MY2 MONITORING REPORT

BRAHMA SITE
Alamance County, North Carolina
Cape Fear River Basin
Cataloging Unit 03030002

DMS Project No. 100092
Full Delivery Contract No. 7743
DMS RFP No. 16-007571
USACE Action ID No. SAW-2019-00126
DWR Project No. 20190158

Data Collection: January - November 2022
Submission: February 2023

Prepared for:

Mitigation Services
ENVIRONMENTAL QUALITY

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES
1652 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1652

Brahma Year 2, 2022 Monitoring Summary

General Notes

- No encroachment was identified in Year 2 (2022).
- No evidence of nuisance animal activity (i.e., heavy deer browsing, beaver activated, etc.) was observed.

Streams

- Streams remained stable with few deviations from MY0 even after receiving several high discharge events.
- All engineered structures were stable and functioning within design parameters; no stream areas of concern were documented.
- Two bankfull events were documented during MY2 (2022) making a total of 4 total bankfull events to date during the monitoring period (Table 11, Appendix D).
- Channel formation was evident in all Site tributaries during MY2 (Table 13A-E, Appendix D).

Wetlands

- Eleven of twelve groundwater gauges met success criteria for the year 2 (2022) monitoring period. Gauges 12 missed the 12% hydroperiod success criteria by two days giving it a hydroperiod of 11.0% (Appendix D).

Yr. 2 (2022) Groundwater Hydrology Data

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2021)	Year 2 (2022)	Year 3 (2023)	Year 4 (2024)	Year 5 (2025)	Year 6 (2026)	Year 7 (2027)
1	Yes 60 days (25.4%)	Yes 66 days (28.0%)					
2	No 21 days (8.9%)	Yes 47 days (19.9%)					
3	No 18 days (7.6%)	Yes 28 days (12.0%)					
4	Yes 46 days (19.5%)	Yes 60 days (25.4%)					
5	Yes 47 days (19.9%)	Yes 59 days (25.0%)					
6	No 25 days (10.6%)	Yes 59 days (25.0%)					
7	Yes 227 days (96.2%)	Yes 236 days (100%)					
8	Yes 46 days (19.5%)	Yes 59 days (25.0%)					
9	Yes 49 days (20.8%)	Yes 59 days (25.0%)					
10	Yes 39 days (16.5%)	Yes 43 days (18.2%)					
11	Yes 46 Days (19.5%)	Yes 66 days (28.0%)					
12	No 21 Days (8.9%)	No 26 days (11.0%)					

Vegetation

- Measurements of the 23 vegetation plots (19 permanent and 4 random transects) resulted in an average of 340 planted stems/acre excluding livestakes. Eleven of nineteen permanent plots and one of four random plots met success criteria (Tables 7-8, Appendix B).
- Qualitative and quantitative monitoring for planted stems indicate a need for replanting within areas of the Site during the 2022/2023 dormant season. A remedial action plan for site planting is provided in Appendix G.

Site Monitoring Activity and Reporting History

Project Millstones	Stream Monitoring Complete	Vegetation Monitoring Complete	Wetland Monitoring	Data Analysis Complete	Completion or Delivery
Construction Earthwork	--	--	--	--	December 9, 2020
Planting	--	--	--	--	January 12, 2021
As-Built Documentation	Jan. 11-12, 2021	Jan. 14-15, 2021	--	March 2021	April 2021
Year 1 Monitoring	October 19, 2021	July 28, 2021	Jan. – Nov. 2021	November 2021	January 2022
Year 2 Monitoring	October 26, 2022	July 7, 2022	Jan. – Nov. 2022	November 2022	February 2023

Site Maintenance Report (2022)

Invasive Species Work	Maintenance work
07/08/2022 Sweetgum, Multiflora rose, Privet 08/23/2022 Privet, Multiflora rose, Russian Olive, Sweetgum 8/29/2022 Sweetgum, Privet, Multiflora rose	None

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APPENDICES

1.0 PROJECT SUMMARY

Restoration Systems, LLC (RS) has established the North Carolina Division of Mitigation Services (NCDMS) Brahma Site (Site).

1.1 Project Background, Components, and Structure

The Brahma Site (hereafter referred to as the "Site") encompasses 22.7 acres of historically disturbed forest and livestock pasture along unnamed tributaries to Reedy Branch (warm water streams in the Jordan Lake watershed). The Site is located approximately 2 miles south of Snow Camp, NC, 5 miles northeast of Silk Hope, NC, and southwest of Clark Road (SR 2352) in southern Alamance County.

Before construction, land use at the Site was characterized by disturbed forest and livestock pasture. Riparian zones are primarily composed of herbaceous vegetation that is sparse and disturbed due to livestock grazing, bush hogging, and regular land-management activities.

During mitigation plan preparation, two Pilgrim's Pride chicken houses were being constructed on the property adjacent to the southeast portion of UT 1. The chicken houses were constructed on pads that have a groundwater drainage network leading to two pipes that discharge adjacent to the easement. The pipes do not drain effluent from the chicken houses and discharge clean water. Most drainage from the chicken house facilities drains through a draw that is treated at the easement boundary and then discharged in wetlands before entering Site tributaries.

Chicken waste management is being managed through a Joint Responsibility – Producer/Third-Party Applicator agreement in a manner consistent with requirements set forth by the State of North Carolina in 15A NCAC 02T Section 1400 (Manure Hauler Regulations) and NRCS standard 633 (Waste Utilization). Documentation of the agreement is available upon request. Under the agreement, the producer is responsible for keeping records on the amount of waste generated by the operation and providing the responsible third party with waste analysis records. The third-party applicator is responsible for applying materials at agronomic rates, soil testing, field evaluation, etc.

At present, no waste is to be discharged onto the property adjacent to the Site easement. If waste management changes, a minimum setback of 100 feet from perennial waters is required.

Proposed Site restoration activities generated 3881.066 Stream Mitigation Units (SMUs) and 6.655 Riparian Wetland Mitigation Units (WMUs), as described in Table 1.

Additional activities that occurred at the Site included the following.

- Planting 17.7 acres of the Site with 20,200 stems (planted species are included in Table 6 [Appendix B]).
- Fencing the entire conservation easement.

Site design was completed in August 2020. Construction started on August 29, 2020, and ended with a final walkthrough on December 9, 2020. The Site was planted on January 12, 2021. Completed project activities, reporting history, completion dates, and project contacts are summarized in Tables 14-15 (Appendix E).

Table 1. Mitigation Site (ID-100092) Project Mitigation Quantities and Credits

Project Segment	Original Mitigation Plan Ft/Ac	As-Built Ft/Ac	Original Mitigation Category	Original Restoration Level	Original Mitigation Ratio (X:1)	Credits		Comments
Stream								
UT-1A	3034	3121	Warm	EI	1.50000	2,022.667		
UT-1B	192	191	Warm	EII	2.50000	76.800		
UT-1C	911	911	Warm	P	10.00000	91.100		
UT-2	1354	1392	Warm	EII	2.50000	12.000		
UT-2A	30	30	Warm	EII	2.50000	541.600		
UT-3	239	245	Warm	R	1.00000	239.000		
UT-4	129	135	Warm	EII	2.50000	51.600		
UT-5	626	631	Warm	EII	2.50000	250.400		
UT-6	501	511	Warm	R	1.00000	501.000		
UT-7	47	48	Warm	EII	2.50000	18.800		
					Total:	**3,804.967**		
Wetland								
Wetland Reestablish	4.740	4.736	R	REE	1.00000	4.740		
Wetland Enhancement	3.709	3.708	R	E	2.00000	1.855		
Wetland Preservation	0.601	0.601	R	P	10.00000	0.060		
					Total:	**6.655**		

Project Credits

	Stream			Riparian	Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration	740.000			0.000	0.000	0.000
Re-establishment	0.000			4.740	0.000	0.000
Rehabilitation	0.000			0.000	0.000	0.000
Enhancement	0.000			1.855	0.000	0.000
Enhancement I	2,022.667	0.000	0.000			
Enhancement II	951.200	0.000	0.000			
Creation				0.000	0.000	0.000
Preservation	91.100	0.000	0.000	0.060	0.000	
Benthics 2%	76.099	0.000	0.000	0.000	0.000	
Totals	**3,881.066**	**0.000**	**0.000**	**6.655**	**0.000**	**0.000**

Total Stream Credit **3,881.066**
Total Wetland Credit **6.655**

Wetland Mitigation Category

CM	Coastal Marsh
R	Riparian
NR	Non-Riparian

Restoration Level

HQP	High Quality Preservation
P	Preservation
E	Wetland Enhancement - Veg and Hydro
EII	Stream Enhancement II
EI	Stream Enhancement I
C	Wetland Creation
RH	Wetland Rehabilitation - Veg and Hydro
REE	Wetland Re-establishment Veg and Hydro
R	Restoration

1.2 Project Goals and Objectives

Project goals are based on the *Cape Fear River Basin Restoration Priorities* (RBRP) report (NCEEP 2009) and on-site data collection of channel morphology and function observed during field investigations. The Site is located within **Targeted Local Watershed (TLW) 03030002050050**. The RBRP report documents benthic ratings vary between "Fair" and "Good-Fair" possibly due to cattle, dairy, and poultry operations. The project is not located in a Regional or Local Watershed Planning Area; however, RBRP goals are addressed by project activities as follows with Site-specific information following the RBRP goals in parenthesis.

1. Reduce and control sediment inputs – reduction of 8.0 tons/year after mitigation is complete);
2. Reduce and manage nutrient inputs - livestock removed from streams resulting in a direct reduction of 1020.8 pounds of nitrogen, 84.6 pounds of phosphorus per year, and 11.2 x 10^{11} colonies of fecal coliform; fertilizer application has been eliminated; and marsh treatment areas were installed);
3. Protect and augment designated natural heritage areas (NA).

Site-specific mitigation goals and objectives were developed through the use of the North Carolina Stream Assessment Method (NC SAM) and North Carolina Wetland Assessment Method (NC WAM) analyses of pre-construction and reference stream systems at the Site (NC SFAT 2015 and NC WFAT 2010) (see table below).

Table 2. Summary: Goals, Performance, and Results

Targeted Functions	Goals	Objectives	Compatibility with Success Criteria
(1) HYDROLOGY			
(2) Flood Flow (4) Wooded Riparian Buffer (4) Microtopography	• Attenuate flood flow across the Site. • Minimize downstream flooding to the maximum extent possible. • Connect streams to functioning wetland systems.	• Construct new channel at historic floodplain elevation to restore overbank flows and restore jurisdictional wetlands • Plant woody riparian buffer • Remove livestock • Deep rip floodplain soils to reduce compaction and increase soil surface roughness • Protect riparian buffers with a perpetual conservation easement	• BHR not to exceed 1.2 • Document four overbank events in separate monitoring years • Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded
(3) Stream Stability (4) Sediment Transport (4) Stream Geomorphology	• Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with proper pattern, dimension, and longitudinal profile • Remove livestock • Construct stable channels with appropriate substrate • Plant woody riparian buffer • Stabilize stream banks	• Cross-section measurements indicate a stable channel with appropriate substrate • Visual documentation of stable channels and structures • BHR not to exceed 1.2 • ER of 2.2 or greater • < 10% change in BHR and ER in any given year • Livestock excluded from the easement • Attain Vegetation Success Criteria

Table 2. Summary: Goals, Performance, and Results (Continued)

Targeted Functions	Goals	Objectives	Compatibility with Success Criteria
(1) WATER QUALITY			
(2) Streamside Area Vegetation (3) Upland Pollutant Filtration (2) Indicators of Stressors (2) Aquatic Life Tolerance Wetland Particulate Change Wetland Physical Change	• Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove livestock and reduce agricultural land/inputs • Install marsh treatment areas • Plant woody riparian buffer • Restore/enhance jurisdictional wetlands adjacent to Site streams • Provide surface roughness and reduce compaction through deep ripping/plowing. • Restore overbank flooding by constructing channels at historic floodplain elevation.	• Livestock excluded from the easement • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria
(1) HABITAT			
(2) In-stream Habitat (3) Substrate (3) In-Stream Habitat (2) Stream-side Habitat (3) Stream-side Habitat (3) Thermoregulation Wetland Physical Structure Wetland Landscape Patch Structure	• Improve instream and stream-side habitat.	• Construct stable channels with appropriate substrate • Plant woody riparian buffer to provide organic matter and shade • Construct new channel at historic floodplain elevation to restore overbank flows • Plant woody riparian buffer • Protect riparian buffers with a perpetual conservation easement • Restore/enhance jurisdictional wetlands adjacent to Site streams • Stabilize stream banks • Install in-stream structures	• Cross-section measurement indicate a stable channel with appropriate substrate • Visual documentation of stable channels and in-stream structures. • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded

1.3 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from on-site NC SAM data collection. From a mitigation perspective, several of the goals and objectives are assumed to be functionally elevated by restoration activities without direct measurement. Other goals and objectives will be considered successful upon achieving success criteria. The following summarizes Site success criteria.

Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow must be documented each year for at least 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • Entrenchment ratio (ER) must be no less than 2.2 at any measured riffle cross-section. • BHR and ER at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. • The stream project shall remain stable and all other performance standards shall be met through four separate bankfull events, occurring in separate years, during the monitoring years 1-7.

Success Criteria (Continued)

Wetland Hydrology
• Saturation or inundation within the upper 12 inches of the soil surface for, at a minimum, 12 percent of the growing season, during average climatic conditions.
Vegetation
• Within planted portions of the site, a minimum of 320 stems per acre must be present at year 3; a minimum of 260 stems per acre must be present at year 5; and a minimum of 210 stems per acre must be present at year 7. • Trees must average 7 feet in height at year 5, and 10 feet in height at year 7 in each plot. • Planted and volunteer stems are counted, provided they are included in the approved planting list for the site; natural recruits not on the planting list may be considered by the IRT on a case-by-case basis.

2.0 METHODS

Monitoring will be conducted by Axiom Environmental, Inc. Annual monitoring reports of the data collected will be submitted to the NCDMS by Restoration Systems no later than December 1 of each monitoring year data is collected. The monitoring schedule is summarized in the following table.

Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Streams	X	X	X		X		X
Wetlands	X	X	X	X	X	X	X
Vegetation	X	X	X		X		X
Macroinvertebrates			X		X		X
Visual Assessment	X	X	X	X	X	X	X
Report Submittal	X	X	X	X	X	X	X

2.1 Monitoring

The monitoring parameters are summarized in the following table.

Monitoring Summary

Stream Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Stream Profile	Full longitudinal survey	As-built (unless otherwise required)	All restored stream channels	Graphic and tabular data.
Stream Dimension	Cross-sections	Years 1, 2, 3, 5, and 7	Total of 12 cross-sections on restored channels	Graphic and tabular data.
Channel Stability	Visual Assessments	Yearly	All restored stream channels	Areas of concern will be depicted on a plan view figure with a written assessment and photograph of the area included in the report.
	Additional Cross-sections	Yearly	Only if instability is documented during monitoring	Graphic and tabular data.
Stream Hydrology	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	3 surface water gauges on UT 3, 5, and 6	Surface water data for each monitoring period
Bankfull Events	Continuous monitoring surface water gauges and/or trail camera	Continuous recording through monitoring period	3 surface water gauges on UT 3, 5, and 6	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through monitoring period	1 crest gauge on UT 1	Visual evidence, photo documentation, and/or rain data.
Benthic Macroinvertebrates	"Qual 4" method described in *Standard Operating Procedures for Collection and Analysis of Benthic Macroinvertebrates, Version 5.0* (NCDWR 2016)	Pre-construction, Years 3, 5, and 7 during the "index period" referenced in *Small Streams Biocriteria Development* (NCDWQ 2009)	2 stations (on UT 1 upstream and UT 1 downstream); however, the exact locations will be determined at the time pre-construction benthics are collected	Results* will be presented on a site-by-site basis and will include a list of taxa collected, an enumeration of *Ephemeroptera, Plecoptera,* and *Tricopetera* taxa as well as Biotic Index values.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Restoration	Groundwater gauges	Years 1, 2, 3, 4, 5, 6, and 7 throughout the year with the growing season defined as March 1-October 22	10 gauges spread throughout restored wetlands	Soil temperature at the beginning of each monitoring period to verify the start of the growing season, groundwater and rain data for each monitoring period
Vegetation Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Vegetation establishment and vigor	Permanent vegetation plots 0.0247 acre (100 square meters) in size; *CVS-EEP Protocol for Recording Vegetation*, *Version 4.2* (Lee et al. 2008)	As-built, Years 1, 2, 3, 5, and 7	19 plots spread across the Site	Species, height, planted vs. volunteer, stems/acre
	Annual random vegetation plots, 0.0247 acre (100 square meters) in size	As-built, Years 1, 2, 3, 5, and 7	4 plots randomly selected each year	Species and height

*Benthic Macroinvertebrate sampling data will not be tied to success criteria; however, the data may be used as a tool to observe positive gains to in-stream habitat

Stream Summary

All streams are functioning as designed, and no stream areas of concern were observed during year 2 (2022) monitoring. Stream morphology data is available in Appendix C.

Wetland Summary

Summary of Monitoring Period/Hydrology Success Criteria by Year

Year	Soil Temperatures/Date Bud Burst Documented	Monitoring Period Used for Determining Success	12 Percent of Monitoring Period
2021 (Year 1)	March 1, 2021	March 1-October 22 (236 days)	28 days
2022 (Year 2)	March 1, 2022*	March 1-October 22 (236 days)	28 days

*Based on documented bud burst on 2/28/22 and an onsite soil temperature logger reading of 45.97°F on 3/1/22 and staying well above 41°F thereafter.

Eleven of twelve groundwater gauges met success criteria for the year 2 (2022) monitoring period. Gauge No. 12 missed the 12% hydroperiod success criteria by 2 days with a hydroperiod of 11.0% (26 days) (Appendix D). WETs monthly rainfall sum and 30-70 percentiles are reported (Figure D1, Appendix D).

Vegetation Summary

During quantitative vegetation sampling, 19 sample plots (10-meter by 10-meter) were installed within the Site as per guidelines established in CVS-EEP Protocol for Recording Vegetation, Version 4.2 (Lee et al. 2008). Year 2 (2022) vegetation measurements occurred on July 7, 2022 and also included four temporary vegetation plots (50 meter by 2 meter). Measurements of the 23 vegetation plots (19 permanent and 4 temporary plots) resulted in an average of 340 planted stems/acre, excluding live stakes. Additionally, eleven of nineteen individual plots and one of four random transects met success criteria (Tables 7-8, Appendix B).

Vegetation mortality during MY1 and 2 mainly occurred in wetland credit areas where herbaceous species have established. These are likely out-competing many of the smaller bare-root trees. Though herbaceous growth across the Site is strong, RS does not feel it is warranted to treat the herbaceous layer at this time.

Given the qualitative and quantitative monitoring data, RS proposes a remedial action plan for site planting - Appendix G.

Table 3. Project Attribute Table								
Project Name	Brahma Site							
County	Alamance County, North Carolina							
Project Area (acres)	22.7							
Project Coordinates (latitude and longitude decimal degrees)	35.8540ºN, 79.4106ºW							
Project Watershed Summary Information								
Physiographic Province	Piedmont							
River Basin	Cape Fear							
USGS Hydrologic Unit 8-digit	03030002							
DWR Sub-basin	03-06-04							
Project Drainage Area (acres)	231							
Project Drainage Area Percentage of Impervious Area	<2%							
Land Use Classification	Managed Herbaceous Cover & Hardwood Swamps							
Reach Summary Information								
Parameters	**UT 1 (upstream of confluence with UT2)**	**UT 1 (downstream of confluence with UT2)**	**UT 2**	**UT 3**	**UT4**	**UT5**	**UT6**	**UT7**
Pre-project length (feet)	1071	3227	1384	239	129	657	501	47
Post-project (feet)	1072	3313	1390	245	135	662	511	48
Valley confinement (Confined, moderately confined, unconfined)	Alluvial, confined - moderately confined							
Drainage area (acres)	149.3	230.8	57.3	14.6	1.6	26.2	12.3	2.9
Perennial, Intermittent, Ephemeral	Per	Per	Int/Per	Int	Int	Int/Per	Int	Int
NCDWR Water Quality Classification	C, NSW							
Dominant Stream Classification (existing)	G5	Cg 4/5	G4/5	G5	F6	G/F4/5	F5	G5
Dominant Stream Classification (proposed)	C/E 4	C/E 4	G4/5	C/E 4	F6	C/F4/5	C/E 4	G5
Dominant Evolutionary class (Simon) if applicable	III/IV	III/IV	III	III	V	IV	III/IV	IV
Wetland Summary Information								
Parameters	**Wetlands**							
Pre-project (acres)	5.157 acres drained & 4.427 acres degraded							
Post-project (acres)	4.736 acres restored & 4.309 acres enhanced/preserved							
Wetland Type (non-riparian, riparian)	Riparian riverine							
Mapped Soil Series	Wehadkee							
Soil Hydric Status	Hydric							
Regulatory Considerations								
Parameters	**Applicable?**		**Resolved?**			**Supporting Docs?**		
Water of the United States - Section 404	Yes		Yes			401 Permit		
Water of the United States - Section 401	Yes		Yes			404 Certification		
Endangered Species Act	Yes		Yes			CE Document		
Historic Preservation Act	Yes		Yes			CE Document		
Coastal Zone Management Act (CZMA or CAMA)	NA		NA			NA		
Essential Fisheries Habitat	NA		NA			NA		

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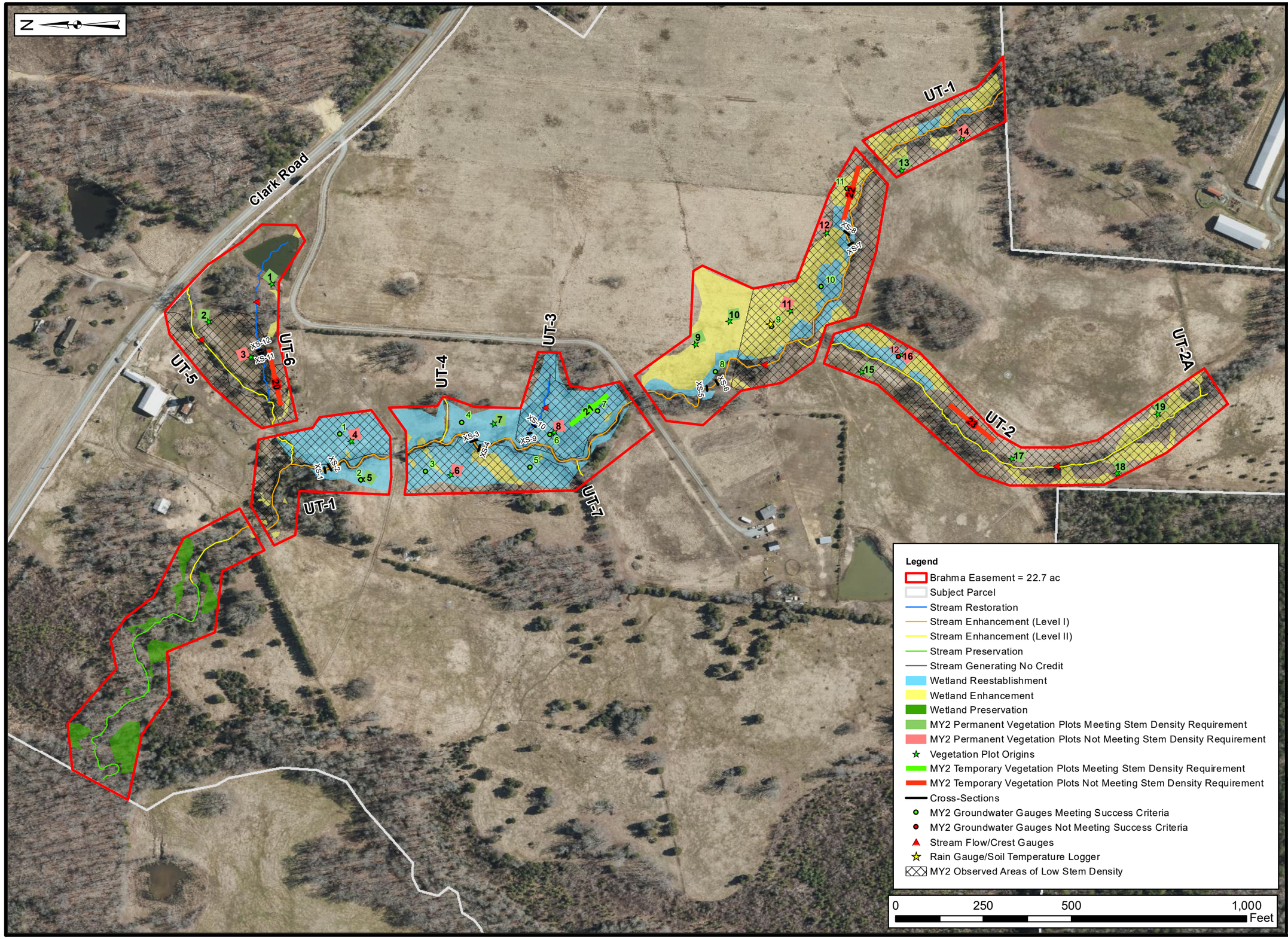
Appendix A
Visual Assessment Data

Figure 1. Current Conditions Plan View
Tables 4A-G. Stream Visual Stability Assessment
Table 5. Visual Vegetation Assessment
Vegetation Plot Photographs



Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

BRAHMA SITE

Alamance County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Drawn by: BEF

Date: JAN 2023

Scale: 1:3100

Project No.: 19-006

FIGURE

1

Table 4A. Visual Stream Stability Assessment

Reach UT 1

Assessed Stream Length 3312

Assessed Bank Length 6624

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.	33	33		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)	33	33		100%

Table 4B. Visual Stream Stability Assessment

Reach UT 2

Assessed Stream Length 1390

Assessed Bank Length 2780

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.	8	8		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)	8	8		100%

Table 4C. Visual Stream Stability Assessment

Reach	UT 3
Assessed Stream Length	245
Assessed Bank Length	490

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.	6	6		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)	6	6		100%

Table 4D. Visual Stream Stability Assessment

Reach UT 4

Assessed Stream Length 135

Assessed Bank Length 270

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.	0	0		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)	0	0		100%

Table 4E. Visual Stream Stability Assessment

Reach UT 5

Assessed Stream Length 662

Assessed Bank Length 1324

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.	0	0		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)	0	0		100%

Table 4F. Visual Stream Stability Assessment

Reach UT 6

Assessed Stream Length 511

Assessed Bank Length 1022

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.	19	19		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)	19	19		100%

Table 5. Visual Vegetation Assessment

Planted acreage **17.7**

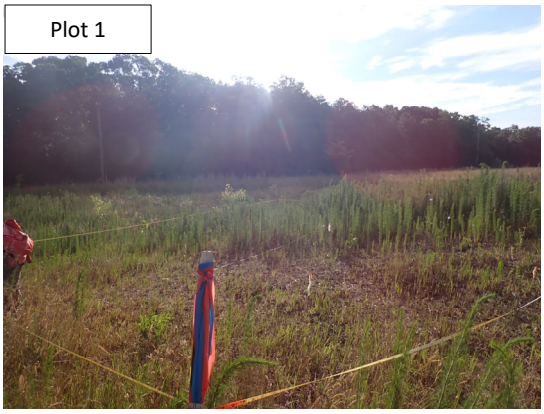
Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10acres	13.08	73.9%
	Total		13.08	73.9%
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
	Cumulative Total		13.08	73.9%

Easement Acreage **22.7**

Vegetation Category	Definitions	Mapping Threshold	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Species included in summation above should be identified in report summary.	0.10 acres	0.00	0.0%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0.00	

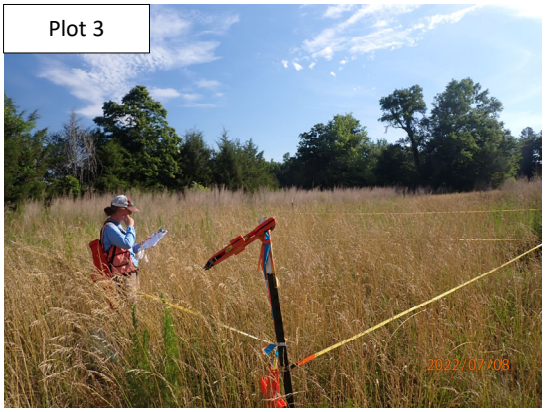
Brahma Site
MY2 (2022) Vegetation Monitoring Photographs (taken July 2022)

Plot 1



Plot 2

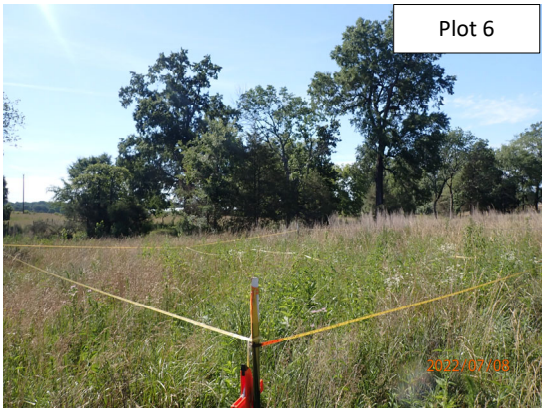
Plot 3



Plot 4

Plot 5

Plot 6



Plot 7

Plot 8

Brahma Site
MY2 (2022) Vegetation Monitoring Photographs (taken July 2022)

Plot 9

Plot 10

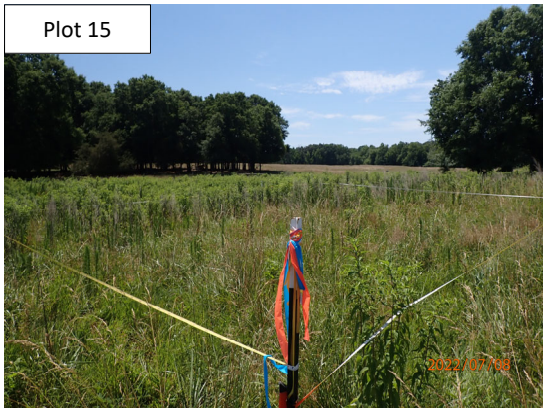
Plot 11

Plot 12

Plot 13

Plot 14

Plot 15

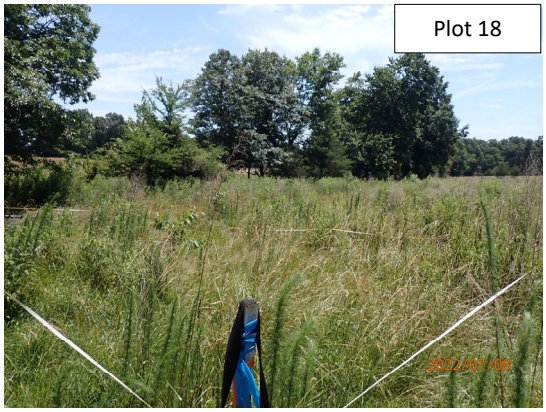


Plot 16

Brahma Site
MY2 (2022) Vegetation Monitoring Photographs (taken July 2022)

Plot 17

Plot 18



Plot 19

Appendix B
Vegetation Data

Table 6. Planted Bare-Root Woody Vegetation
Table 7. Vegetation Plot Counts and Densities
Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Table 6. Planted Bare Root Woody Vegetation
Brahma Site

Species	Total
Acres	**17.7**
Asimina triloba	200
Betula nigra	1500
Celtis occidentalis	500
Cephalanthus occidentalis	600
Cornus amomum	2700
Diospyros virginiana	500
Fraxinus pennsylvanica	900
Liriodendron tulipifera	1000
Morus rubra	600
Nyssa sylvatica	1000
Platanus occidentalis	2700
Quercus alba	1000
Quercus lyrata	500
Quercus nigra	2000
Quercus pagoda	1000
Quercus phellos	2000
Quercus shumardii	1000
Ulmus americana	500
TOTALS	**20,200**
Average Stems/Acre	**1141**

Table 7. Planted Vegetation Totals
Brahma Site

Plot #	Planted Stems/Acre	Success Criteria Met?
1	648	Yes
2	486	Yes
3	162	No
4	283	No
5	445	Yes
6	283	No
7	648	Yes
8	202	No
9	486	Yes
10	445	Yes
11	283	No
12	202	No
13	405	Yes
14	202	No
15	324	Yes
16	283	No
17	567	Yes
18	364	Yes
19	364	Yes
R-20	202	No
R-21	324	Yes
R-22	121	No
R-23	81	No
Average Planted Stems/Acre	**340**	**Yes**

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Planted Acreage	17.7
Date of Initial Plant	2021-01-01
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2022-07-07
Date of Current Survey	2022-07-07
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Asimina triloba	pawpaw	Tree	FAC																			3	3	1	1		
	Betula nigra	river birch	Tree	FACW			2	2	1	1															1	1		
	Celtis laevigata	sugarberry	Tree	FACW																								
	Celtis occidentalis	common hackberry	Tree	FACU													3	3									1	1
	Cornus amomum	silky dogwood	Shrub	FACW	4	4	1	1																				
	Diospyros virginiana	common persimmon	Tree	FAC	1	1	5	5	3	3					3	3					1	1					1	1
	Fraxinus pennsylvanica	green ash	Tree	FACW			3	3																				
	Liriodendron tulipifera	tuliptree	Tree	FACU	2	2																						
	Morus rubra	red mulberry	Tree	FACU																								
	other																				1	1						
	Platanus occidentalis	American sycamore	Tree	FACW	2	2	1	1			1	1	1	1					1	1	6	6	3	3				
	Quercus alba	white oak	Tree	FACU	2	2			1	1			1	1					1	1					1	1		
	Quercus lyrata	overcup oak	Tree	OBL									1	1			2	2			1	1						
	Quercus nigra	water oak	Tree	FAC											1	1					1	1	1	1				
	Quercus pagoda	cherrybark oak	Tree	FACW	2	2					3	3	2	2	1	1	1	1	2	2								
	Quercus phellos	willow oak	Tree	FAC									3	3			3	3									2	2
	Quercus rubra	northern red oak	Tree	FACU																								
	Quercus sp.				3	3					3	3	3	3	2	2	4	4	1	1	1	1	4	4	6	6	1	1
	Ulmus americana	American elm	Tree	FACW													3	3			1	1						
Sum	Performance Standard				16	16	12	12	5	5	7	7	11	11	7	7	16	16	5	5	12	12	11	11	9	9	5	5
Mitigation Plan Performance Standard	Current Year Stem Count					16		12		5		7		11		7		16		5		12		11		9		5
	Stems/Acre					648		486		162		283		445		283		648		202		486		445		283		202
	Species Count					7		5		3		3		6		4		6		4		7		4		4		4
	Dominant Species Composition (%)					25		42		60		43		27		43		25		40		50		36		67		40
	Average Plot Height (ft.)					1		2		2		1		2		1		1		1		2		2		1		1
	% Invasives					0		0		0		0		0		0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					16		12		5		7		11		7		16		5		12		11		9		5
	Stems/Acre					648		486		162		283		445		283		648		202		486		445		283		202
	Species Count					7		5		3		3		6		4		6		4		7		4		4		4
	Dominant Species Composition (%)					25		42		60		43		27		43		25		40		50		36		67		40
	Average Plot Height (ft.)					1		2		2		1		2		1		1		1		2		2		1		1
	% Invasives					0		0		0		0		0		0		0		0		0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Planted Acreage	17.7
Date of Initial Plant	2021-01-01
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	2022-07-07
Date of Current Survey	2022-07-07
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 13 F		Veg Plot 14 F		Veg Plot 15 F		Veg Plot 16 F		Veg Plot 17 F		Veg Plot 18 F		Veg Plot 19 F		Veg Plot 20 R	Veg Plot 21 R	Veg Plot 22 R	Veg Plot 23 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Asimina triloba	pawpaw	Tree	FAC											1	1						
	Betula nigra	river birch	Tree	FACW																		
	Celtis laevigata	sugarberry	Tree	FACW															4			
	Celtis occidentalis	common hackberry	Tree	FACU	1	1																
	Cornus amomum	silky dogwood	Shrub	FACW																		
	Diospyros virginiana	common persimmon	Tree	FAC			1	1			2	2							1	1		2
	Fraxinus pennsylvanica	green ash	Tree	FACW					2	2			2	2	1	1	2	2				
	Liriodendron tulipifera	tuliptree	Tree	FACU									1	1	2	2	1	1				
	Morus rubra	red mulberry	Tree	FACU			2	2														
	other				1	1			1	1												
	Platanus occidentalis	American sycamore	Tree	FACW	2	2	1	1			5	5	3	3	2	2						
	Quercus alba	white oak	Tree	FACU																1	1	
	Quercus lyrata	overcup oak	Tree	OBL											1	1						
	Quercus nigra	water oak	Tree	FAC													2	2				
	Quercus pagoda	cherrybark oak	Tree	FACW	1	1																
	Quercus phellos	willow oak	Tree	FAC			1	1					3	3			3	3	1	3		
	Quercus rubra	northern red oak	Tree	FACU																	1	
	Quercus sp.				5	5			7	7	1	1	5	5	2	2	1	1		3	1	1
	Ulmus americana	American elm	Tree	FACW																		
Sum	Performance Standard				10	10	5	5	10	10	8	8	14	14	9	9	9	9	6	8	3	3
Mitigation Plan Performance Standard	Current Year Stem Count					10		5		10		8		14		9		9	6	8	3	3
	Stems/Acre					405		202		324		283		567		364		364	202	324	121	81
	Species Count					5		4		3		3		5		6		5	3	4	3	2
	Dominant Species Composition (%)					50		40		70		62		36		22		33	67	38	33	67
	Average Plot Height (ft.)					1		2		1		2		1		1		1	1	1	2	2
	% Invasives					0		0		0		0		0		0		0	0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					10		5		10		8		14		9		9	6	8	3	3
	Stems/Acre					405		202		324		283		567		364		364	202	324	121	81
	Species Count					5		4		3		3		5		6		5	3	4	3	2
	Dominant Species Composition (%)					50		40		70		62		36		22		33	67	38	33	67
	Average Plot Height (ft.)					1		2		1		2		1		1		1	1	1	2	2
	% Invasives					0		0		0		0		0		0		0	0	0	0	0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Appendix C
Stream Geomorphology Data

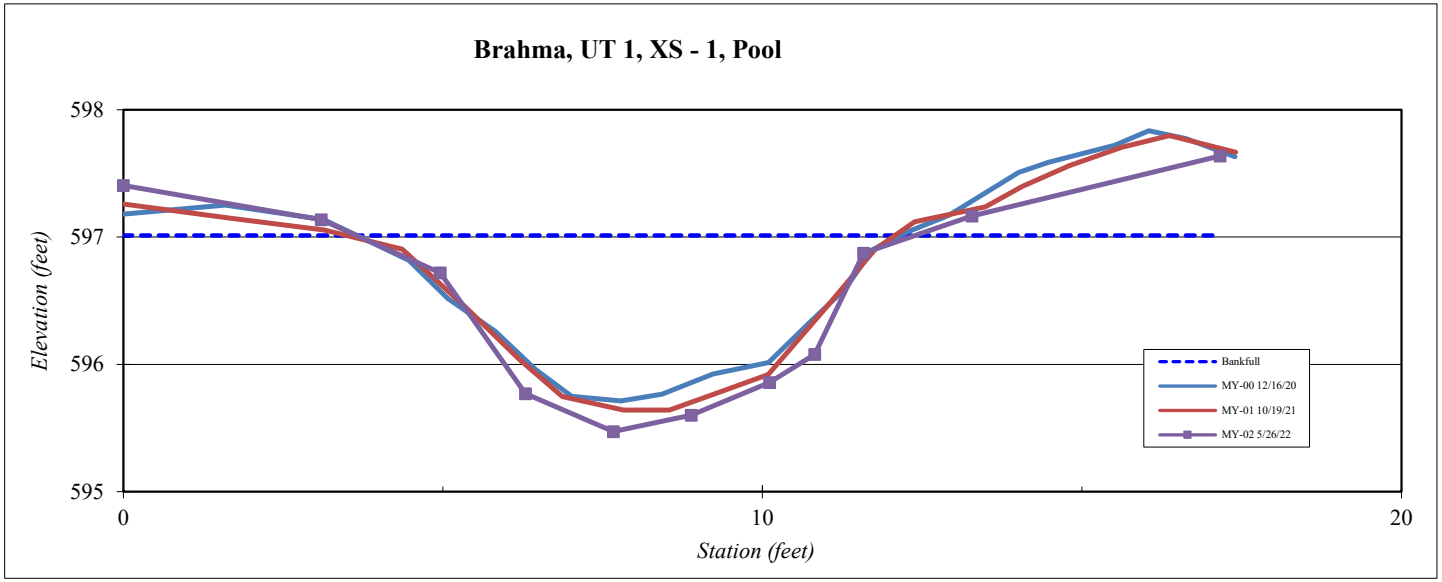
Cross-Sections with Annual Overlays
Table 9A-B. Baseline Stream Data Summary Tables
Table 10. Cross-Section Morphology Monitoring Summary

Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS -1, Pool
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.0	597.4
3.1	597.1
5.0	596.6
6.3	595.6
7.7	595.2
8.9	595.4
10.1	595.7
10.8	595.9
11.6	596.8
13.3	597.1
17.2	597.7

SUMMARY DATA	
Bankfull Elevation:	597.0
Bank Hieght Ratio:	0.91
Thalweg Elevation:	595.2
LTOB Elevation:	596.8
LTOB Max Depth:	1.6
LTOB Cross Sectional Area:	7.5

Stream Type	E/C 5

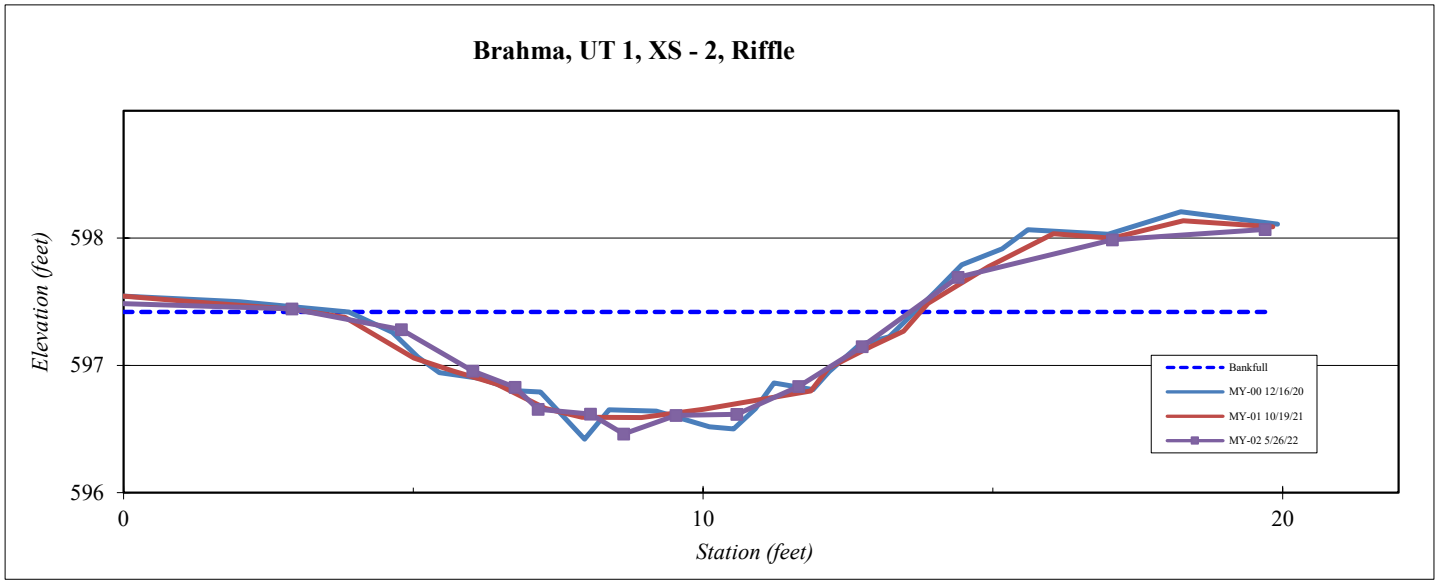


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS -2, Riffle
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
-0.2	597.5
2.9	597.5
4.8	597.3
6.0	596.9
6.8	596.8
7.2	596.6
8.1	596.5
8.6	596.3
9.5	596.5
10.6	596.5
11.6	596.8
12.7	597.1
14.4	597.7
17.1	598.1
19.7	598.2

SUMMARY DATA	
Bankfull Elevation:	597.4
Bank Hieght Ratio:	0.97
Thalweg Elevation:	596.3
LTOB Elevation:	597.5
LTOB Max Depth:	1.1
LTOB Cross Sectional Area:	6.3

Stream Type	E/C 5

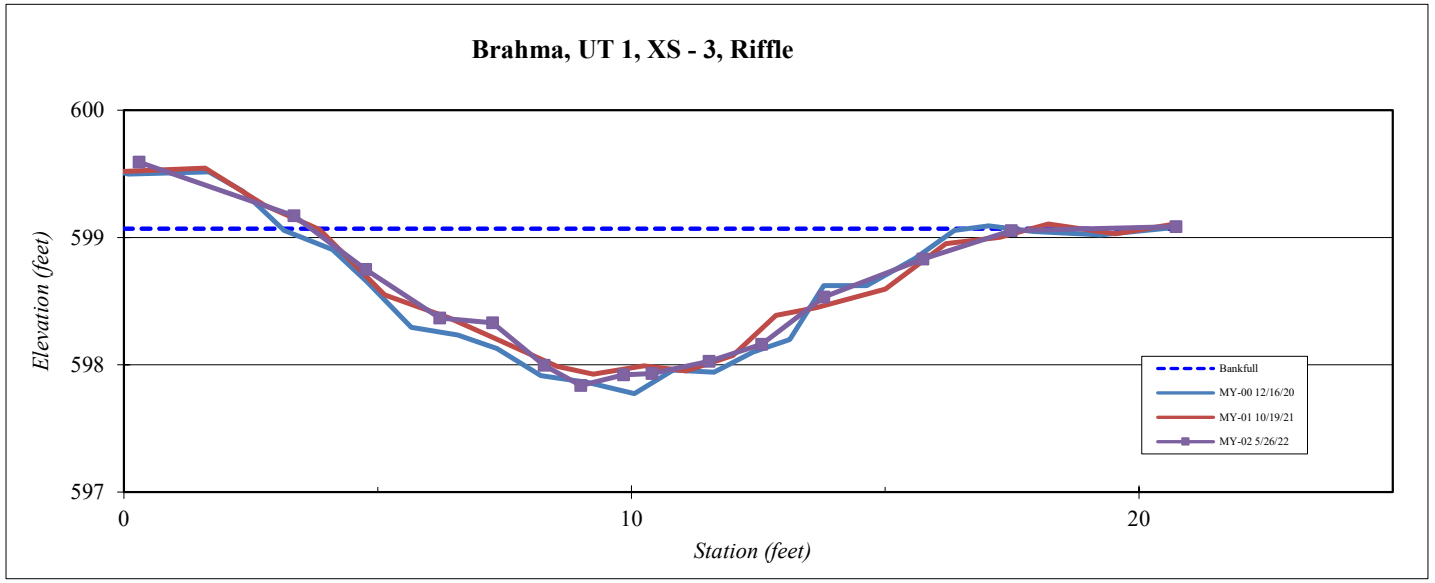


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS -3, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.3	599.9
3.4	599.4
4.8	598.9
6.2	598.5
7.3	598.5
8.3	598.1
9.0	597.9
9.8	598.0
10.4	598.0
11.5	598.1
12.6	598.3
13.8	598.7
15.7	599.0
17.5	599.3
20.7	599.3

SUMMARY DATA	
Bankfull Elevation:	599.3
Bank Hieght Ratio:	1.01
Thalweg Elevation:	597.9
LTOB Elevation:	599.3
LTOB Max Depth:	1.4
LTOB Cross Sectional Area:	10.1

Stream Type	E/C 5

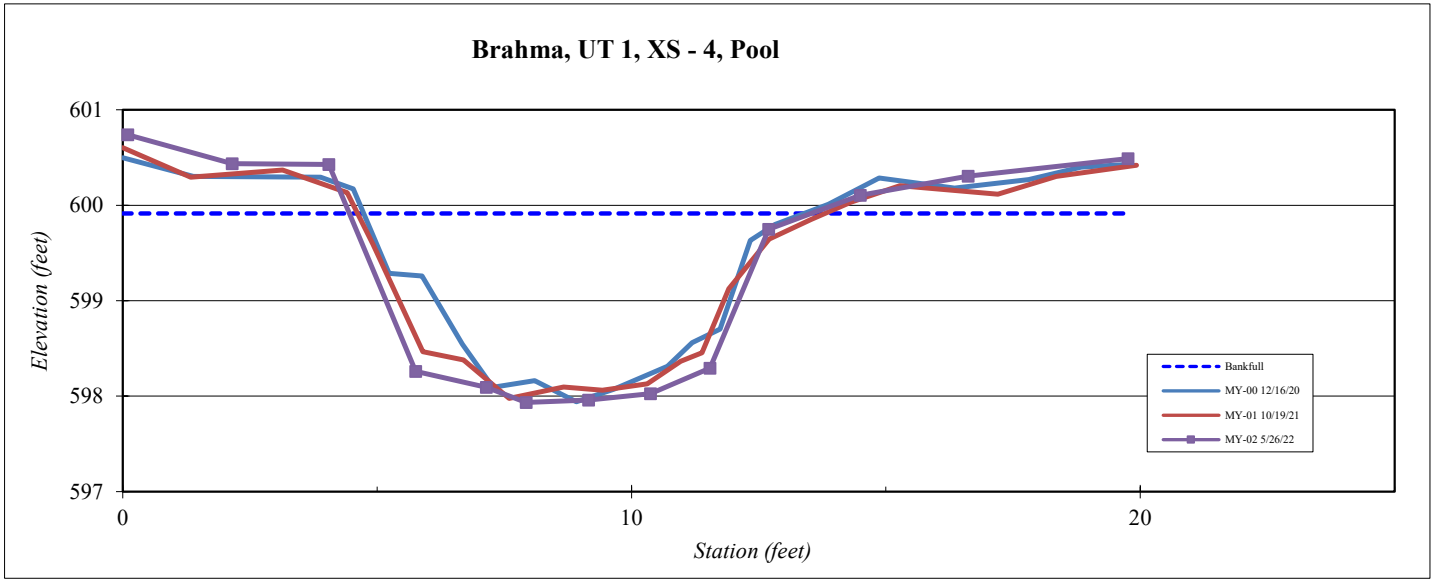


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS -4, Pool
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.1	601.2
2.1	600.8
4.1	600.8
5.8	598.4
7.1	598.2
7.9	598.0
9.2	598.0
10.4	598.1
11.5	598.4
12.7	600.1
14.5	600.5
16.6	600.7
19.8	600.9

SUMMARY DATA	
Bankfull Elevation:	600.3
Bank Hieght Ratio:	1.04
Thalweg Elevation:	598.0
LTOB Elevation:	600.5
LTOB Max Depth:	2.5
LTOB Cross Sectional Area:	16.6

Stream Type	E/C 5

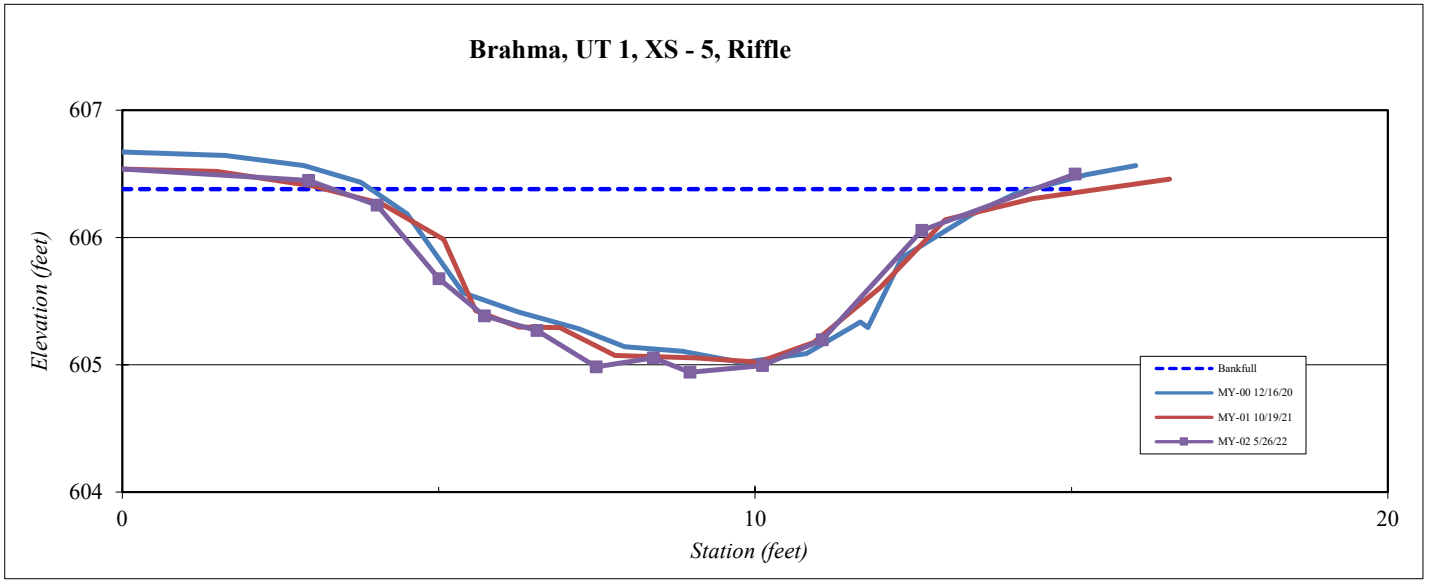


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS - 5, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
-1.1	606.6
2.9	606.5
4.0	606.3
5.0	605.6
5.7	605.3
6.6	605.2
7.5	604.9
8.4	604.9
9.0	604.8
10.1	604.9
11.1	605.1
12.6	606.1
15.1	606.6

SUMMARY DATA	
Bankfull Elevation:	606.4
Bank Hieght Ratio:	0.95
Thalweg Elevation:	604.8
LTOB Elevation:	606.5
LTOB Max Depth:	1.7
LTOB Cross Sectional Area:	11.6

Stream Type	E/C 5

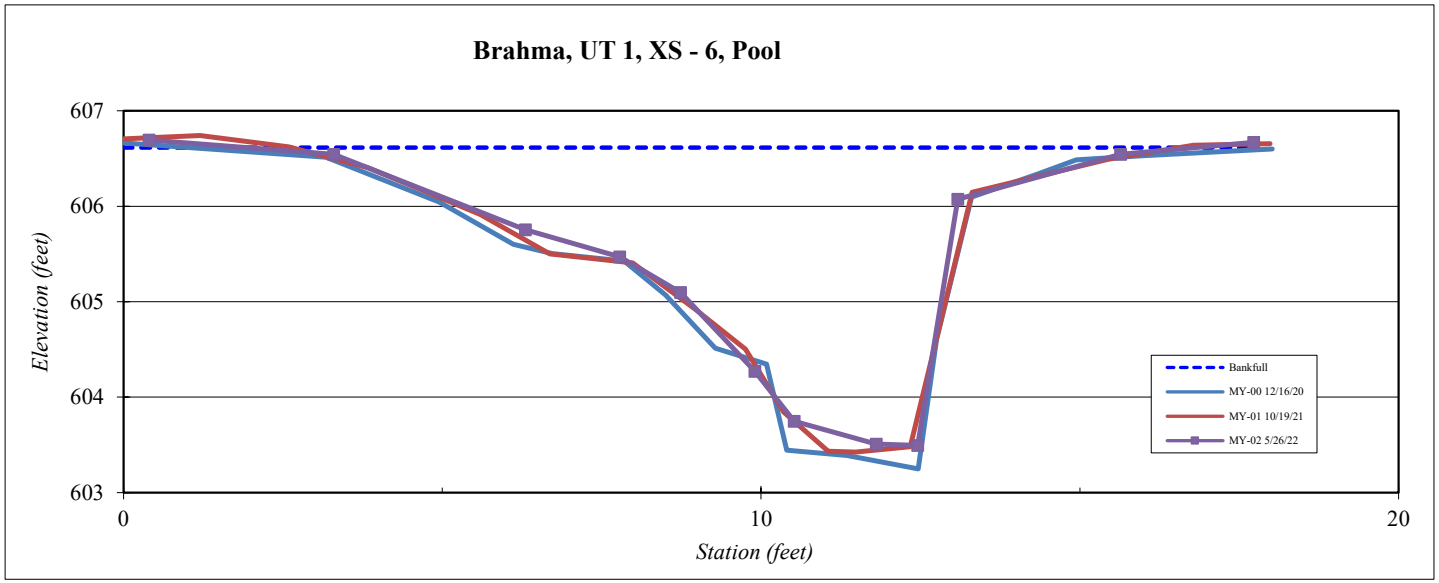


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS - 6, Pool
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.4	606.8
3.3	606.6
6.3	605.7
7.8	605.4
8.7	605.0
9.9	604.0
10.5	603.5
11.8	603.2
12.5	603.2
13.1	606.1
15.6	606.6
17.7	606.8

SUMMARY DATA	
Bankfull Elevation:	606.7
Bank Hieght Ratio:	1.02
Thalweg Elevation:	603.2
LTOB Elevation:	606.6
LTOB Max Depth:	3.4
LTOB Cross Sectional Area:	16.9

Stream Type	E/C 5

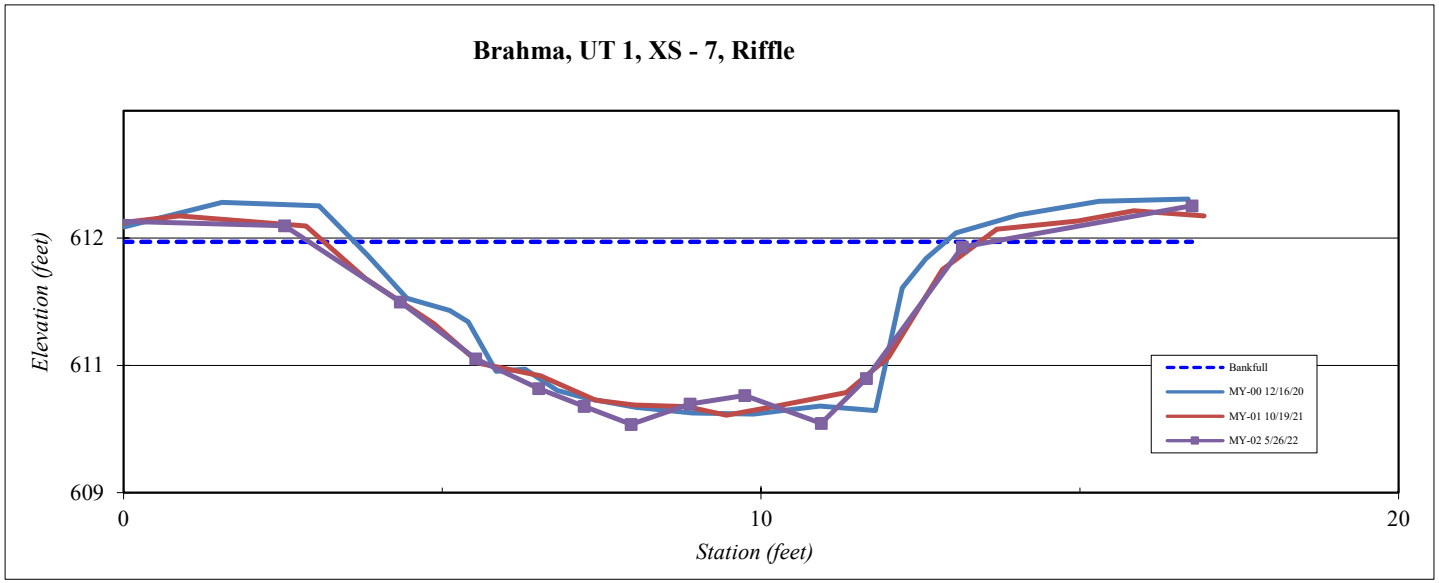


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS - 7, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
-0.2	611.8
2.5	611.8
4.3	611.1
5.5	610.6
6.5	610.3
7.2	610.2
8.0	610.0
8.9	610.2
9.7	610.3
10.9	610.0
11.7	610.4
13.2	611.6
16.8	611.9

SUMMARY DATA	
Bankfull Elevation:	611.6
Bank Hieght Ratio:	1.03
Thalweg Elevation:	610.0
LTOB Elevation:	611.6
LTOB Max Depth:	1.6
LTOB Cross Sectional Area:	10.5

Stream Type	E/C 5

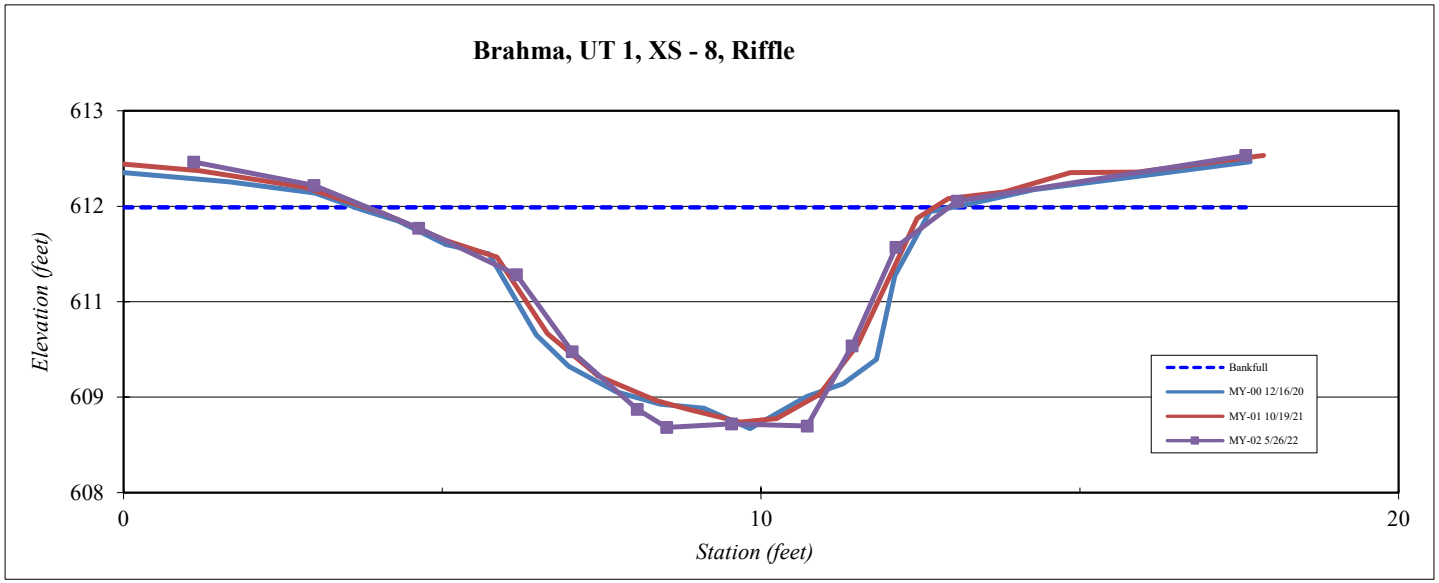


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT1, XS - 8, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
1.1	612.2
3.0	611.9
4.6	611.4
6.2	610.8
7.0	609.9
8.1	609.2
8.5	609.0
9.5	609.1
10.7	609.0
11.4	610.0
12.1	611.2
13.1	611.7
17.6	612.3

SUMMARY DATA	
Bankfull Elevation:	611.6
Bank Hieght Ratio:	0.97
Thalweg Elevation:	609.0
LTOB Elevation:	611.7
LTOB Max Depth:	2.7
LTOB Cross Sectional Area:	14.0

Stream Type	E/C 5

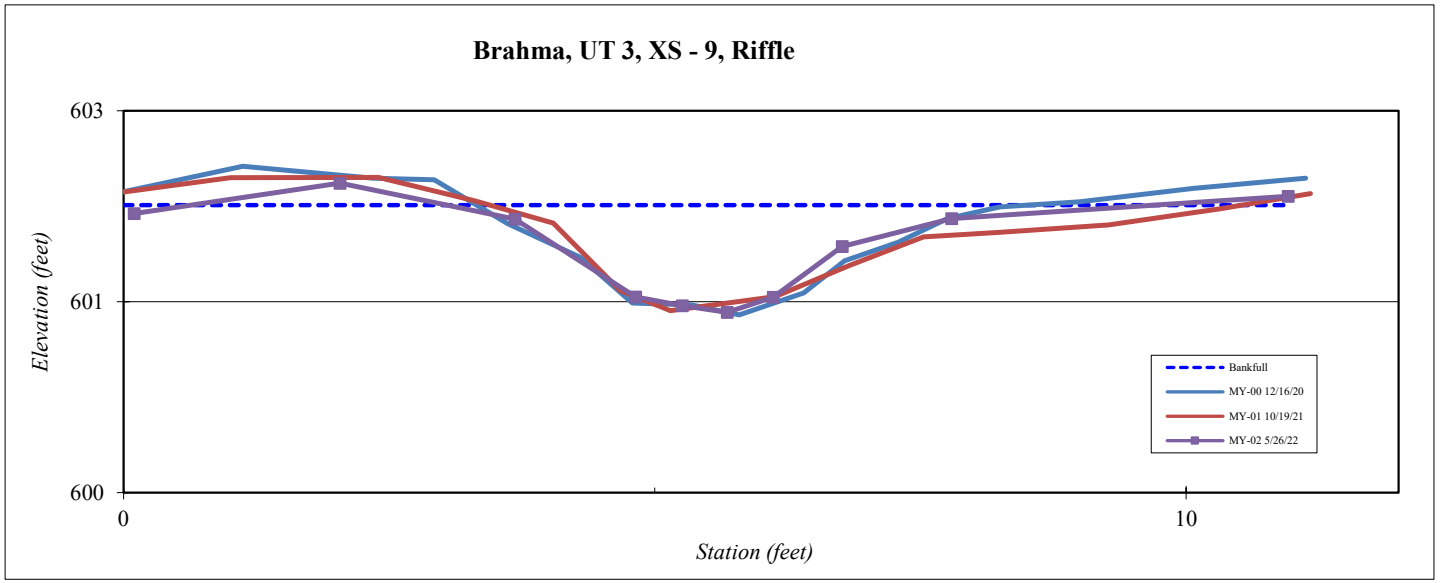


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT3, XS - 9, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.1	602.0
2.0	602.2
3.7	602.0
4.8	601.5
5.3	601.5
5.7	601.4
6.1	601.5
6.8	601.8
7.8	602.0
11.0	602.1

SUMMARY DATA	
Bankfull Elevation:	602.1
Bank Hieght Ratio:	0.92
Thalweg Elevation:	601.4
LTOB Elevation:	602.1
LTOB Max Depth:	0.7
LTOB Cross Sectional Area:	2.1

Stream Type	E/C 5

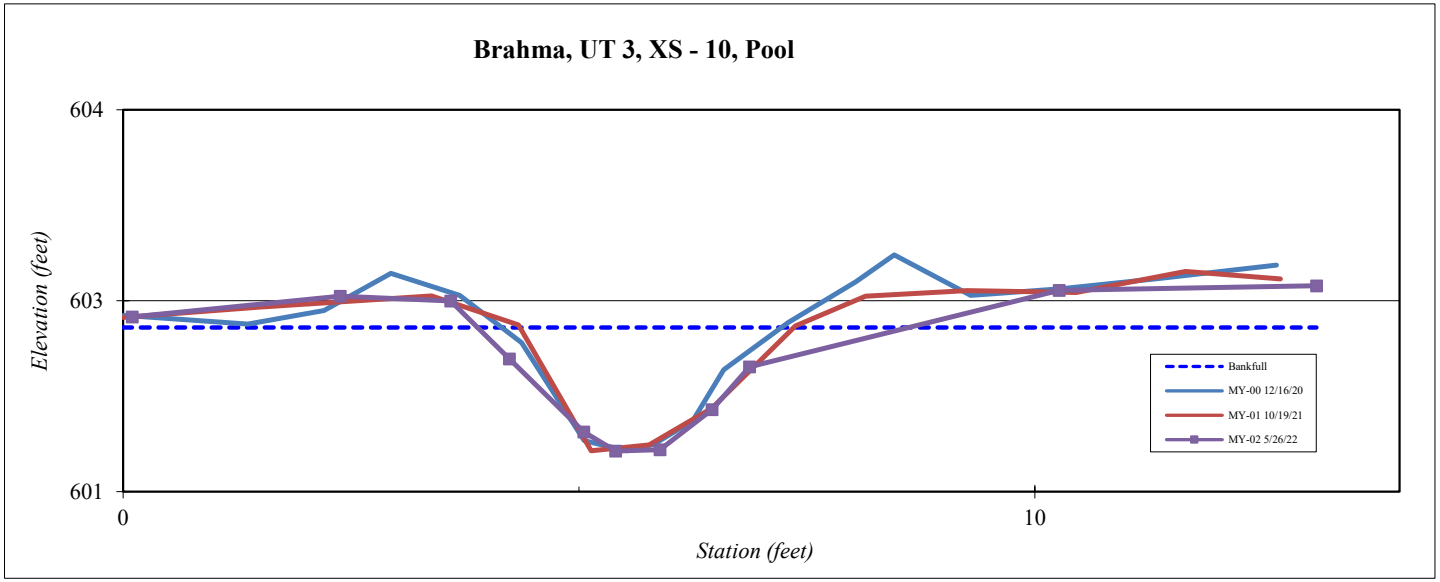


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT3, XS - 10, Pool
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.1	602.5
2.4	602.6
3.6	602.6
4.2	602.3
5.1	601.8
5.4	601.7
5.9	601.7
6.5	602.0
6.9	602.2
10.3	602.7
13.1	602.7

SUMMARY DATA	
Bankfull Elevation:	602.5
Bank Hieght Ratio:	0.82
Thalweg Elevation:	601.7
LTOB Elevation:	602.6
LTOB Max Depth:	0.9
LTOB Cross Sectional Area:	2.6

Stream Type	E/C 5

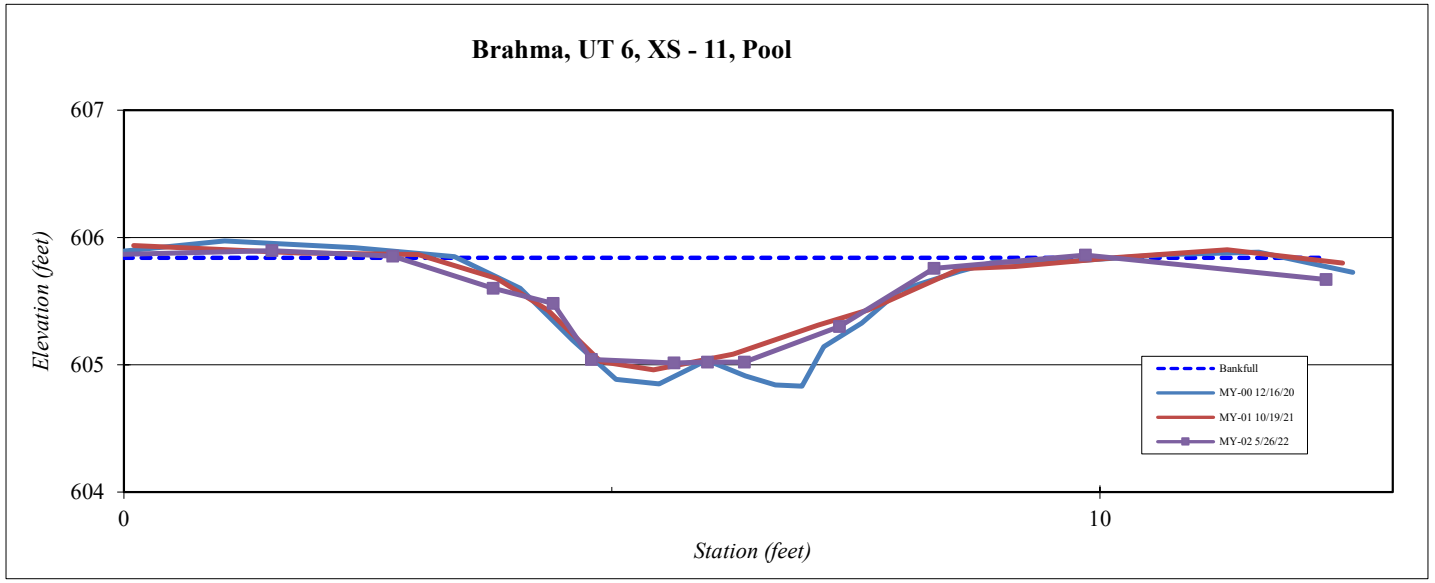


Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT6, XS - 11, Pool
Feature	Pool
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
-0.1	605.8
1.5	605.9
2.8	605.8
3.8	605.5
4.4	605.4
4.8	604.9
5.6	604.9
6.0	604.9
6.4	604.9
7.3	605.2
8.3	605.7
9.9	605.8
12.3	605.6

SUMMARY DATA	
Bankfull Elevation:	605.8
Bank Hieght Ratio:	0.99
Thalweg Elevation:	604.9
LTOB Elevation:	605.8
LTOB Max Depth:	0.9
LTOB Cross Sectional Area:	3.5

Stream Type	E/C 5



Site	Brahma Site
Watershed:	Cape Fear River Basin, 03030002
XS ID	UT6, XS - 12, Riffle
Feature	Riffle
Date:	5/26/2022
Field Crew:	Perkinson, Lewis

Station	Elevation
0.1	606.4
2.5	605.9
3.9	605.9
4.7	605.5
5.3	605.4
6.1	605.3
6.8	605.4
7.3	605.7
8.0	605.8
9.2	606.0
10.9	606.0
12.0	606.1

SUMMARY DATA	
Bankfull Elevation:	605.9
Bank Hieght Ratio:	1.12
Thalweg Elevation:	605.3
LTOB Elevation:	605.9
LTOB Max Depth:	0.5
LTOB Cross Sectional Area:	1.4

Stream Type	E/C 5

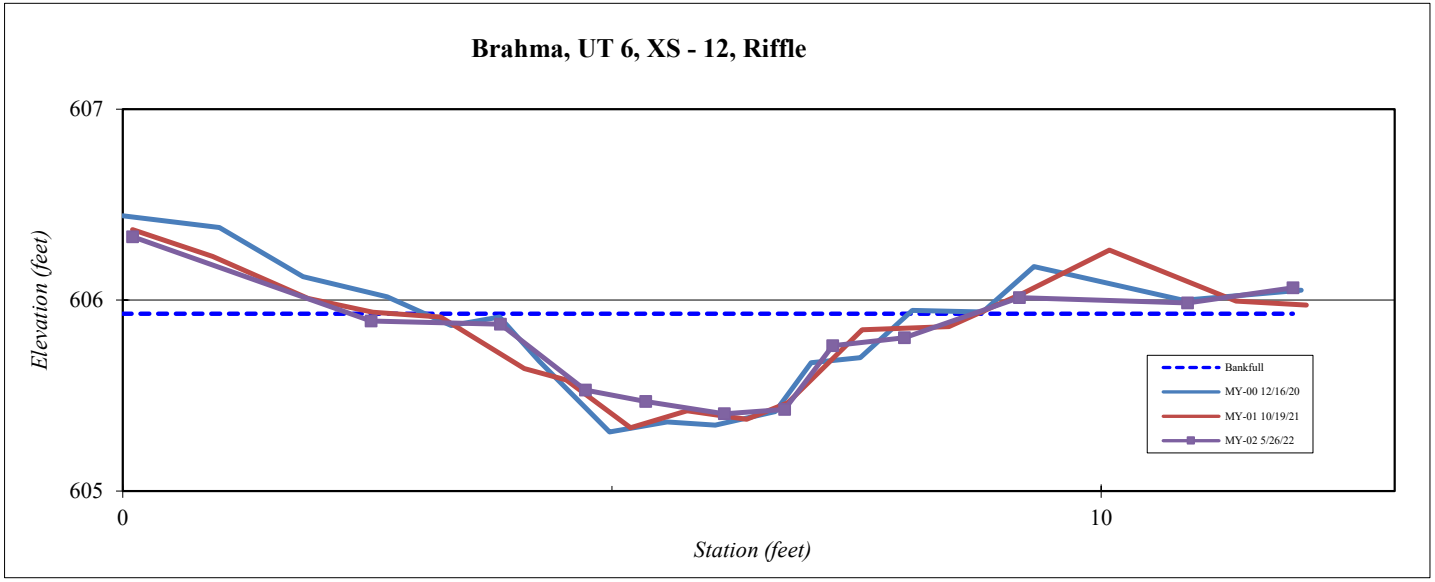


Table 9A. Baseline Stream Data Summary Brahma - UT 1 (Upstream)										
Parameter	**Pre-Existing Condition (applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	5.8	8		16		9.4	10.8	9.8	12.9	3
Floodprone Width (ft)	6	8		14		40	100	100	100	3
Bankfull Mean Depth (ft)	0.5	0.9		1.3		0.7	0.8	0.6	1.0	3
Bankfull Max Depth (ft)	1	1.5		1.8		0.9	1.2	1.1	1.6	3
Bankfull Cross Sectional Area (ft^2)	7.3	7.3		7.3		7.3	7.3	6.2	10.7	3
Width/Depth Ratio	4.5	9.1		32		12	16	11.3	15.8	3
Entrenchment Ratio	0.9	1		1		4.3	9.3	7.8	10.2	3
Bank Height Ratio	**1.1**	**1.5**		**1.9**		**1**	**1.3**	**1.0**	**1.0**	3
Max part size (mm) mobilized at bankfull										
Rosgen Classification	G5					E/C 4		E/C 4		
Bankfull Discharge (cfs)	28.2					28.2		28.2		
Sinuosity (ft)	1.1					1.12		1.12		
Water Surface Slope (Channel) (ft/ft)	0.0076					0.0075		0.0073		
Other										

Table 9B. Baseline Stream Data Summary Brahma - UT 1 (Downstream)										
Parameter	**Pre-Existing Condition (applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	5.4	8.2		16.9		10.2	11.8	9.6	9.6	1
Floodprone Width (ft)	14	19		100		50	150	75.0	75.0	1
Bankfull Mean Depth (ft)	0.5	1.1		1.6		0.7	0.9	1.1	1.1	1
Bankfull Max Depth (ft)	0.8	1.6		2.7		0.9	1.3	1.6	1.6	1
Bankfull Cross Sectional Area (ft^2)	8.7	8.7		8.7		8.7	8.7	11.0	11.0	1
Width/Depth Ratio	3.4	7.8		33.8		12	16	8.4	8.4	1
Entrenchment Ratio	1.3	2.4		13.3		4.9	12.7	7.8	7.8	1
Bank Height Ratio	**1.2**	**2.1**		**2.9**		**1**	**1.3**	**1.0**	**1.0**	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Gg 4/5					E/C 4		E 4		
Bankfull Discharge (cfs)	34.4					34.4		34.4		
Sinuosity (ft)	1.33					1.33		1.33		
Water Surface Slope (Channel) (ft/ft)	0.0052					0.0052		0.0064		
Other										

Table 9C. Baseline Stream Data Summary Brahma - UT 3										
Parameter	**Pre-Existing Condition (applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	3.1	3.8		5.9		4.1	4.7	4.9	4.9	1
Floodprone Width (ft)	3	5		8		25	75	50.0	50.0	1
Bankfull Mean Depth (ft)	0.3	0.4		0.5		0.3	0.4	0.3	0.3	1
Bankfull Max Depth (ft)	0.4	0.6		0.7		0.4	0.5	0.6	0.6	1
Bankfull Cross Sectional Area (ft^2)	1.5	1.5		1.5		1.5	1.5	1.7	1.7	1
Width/Depth Ratio	6.2	9.5		19.7		12	16	14.3	14.3	1
Entrenchment Ratio	0.8	1.4		1.6		6.1	15.8	10.2	10.2	1
Bank Height Ratio	**2.3**	**3.2**		**4**		**1**	**1.3**	**1.0**	**1.0**	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	G 5					E/C 4		E/C 4		
Bankfull Discharge (cfs)	5.4					5.4		5.4		
Sinuosity (ft)	1.08					1.12		1.12		
Water Surface Slope (Channel) (ft/ft)	0.017					0.0173		0.0195		
Other										

Table 9D. Baseline Stream Data Summary Brahma - UT 6										
Parameter	**Pre-Existing Condition (applicable)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	3.3	6.5		16.3		4.1	4.7	4.1	4.1	1
Floodprone Width (ft)	5	13		23		25	75	50.0	50.0	1
Bankfull Mean Depth (ft)	0.1	0.2		0.4		0.3	0.4	0.4	0.4	1
Bankfull Max Depth (ft)	0.2	0.4		0.7		0.4	0.5	0.7	0.7	1
Bankfull Cross Sectional Area (ft^2)	1.4	1.4		1.4		1.4	1.4	1.8	1.8	1
Width/Depth Ratio	3.6	32.5		163		12	16	9.6	9.6	1
Entrenchment Ratio	1.2	1.5		2.7		6.1	15.8	12.1	12.1	1
Bank Height Ratio	**1**	**3.1**		**5**		**1**	**1.3**	**1.0**	**1.0**	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	F 5					E/C 4		E 4		
Bankfull Discharge (cfs)	4.8					4.8		4.8		
Sinuosity (ft)	1.02					1.12		1.12		
Water Surface Slope (Channel) (ft/ft)	0.0203					0.0173		0.0297		
Other										

Table 10A. Monitoring Data - Cross Section Morphology Monitoring Summary
(Brahma/ DMS:100092) UT 1

	UT 1 - Cross Section 1 (Pool)							UT 1 - Cross Section 2 (Riffle)							UT 1 - Cross Section 3 (Riffle)							UT 1 - Cross Section 4 (Pool)							UT 1 - Cross Section 5 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	597.11	597.07	596.99					597.43	597.41	597.43					599.24	599.30	599.30					600.54	600.41	600.27					606.49	606.47	606.43				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.02	0.90					1.00	1.05	1.03					1.00	0.99	0.98					1.00	1.04	0.91					1.00	0.99	1.05				
Thalweg Elevation	595.50	595.42	595.23					596.39	596.49	596.35					597.83	598.00	597.90					598.02	598.06	598.01					604.89	604.89	604.80				
LTOB[2] Elevation	597.11	597.09	596.81					597.43	597.45	597.46					599.24	599.29	599.28					600.54	600.50	600.06					606.49	606.46	606.51				
LTOB[2] Max Depth (ft)	1.61	1.67	1.58					1.04	0.96	1.11					1.41	1.28	1.38					2.52	2.44	2.05					1.60	1.56	1.70				
LTOB[2] Cross Sectional Area (ft[2])	8.74	9.01	7.46					6.02	6.51	6.31					10.48	10.35	10.14					14.62	15.47	12.96					10.71	10.55	11.57				

	UT 1 - Cross Section 6 (Pool)							UT 1 - Cross Section 7 (Riffle)							UT 1 - Cross Section 8 (Riffle)						
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	606.58	606.65	606.70					611.70	611.65	611.62					611.59	611.68	611.64				
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.01	0.97					1.00	1.07	0.97					1.00	1.03	1.03				
Thalweg Elevation	602.89	603.09	603.17					610.09	610.08	610.00					609.02	609.10	609.03				
LTOB[2] Elevation	606.58	606.70	606.62					611.70	611.76	611.58					611.59	611.74	611.72				
LTOB[2] Max Depth (ft)	3.69	3.61	3.45					1.61	1.68	1.58					2.57	2.64	2.68				
LTOB[2] Cross Sectional Area (ft[2])	17.98	18.67	16.89					10.95	12.13	10.48					13.32	13.94	14.04				

Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area							
Bank Height Ratio_Based on AB Bankfull[1] Area							
Thalweg Elevation							
LTOB[2] Elevation							
LTOB[2] Max Depth (ft)							
LTOB[2] Cross Sectional Area (ft[2])							

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Table 10B. Monitoring Data - Cross Section Morphology Monitoring Summary
(Brahma/ DMS:100092) UT 3 and UT 6

	UT 3 - Cross Section 9 (Riffle)							UT 3 - Cross Section 10 (Pool)							UT 6 - Cross Section 11 (Pool)							UT 6 - Cross Section 12 (Riffle)													
	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+	MY0	MY1	MY2	MY3	MY5	MY7	MY+							
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	602.04	602.02	602.08					602.55	602.53	602.45					605.79	605.85	605.85					605.90	605.89	605.95												
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00	1.02	0.83					1.00	1.12	1.22					1.00	1.00	0.99					1.00	1.01	0.86												
Thalweg Elevation	601.40	601.43	601.42					601.72	601.72	601.72					604.69	604.83	604.89					605.26	605.25	605.33												
LTOB[2] Elevation	602.04	602.03	601.97					602.55	602.64	602.61					605.79	605.85	605.83					605.90	605.90	605.86												
LTOB[2] Max Depth (ft)	0.64	0.60	0.55					0.83	0.91	0.89					1.10	1.02	0.95					0.64	0.65	0.53												
LTOB[2] Cross Sectional Area (ft[2])	1.68	1.77	1.22					1.63	2.06	2.51					3.37	3.34	3.29					1.64	1.83	1.39												

Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area							
Bank Height Ratio_Based on AB Bankfull[1] Area							
Thalweg Elevation							
LTOB[2] Elevation							
LTOB[2] Max Depth (ft)							
LTOB[2] Cross Sectional Area (ft[2])							

The above morphology parameters reflect the 2018 guidance that arose from the mitigation technical workgroup consisting of DMS, the IRT and industry mitigation providers/practitioners. The outcome resulted in the focus on three primary morphological parameters of interest for the purposes of tracking channel change moving forward. They are the bank height ratio using a constant As-built bankfull area and the cross sectional area and max depth based on each years low top of bank. These are calculated as follows:

1 - **Bank Height Ratio (BHR)** takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation. For example if the As-built bankfull area was 10 ft2, then the MY1 bankfull elevation would be adjusted until the calculated bankfull area within the MY1 cross section survey = 10 ft2. The BHR would then be calculated with the difference between the low top of bank (LTOB) elevation for MY1 and the thalweg elevation for MY1 in the numerator with the difference between the MY1 bankfull elevation and the MY1 thalweg elevation in the denominator. This same process is then carried out in each successive year.

2 - **LTOB Area and Max depth -** These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Note: The smaller the channel the closer the survey measurements are to their limit of reliable detection, therefore inter-annual variation in morphological measurement (as a percentage) is by default magnified as channel size decereases. Some of the variability above is the result of this factor and some is due to the large amount of depositional sediments observed.

Appendix D
Hydrologic Data

Table 11. Verification of Bankfull Events
Table 12. Groundwater Hydrology Data
Groundwater Gauge Graphs
Tables 13 A-E. Channel Evidence
Surface Water Gauge Graphs
Figure D1. 30/70 Percentile Graph for Rainfall
Soil Temperature Graph

Table 11. Verification of Bankfull Events

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
December 24, 2020	December 24, 2020	Trail cameras and crest gauges documented a bankfull event on UT1 and UT2 after 1" of rain was captured by an on-site rain gauge on December 24.	1, 2
January 31, 2021	January 31, 2021	Trail cameras and crest gauges documented a bankfull event on tributaries 1, 2, 3, and 4 after 2.25" of rain was captured by an on-site gauge between January 25 – 31.	3, 4, 5, 6
March 12, 2022	March 12, 2022	Trail cameras and crest gauges documented a bankfull event on UT1, UT3, and UT5 after 1.15" of rain was captured by an on-site gauge on March 12, 2022.	7, 8, 9
October 26, 2022	September 30, 2022	Crest gauges documented bankfull flows on all site tributaries after 3.22" of rain was captured by an on-site gauge on September 30, 2022 as a result of Tropical Storm Ian.	--

Photo 1: UT1 during a bankfull event.

Photo 2: UT2 during a bankfull event.

Photo 3: UT1 during a bankfull event.

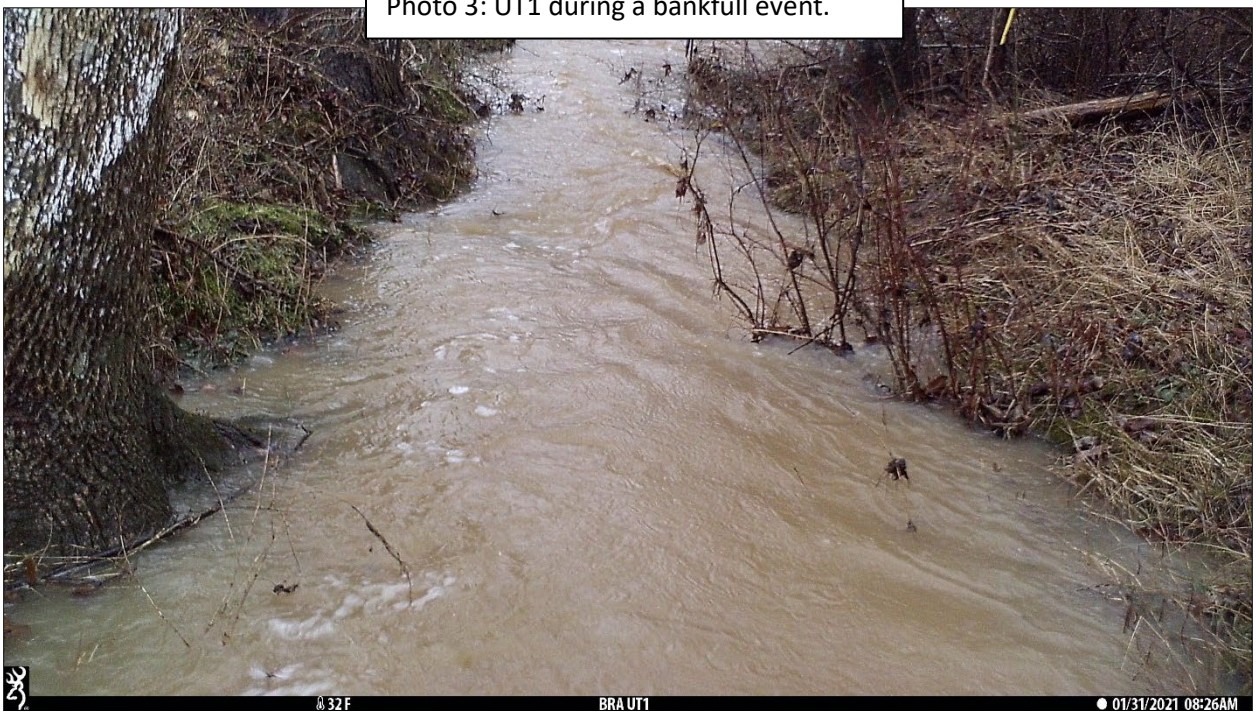


Photo 4: UT2 during a bankfull event.

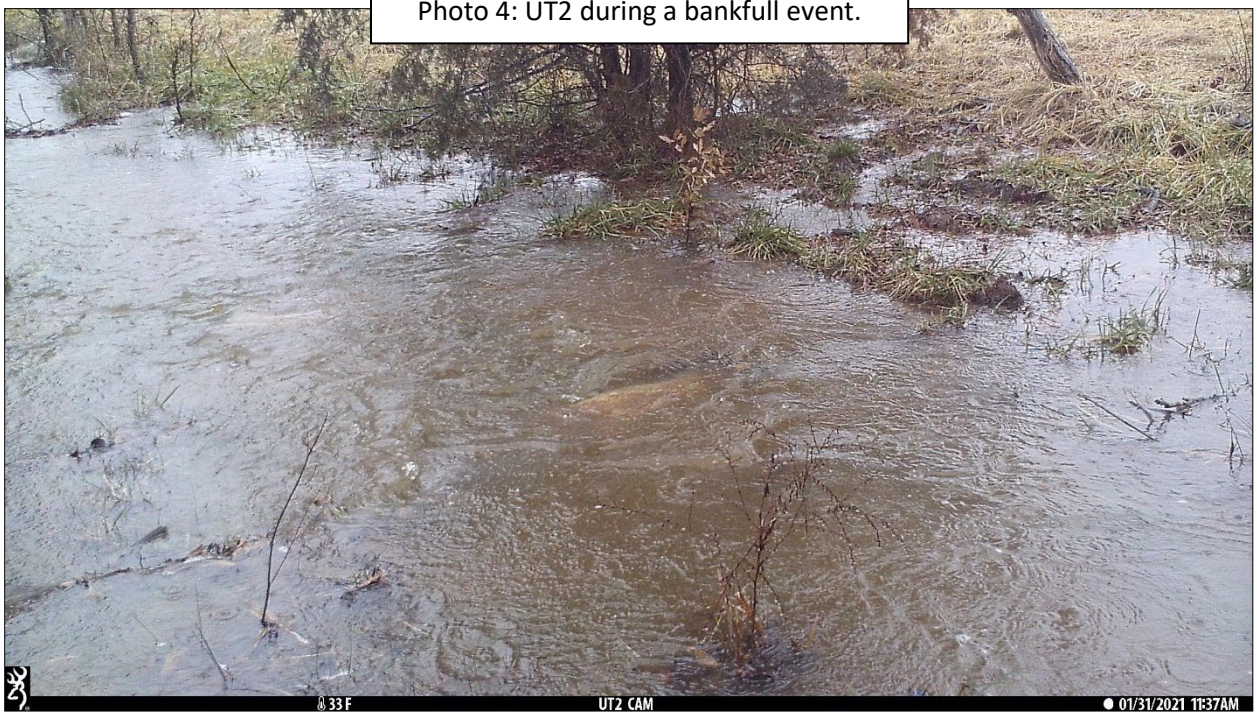


Photo 5: UT3 during a bankfull event.

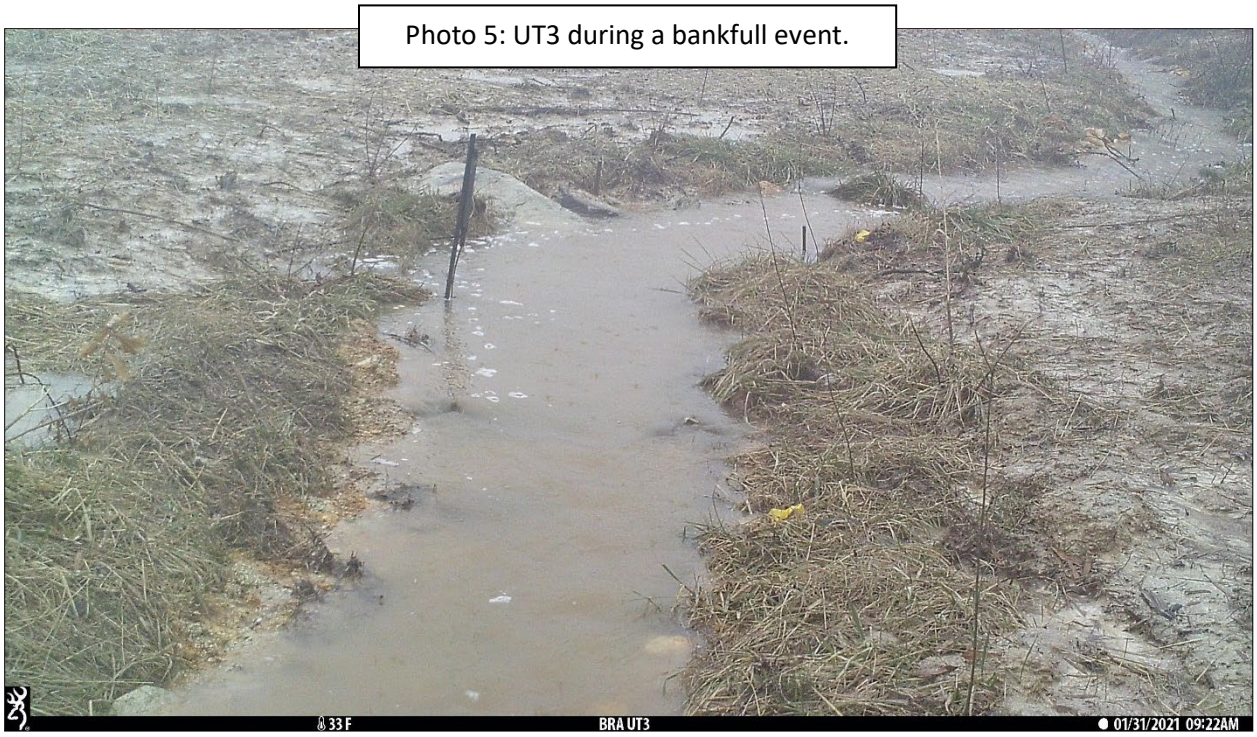


Photo 6: UT5 receding from a bankfull event.

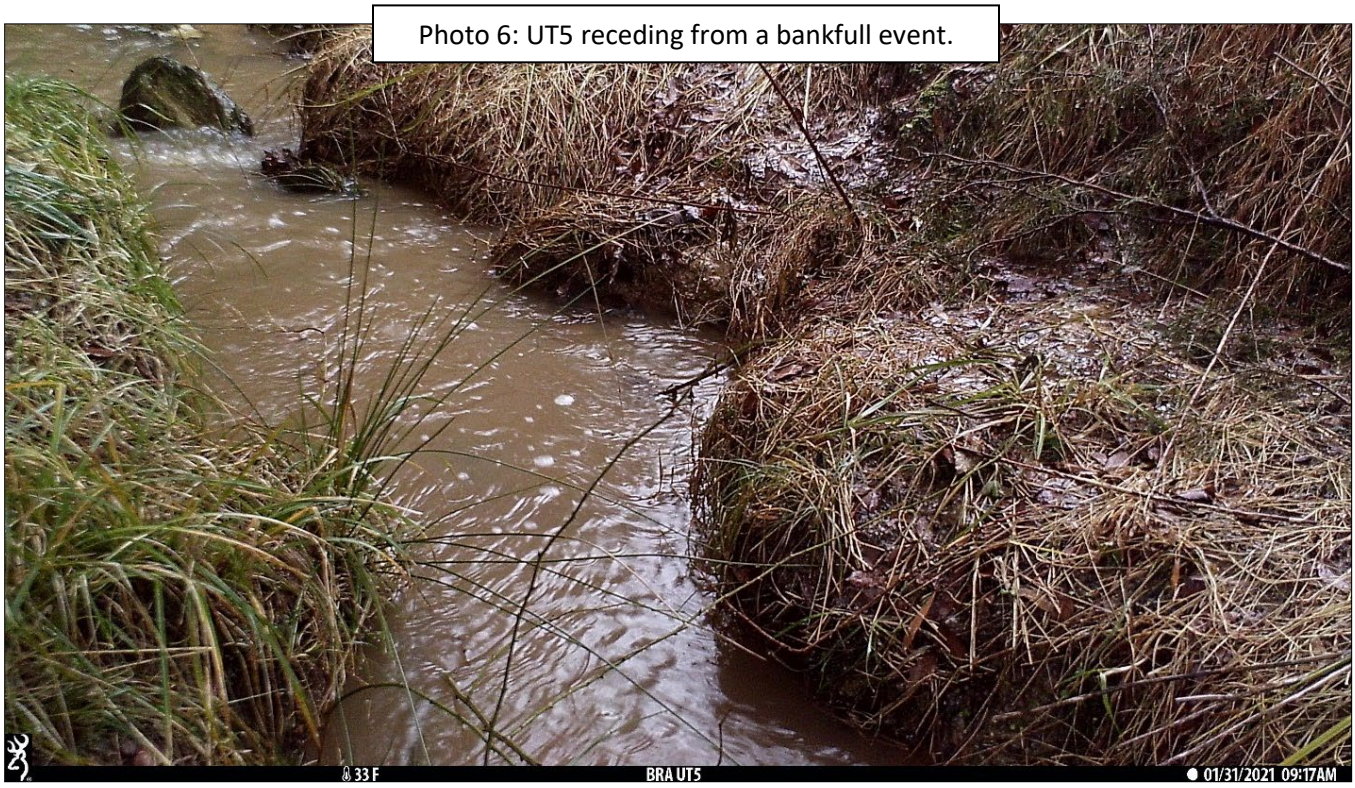


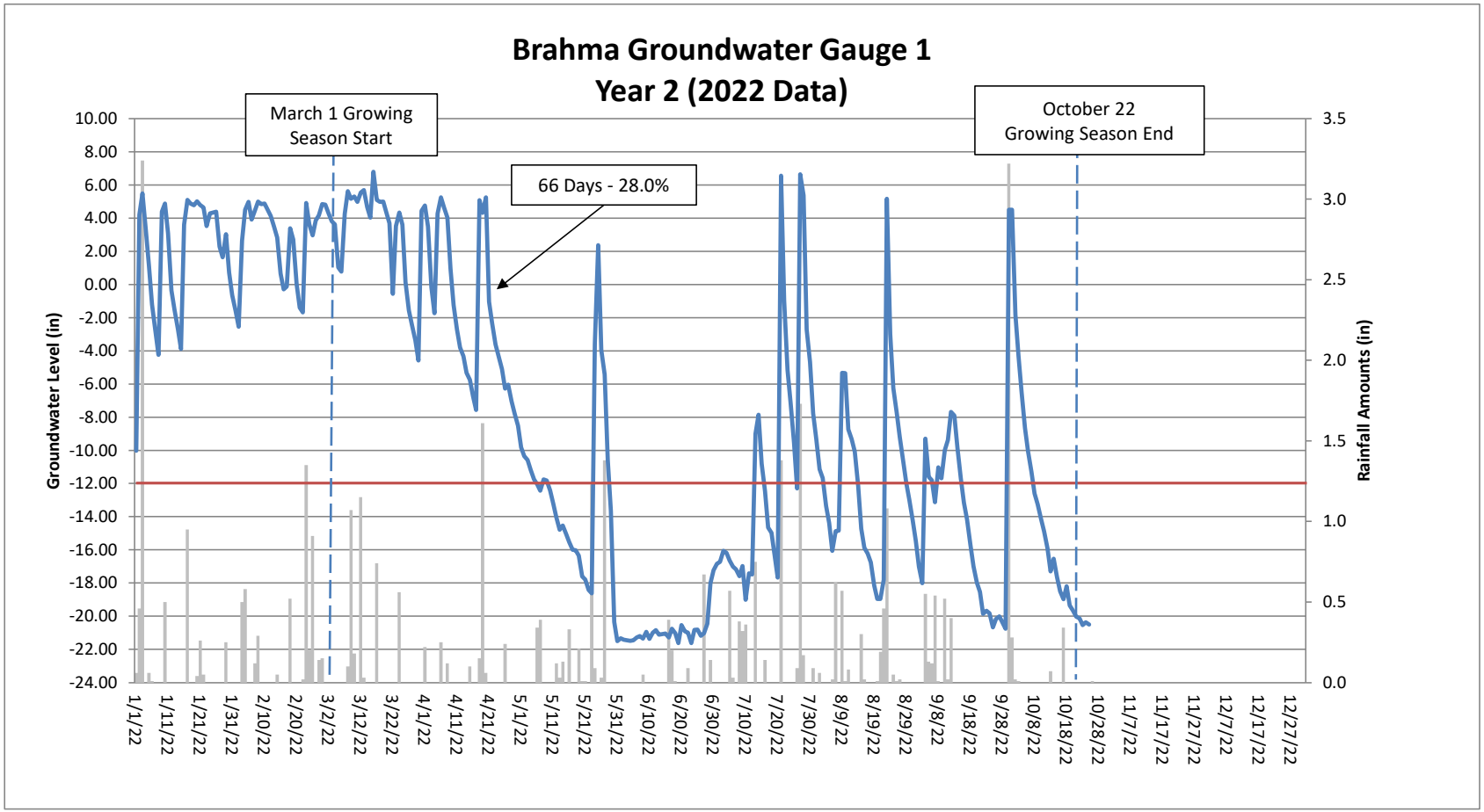
Photo 7: UT1 during a bankfull event.

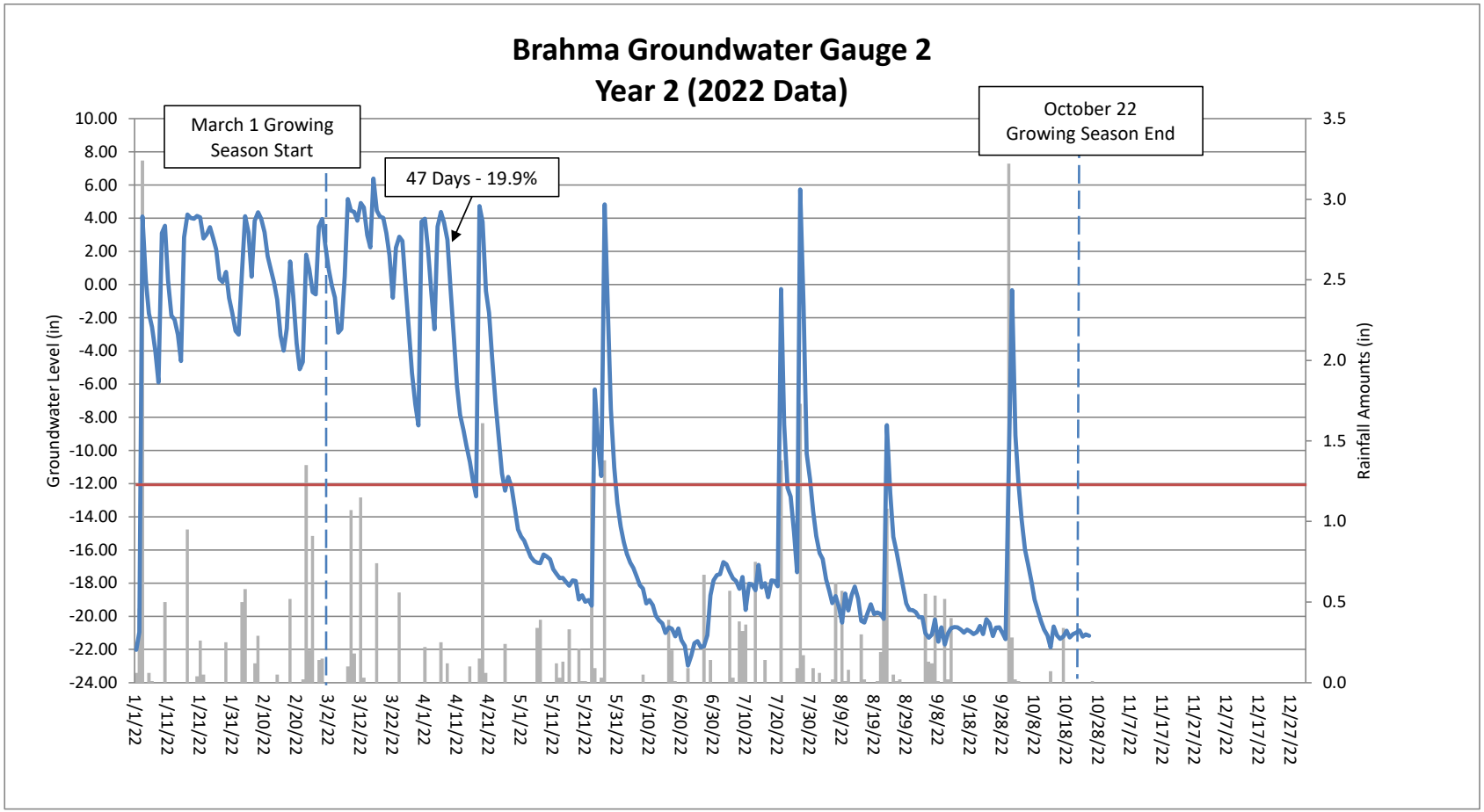
Photo 8: UT3 during a bankfull event.

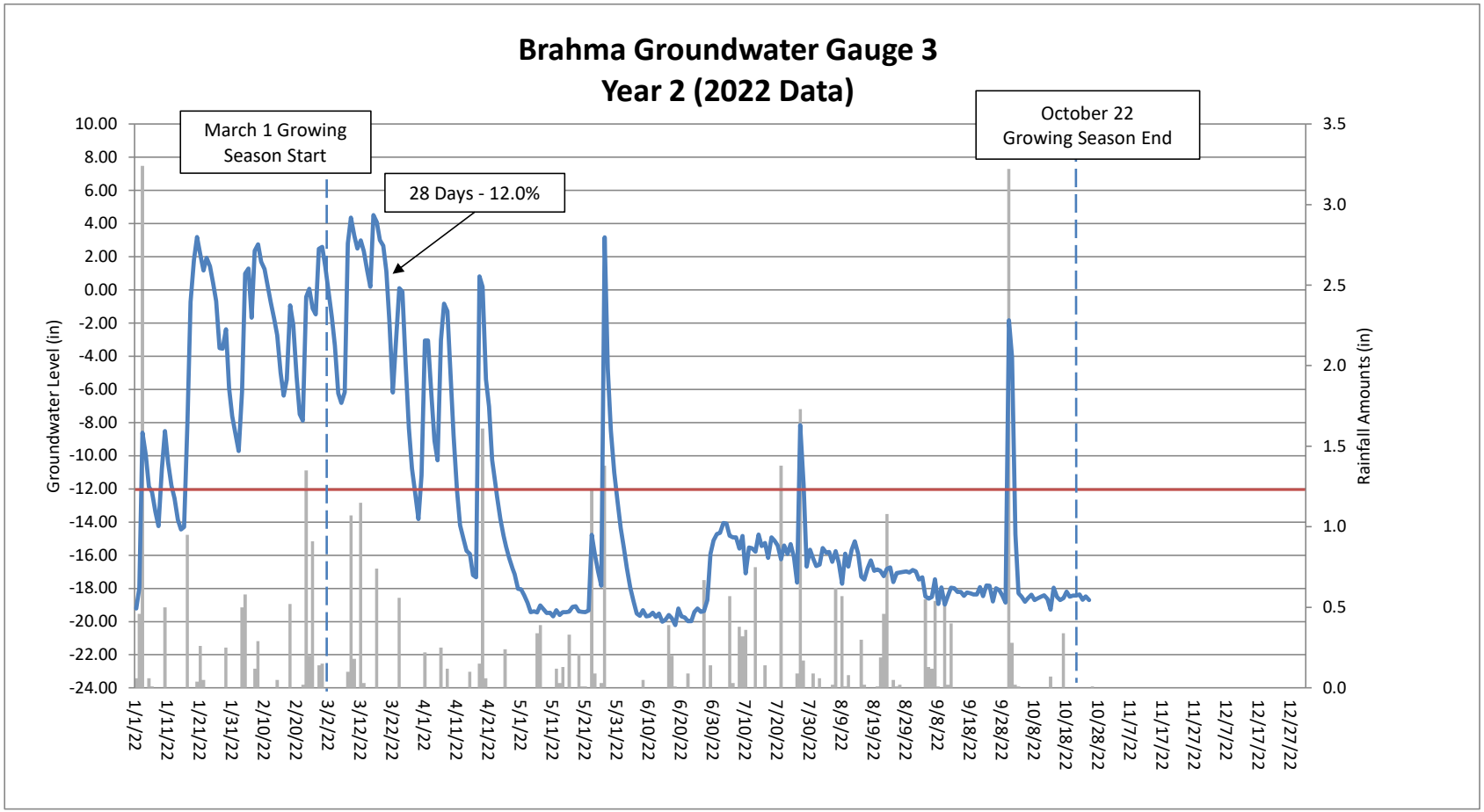
Photo 9: UT5 rising just before a bankfull event.

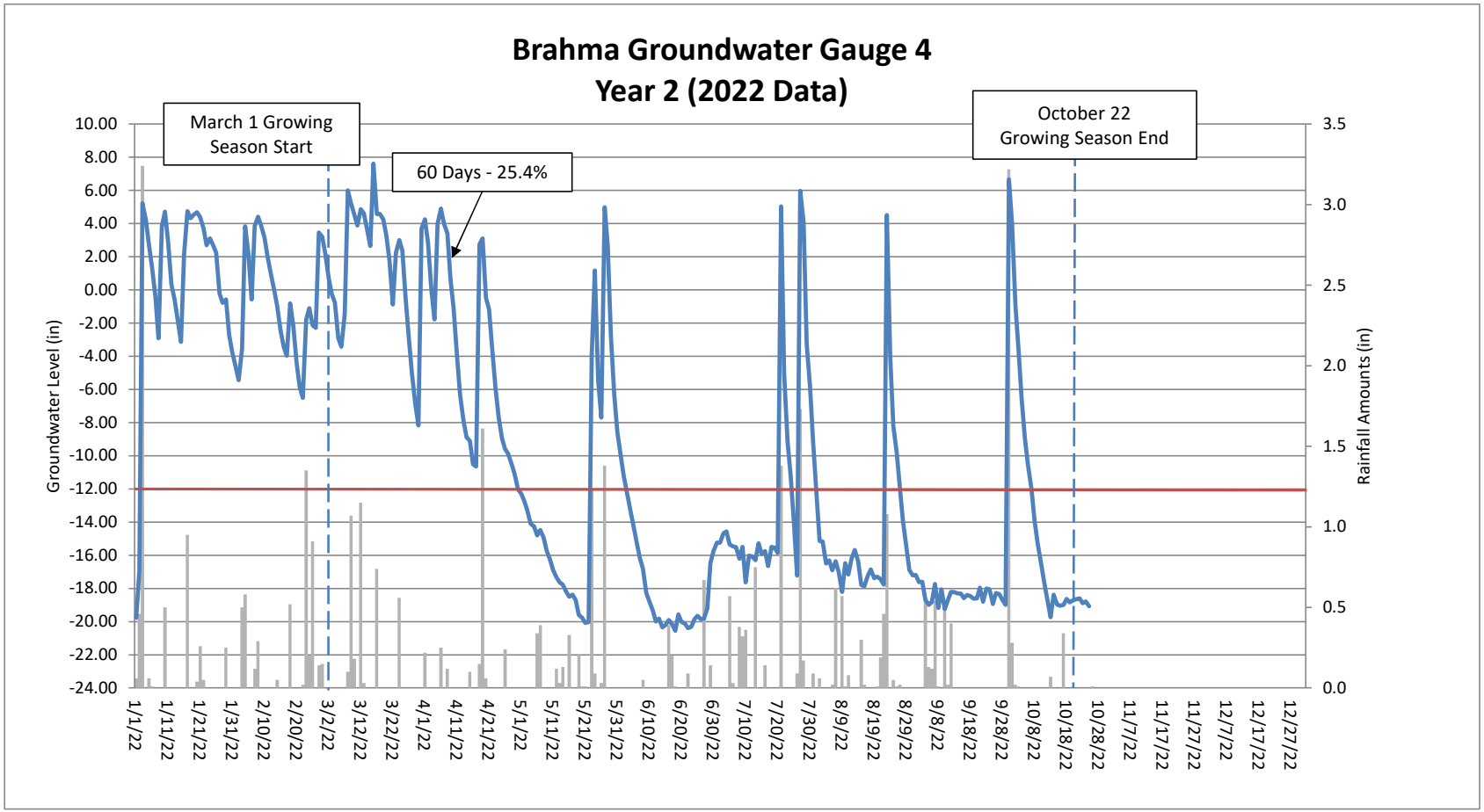
Table 12. Groundwater Hydrology Data

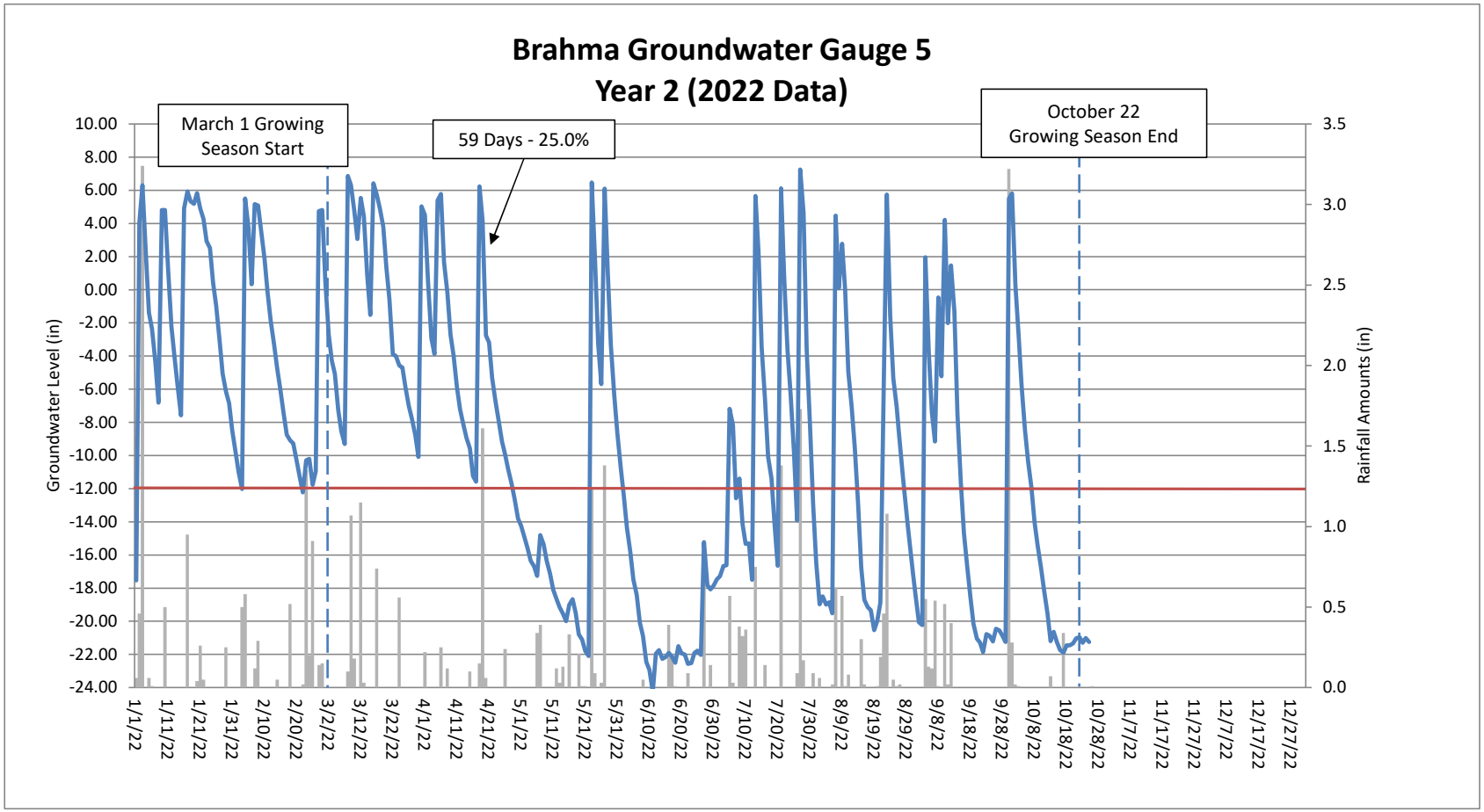
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2021)	Year 2 (2022)	Year 3 (2023)	Year 4 (2024)	Year 5 (2025)	Year 6 (2026)	Year 7 (2027)
1	Yes 60 days (25.4%)	Yes 66 days (28.0%)					
2	No 21 days (8.9%)	Yes 47 days (19.9%)					
3	No 18 days (7.6%)	Yes 28 days (12.0%)					
4	Yes 46 days (19.5%)	Yes 60 days (25.4%)					
5	Yes 47 days (19.9%)	Yes 59 days (25.0%)					
6	No 25 days (10.6%)	Yes 59 days (25.0%)					
7	Yes 227 days (96.2%)	Yes 236 days (100%)					
8	Yes 46 days (19.5%)	Yes 59 days (25.0%)					
9	Yes 49 days (20.8%)	Yes 59 days (25.0%)					
10	Yes 39 days (16.5%)	Yes 43 days (18.2%)					
11	Yes 46 Days (19.5%)	Yes 66 days (28.0%)					
12	No 21 Days (8.9%)	No 26 days (11.0%)					

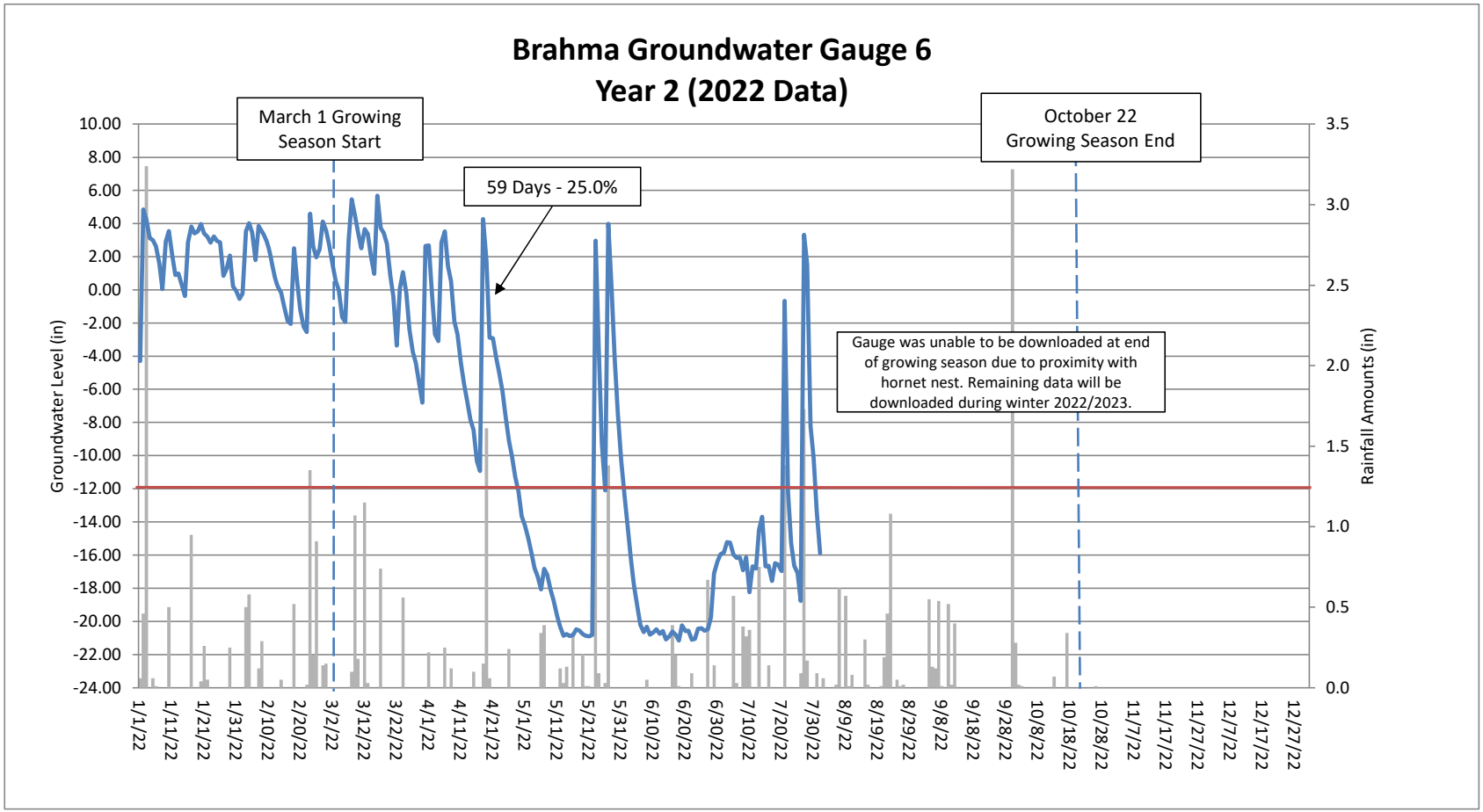

Brahma Groundwater Gauge 1
Year 2 (2022 Data)
March 1 Growing Season Start
October 22 Growing Season End
66 Days - 28.0%
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 2
Year 2 (2022 Data)
March 1 Growing Season Start
47 Days - 19.9%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 3
Year 2 (2022 Data)
March 1 Growing Season Start
28 Days - 12.0%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 4
Year 2 (2022 Data)
March 1 Growing Season Start
60 Days - 25.4%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 5
Year 2 (2022 Data)
March 1 Growing Season Start
59 Days - 25.0%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 6
Year 2 (2022 Data)
March 1 Growing Season Start
October 22 Growing Season End
59 Days - 25.0%
Gauge was unable to be downloaded at end of growing season due to proximity with hornet nest. Remaining data will be downloaded during winter 2022/2023.
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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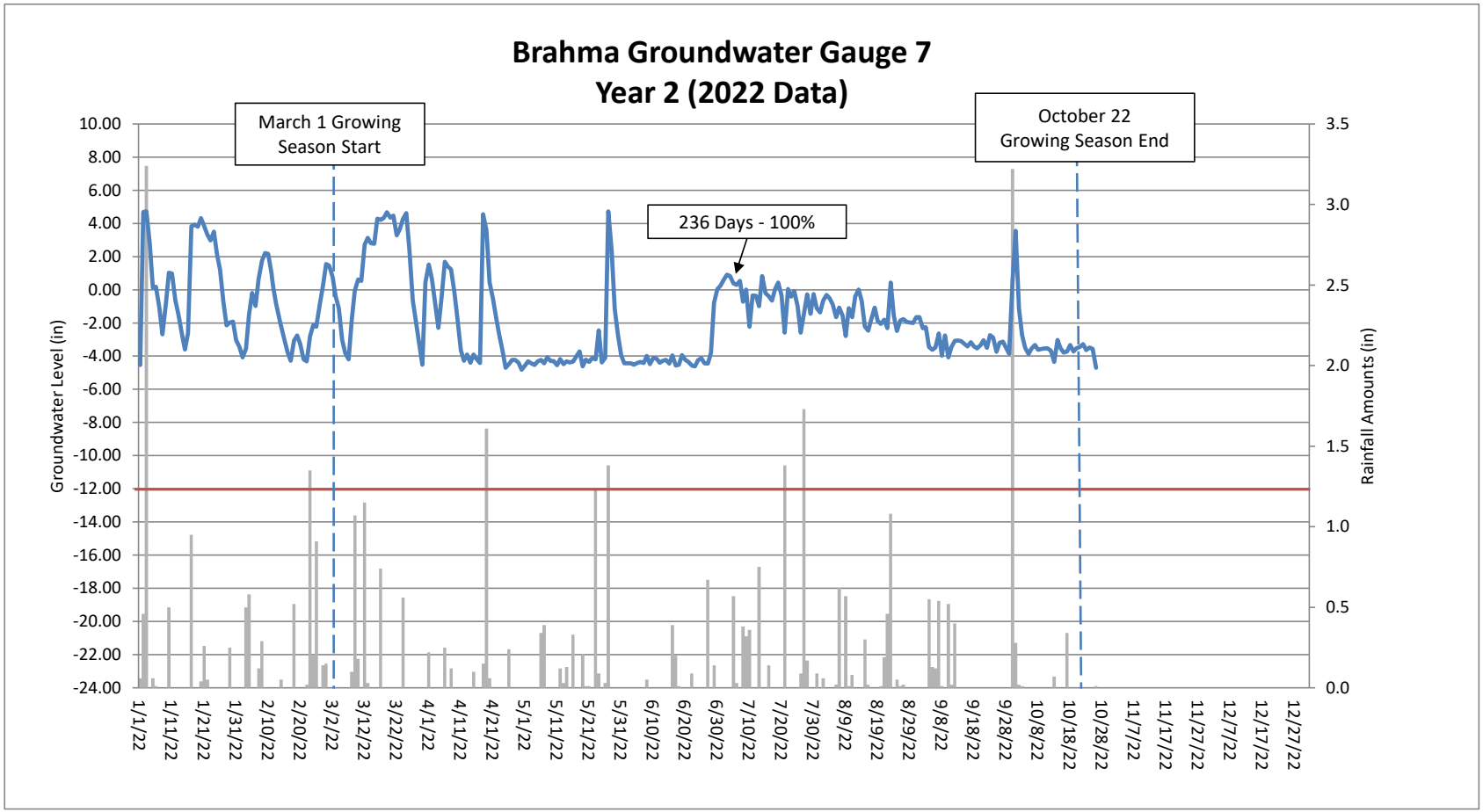
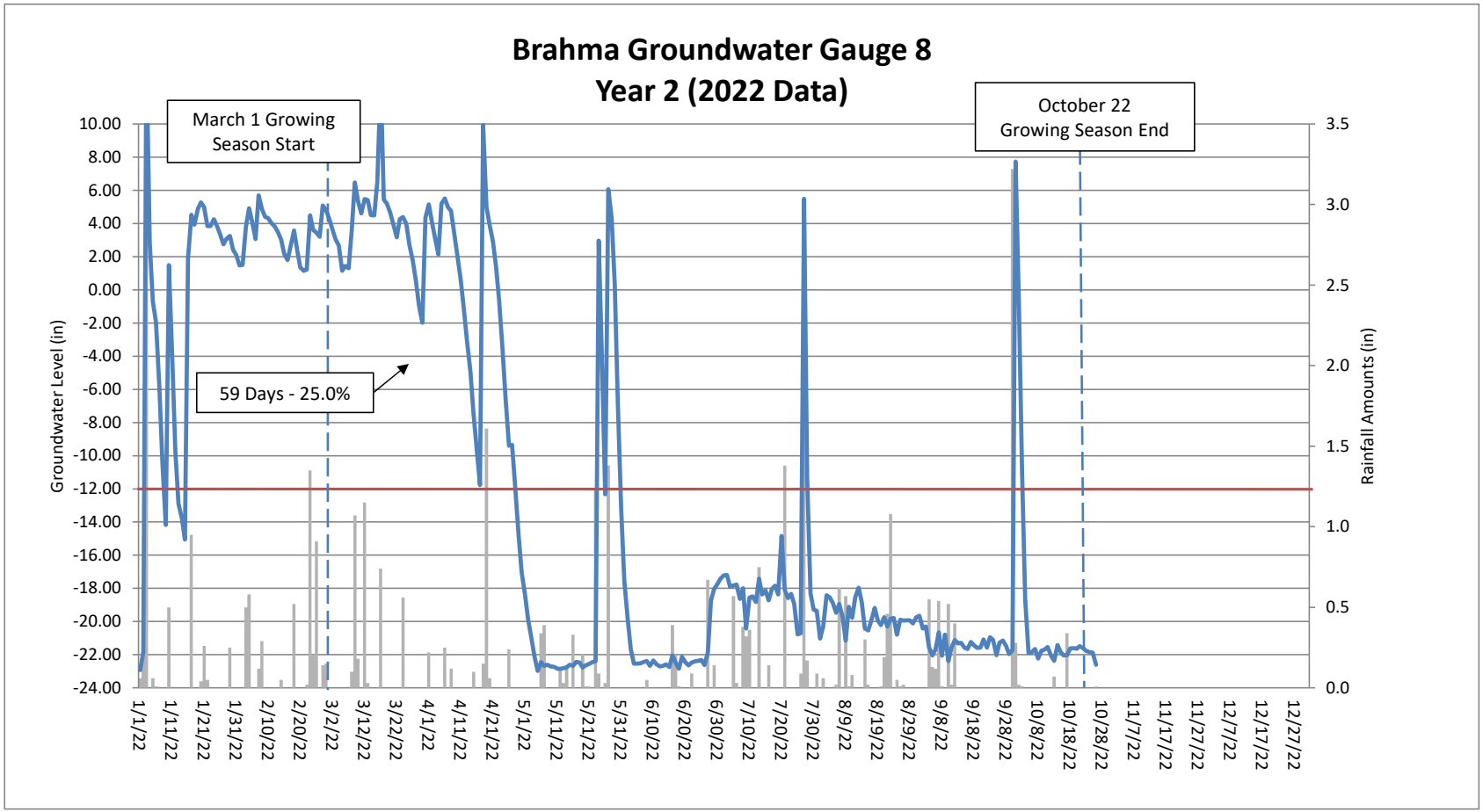
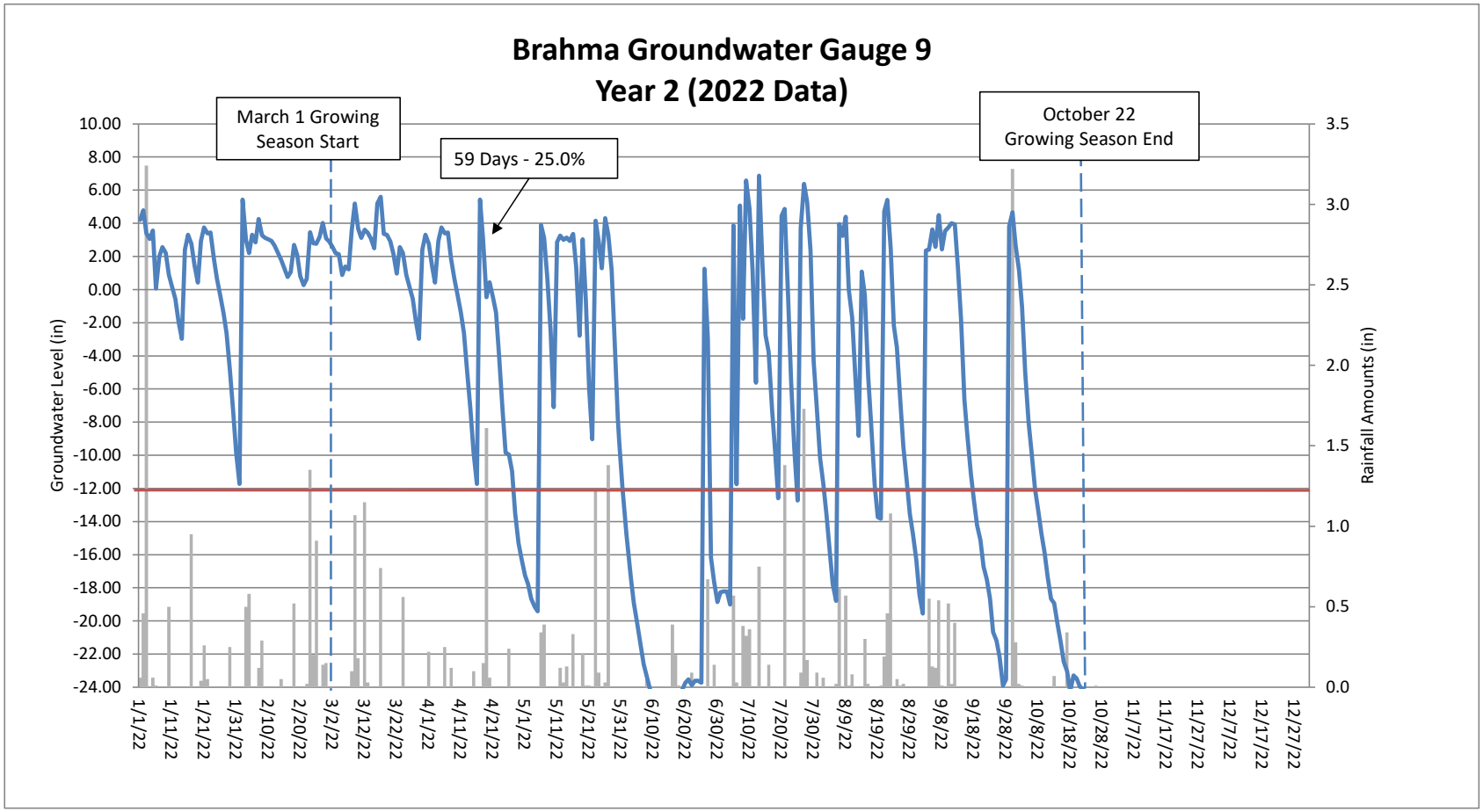
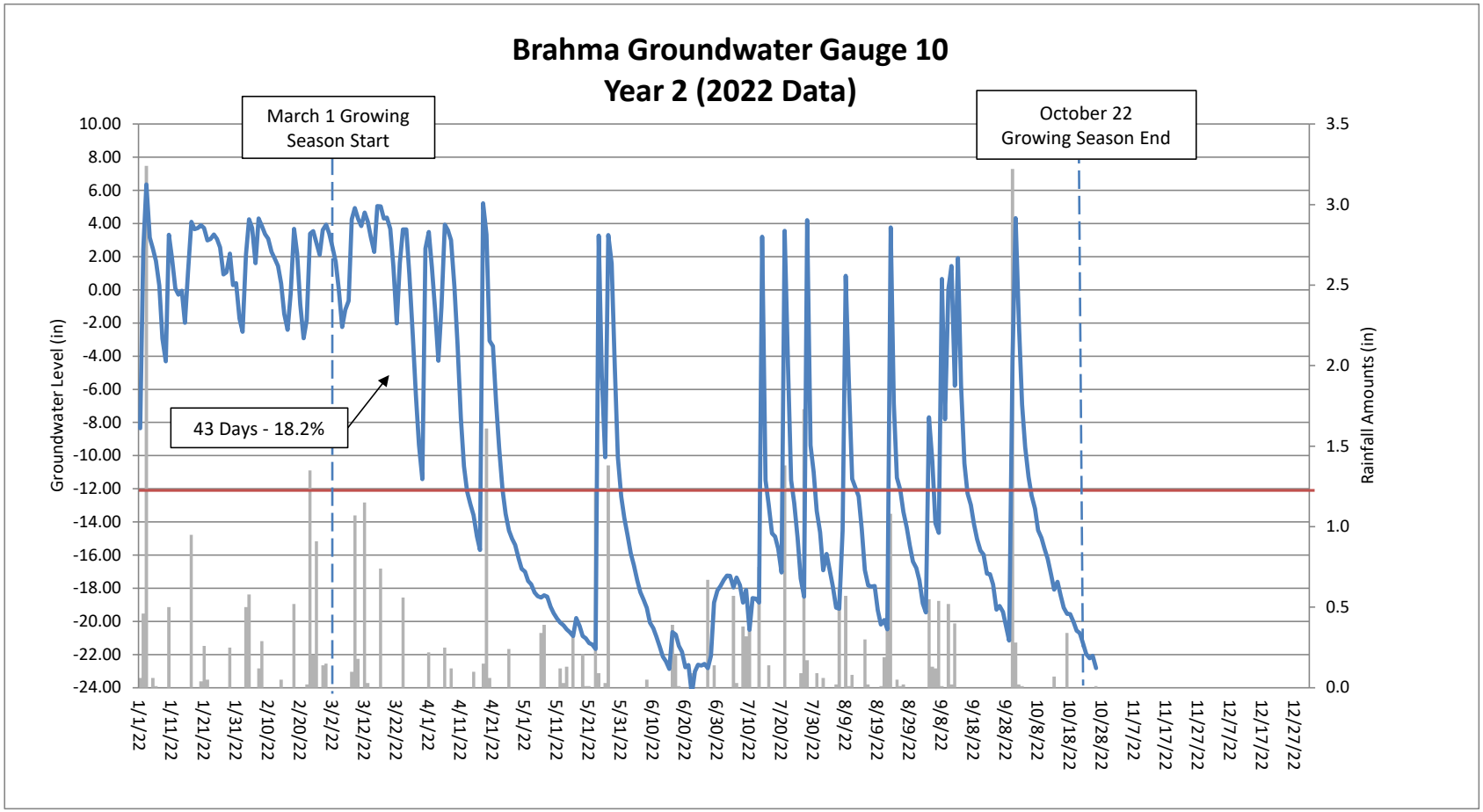
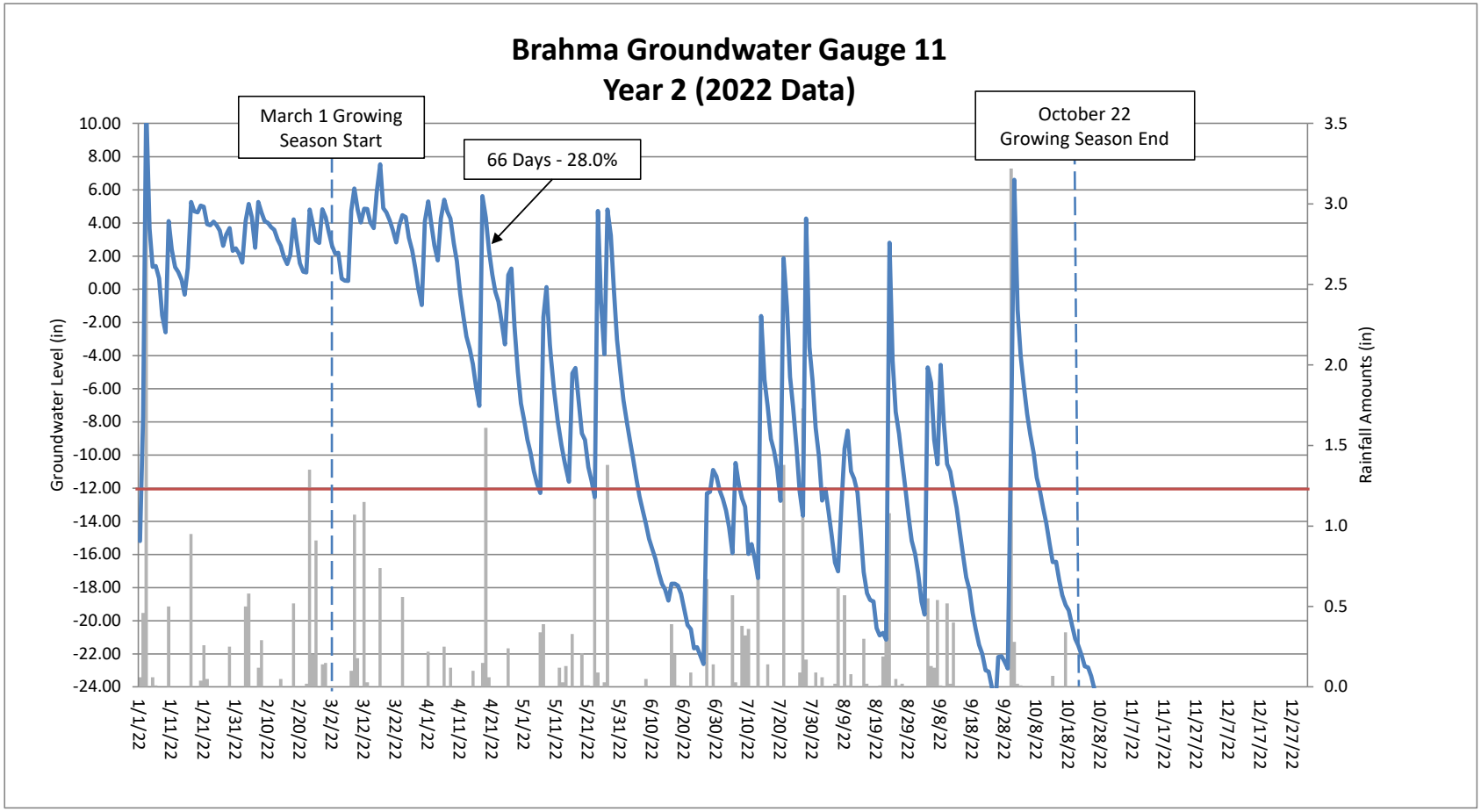
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 7
Year 2 (2022 Data)
March 1 Growing Season Start
October 22 Growing Season End
236 Days - 100%
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 8
Year 2 (2022 Data)
March 1 Growing Season Start
October 22 Growing Season End
59 Days - 25.0%
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 9
Year 2 (2022 Data)
March 1 Growing Season Start
59 Days - 25.0%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 10
Year 2 (2022 Data)
March 1 Growing Season Start
October 22 Growing Season End
43 Days - 18.2%
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Groundwater Gauge 11
Year 2 (2022 Data)
March 1 Growing Season Start
66 Days - 28.0%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

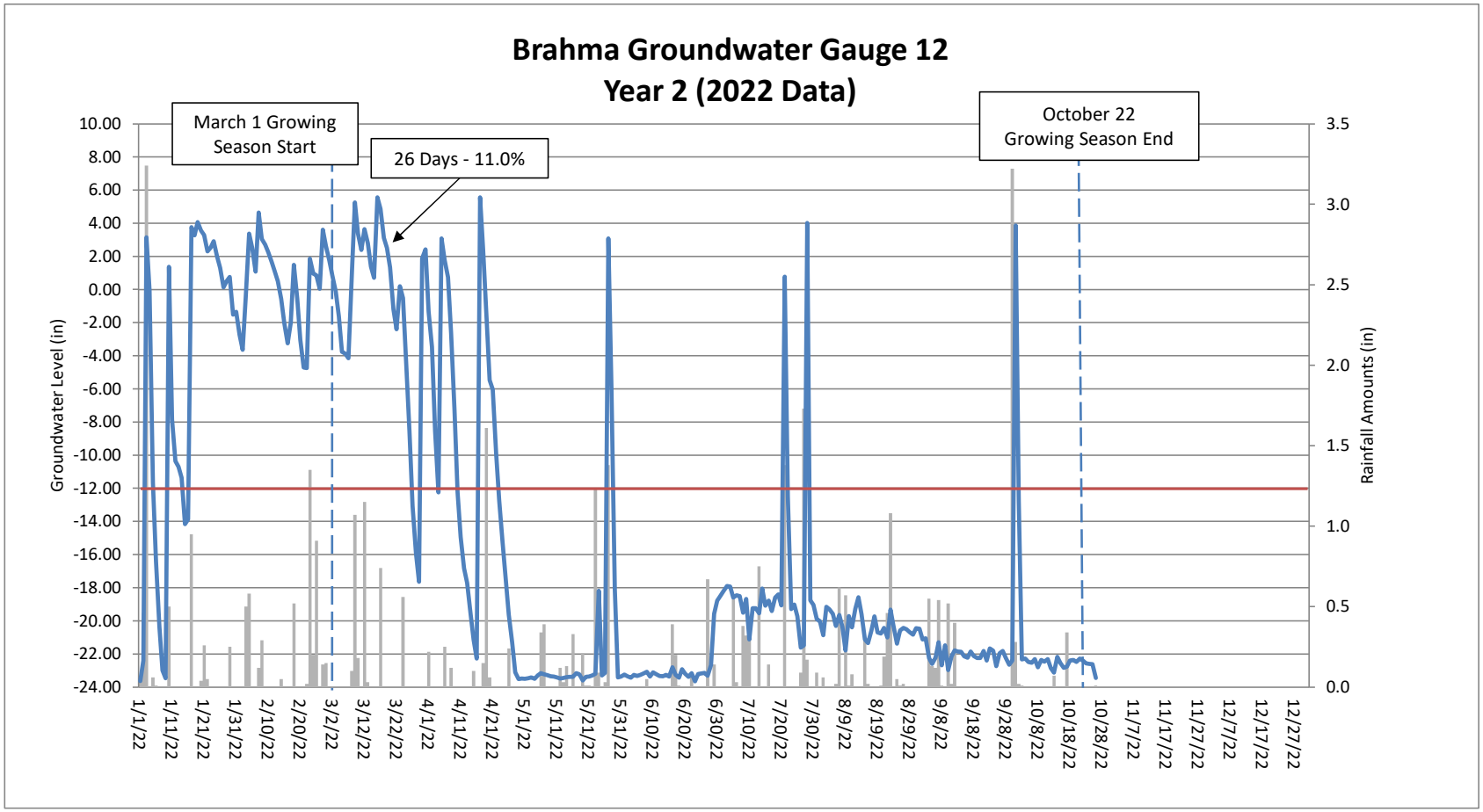

Brahma Groundwater Gauge 12
Year 2 (2022 Data)
March 1 Growing Season Start
26 Days - 11.0%
October 22 Growing Season End
Groundwater Level (in)
Rainfall Amounts (in)
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

Table 13A. UT-1 Channel Evidence

UT-1 Channel Evidence	Year 1 (2021)	Year 2 (2022)
Max consecutive days channel flow	83	133
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13B. UT-2 Channel Evidence

UT-2 Channel Evidence	Year 1 (2021)	Year 2 (2022)
Max consecutive days channel flow	78	139
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13C. UT-3 Channel Evidence

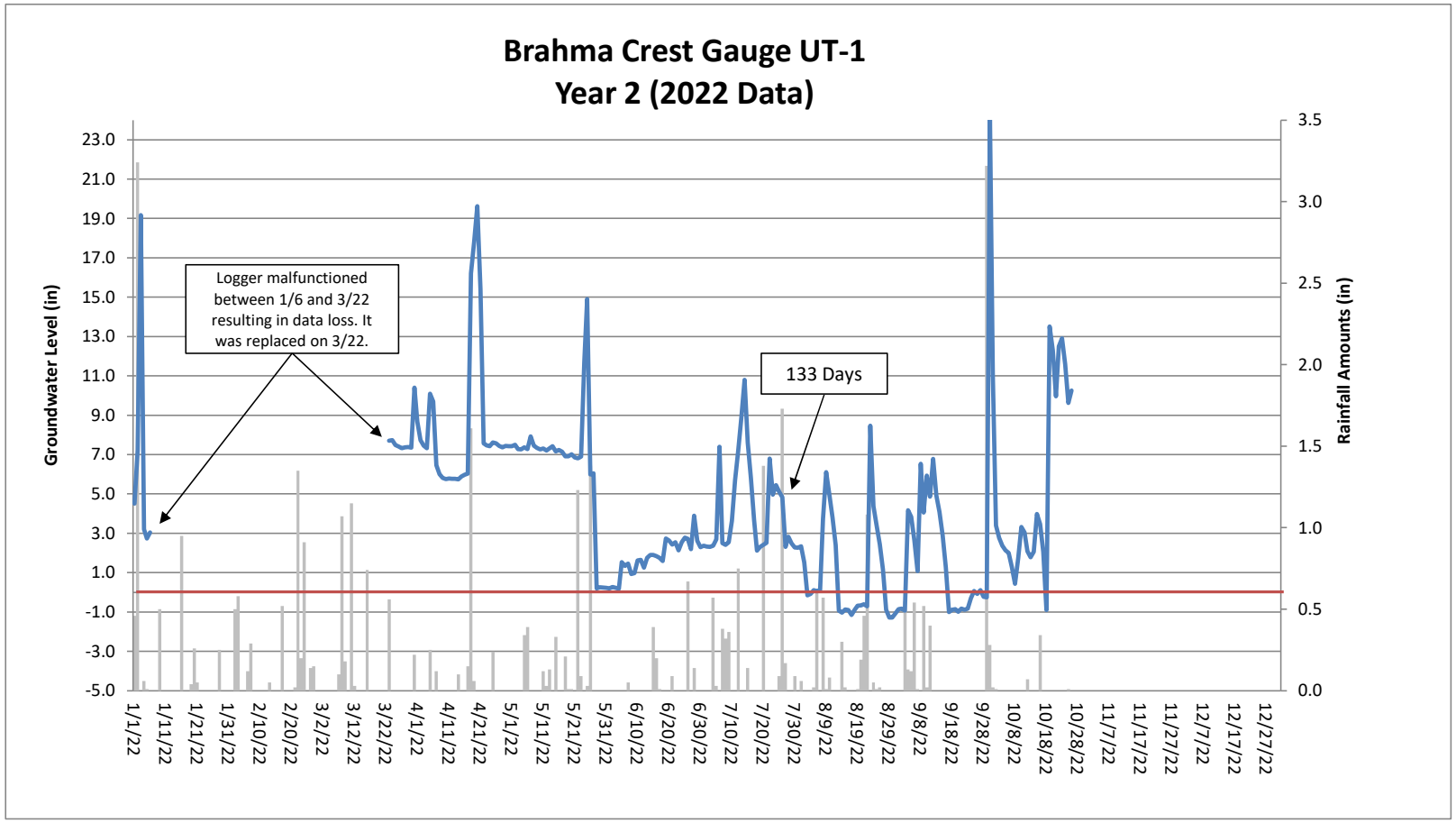
UT-3 Channel Evidence	Year 1 (2021)	Year 2 (2022)
Max consecutive days channel flow	266	226
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13D. UT-5 Channel Evidence

UT-5 Channel Evidence	Year 1 (2021)	Year 2 (2022)
Max consecutive days channel flow	50	86
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		

Table 13E. UT-6 Channel Evidence

UT-6 Channel Evidence	Year 1 (2021)	Year 2 (2022)
Max consecutive days channel flow	73	92
Presence of litter and debris (wracking)	Yes	Yes
Leaf litter disturbed or washed away	Yes	Yes
Matted, bent, or absence of vegetation (herbaceous or otherwise)	Yes	Yes
Sediment deposition and/or scour indicating sediment transport	Yes	Yes
Water staining due to continual presence of water	Yes	Yes
Formation of channel bed and banks	Yes	Yes
Sediment sorting within the primary path of flow	Yes	Yes
Sediment shelving or a natural line impressed on the banks	Yes	Yes
Change in plant community (absence or destruction of terrestrial vegetation and/or transition to species adapted for flow or inundation for a long duration, including hydrophytes)	Yes	Yes
Development of channel pattern (meander bends and/or channel braiding) at natural topographic breaks, woody debris piles, or plant root systems	Yes	Yes
Exposure of woody plant roots within the primary path of flow	No	No
Other:		


Brahma Crest Gauge UT-1
Year 2 (2022 Data)
Groundwater Level (in)
Rainfall Amounts (in)
Logger malfunctioned between 1/6 and 3/22 resulting in data loss. It was replaced on 3/22.
133 Days
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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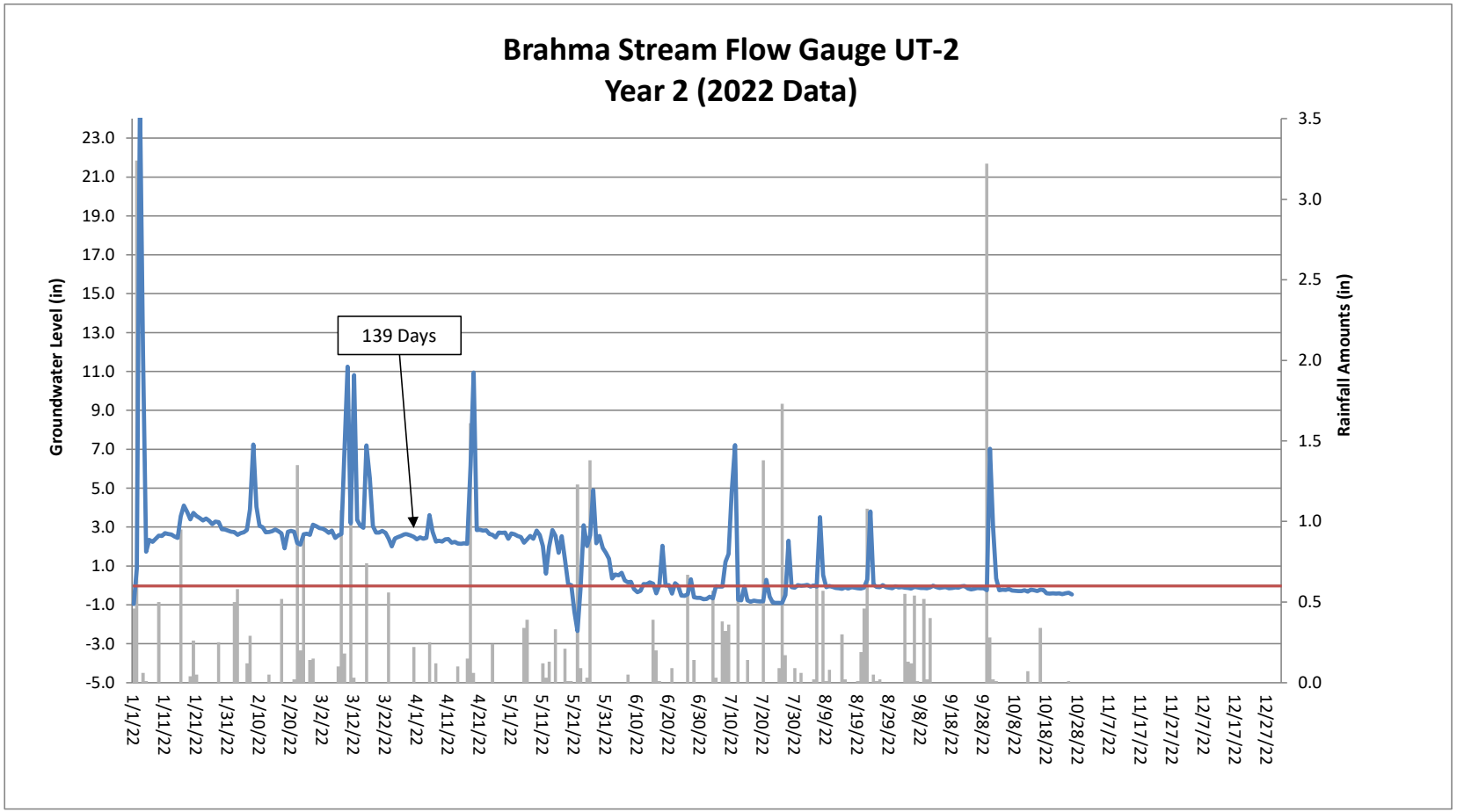
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Stream Flow Gauge UT-2
Year 2 (2022 Data)
Groundwater Level (in)
Rainfall Amounts (in)
139 Days
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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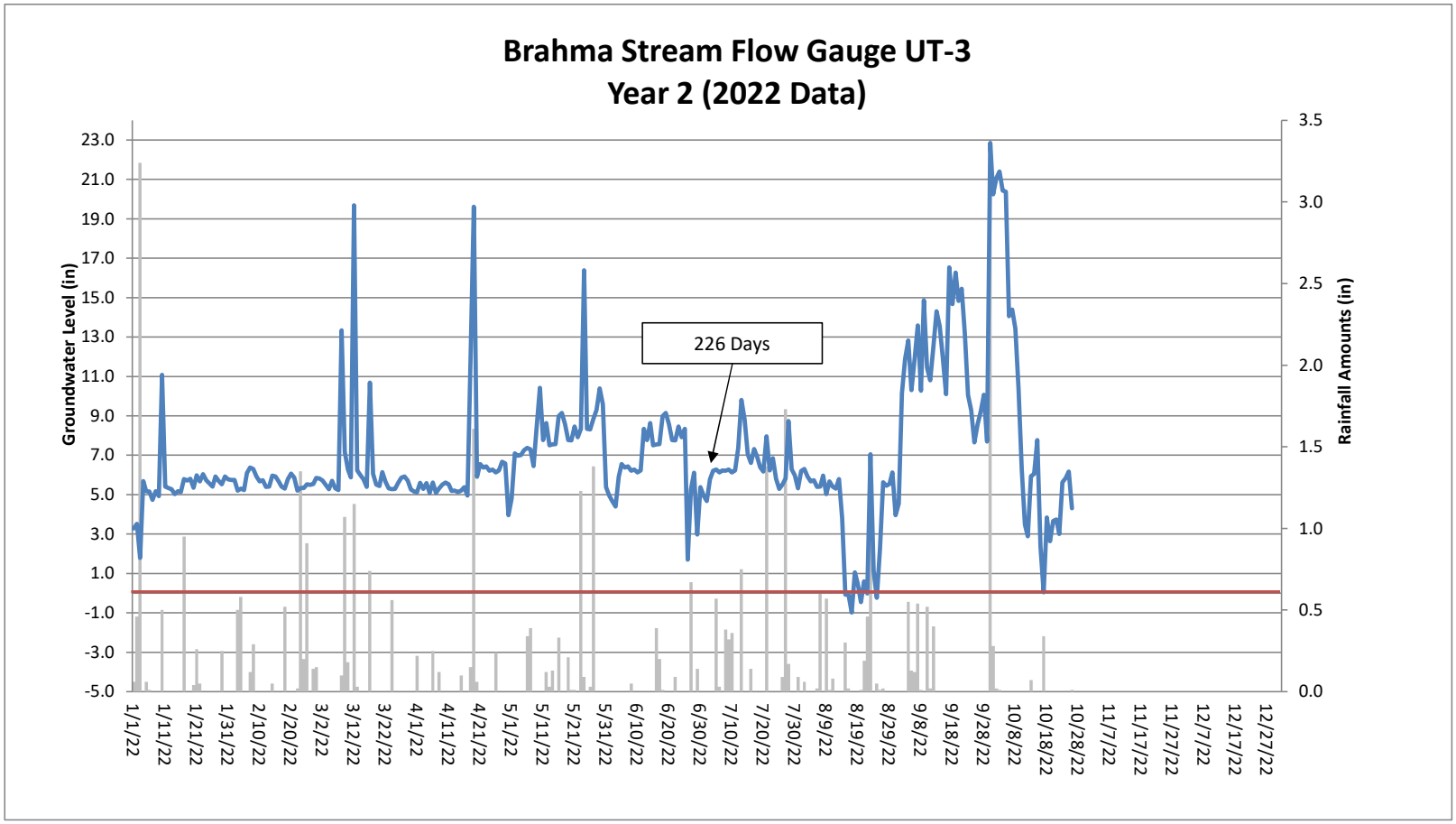
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Stream Flow Gauge UT-3
Year 2 (2022 Data)
Groundwater Level (in)
Rainfall Amounts (in)
226 Days
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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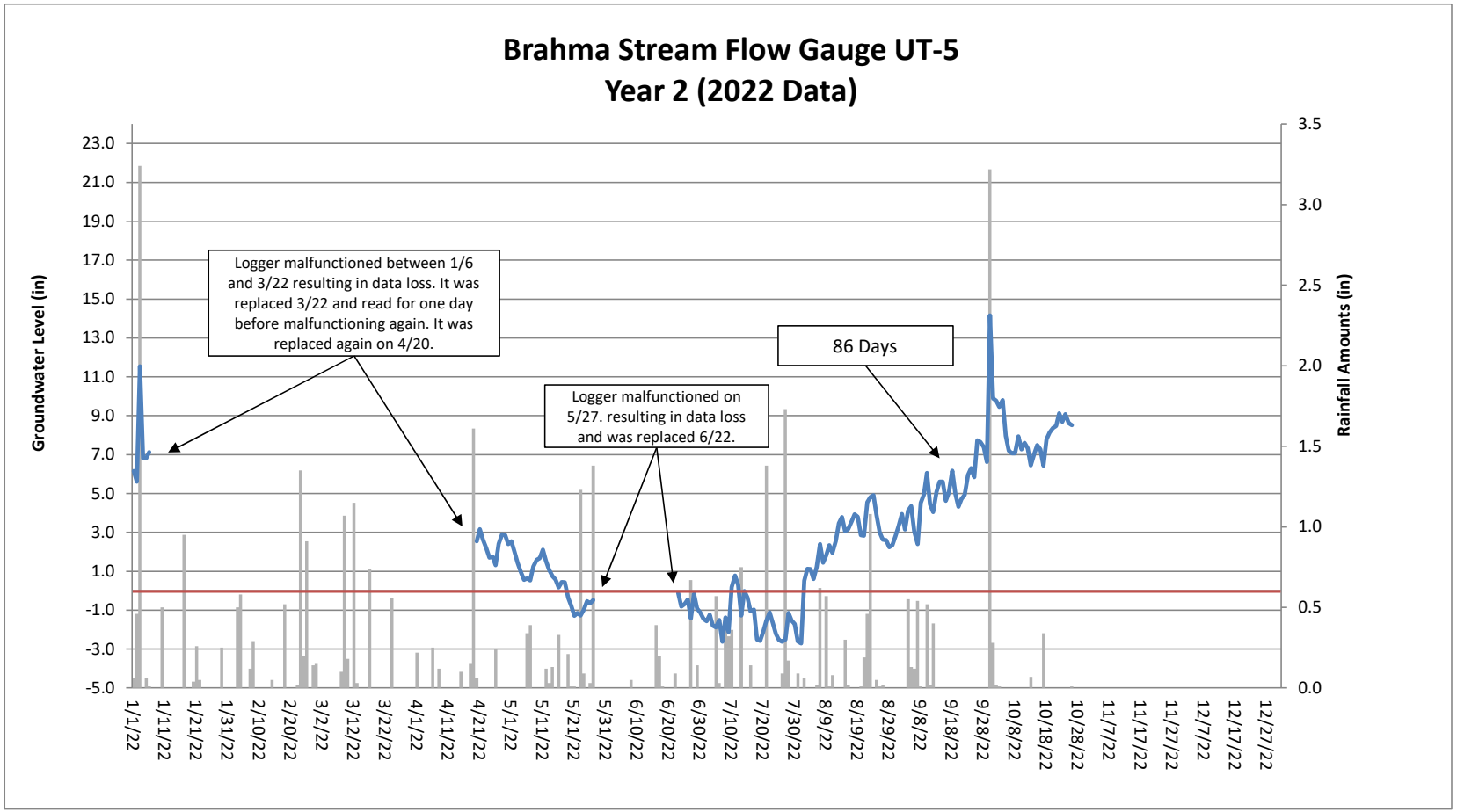
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Stream Flow Gauge UT-5
Year 2 (2022 Data)
Groundwater Level (in)
Rainfall Amounts (in)
Logger malfunctioned between 1/6 and 3/22 resulting in data loss. It was replaced 3/22 and read for one day before malfunctioning again. It was replaced again on 4/20.
Logger malfunctioned on 5/27. resulting in data loss and was replaced 6/22.
86 Days
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
6/20/22
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
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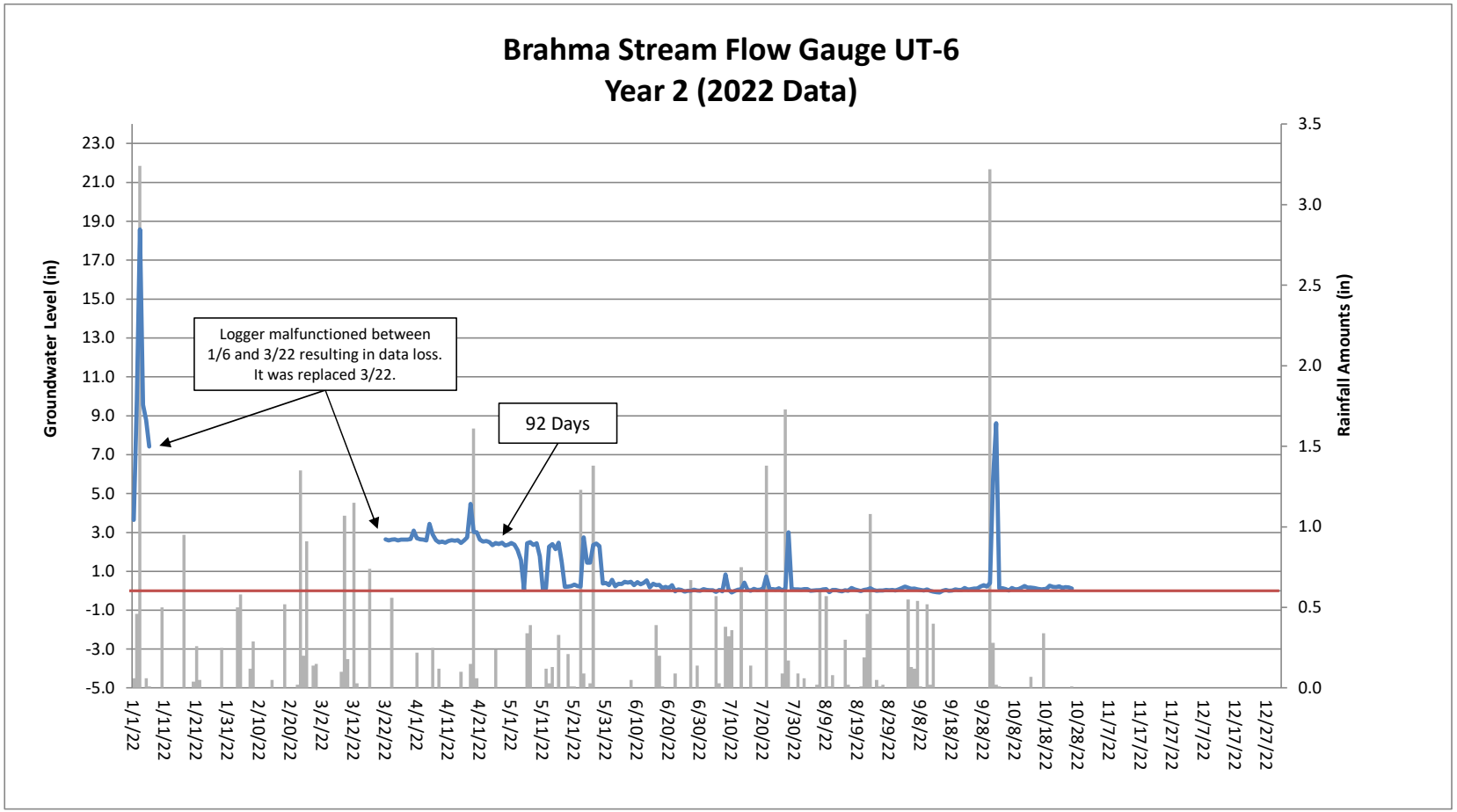
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22


Brahma Stream Flow Gauge UT-6
Year 2 (2022 Data)
Groundwater Level (in)
Rainfall Amounts (in)
Logger malfunctioned between 1/6 and 3/22 resulting in data loss. It was replaced 3/22.
92 Days
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
-1.0
-3.0
-5.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1/22
1/11/22
1/21/22
1/31/22
2/10/22
2/20/22
3/2/22
3/12/22
3/22/22
4/1/22
4/11/22
4/21/22
5/1/22
5/11/22
5/21/22
5/31/22
6/10/22
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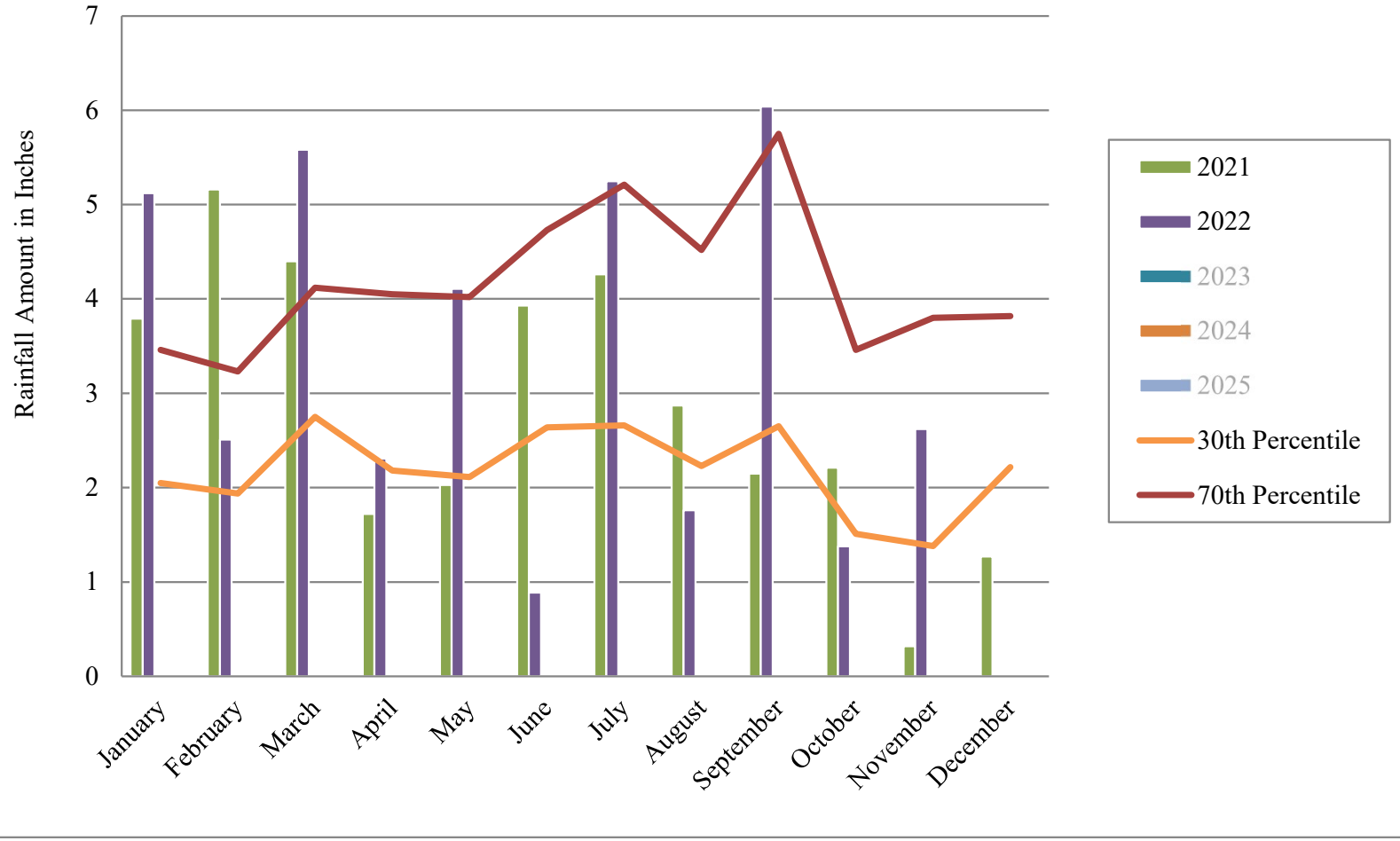
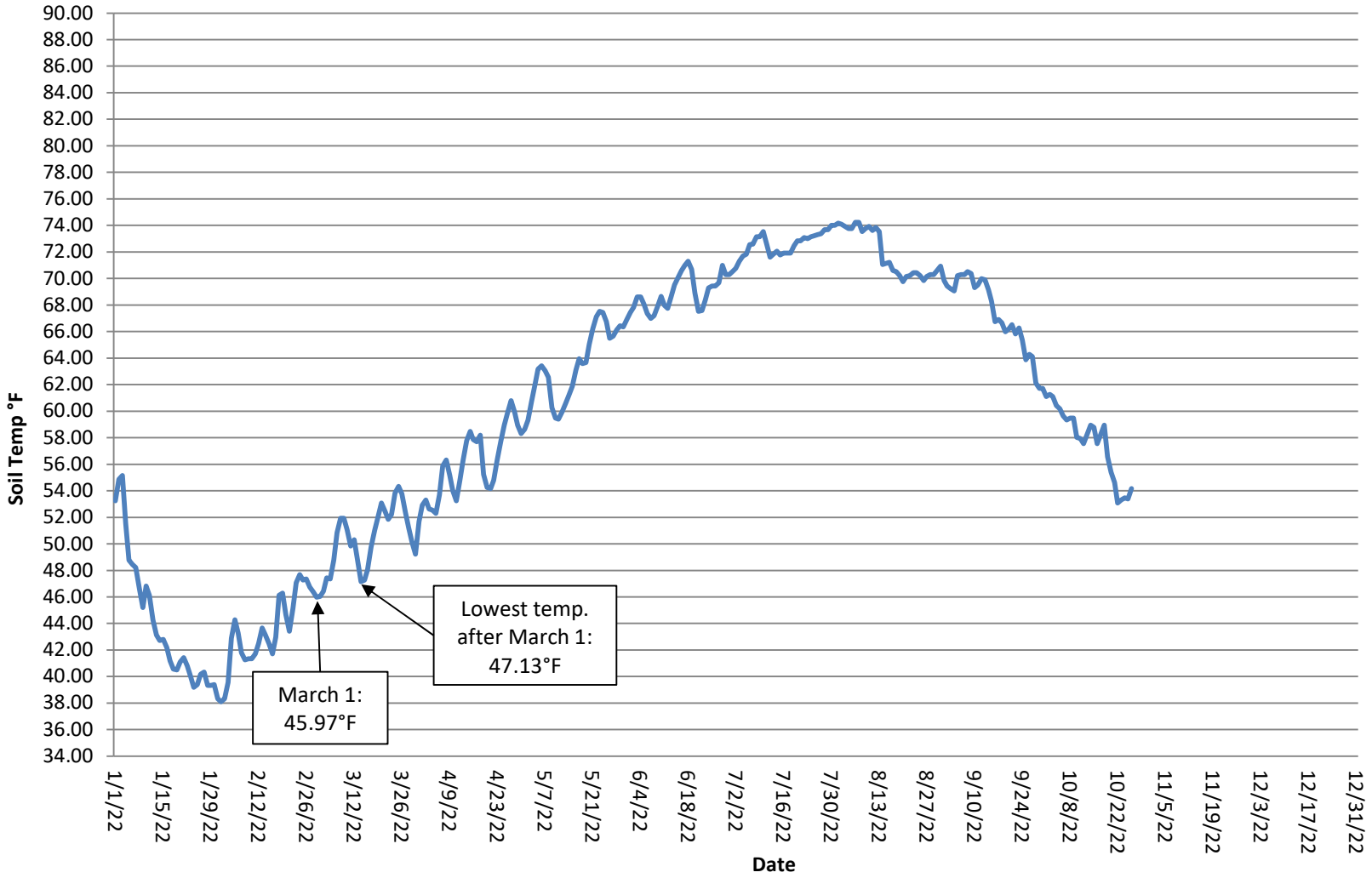
6/30/22
7/10/22
7/20/22
7/30/22
8/9/22
8/19/22
8/29/22
9/8/22
9/18/22
9/28/22
10/8/22
10/18/22
10/28/22
11/7/22
11/17/22
11/27/22
12/7/22
12/17/22
12/27/22

Figure D1: Brahma
30-70 Percentile Graph for Rainfall
Current year data from onsite rain gauge
30-70th percentile data from WETS Station: Burlington Alamance Regional Airport



Brahma Soil Temperature
Year 2 (2022 Data)



Appendix E
Project Timeline and Contact Info

Table 14. Project Timeline
Table 15. Project Contacts

Table 14. Project Timeline

Activity or Deliverable	Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted	NA	Dec-18
Mitigation Plan Approved	NA	8-Jul-20
Construction (Grading) Completed	NA	9-Dec-21
Planting Completed	NA	12-Jan-21
As-built Survey Completed	15-Jan-20	Feb-21
MY-0 Baseline Report	Jan-21	Apr-21
Year 1 Monitoring Report	Nov-21	Dec-21
Year 2 Monitoring Report	Nov-22	Dec-22
Remediation Items (e.g. beaver removal, supplements, repairs etc.)		
Encroachment		

Table 15. Project Contacts

Brahma Site/100092	
Provider	Restoration Systems, LLC 1101 Haynes Street, Suite 211 Raleigh, NC 27604
Mitigation Provider POC	Worth Creech 919-755-9490
Designer	Axiom Environmental, Inc. 218 Snow Ave Raleigh, NC 27603
Primary project design POC	Grant Lewis 919-215-1693
Construction Contractor	Land Mechanics Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592
	Charles Hill 919-639-6132

Appendix F
MY2 Photo Log

Brahma
MY-02 (2022) Photo Log

Photo 1: UT1 shortly after bankfull event, reclining vegetation

Photo 2: Enhancement (Level I) on UT1

Brahma
MY-02 (2022) Photo Log

Photo 3: UT-1 Northernmost Piped Crossing - Left Bank

Photo 4: UT-1 Northernmost Piped Crossing - Right Bank

Brahma
MY-02 (2022) Photo Log

Photo 5: UT-1 Northernmost Piped Crossing – Upstream End

Photo 6: UT-1 Northernmost Piped Crossing – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 7: UT-1 Piped Crossing North of UT-4 – Upstream End

Photo 8: UT-1 Piped Crossing North of UT-4 – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 9: UT-1 Road Crossing Piped Crossing – Left Bank

Photo 10: UT-1 Road Crossing Piped Crossing – Right Bank

Brahma
MY-02 (2022) Photo Log

Photo 11: UT-1 Road Crossing Piped Crossing – Upstream End

Photo 12: UT-1 Road Crossing Piped Crossing – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 13: UT-1 Southernmost Piped Crossing – Left Bank

Photo 14: UT-1 Southernmost Piped Crossing – Right Bank

Brahma
MY-02 (2022) Photo Log

Photo 15: UT-1 Southernmost Piped Crossing – Upstream End

Photo 16: UT-1 Southernmost Piped Crossing – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 17: UT-2 Piped Crossing – Left Bank

Photo 18: UT-2 Piped Crossing – Right Bank

Brahma
MY-02 (2022) Photo Log

Photo 19: UT-2 Piped Crossing – Upstream End

Photo 20: UT-2 Piped Crossing – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 21: UT-5 Piped Crossing – Left Bank

Photo 22: UT-5 Piped Crossing – Right Bank

Brahma
MY-02 (2022) Photo Log

Photo 23: UT-5 Piped Crossing – Upstream End

Photo 24: UT-5 Piped Crossing – Downstream End

Brahma
MY-02 (2022) Photo Log

Photo 25: Bud Burst of Prunus serotina
Photo Taken 2/28/22

Photo 26: Bud Burst of Ulmus americana
Photo Taken 2/28/22

Brahma
MY-02 (2022) Photo Log

Photo 27: UT-1 Flow 1/18/22

Photo 28: UT-1 Flow, Wrack on Top of Bank 3/17/22

Brahma
MY-02 (2022) Photo Log

Photo 29: UT-3 Flow 1/17/22

Photo 30: UT-3 Flow 4/8/22

Brahma
MY-02 (2022) Photo Log

Photo 31: UT-5 Flow 1/13/22

Photo 32: UT-5 High Flow 3/16/22

Brahma
MY-02 (2022) Photo Log

Photo 33: UT-5 Flow 4/8/22

Photo 34: UT-5 Flow 5/2/22

Appendix G
Remedial Planting Plan (2022/2023 Dormant Season)

December 1, 2022

Restoration Systems, LLC
1101 Haynes St. Suite 211
Raleigh, North Carolina
Ph: (919) 755-9490
Fx: (919) 755-9492

Lindsay Crocker
Eastern Regional Supervisor
NC DEQ Division of Mitigation Services
217 West Jones St., Raleigh, NC 27603

Subject: Brahma Mitigation Site: Remedial Action Plan for Additional Bare-Root Planting
Contract# 7743, DMS Project ID/IMS #: 100092, RFP: 16-007571
USACE Action ID No. SAW-2019-00126 & DWR Project No. 20190158

Mrs. Crocker,

During the 2022 growing season, Restoration Systems (RS) observed areas of low planted-stem densities at the Brahma Mitigation Site (Site). These observations were confirmed by quantitative vegetation surveying; results of the vegetation survey, both permanent plots and random transects, are included in the MY2 (2022) Monitoring Report. The survey showed a site-wide average of 340 planted stems/acre, excluding live stakes, slightly above the MY 3 vegetation success criteria of 320 stems per acre. However, 11 of the 23 surveyed plots/transects failed to achieve the 320 stems per acre criteria. The 11 failing plots/transects averaged 209 stems/acre, below the MY7 vegetation success criteria for planted stems.

Vegetation mortality during MY1 and 2 mainly occurred in wetland credit areas where herbaceous species have established. These are likely out-competing many of the smaller bare-root trees. Though herbaceous growth across the Site is strong, RS does not feel it is warranted to treat the herbaceous layer at this time. Remedial bare-root planting will be of a higher-quality stock with species being a minimum of 18"-24" inches tall with adequate root mass to help reduce mortality.

Based on the qualitative and quantitative assessments, RS proposes implementing an adaptive management plan, which includes 13.08 acres of bare-root planting within the Site's original 17.7-acre planted area (Figure A – Attached). Table A lists proposed bare-root species and quantities. These stems have been secured, and RS anticipates planting in late January/early February of 2023.

Table A: Proposed Species and Quantity of Supplemental Planting
Vegetation Association: Piedmont/Low Mountain Alluvial Forest
Proposed Planting Area = 13.08 Acres

Species	Count	% of Total Replant	Listed Mitigation Plan Species	Wetland Indicator
River birch (*Betula nigra*)	600	16.44%	Yes	FACW
Black Gum (*Nyssa sylvatica*)	550	15.07%	Yes	FAC
Green Ash (*Fraxinus pennsylvanica*)	150	4.11%	Yes	FACW
Oak Water (*Quercus nigra)*	550	15.07%	Yes	FAC
Oak Willow (*Quercus phellos)*	350	9.59%	Yes	FACW
Silky Dogwood (*Cornus amomum*)	350	9.59%	Yes	FACW
Sycamore (*Platanus occidentalis*)	550	15.07%	Yes	FACW
Tulip Poplar (*Liriodendron tulipifera*)	550	15.07%	Yes	FAC
Total	3,650	100%		

MY2 data indicates the current planted stem density within the proposed replant area is roughly 209 stems per acre. RS intends to replant the designated areas to a density of 480 stems per acre or plant an additional +/-270 stems per acre. As part of this effort, RS will replant permanent vegetation monitoring plots 3-4, 6, 8, 11-16, 18, and 19. Though vegetation plot 17 is within the remedial planting area, the MY2 vegetation survey recorded 14 living planted stems. RS is not planning to replant Plot 17.

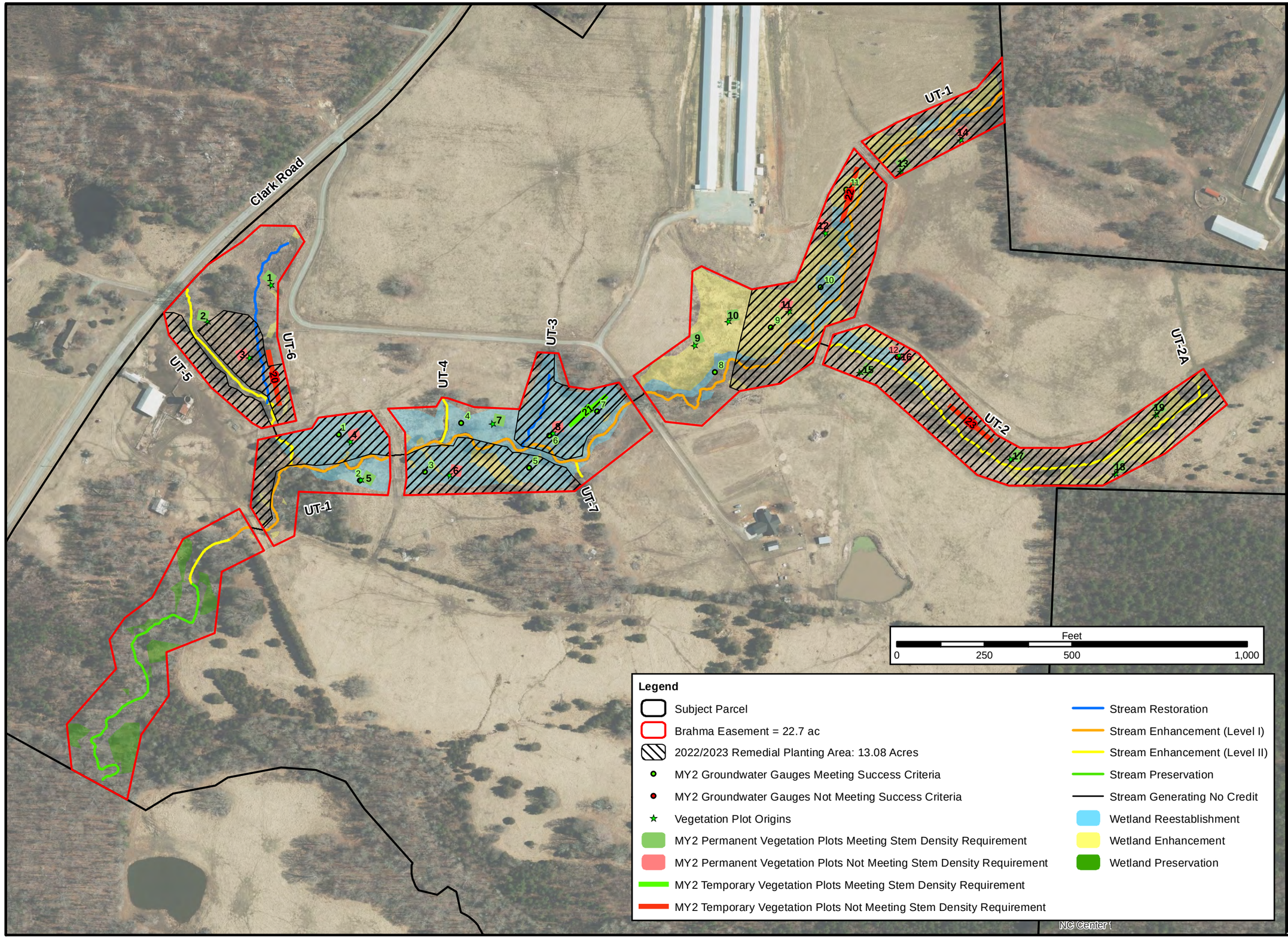
RS will conduct four random vegetation transects within the replanted areas in the Spring of 2023 and repeat the same transects in the Fall of 2023. Transect data will be presented in the MY3 (2023) Monitoring Report.

Please let me know if you have any questions or if I can provide any additional information.

Sincerely,

Raymond Holz
Operations Manager
Restoration Systems, LLC

Attachment – Figure A, Remedial Planting Plan Figure



RESTORATION SYSTEMS | LLC

Prepared for:

NC DEQ
Division of Enviromental Quality

Division of Mitigation Services

Project:

BRAHMA SITE

Alamance County, NC

Title:

2022/2023 REMEDIAL PLANTING PLAN

Drawn by: RJH

Date: NOV. 2022

Scale: 1:3,100

Project No.: DMS ID: 100092

FIGURE

A

N