405	405	445	445	445	607	607	607	567	567	567	483	483	508	496	496	496	599	599	599

Appendix D

Stream Measurement and

Geomorphology Data

Table 10. Baseline Stream Data Summary
Monkey Wall Mitigation Site - Reach G1-C

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)		---	---	---	6.0	6.9	6.9	7.8	1.3	2	---	---	---	---	---	---	---	9.9	---	8.4	8.8	8.8	9.3	0.5	3
Floodprone Width (ft)					12.0	13.6	13.6	15.2	2.3	2	---	---	---	---	---	---	---	35.0	---	43.2	46.1	44.8	50.4	3.8	3
Bankfull Mean Depth (ft)		---	---	---	1.3	1.5	1.5	1.7	0.3	2	---	---	---	---	---	---	---	0.7	---	---	---	---	---	---	---
[1]Bankfull Max Depth (ft)					1.3	1.5	1.5	1.7	0.3	2	---	---	---	---	---	---	---	1.1	---	1.0	1.1	1.2	1.2	0.1	3
Bankfull Cross Sectional Area (ft^2)		---	---	---	4.0	6.1	6.1	8.1	2.9	2	---	---	---	---	---	---	---	6.5	---	5.1	6.0	6.3	6.5	0.8	3
Width/Depth Ratio					7.6	8.2	8.2	8.7	0.8	2	---	---	---	---	---	---	---	15.0	---	---	---	---	---	---	---
Entrenchment Ratio					1.5	1.9	1.9	2.3	0.6	2	---	---	---	---	---	---	---	3.5	---	5.3	5.7	5.8	5.9	0.3	3
[1]Bank Height Ratio					1.1	1.4	1.4	1.6	0.4	2	---	---	---	---	---	---	---	1.0	---	1.0	1.0	1.0	1.0	0.0	3
Profile																									
Riffle Length (ft)					---	---	---	---	---	---	---	---	---	---	---	---	5	---	12	5	---	---	12	---	---
Riffle Slope (ft/ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pool Length (ft)					---	---	---	---	---	---	---	---	---	---	---	---	8	---	16	8	---	---	16	---	---
Pool Max depth (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pool Spacing (ft)					---	---	---	---	---	---	---	---	---	---	---	---	10	---	21	10	---	---	21	---	---
Pattern																									
Channel Beltwidth (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Radius of Curvature (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rc:Bankfull width (ft/ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Meander Wavelength (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Meander Width Ratio					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					---												---			---					
Max part size (mm) mobilized at bankfull					---												---			---					
Stream Power (transport capacity) W/m^2					---												---			---					
Additional Reach Parameters																									
Rosgen Classification					A/B3 moving to G4						---						E4a, C4b			E4a, C4b					
Bankfull Velocity (fps)		---	---	---	---						---						---			---					
Bankfull Discharge (cfs)		---	---	---	---						---						---			---					
Valley length (ft)					1908						---						1525			1525					
Channel Thalweg length (ft)					1996						---						1529			1529					
Sinuosity (ft)					---						---						---			---					
Water Surface Slope (Channel) (ft/ft)					---						---						---			---					
Channel slope (ft/ft)					0.14						---						0.12			0.12					
[3]Bankfull Floodplain Area (acres)					---						---						---			---					
[4]% of Reach with Eroding Banks					---						---														
Channel Stability or Habitat Metric					---						---														
Biological or Other					---						---														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Table 10. Baseline Stream Data Summary
Monkey Wall Mitigation Site - Reach G2

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD[5]	n	Min	Mean	Med	Max	SD[5]	n	Min	Med	Max	Min	Mean	Med	Max	SD[5]	n
Bankfull Width (ft)		---	---	---	5.4	6.6	6.6	7.8	---	2	---	---	---	---	---	---	---	9.4	---	8.3	8.8	9.0	9.1	0.4	3
Floodprone Width (ft)					9.9	11.0	11.0	12.0	---	2	---	---	---	---	---	---	---	45.0	---	40.9	44.4	43.2	49.1	4.2	3
Bankfull Mean Depth (ft)		---	---	---	0.7	0.9	0.9	1.0	---	2	---	---	---	---	---	---	---	0.7	---	---	---	---	---	---	---
[1]Bankfull Max Depth (ft)					1.4	1.6	1.6	1.7	---	2	---	---	---	---	---	---	---	1.1	---	1.1	1.2	1.2	1.3	0.1	3
Bankfull Cross Sectional Area (ft^2)		---	---	---	3.7	5.9	5.9	8.1	---	2	---	---	---	---	---	---	---	6.5	---	5.6	6.2	5.8	7.1	0.8	3
Width/Depth Ratio					7.7	7.7	7.7	0.1	---	2	---	---	---	---	---	---	---	13.5	---	---	---	---	---	---	---
Entrenchment Ratio					1.5	1.9	1.9	2.3	---	2	---	---	---	---	---	---	---	5.1	---	5.6	5.8	5.6	6.1	0.3	3
[1]Bank Height Ratio					1.1	1.4	1.4	1.7	---	2	---	---	---	---	---	---	---	1.0	---	1.0	1.0	1.0	1.0	0.0	3
Profile																									
Riffle Length (ft)					---	---	---	---	---	---	---	---	---	---	---	---	5	---	14	5	---	---	14	---	---
Riffle Slope (ft/ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pool Length (ft)					---	---	---	---	---	---	---	---	---	---	---	---	8	---	14	8	---	---	14	---	---
Pool Max depth (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pool Spacing (ft)					---	---	---	---	---	---	---	---	---	---	---	---	9	---	21	9	---	---	21	---	---
Pattern																									
Channel Beltwidth (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Radius of Curvature (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rc:Bankfull width (ft/ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Meander Wavelength (ft)					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Meander Width Ratio					---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					---												---			---					
Max part size (mm) mobilized at bankfull					---												---			---					
Stream Power (transport capacity) W/m^2					---												---			---					
Additional Reach Parameters																									
Rosgen Classification					G4						---						E4a			E4a					
Bankfull Velocity (fps)		---	---	---	---						---						---			---					
Bankfull Discharge (cfs)		---	---	---	---												---			---					
Valley length (ft)					1800						---						1702			1702					
Channel Thalweg length (ft)					1890						---						1710			1710					
Sinuosity (ft)					---						---						---			---					
Water Surface Slope (Channel) (ft/ft)					---						---						---			---					
Channel slope (ft/ft)					0.14						---						0.14			0.14					
[3]Bankfull Floodplain Area (acres)					---						---						---			---					
[4]% of Reach with Eroding Banks					---						---														
Channel Stability or Habitat Metric					---						---														
Biological or Other					---						---														

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section measurements and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing XS measurement data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

Appendix D. Table 11 - Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

Project Name/Number: Monkey Wall #100069

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Pool)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2635.1	2635.1	2635.1					2634.0	2633.9	2633.9					2548.3	2548.4	2548.4					2547.7	2547.6	2547.7					2519.0	2518.9	2519.0				
Bankfull Width (ft)[1]	9.1	9.5	9.3					-	-	-					-	-	-					8.3	8.3	8.4					-	-	-				
Floodprone Width (ft)[1]	49.1	44.8	46.2					-	-	-					-	-	-					40.9	40.1	39.8					-	-	-				
Bankfull Max Depth (ft)[2]	1.3	1.3	1.4					1.4	1.2	1.2					1.6	1.7	1.5					1.1	1.1	0.9					1.7	1.6	1.6				
Low Bank Elevation (ft)	2635.1	2635.1	2635.2					2634.0	2633.7	2633.8					2548.3	2548.3	2548.2					2547.7	2547.7	2547.6					2519.0	2518.9	2519.0				
Bankfull Cross Sectional Area (ft^2)[2]	7.1	7.9	7.9					5.6	4.5	4.7					8.6	8.6	7.4					5.6	5.9	5.0					6.7	6.8	6.4				
Bankfull Entrenchment Ratio[1]	5.6	4.7	5.0					-	-	-					-	-	-					6.1	4.9	4.7					-	-	-				
Bankfull Bank Height Ratio[1]	1.0	1.1	1.1					-	-	-					-	-	-					1.0	1.0	0.9					-	-	-				

	Cross Section 6 (Riffle)							Cross Section 7 (Pool)							Cross Section 8 (Riffle)							Cross Section 9 (Riffle)							Cross Section 10 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2518.5	2518.5	2518.5					2694.3	2694.2	2694.4					2691.0	2690.9	2691.1					2614.6	2614.5	2614.5					2612.4	2612.3	2612.3				
Bankfull Width (ft)[1]	9.0	8.5	8.6					-	-	-					8.4	8.9	8.9					8.8	8.9	9.2					-	-	-				
Floodprone Width (ft)[1]	>43.2	>42.8	>43.4					-	-	-					>44.8	>43.7	>46					>50.4	>50.4	>50.4					-	-	-				
Bankfull Max Depth (ft)[2]	1.2	1.0	1.0					1.9	1.5	1.3					1.0	0.9	0.9					1.2	1.0	1.3					1.7	1.4	1.3				
Low Bank Elevation (ft)	2518.5	2518.4	2518.4					2694.3	2694.2	2694.2					2691.0	2690.9	2691.0					2614.6	2614.4	2614.6					2612.4	2612.3	2612.1				
Bankfull Cross Sectional Area (ft^2)[2]	5.8	5.5	5.2					9.1	8.6	6.7					5.1	5.3	4.0					6.5	5.7	7.1					7.9	7.5	5.8				
Bankfull Entrenchment Ratio[1]	>5.6	>5	>5					-	-	-					>5.9	>4.9	>5.2					>5.8	>5.7	>5.5					-	-	-				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9					-	-	-					1.0	1.0	0.9					1.0	0.9	1.1					-	-	-				

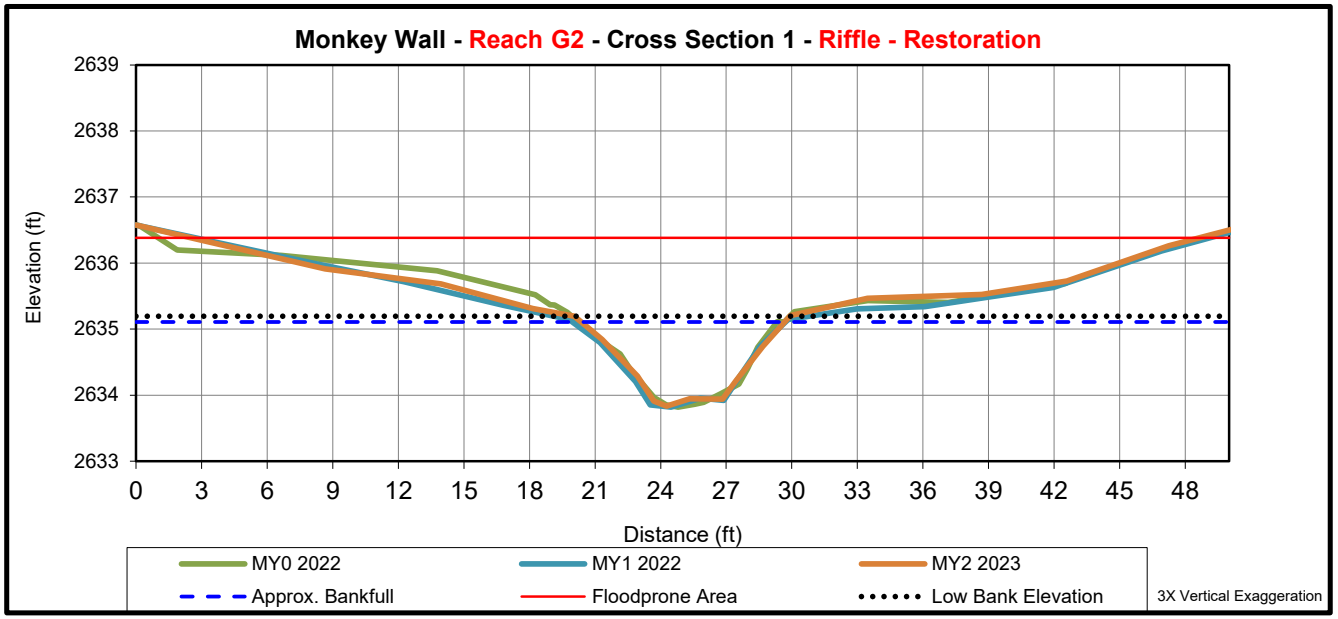
	Cross Section 11 (Riffle)							Cross Section 12 (Pool)						
	Base	MY1	MY2	MY3	MY5	MY7	MY+	Base	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2539.2	2539.2	2539.2					2537.7	2537.7	2537.7				
Bankfull Width (ft)[1]	9.3	9.2	9.0					-	-	-				
Floodprone Width (ft)[1]	43.2	43.1	42.8					-	-	-				
Bankfull Max Depth (ft)[2]	1.2	1.0	1.1					1.5	1.5	1.5				
Low Bank Elevation (ft)	2539.2	2539.2	2539.2					2537.7	2537.8	2537.8				
Bankfull Cross Sectional Area (ft^2)[2]	6.3	5.9	5.8					7.3	8.3	7.9				
Bankfull Entrenchment Ratio[1]	5.3	4.7	4.7					-	-	-				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9					-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation

2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

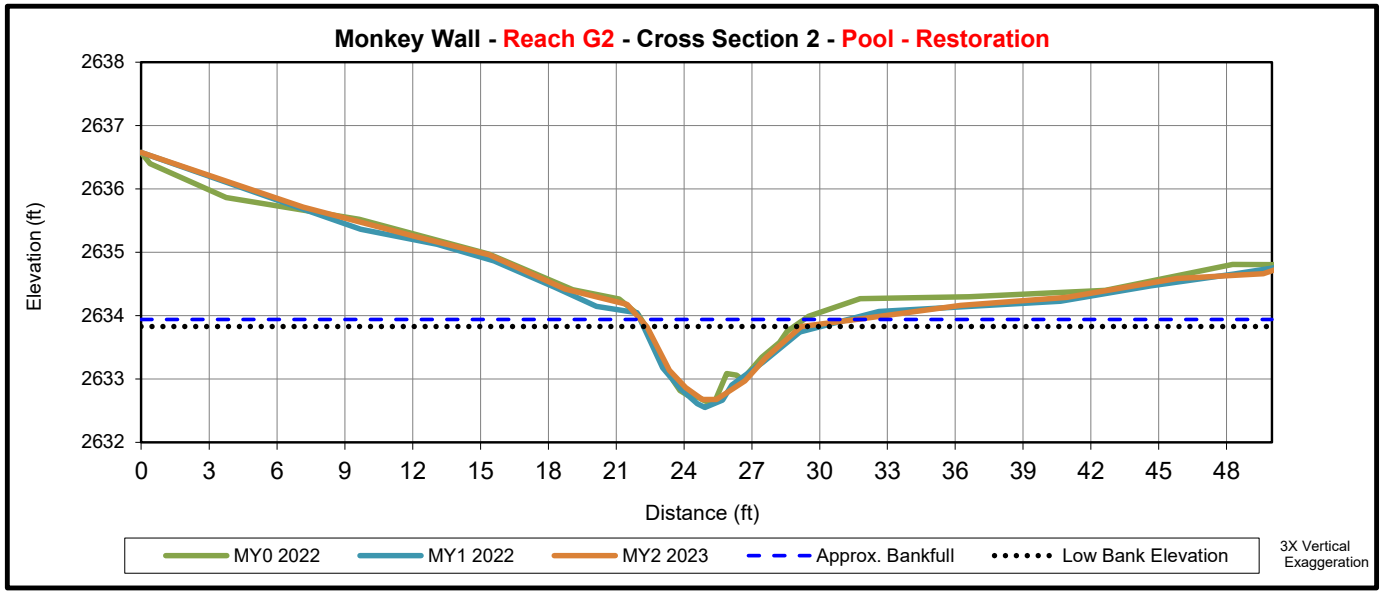


	Cross Section 1 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2635.1	2635.1	2635.1				
Bankfull Width (ft)[1]	9.1	9.5	9.3				
Floodprone Width (ft)[1]	49.1	44.8	46.2				
Bankfull Max Depth (ft)[2]	1.3	1.3	1.4				
Low Bank Elevation (ft)	2635.1	2635.1	2635.2				
Bankfull Cross Sectional Area (ft^2)[2]	7.1	7.9	7.9				
Bankfull Entrenchment Ratio[1]	5.6	4.7	5.0				
Bankfull Bank Height Ratio[1]	1.0	1.1	1.1				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

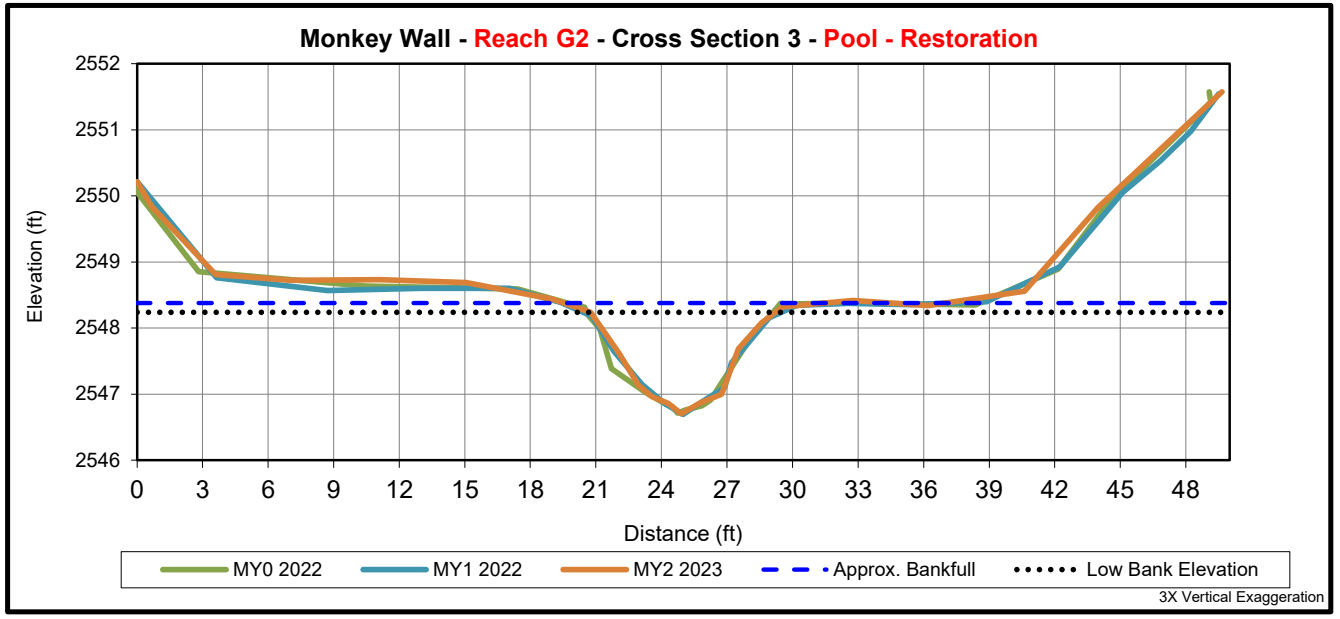


	Cross Section 2 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2634.0	2633.9	2633.9				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.4	1.2	1.2				
Low Bank Elevation (ft)	2634.0	2633.7	2633.8				
Bankfull Cross Sectional Area (ft^2)[2]	5.6	4.5	4.7				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

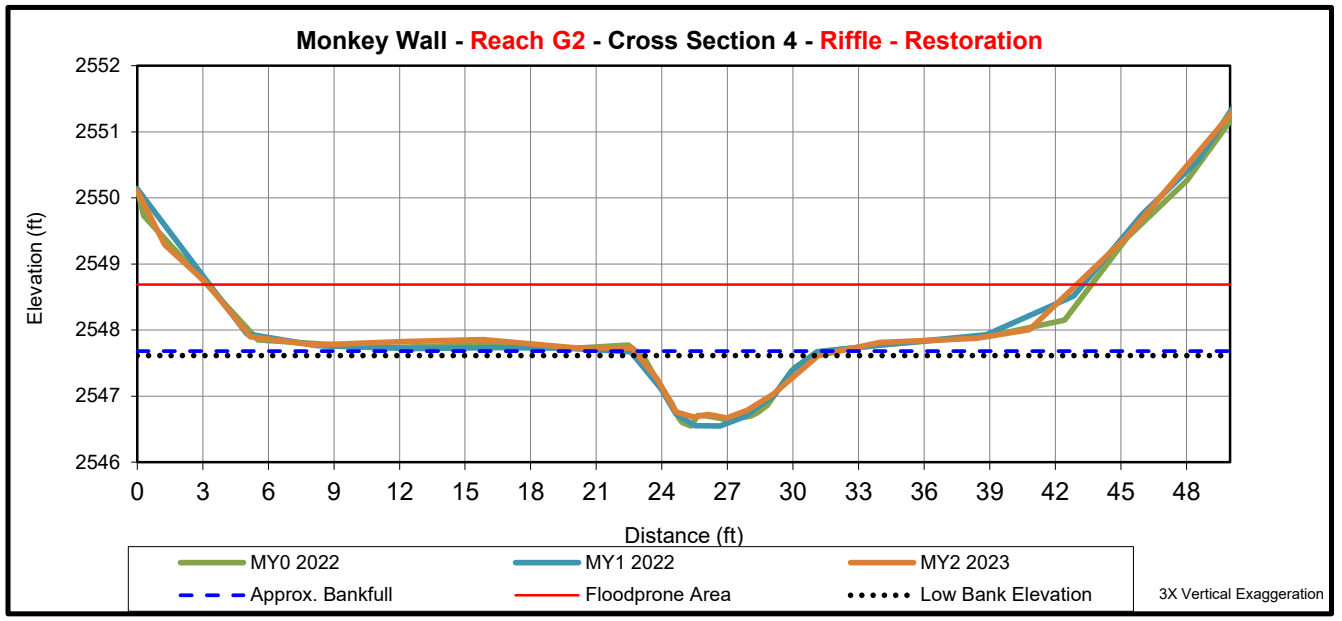


	Cross Section 3 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2548.3	2548.4	2548.4				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.6	1.7	1.5				
Low Bank Elevation (ft)	2548.3	2548.3	2548.2				
Bankfull Cross Sectional Area (ft^2)[2]	8.6	8.6	7.4				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

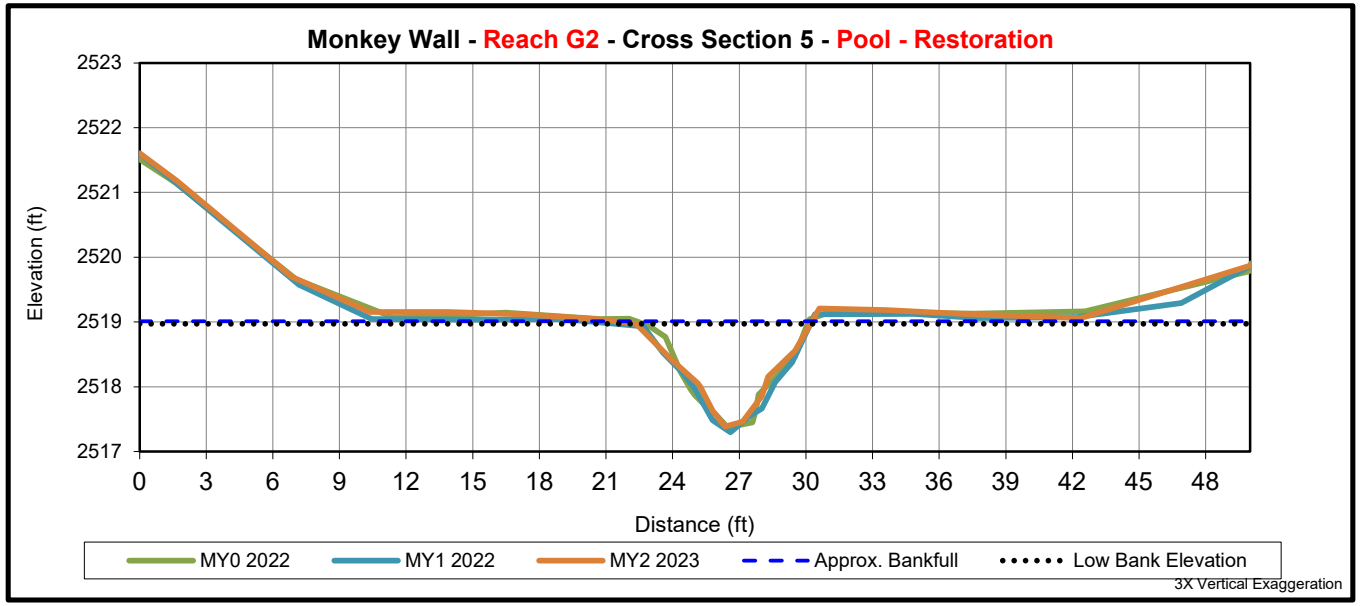


	Cross Section 4 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2547.7	2547.6	2547.7				
Bankfull Width (ft)[1]	8.3	8.3	8.4				
Floodprone Width (ft)[1]	40.9	40.1	39.8				
Bankfull Max Depth (ft)[2]	1.1	1.1	0.9				
Low Bank Elevation (ft)	2547.7	2547.7	2547.6				
Bankfull Cross Sectional Area (ft^2)[2,2]	5.6	5.9	5.0				
Bankfull Entrenchment Ratio[1]	6.1	4.9	4.7				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

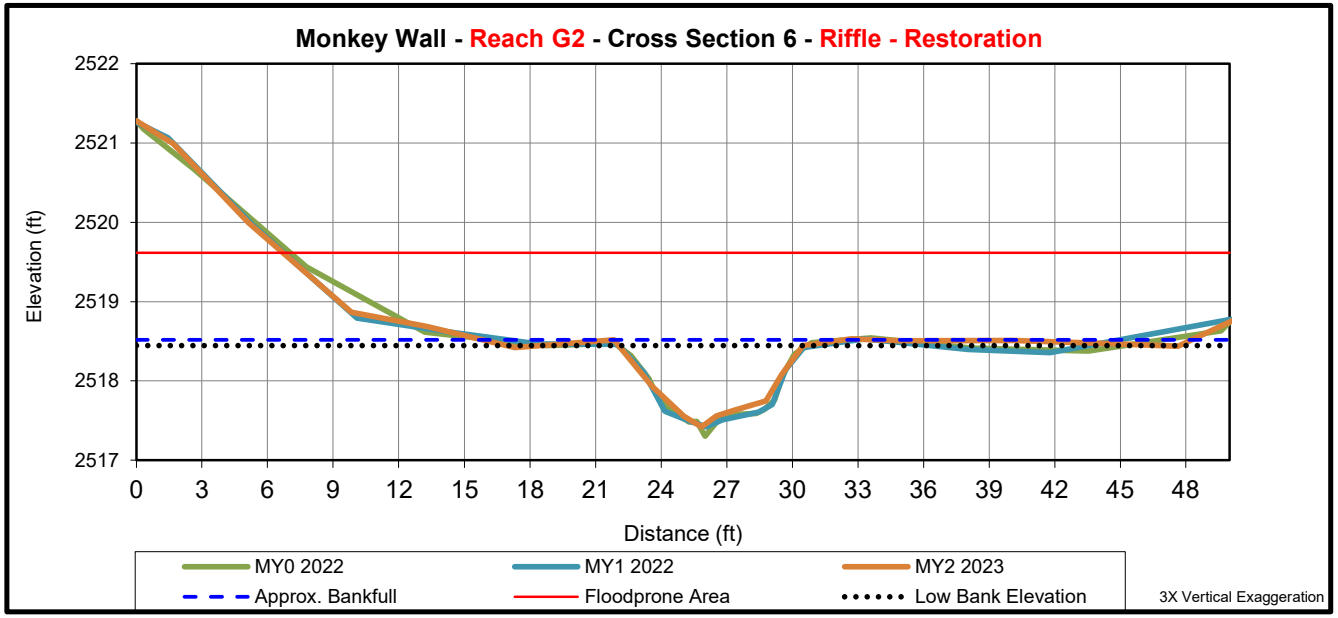


	Cross Section 5 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2519.0	2518.9	2519.0				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.7	1.6	1.6				
Low Bank Elevation (ft)	2519.0	2518.9	2519.0				
Bankfull Cross Sectional Area (ft^2)[2,2]	6.7	6.8	6.4				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

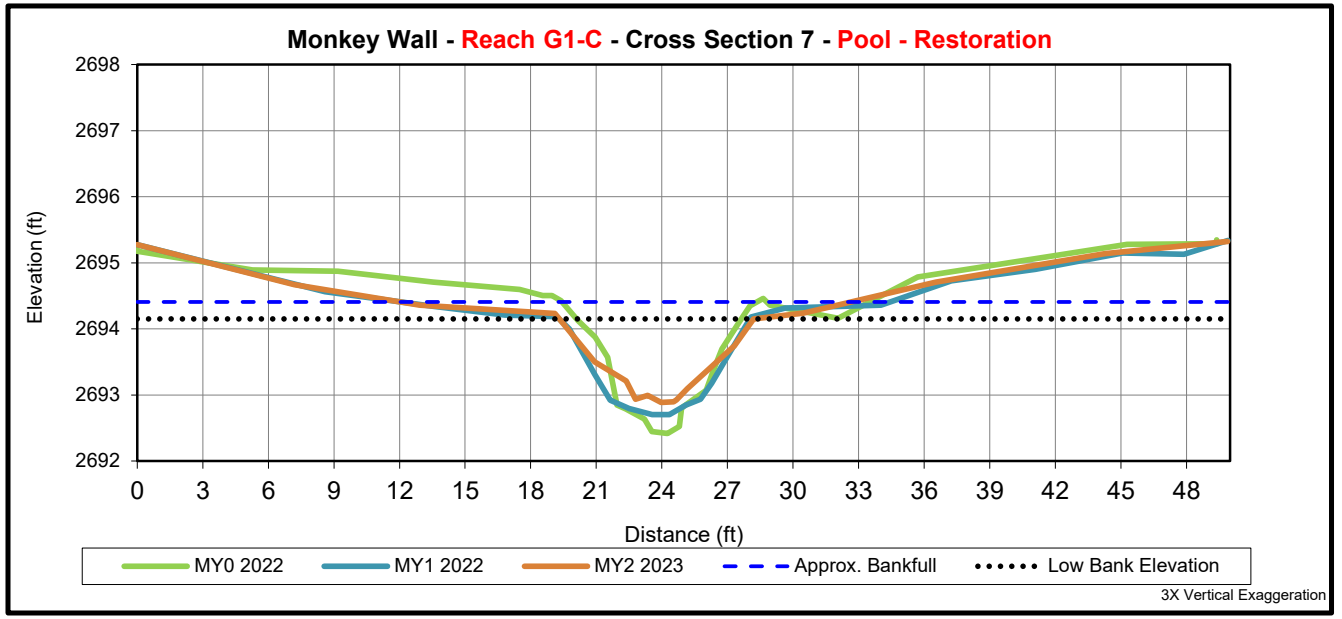


	Cross Section 6 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2518.5	2518.5	2518.5				
Bankfull Width (ft)[1]	9.0	8.5	8.6				
Floodprone Width (ft)[1]	>43.2	>42.8	>43.4				
Bankfull Max Depth (ft)[2]	1.2	1.0	1.0				
Low Bank Elevation (ft)	2518.5	2518.4	2518.4				
Bankfull Cross Sectional Area (ft^2)[2,2]	5.8	5.5	5.2				
Bankfull Entrenchment Ratio[1]	>5.6	>5	>5				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

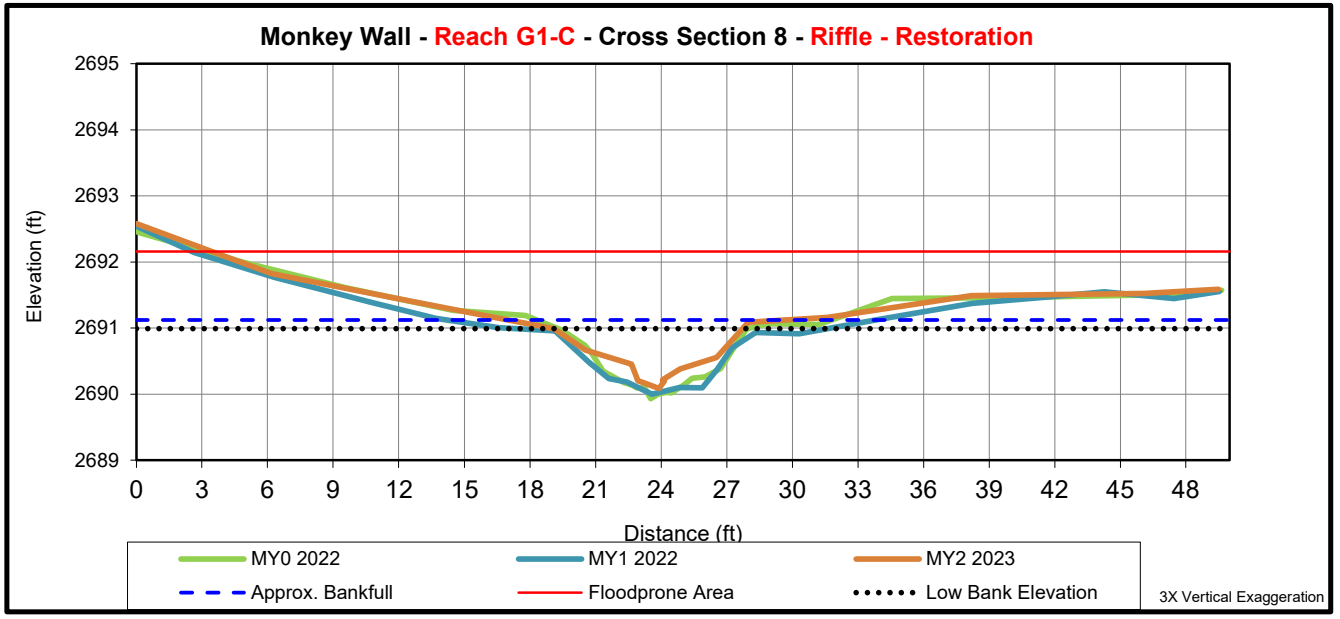


	Cross Section 7 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2694.3	2694.2	2694.4				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.9	1.5	1.3				
Low Bank Elevation (ft)	2694.3	2694.2	2694.2				
Bankfull Cross Sectional Area (ft^2)[2,2]	9.1	8.6	6.7				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

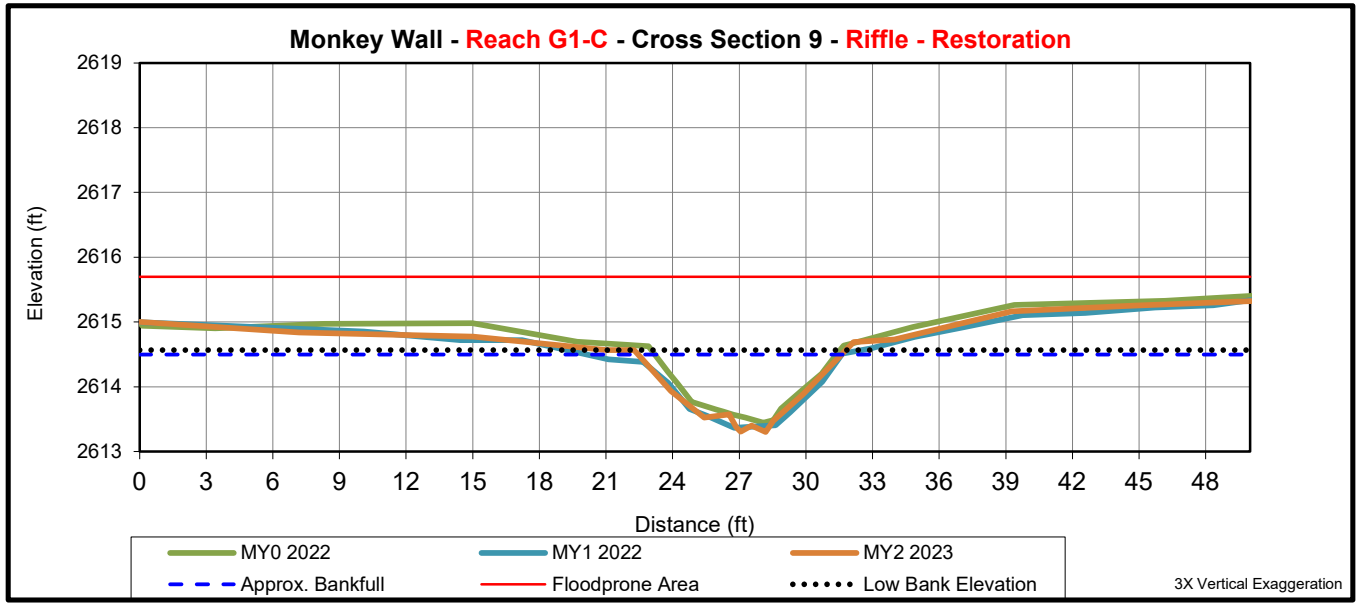


	Cross Section 8 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2691.0	2690.9	2691.1				
Bankfull Width (ft)[1]	8.4	8.9	8.9				
Floodprone Width (ft)[1]	>44.8	>43.7	>46				
Bankfull Max Depth (ft)[2]	1.0	0.9	0.9				
Low Bank Elevation (ft)	2691.0	2690.9	2691.0				
Bankfull Cross Sectional Area (ft^2)[2,2]	5.1	5.3	4.0				
Bankfull Entrenchment Ratio[1]	>5.9	>4.9	>5.2				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream



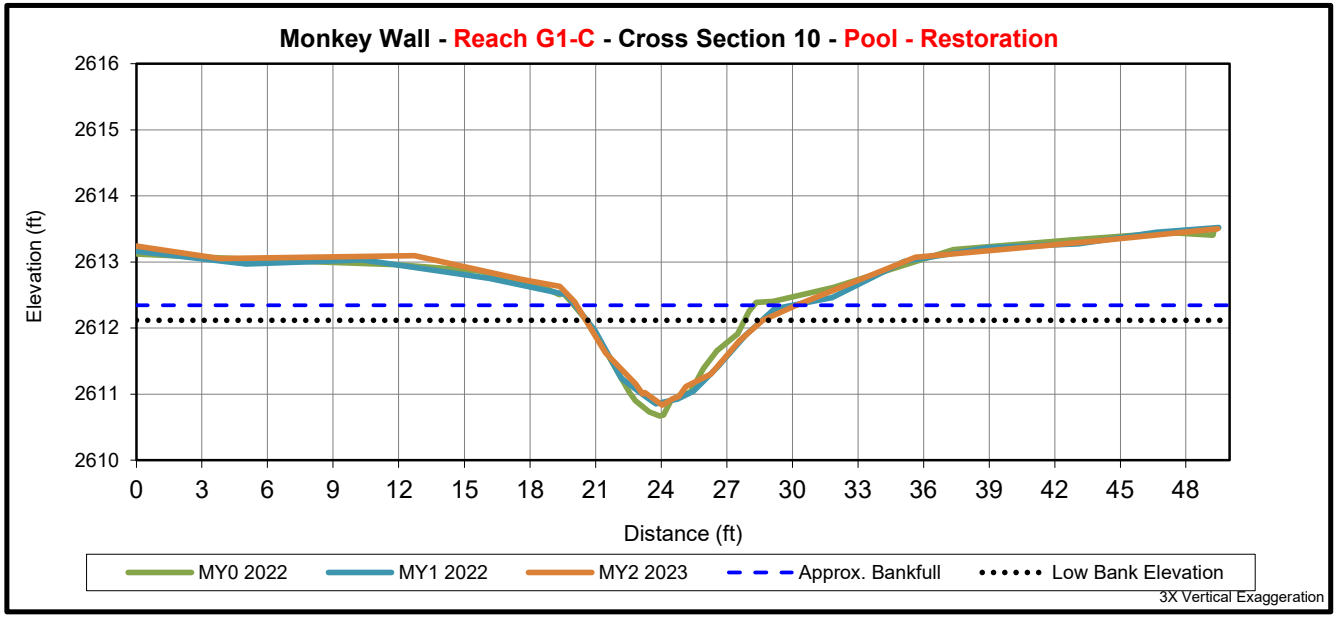
	Cross Section 5 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2519.0	2518.9	2519.0				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.7	1.6	1.6				
Low Bank Elevation (ft)	2519.0	2518.9	2519.0				
Bankfull Cross Sectional Area (ft^2)[2]	6.7	6.8	6.4				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation

2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

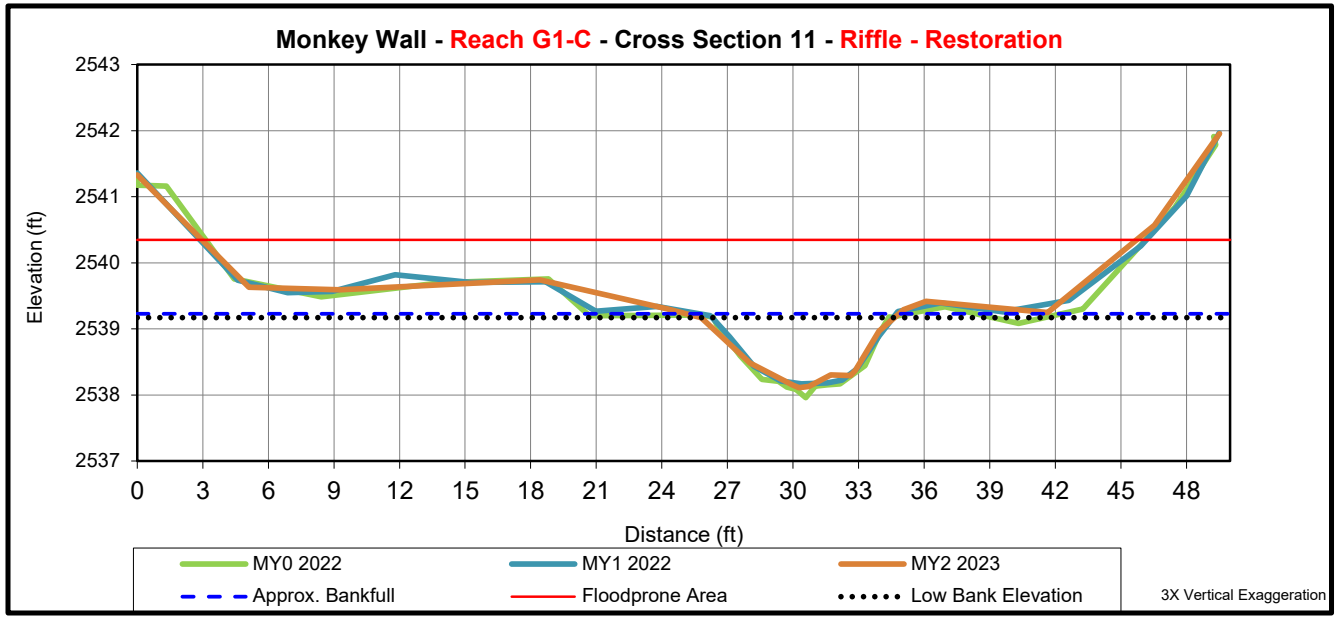


	Cross Section 6 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2518.5	2518.5	2518.5				
Bankfull Width (ft)[1]	9.0	8.5	8.6				
Floodprone Width (ft)[1]	>43.2	>42.8	>43.4				
Bankfull Max Depth (ft)[2]	1.2	1.0	1.0				
Low Bank Elevation (ft)	2518.5	2518.4	2518.4				
Bankfull Cross Sectional Area (ft^2)[2]	5.8	5.5	5.2				
Bankfull Entrenchment Ratio[1]	>5.6	>5	>5				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream

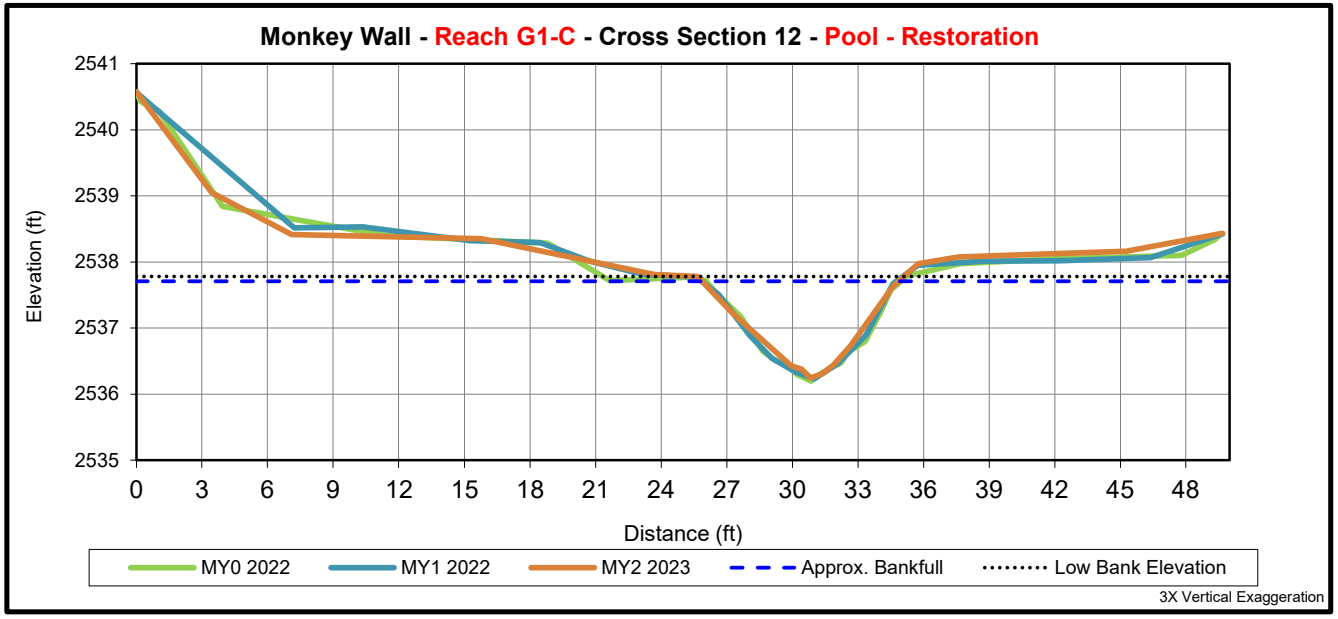


	Cross Section 7 (Pool)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2694.3	2694.2	2694.4				
Bankfull Width (ft)[1]	-	-	-				
Floodprone Width (ft)[1]	-	-	-				
Bankfull Max Depth (ft)[2]	1.9	1.5	1.3				
Low Bank Elevation (ft)	2694.3	2694.2	2694.2				
Bankfull Cross Sectional Area (ft^2)[2,2]	9.1	8.6	6.7				
Bankfull Entrenchment Ratio[1]	-	-	-				
Bankfull Bank Height Ratio[1]	-	-	-				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Upstream

Downstream



	Cross Section 8 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-XSA[1]	2691.0	2690.9	2691.1				
Bankfull Width (ft)[1]	8.4	8.9	8.9				
Floodprone Width (ft)[1]	>44.8	>43.7	>46				
Bankfull Max Depth (ft)[2]	1.0	0.9	0.9				
Low Bank Elevation (ft)	2691.0	2690.9	2691.0				
Bankfull Cross Sectional Area (ft^2)[2,2]	5.1	5.3	4.0				
Bankfull Entrenchment Ratio[1]	>5.9	>4.9	>5.2				
Bankfull Bank Height Ratio[1]	1.0	1.0	0.9				

1 - Uses the as-built cross sectional area as the basis for adjusting each subsequent years bankfull elevation
2 - Uses the current years low top of bank as the basis for adjusting each subsequent years bankfull elevation

Appendix E

Hydrology Data

Table 12. 2023 Rainfall Summary

Month	Average	Normal Limits		Project Location Precipitation*
		30 Percent	70 Percent	
January	5.97	3.44	7.26	4.65
February	4.86	3.36	5.79	3.94
March	5.79	4.47	6.71	4.41
April	5.43	3.86	6.43	6.43
May	5.48	3.39	6.63	5.32
June	5.83	4.01	6.95	8.27
July	5.29	3.39	6.37	3.51
August	5.43	3.01	6.62	7.60
September	5.55	2.67	6.78	2.82
October	3.99	2.28	4.81	1.14
November	4.21	2.66	5.09	1.49
December	4.33	3.31	5.02	-
Total Annual **	5.18	3.32	6.21	4.51
Above Normal Limits	Below Normal Limits			

*The Jessen Station is approximately 9.5 miles west of the Monkey Wall Site
**Total Annual represents the average total precipitation, annually, as calculated by the 30-year period.

Table 13. Documentation of Geomorphically Significant Flow Events

Year	Number of Bankfull Events	Maximum Bankfull Height (ft)	Date of Maximum Bankfull Event
Stage Recorder G1-C			
MY1 2022	0	NA	NA
MY2 2023	0	NA	NA
Stage Recorder G2			
MY1 2022	0	NA	NA
MY2 2023	1	0.03	7/10/2023
Year	**Consecutive Flow Days**	**Cummlative Flow Days**	**Number of Flow Events**
Flow Gauge G1-C			
MY1 2022	151	153	2
MY2 2023	278	278	1
Flow Gauge G2			
MY1 2022	258	258	1
MY2 2023	3	4	2

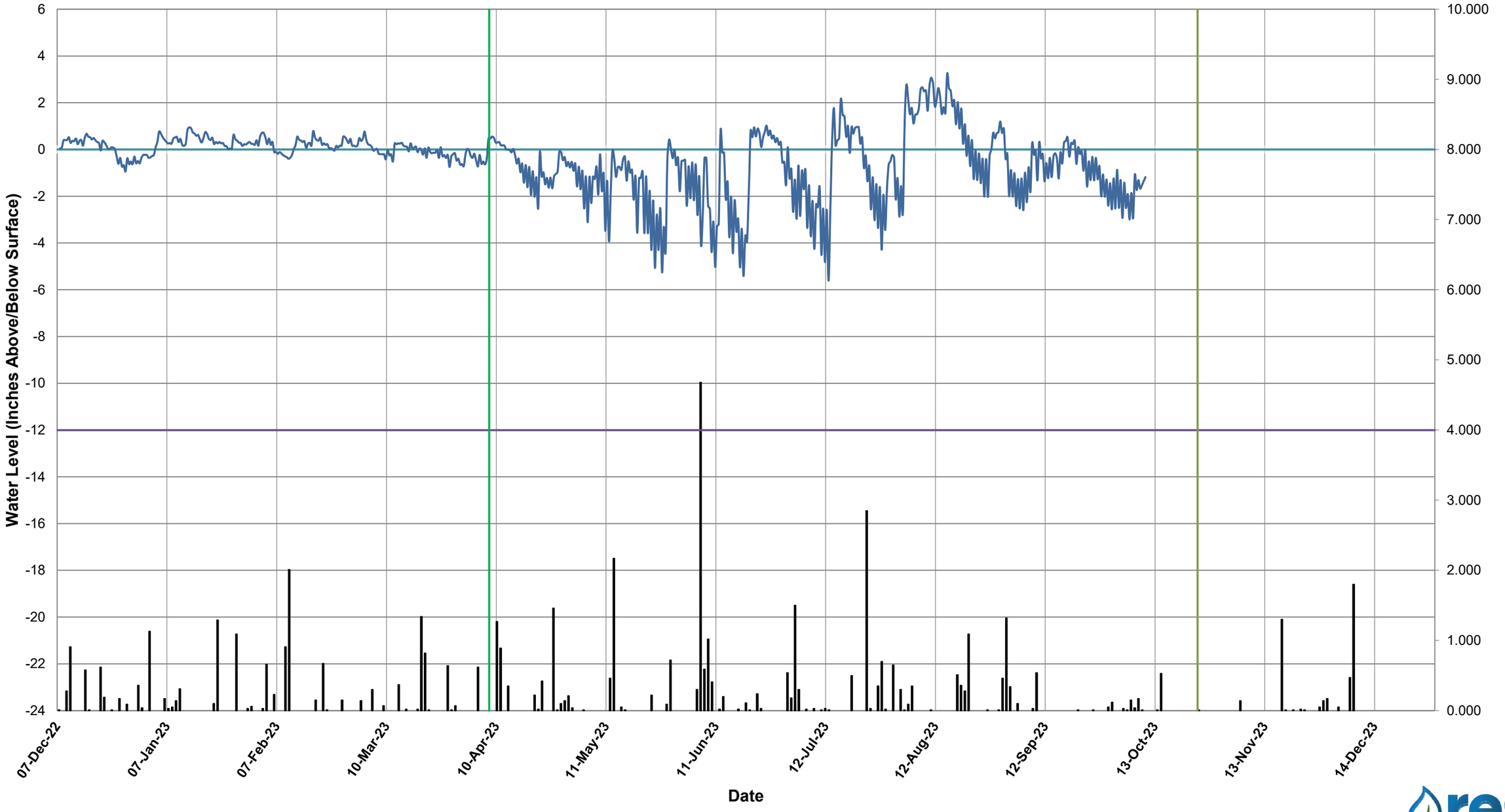
Table 14.

2023 Max Hydroperiod (Growing Season 8-Apr through 25-Oct, 200 days)					
Well ID	**Consecutive**		**Cumulative**		**Occurrences**
	Days	**Hydroperiod (%)**	**Days**	**Hydroperiod (%)**	
GW1	185	93%	185	93%	1

Table 15.

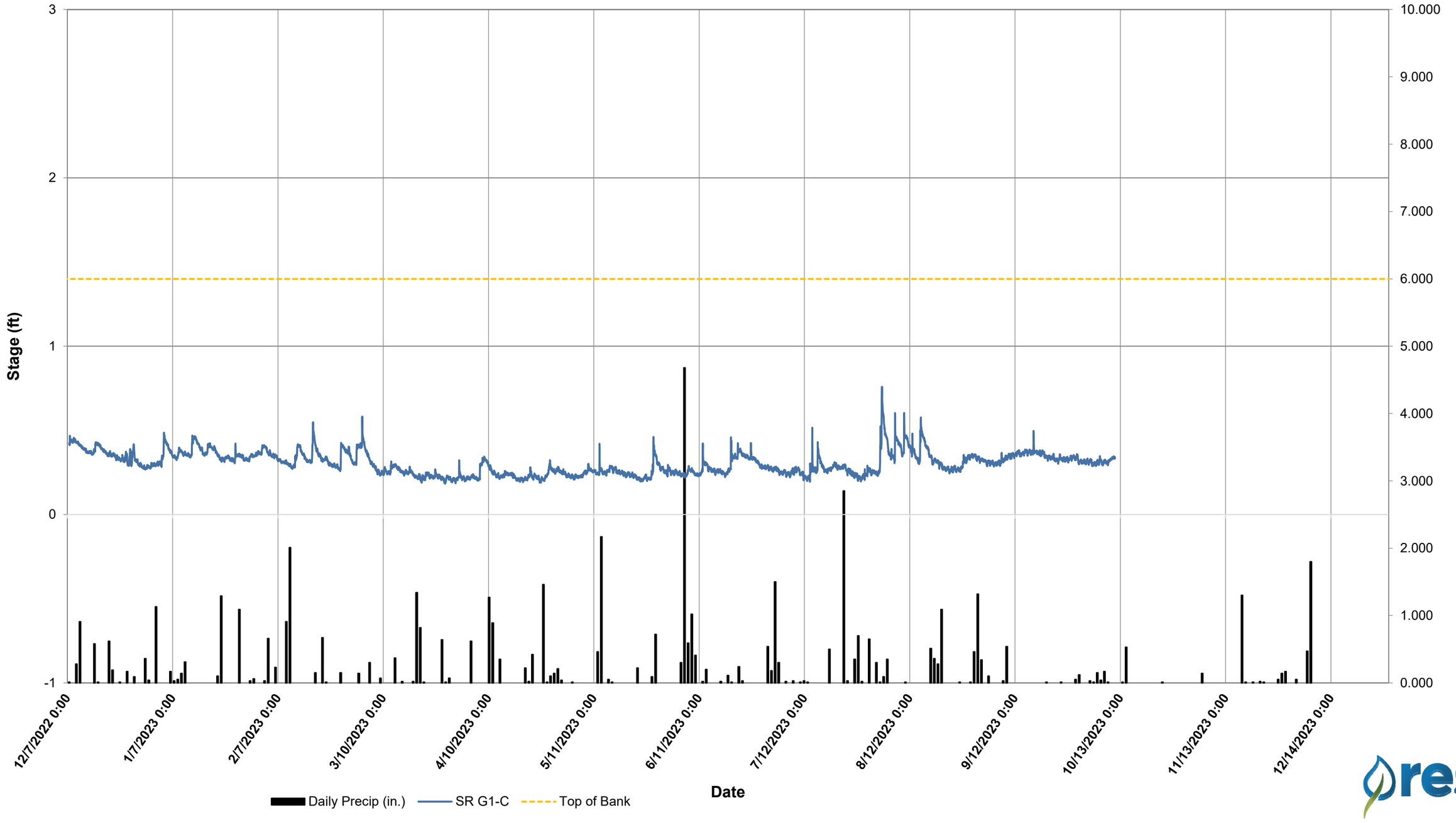
Summary of Groundwater Monitoring Results Monkey Wall								
Well ID	**Wetland ID**	**Hydroperiod (%)**						
		Year 1 (2022)	**Year 2 (2023)**	**Year 3 (2024)**	**Year 4 (2025)**	**Year 5 (2026)**	**Year 6 (2027)**	**Year 7 (2028)**
GW1	**WA**	100	93					

MY2 Monkey Wall GW1

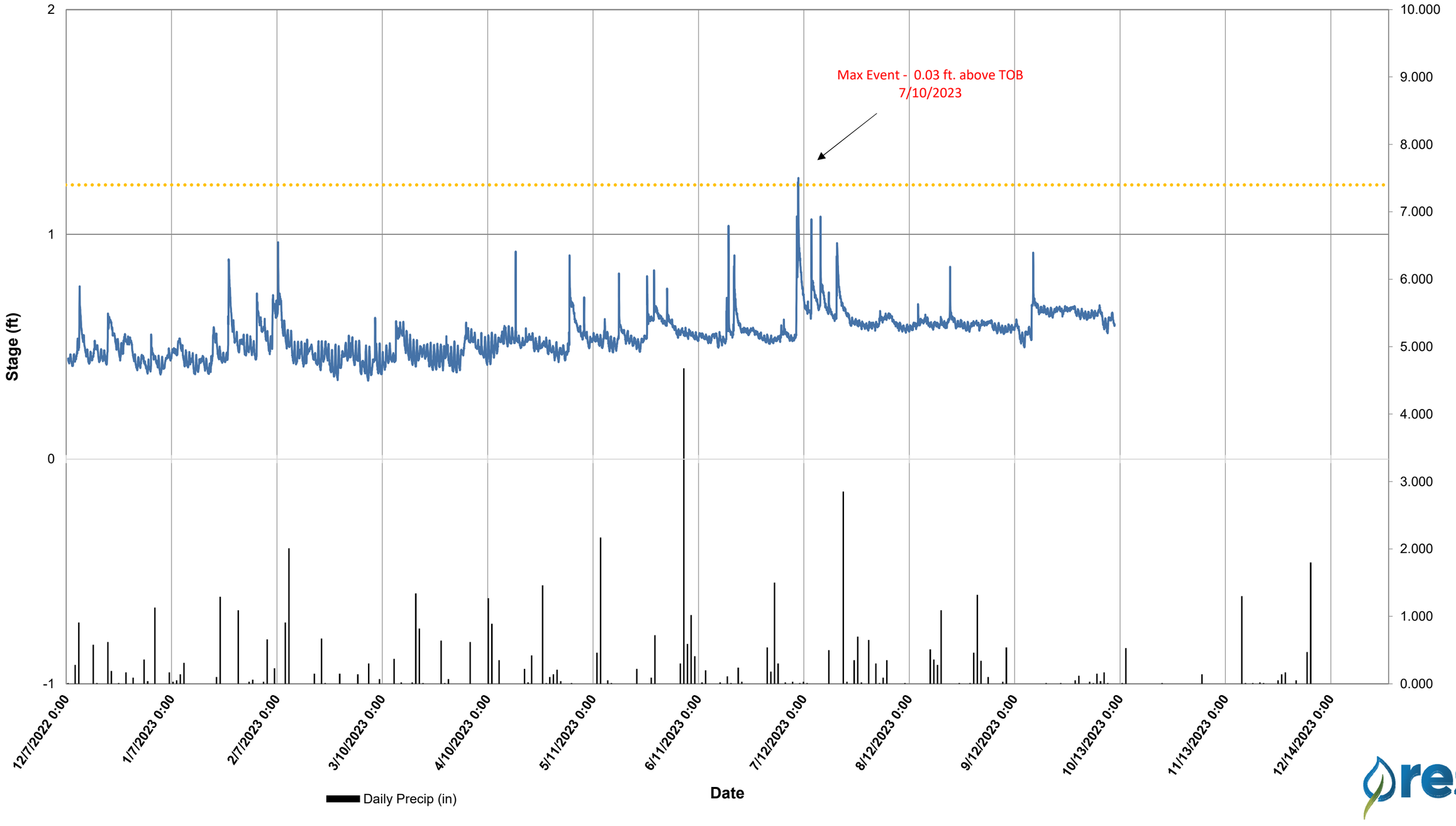


96 Consecutive Days of Hydrology
07/11/23-10/10/23

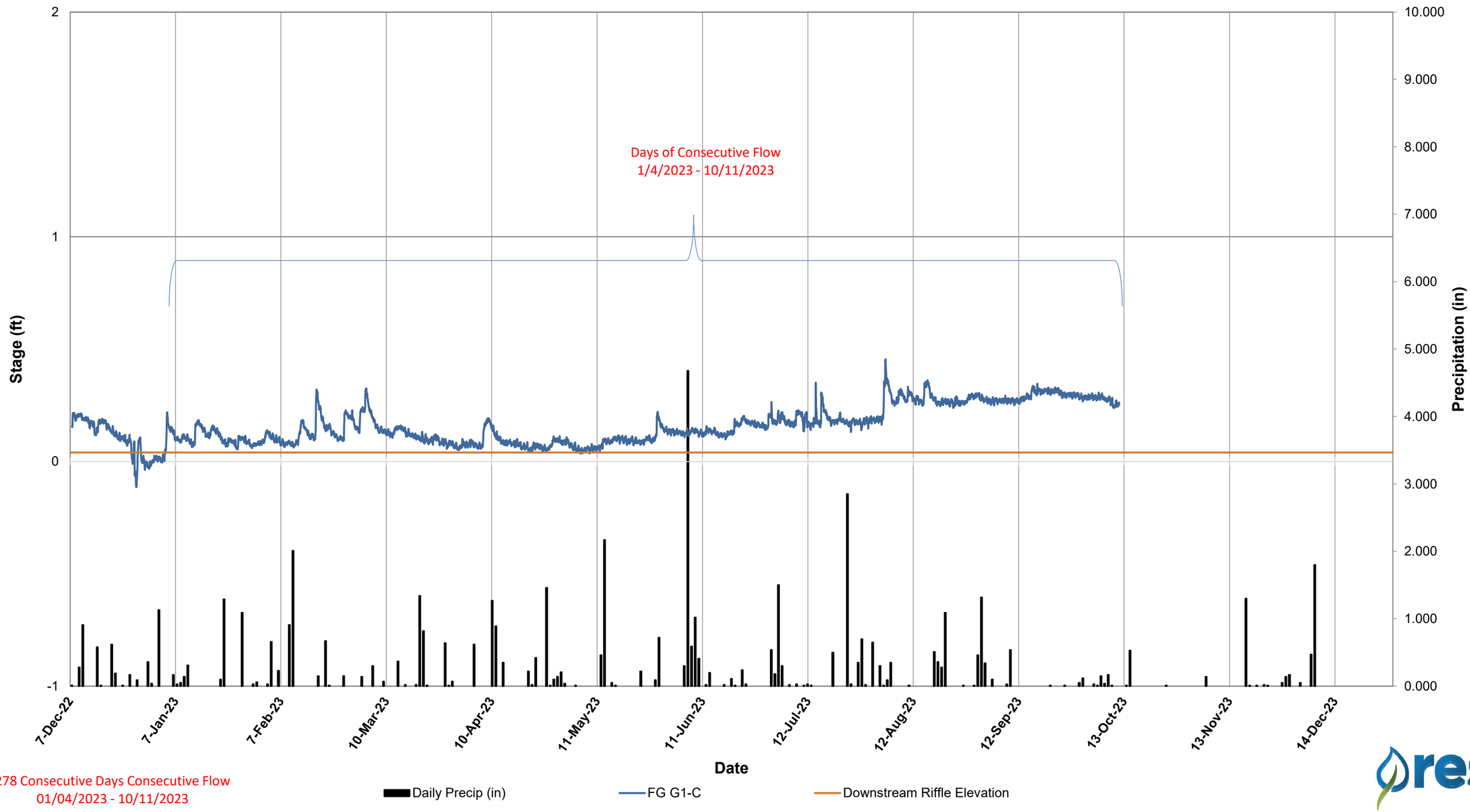
2023 Monkey Wall G1 Stage Recorder Graph



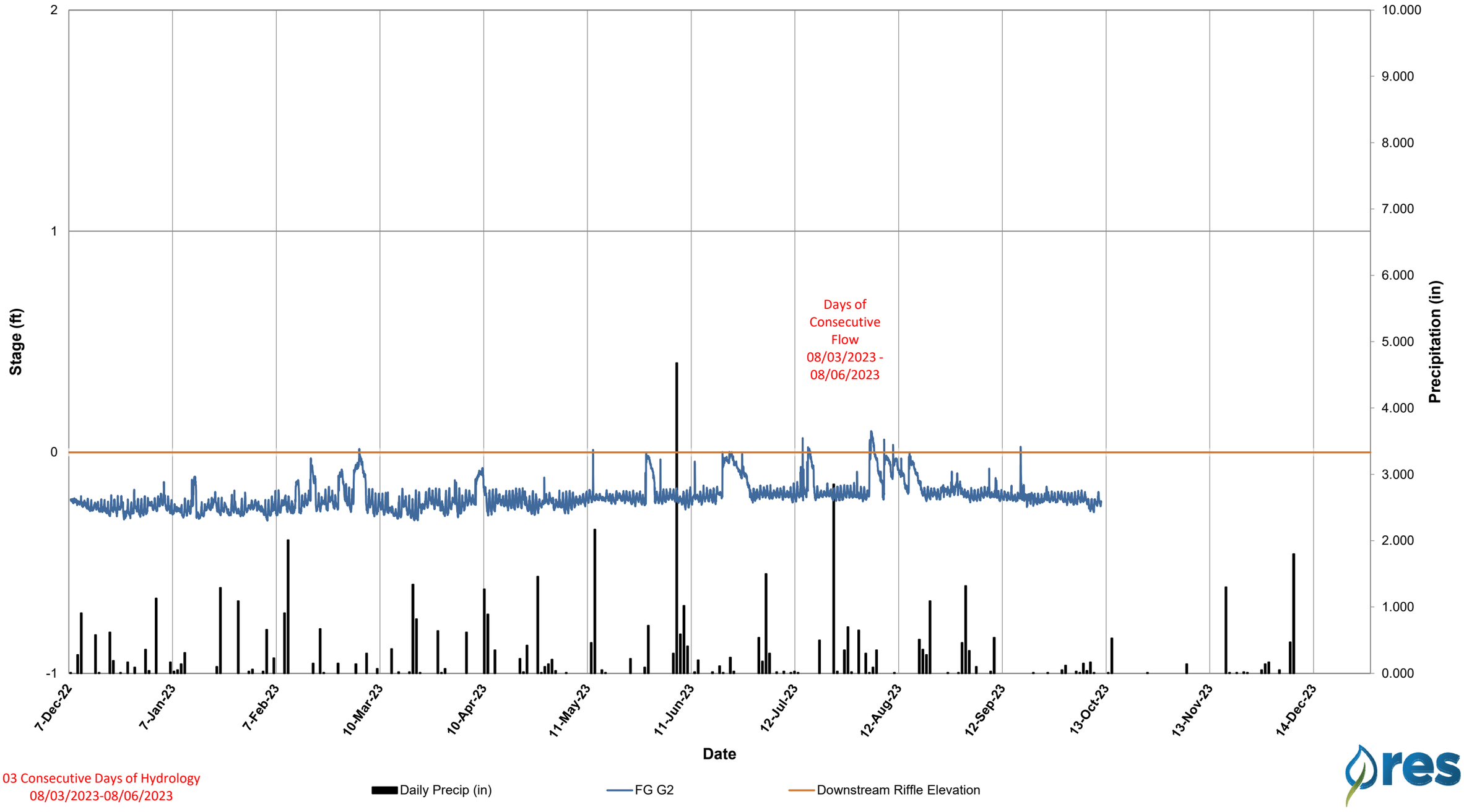
2023 Monkey Wall G2 Stage Recorder Graph



2023 Monkey Wall G1 Flow Gauge Graph



2023 Monkey Wall G2 Flow Gauge Graph



03 Consecutive Days of Hydrology
08/03/2023-08/06/2023