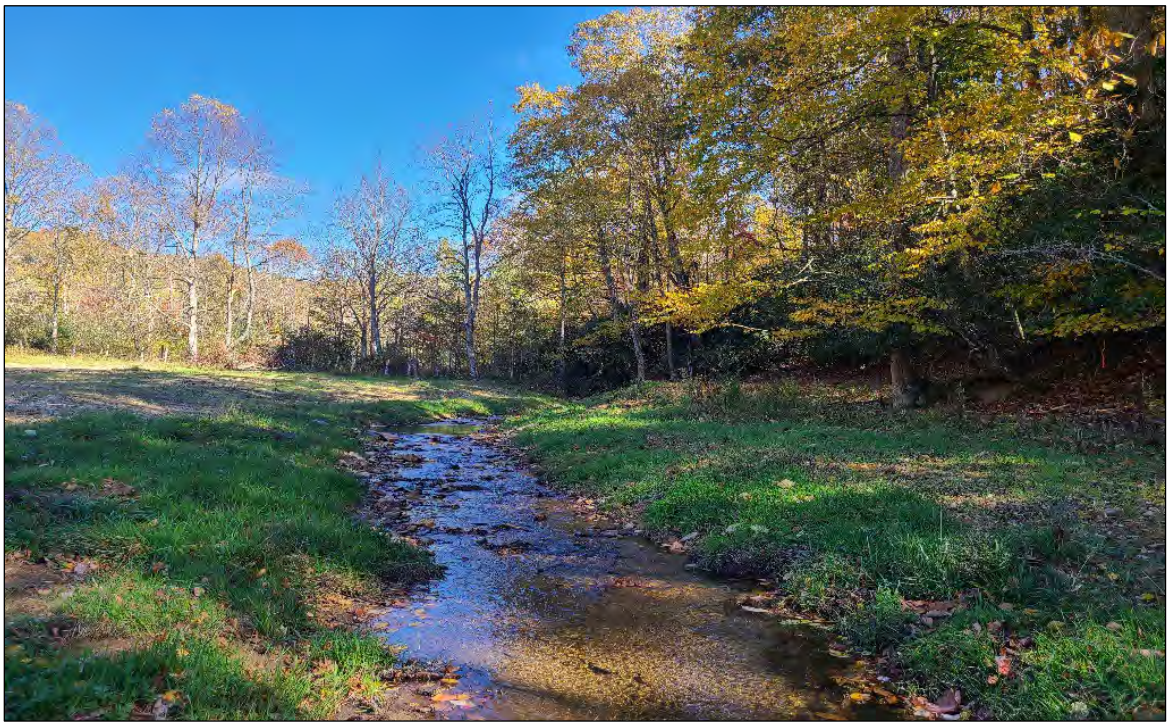
MY0 FINAL MONITORING REPORT

LAUREL SPRINGS STREAM AND WETLAND MITIGATION SITE

Avery County, North Carolina
French Broad River Basin
Cataloging Unit 06010108

DMS Project No. 100122
Full Delivery Contract No. 7890
DMS RFP No. 16-007725 (issued 11/13/18)
USACE Action ID No. SAW-2019-00835
DWR Project No. 2019-0865

Data Collection: October 2021-February 2022
Submission: December 2022



Prepared for:

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

Mitigation Services
ENVIRONMENTAL QUALITY

Ray Holz

From: Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>
Sent: Friday, December 09, 2022 10:08 AM
To: Ray Holz
Cc: Wiesner, Paul; Haywood, Casey M CIV USARMY CESAW (USA)
Subject: RE: Request for Additional Information/ NCDMS Laurel Springs Mitigation Site As-Built/ SAW-2019-00835/ Avery County

Follow Up Flag: Follow up
Flag Status: Completed

Hi Ray,
Thanks for the follow-up. In general, the IRT does not have any concerns with the Remedial Planting Plan or counting the bare root species towards success. WRC and DWR request that you contact them if you plan to supplement understory/shrub species next year. They would like to encourage diversity out there. Andrea Leslie did mention that American Hazelnut is not a typical riparian species and is often found on hillslopes. This species may not do well in the riparian zone. She would recommend Witch Hazel as an alternative. She also noted that Red Spruce is very elevation specific and survives in elevations in excess of 4,000 feet.
Thanks,
Kim

Kim Isenhour
Mitigation Project Manager, Regulatory Division I U.S. Army Corps of Engineers I 919.946.5107

-----Original Message-----
From: Ray Holz <rholz@restorationsystems.com>
Sent: Wednesday, November 30, 2022 4:26 PM
To: Isenhour, Kimberly T CIV USARMY CESAW (USA) <Kimberly.D.Browning@usace.army.mil>; Wiesner, Paul <paul.wiesner@ncdenr.gov>
Cc: Tugwell, Todd J CIV USARMY CESAW (USA) <Todd.J.Tugwell@usace.army.mil>; Haywood, Casey M CIV USARMY CESAW (USA) <Casey.M.Haywood@usace.army.mil>; 'erin.davis@ncdenr.gov' <erin.davis@ncdenr.gov>; bowers.todd@epa.gov; Youngman, Holland J <holland_youngman@fws.gov>; 'travis.wilson@ncwildlife.org' <travis.wilson@ncwildlife.org>; andrea.leslie@ncwildlife.org; Melonie Allen <melonie.allen@ncdenr.gov>; Crumbley, Tyler A CIV USARMY CESAW (USA) <Tyler.A.Crumbley2@usace.army.mil>; John Hamby <jhamby@restorationsystems.com>
Subject: [URL Verdict: Neutral][Non-DoD Source] RE: Request for Additional Information/ NCDMS Laurel Springs Mitigation Site As-Built/ SAW-2019-00835/ Avery County

To Kim and IRT Members -

Firstly, my personal and sincere apologies for the lack of QA/QC on not only the Laurel Springs As-Built/MY0 Baseline Report but also for the failure to appropriately updated all portions of the Mitigation Plan and with our ordering of non-approved bare-root species and quantities. I wholeheartedly believe the IRT's mitigation plan review and comment process results in a superior product, and it is never our intent to dismiss or disregard IRT's comments.

In this case, within the final/approved Mitigation Plan, RS failed to update the planting plan on Sheet L5.00 of the Construction Drawings; however, RS did apply the IRT's comments regarding the planting plan to Table 18 of the Mitigation Plan, which led to the discrepancy between the two.

During the bare-root tree ordering process, when species availability became an issue, RS staff charged with ordering trees did not notice or review the IRT's draft Mitigation Plan comments concerning the planting plan. Specifically, the IRT's request to cap the amount of Eastern hemlock planted. This mistake and the ordering of non-approved species caused us to review our bare-root tree ordering process in detail. We have established additional QA/QC measures as a result, which include:

1.) a full review of the IRT's mitigation plan comments while ordering trees by both personnel charged with ordering trees and the project manager, and

2.) if non-approved substitution species are required, or quantities of species change drastically due to a lack of availability, coordination with the IRT will occur immediately.

With that said, I have attached, as a single .pdf, the following items:

1. Response to IRT comments which includes revised MY0 Report and Recorded Drawing pages
2. A revised Mitigation Plan Amendment Request to count bare-root substitution species towards success criteria, and
3. A Remedial planting plan for areas of observed low-stem density within the Site's Acidic Cove Forest vegetation community

After discussing with Paul Wisner at DMS, we believe it would be best to allow the IRT to review the attached information and provide comments before updating the MY0 Report and re-posting the document.

If there are any items you wish to discuss with me directly, please feel free to email or call me at 919-604-9314.

Thank you for your time and patience.

Sincerely,

Raymond H.

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Response to IRT Comments – MY 0, Baseline Report
Laurel Springs Mitigation Site – Avery County
DMS Project ID No. 100122
Full Delivery Contract No. 7890
RFP No. 16-007725 (Issuance Date 11/13/2018)
USACE Action ID No. SAW-2019-00835
DWR Project No. 2019-0865

Comments Received (Black Text) & Responses (Blue Text)

Casey Haywood, USACE:

1. QAQC of the Vegetation tables need to be addressed in the report. Looking back at the Mitigation Plan, Table 18 Planting Plan does not match the listed species on the L5 Plan Sheet. It appears that some of the discrepancies listed below are likely a result of this. Please ensure these tables reflect the same information in future submittals.
   You are correct. The final Mitigation Plan, submitted with the permit application(s), was updated based on IRT comments, including updates to Table 18 – Planting Plan. However, the Planting Plan table within the construction drawings (Sheet L5) was not updated. Steps were taken to ensure this oversight does not occur in the future. Our sincere apologies for this lack of quality control.

   a. Table A lists yellow birch (Betula alleghaniensis) as a species that was not planted; however, Table B shows it was planted but had it listed as swamp birch (Betula alleghaniensis). Plan Sheet L5 also indicates it was planted. Please clarify.
      Response: *Betula alleghaniensis* was planted. The use of two different common names for *Betula alleghaniensis* (yellow birch and swamp birch) resulted in it being listed in Table A as a non-planted species. The row containing this species was deleted from Table A, and the common name listed in Table B was updated to *yellow birch*.

   b. Table A should reflect all species that were not planted to include elderberry and buttonbush as shown on Table 18 of the Final Mitigation Plan.
      Response: Elderberry and buttonbush were live-staked in the stream-side assemblage area. They have been included in Table B as such.

   c. Sheet L5 lists Scarlet Oak as an added species, however this is shown in Table B (and Table 18 in the Mitigation Plan) as an approved species. Table B lists Red Spruce as an added species, whereas Sheet L5 has it listed as an approved species. Please update.
      Response: Scarlett oak was planted and was included in the original mitigation plan planting plan; however, the species was incorrectly listed in the mitigation plan as Quercus imbricaria. This has been corrected in the redline Recording Drawings planting plan (Sheet L5) and is not considered a species substitution. Red spruce was not included in the mitigation plan. The redline Recording Drawings planting plan (Sheet L5) and Table F (As-Built Planted Species and Stems) of the Baseline Report were updated accordingly.

   d. Based on the information provided, it appears the modification request includes the addition of three species: arrowwood viburnum (Viburnum dentatum), bitternut hickory (Carya cordiformis) and American hazelnut (Corylus americana). Is this accurate? If so, I am okay with the inclusion of the replacement species, however, please provide an updated redline planting table to reflect Plan Sheet L5 and Table 18 of the Final Mitigation Plan to include consistency between common species names and planting numbers. Updating this table will be beneficial to use as a reference for potential replanting efforts in the future.
      Response: The modification request includes the addition of four species: arrowwood viburnum (*Viburnum dentatum*), bitternut hickory (*Carya cordiformis*), American hazelnut (*Corylus americana*), and Red Spruce (*Picea rubens*). Although no red spruce was counted during MY0 permanent vegetation plot monitoring, the species was planted, and RS requests its consideration for inclusion in the event it is

counted in temporary vegetation plots during the monitoring period. Additionally, common ninebark was included in the stream-side assemblage but was planted via live stake. This species is not being proposed for IRT consideration since live-stakes do not count toward planted stem success criteria. The redline Recording Drawings planting plan (Sheet L5) and Table F (As-Built Planted Species and Stems) of the Baseline Report were updated accordingly.

2. With the possibility of a replant in 2023, I concur with EPA's comment to include random vegetation plots and would support the replacement of 3 permeant plots to random plots (recommend plots 3, 5, and 13).
   Response: RS will continue monitoring all permanent vegetation plots and will add three additional plots within the 2023 proposed replant areas. Three random temporary vegetation plots will be monitored for the remainder of the monitoring period or until otherwise requested by the IRT.

3. When comparing the MY0 CCPV (Figure 1) to the updated Monitoring Map (Figure 9) provided on August 26, 2021, some of the veg plots and groundwater gauge locations appear to be flipped and are no longer located in creditable wetland reestablishment areas (GWG 1, 6, & 9). While it's beneficial to have some groundwater gauges located in non-credited wetlands, please ensure creditable wetland reestablishment areas have adequate monitoring wells to document hydrologic uplift.
   Response: During the 2022/2023 dormant season, RS plans to move gauges 6, 9, 11, and 12 into creditable wetland reestablishment areas. Also, gauge 1 will be moved into the wetland enhancement area, as depicted in Figure 9 of the approved Mitigation Plan. Please advise if the IRT would like additional changes to the locations of monitoring features.

4. Appreciate the efforts made to work with the landowner to remove the shed located in the easement near UT3. To help prevent future encroachments (such as mowing), were additional boundary markers or horse tape added to this area when the surveyor visited the site on 9/2022? When the new shed is constructed, please be sure to have the structure located far enough off the easement boundary to prevent any future encroachments.
   Response: Yes, 6-inch treated fence posts were used to delineate the easement boundary in this area. The new shed was erected approximately 15 feet from the easement.

Andrea Leslie, WRC:

1. The as-built and final mitigation plan do not match when it comes to planting. The numbers/percentages of what was planned (in black) to plant are not what is in the final plan. The planned percentages are also different from the as-built (e.g., hemlock at 2-3% in final plan, but in the as-built as planned at 8% and actually planted at 6%). The MY0 report does note that a number of species were not planted (but it is inaccurate, as it fails to include a number of those that were in the final plan and includes Betula alleganiensis, which was planted). Please include me in a discussion with RS; I'd like to have input on the supplemental planting.
   Response: Based on species availability and surrounding natural communities, several substitutions were made between the mitigation plan and the as-built planting. The addendum to the mitigation plan has been updated to indicate that *Betula alleghaniensis* was planted.

   RS has ordered trees to replant 2.67 acres at a density of 670 stems per acre within observed low stem density areas, which includes the 0.107-acre area of encroachment. These areas are within the Acidic Cove Forest Association. The following species and quantities were secured for Q1-2023 planting.

   Targeted Vegetation Associations: Acidic Cove Forest
   Area of Replant: 2.67 Acres

Species	Indicator Status	Number of Stems
American elm (*Ulmus americana*)	FACW	600
White Oak (*Quercus alba*)	FACU	600
Persimmon (*Diospyros virginiana*)	FAC	600
Total		**1,800**

These species were listed within the approved Mitigation Plan but were not planted within the Acidic Cove vegetation association during initial planting. These three species will add to the six species planted during initial planting for a total of nine species within the Acidic Cove vegetation association. A formal Remedial Planting Plan letter is provided after RS's Mitigation Plan Modification Request (request to count replacement tree species towards site success criteria) – immediately following these comment responses.

RS recognizes that additional "diversity plantings" may be desired by the IRT, and we welcome the opportunity to discuss a diversity planting effort with the IRT. RS will plan to reach out to Andrea Leslie and Erin Davis in Q1-2023 to discuss this effort.

Todd Bowers, EPA:

1. Table 8: Post Mitigation Plan dominant species composition needs to be recalculated for all plots.
   Response: Post Mitigation Plan dominant species composition was recalculated.

2. Were there no random vegetation plots installed? If not, I recommend adding 3 random plots in place of fixed plots for future vegetation monitoring.
   Response: 3 random vegetation plots will be measured annually in addition to the 16 permanent plots.

3. Modifications and red line changes in As-Built plans such as floodplain culvert features, added rock sills and log vanes, j-hooks, replacement of a box culvert with a bridge span, and the modified planting plan are all noted with no comment.
   Response: Noted.

4. Sheet L5.00: Recommend breaking down each species component (stem counts) into each vegetation community.
   Response: The revised redline planting table has broken down species stem counts by vegetation community.

5. I think the Corps (and IRT) should have been notified much earlier than concurrently with the MY0 Report of a modification request with changes or modifications to the planting plan.
   Response: Noted. Apologies for the lack of notice – RS has implemented new QA/QC procedures regarding ordering bare-root species from nurseries to prevent this situation from occurring on future sites.

6. Table 5: 16.5% of the site's planted acreage has low stem density based on visual assessment. Recommend placing some of the recommended random plots in areas of concern. If an adaptive management plan for supplemental planted is anticipated, please submit to the IRT as soon as possible so that the site can be replanted no later than March 2023.
   Response: Temporary plots will be measured in this area during MY1 monitoring, although RS plans to replant these areas in Q1-2023 – see WRC comment 1 response.

7. Overall, I am very satisfied with the report and the work that RS has completed at the site. Having not been able to visit this location, I really appreciated the detailed ground-level and drone level wetland, vegetation and stream feature photos to illustrate the grading, planting and features implemented.
   Response: Noted.

Erin Davis, DWR:

1. DWR appreciated DMS' report review and site visit comments.
   Response: Noted.

2. The inclusion of additional photos, particularly the drone images, were very helpful for this review. Thank you.
   Response: Noted.

3. I was confused about the addition of 29 rock sills that weren't engineered and installed to act as grade control. In hindsight, is there a better term to depict adding cobble to support a constructed riffle as described in Section 2.1?
   Response: RS agrees that the label "Rock Sills" is not appropriate for what occurred. "Rock Sills" was used by the surveyor and, in turn, by the Engineer of Record on the Recording Drawing Plan Set. We feel the description provided in Section 2.1 of "large cobble" is more appropriate. In hindsight, within the Recorded Drawing Plan Set, "Large Cobble Added" would have been more appropriate than "Rock Sill Added."

4. Once all straw wattles with plastic netting have been removed from the site, please add a note in the corresponding monitoring report narrative.
   Response: Will do. We expect all straw wattles to be removed during the spring/summer of 2023 and will report their removal in the MY2 (2023) monitoring report.

5. The mowing and shed encroachment should be identified in Table 5.
   Response: The two areas of encroachment have been depicted on the CCPV and are quantified in Table 5.

6. An additional five stormwater culverts were installed within project easement breaks. Throughout the monitoring period, please pay particular attention to associated easement areas that receive discharge from these structures for any evidence of wetland/floodplain instability or erosion.
   Response: All easement areas receiving discharge from stormwater culverts will be monitored throughout the monitoring period for erosion/instability.

7. DWR is very disappointed with the planted species list. First, looking back at the final mitigation plan, DWR reviewed and supported the Table 18 and Figure 8 plant list, which took into account the several IRT draft mitigation plan comments. It appears that Table 18/Figure 8 was not correctly updated in the associated construction plan sheets and that the draft mitigation plan plant list was used for construction planting. Additionally, it does not appear that the IRT comments were reviewed when making plant quantity adjustments as both WRC and DWR requested a cap for Eastern hemlock at 5 percent.
   Response: RS sincerely apologizes for the planted species issue – it was not intentional. RS has implemented new QA/QC procedures regarding the ordering of bare-root species from nurseries to prevent this situation from occurring again. Please see WRC comment response 1 and the Remedial Planting Plan included with this submittal. RS recognizes that additional "diversity plantings" may be desired by the IRT, and we welcome the opportunity to discuss a diversity planting effort with the IRT. RS will contact Andrea Leslie and Erin Davis in Q1-2023 to discuss this effort.

8. DWR understands that species availability is a common constraint during the construction phase. However, had DWR been notified and engaged on this issue we could have discussed and agreed upon an adaptive planning approach such as phased planting to ultimately ensure that appropriate species and appropriate species quantities were planted across the project.
   Response: Understood. We hope our new QA/QC procedures around bare-root species ordering will ensure appropriate species are ordered. If species are unavailable, we will know early enough to allow for collaboration with the DWR and other IRT members ahead of finalizing bare-root orders.

9. Please provide a supplemental list of species and quantities for the proposed supplemental planting effort. In addition to the proposed 18 percent supplemental planting area (total 16.2 acres), DWR recommends sitewide supplemental planting of understory/shrub species as specified in the approved Final Mitigation Plan Figure 8.
   Response: Please see the response to WRC comment 1 regarding the Q1-2023 replanting effort. Regarding the sitewide understory/shrub species planting, RS will reach out to DWR and WRC early in 2023 to discuss this planting and additional "diversity" planting efforts.

10. DWR recommends conducting random plots/transects in proposed supplemental planting areas, with at least one survey area within the UT3 decommissioned farm road footprint.
    Response: 3 temporary vegetation plots were measured within the supplemental planting areas as part of our response to these comments. Data is included in Table 8 of this submittal. RS plans to monitor 3 random

temporary vegetation plots for the remainder of the monitoring period or until otherwise requested by the IRT. Josh Merritt of RS walked the former soil path along UT3 and observed living planted stems. No mowing or vehicular access occurred along the decommissioned soil path in 2022, and planted stems are establishing. Josh oversaw the planting of two rows along the soil path during site planting. RS will continue to visually monitor this area. If planted stems do not survive into year two (2023) monitoring, RS will propose replanting the decommissioned road with potted trees/shrubs during the 2023/2024 dormant season.

11. Please provide wetland indicator status for proposed species additions to the approved plant list.
    Response: Wetland indicator status has been provided in Tables A and B in the Mitigation Plan Addendum and in the redline Recording Drawing planting plan on Sheet L5.

12. DWR respectfully disagrees with RS' response to DMS that there were no significant changes in monitoring device locations from the approved mitigation plan. As noted in the August 2021 correspondence, DWR was ok with relocating one groundwater gauge (#4) to a non-crediting area. However, the MY0 monitoring figure shows several gauges have been shifted outside of wetland credit generating areas. In order to demonstrate performance standard success there needs to be sufficient number and representative cover of monitoring devices across proposed credit areas. If gauge locations remain as-is, DWR may request additional gauge installation during the monitoring period.
    Response: Understood. During the 2022/2023 dormant season, RS plans to move gauges 6, 9, 11, and 12 into creditable wetland reestablishment areas. Also, gauge 1 will be moved into the wetland enhancement area, as depicted in Figure 9 of the approved mitigation plan. Please advise if the IRT would like additional changes to the locations of monitoring features.

Table F. As-Built Planted Species and Stems

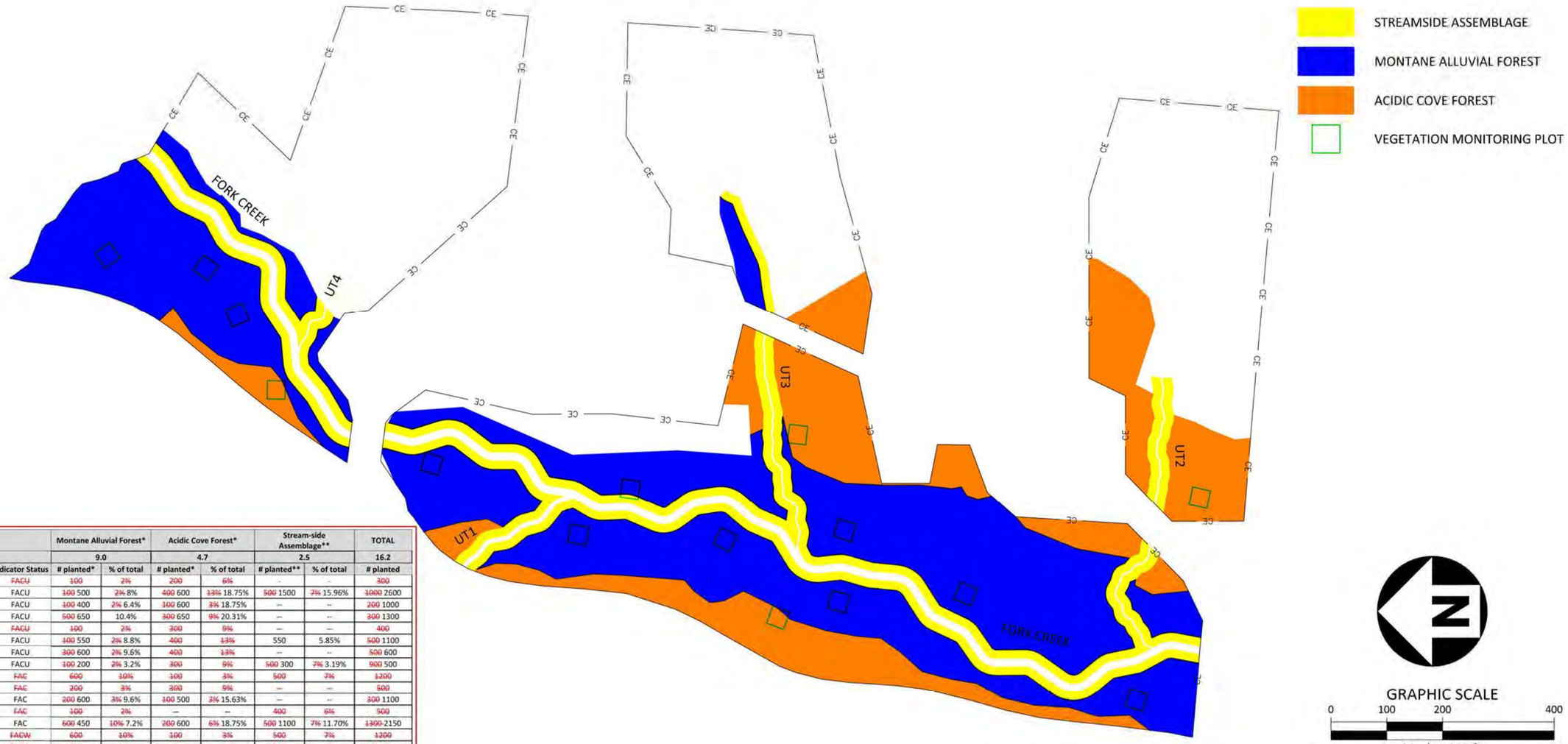
Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		9.0		4.7		2.5		16.2
Species	Indicator Status	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
~~Basswood (*Tilia americana*)~~	~~FACU~~	~~100~~	~~2%~~	~~200~~	~~6%~~	~~-~~	~~-~~	~~300~~
Cherry birch *(Betula lenta*)	FACU	~~100~~ 500	~~2%~~ 8%	~~400~~ 600	~~13%~~ 18.75%	~~500~~ 1500	~~7%~~ 15.96%	~~1000~~ 2600
Eastern hemlock (*Tsuga canadensis*)	FACU	~~100~~ 400	~~2%~~ 6.4%	~~100~~ 600	~~3%~~ 18.75%	--	--	~~200~~ 1000
Red oak (*Quercus rubra*)	FACU	~~500~~ 650	10.4%	~~300~~ 650	~~9%~~ 20.31%	--	--	~~300~~ 1300
~~White ash (Fraxinus americana)~~	~~FACU~~	~~100~~	~~2%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~400~~
White oak (*Quercus alba*)	FACU	~~100~~ 550	~~2%~~ 8.8%	~~400~~	~~13%~~	550	5.85%	~~500~~ 1100
White pine (*Pinus strobus*)	FACU	~~300~~ 600	~~2%~~ 9.6%	~~400~~	~~13%~~	--	--	~~500~~ 600
Yellow birch *(Betula alleghaniensis*)	FACU	~~100~~ 200	~~2%~~ 3.2%	~~300~~	~~9%~~	~~500~~ 300	~~7%~~ 3.19%	~~900~~ 500
~~Black gum (Nyssa sylvatica)~~	~~FAC~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Persimmon (Diospyros virginiana)~~	~~FAC~~	~~200~~	~~3%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~500~~
Scarlet oak (*Quercus coccinea*)	FAC	~~200~~ 600	~~3%~~ 9.6%	~~100~~ 500	~~3%~~ 15.63%	--	--	~~300~~ 1100
~~Shadbush (Amelanchier arborea)~~	~~FAC~~	~~100~~	~~2%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~500~~
Tulip poplar (*Liriodendron tulipifera*)	FAC	~~600~~ 450	~~10%~~ 7.2%	~~200~~ 600	~~6%~~ 18.75%	~~500~~ 1100	~~7%~~ 11.70%	~~1300~~ 2150
~~American elm (Ulmus americana)~~	~~FACW~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Hackberry (Celtis laevigata)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~500~~	~~7%~~	~~1100~~
River birch (*Betula nigra*)	FACW	~~600~~ 500	~~10%~~ 8%	--	--	~~500~~ 950	~~7%~~ 10.10%	~~1100~~ 1450
~~Swamp chestnut oak (Quercus michauxii)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~1000~~
Sycamore (*Platanus occidentalis*)	FACW	600	~~10%~~ 9.6%	--	--	~~500~~ 1500	~~7%~~ 15.96%	~~1100~~ 2100
~~Tag alder (Alnus serrulata)~~	~~FACW~~	~~300~~	~~5%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~700~~
Silky dogwood (*Cornus amomum*)	FACW	~~200~~	~~3%~~	--	--	~~400~~ 600***	~~6%~~ 6.38%	600
Black willow (*Salix nigra*)	OBL	~~300~~	~~5%~~	--	--	~~400~~ 800***	~~6%~~ 8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
^Common ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Corylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		~~6200~~ **6250**	**100%**	**3200**	**100%**	~~6800~~ **9400**	**100%**	~~**16200**~~ **18850**

^Species Added

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

*** These species were live staked and planted along the stream channels – Total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.



Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
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Yellow birch (*Betula alleghaniensis*)	FACU	~~100~~ 200	~~2%~~ 3.2%	~~300~~	~~9%~~	~~500~~ 300	~~7%~~ 3.19%	~~900~~ 500
~~Black Gum (*Nyssa sylvatica*)~~	~~FAC~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
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~~American elm (*Ulmus americana*)~~	~~FACW~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Hackberry (*Celtis laevigata*)~~	~~FACW~~	~~600~~	~~10%~~	--	--	~~500~~	~~7%~~	~~1100~~
River birch (*Betula nigra*)	FACW	~~600~~ 500	~~10%~~ 8%	--	--	~~500~~ 950	~~7%~~ 10.10%	~~1100~~ 1450
~~Swamp Chestnut Oak (*Quercus michauxii*)~~	~~FACW~~	~~600~~	~~10%~~	--	--	~~400~~	~~6%~~	~~1000~~
Sycamore (*Platanus occidentalis*)	FACW	600	~~10%~~ 9.6%	--	--	~~500~~ 1500	~~7%~~ 15.96%	~~1100~~ 2100
~~Tag alder (*Alnus serrulata*)~~	~~FACW~~	~~300~~	~~5%~~	--	--	~~400~~	~~6%~~	~~700~~
Silky Dogwood (*Cornus amomum*)	FACW	~~200~~	~~3%~~	--	--	~~400~~ 600***	~~6%~~ 6.38%	600
Black willow (*Salix nigra*)	OBL	~~300~~	~~5%~~	--	--	~~400~~ 800***	~~6%~~ 8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
^Common Ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Carylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		~~6200~~ 6250	100%	3200	100%	~~6800~~ 9400	100%	~~16200~~ 18850

^Species Added
* Planted at a density of 680 stems/acre.
** Planted at a density of 2720 stems/acre.
*** These species were live staked and planted along the stream channels – Total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-LS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=200'
DATE	11.15.2022

PLANTING PLAN

L5.00

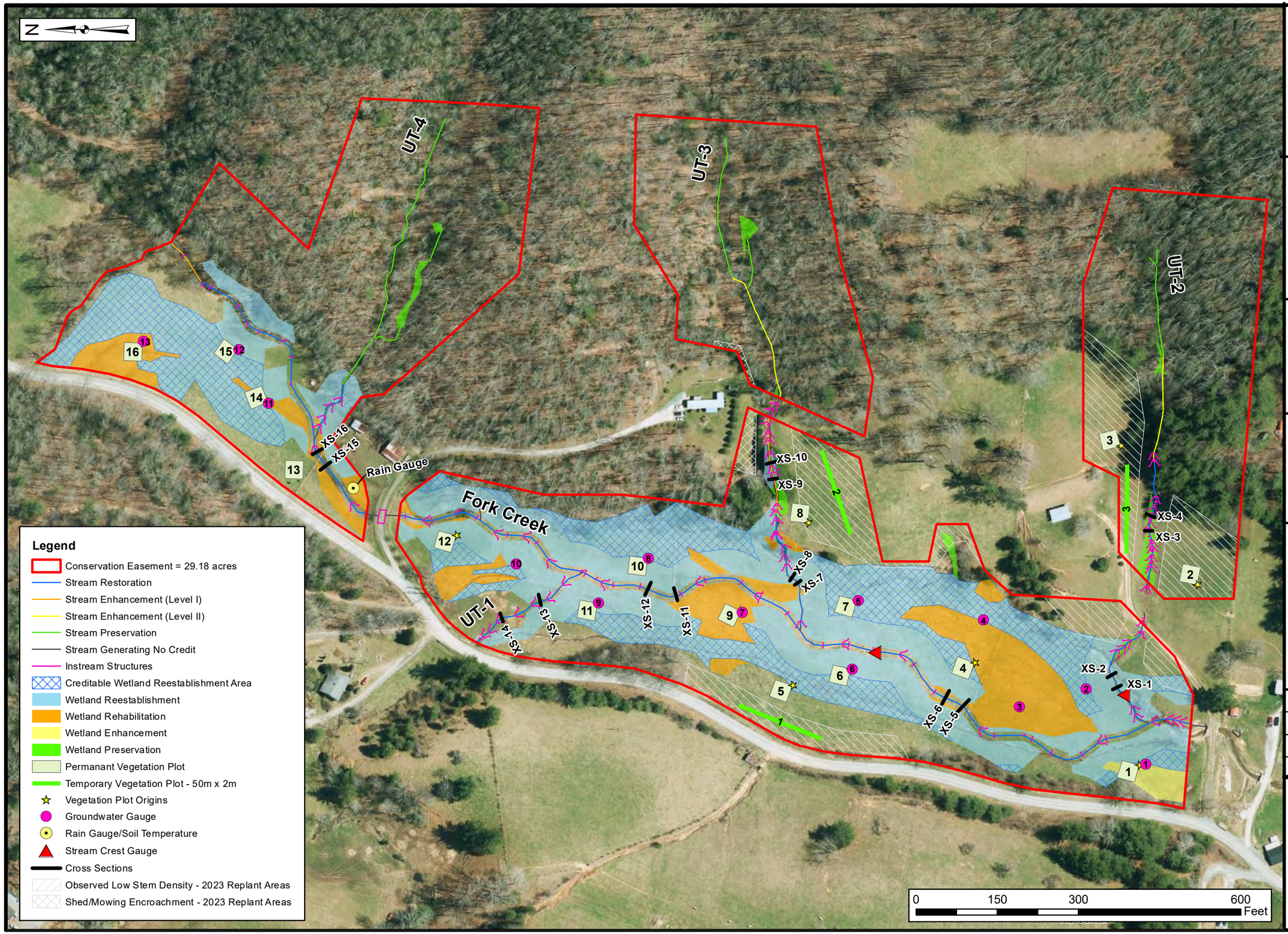
Table 5. Visual Vegetation Assessment

Planted acreage **16.2** Survey Date: February 1, 2022

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	2.67	16.5%
	Total		2.67	16.5%
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		2.67	16.5%

Easement Acreage **29.19**

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	2 Encroachments noted (0.107 acre)	



Legend

- Conservation Easement = 29.18 acres
- Stream Restoration
- Stream Enhancement (Level I)
- Stream Enhancement (Level II)
- Stream Preservation
- Stream Generating No Credit
- Instream Structures
- Creditable Wetland Reestablishment Area
- Wetland Reestablishment
- Wetland Rehabilitation
- Wetland Enhancement
- Wetland Preservation
- Permanant Vegetation Plot
- Temporary Vegetation Plot - 50m x 2m
- Vegetation Plot Origins
- Groundwater Gauge
- Rain Gauge/Soil Temperature
- Stream Crest Gauge
- Cross Sections
- Observed Low Stem Density - 2023 Replant Areas
- Shed/Mowing Encroachment - 2023 Replant Areas

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LAUREL SPRINGS MITIGATION SITE

Avery County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Notes:

1. Background Imagery Source: 2018 aerial photography provided by the NC OneMap program (online, provided by the NC Geographic Information Coordination Council)

Drawn by:	PHP
Date:	NOV 2022
Scale:	1:2000
Project No.:	19-006

FIGURE

1

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

Planted Acreage	16.2
Date of Initial Plant	2022-01-12
Date(s) of Supplemental Plant(s)	
Date(s) Mowing	
Date of Current Survey	2022-02-01
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	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Betula alleghaniensis	yellow birch	Tree	FAC													1	1				
	Betula lenta	sweet birch	Tree	FACU	1	1					2	2							1	1		
	Betula nigra	river birch	Tree	FACW	10	10					3	3										
	Betula sp.						1	1			2	2	2	2	5	5	7	7	4	4	4	4
	Liriodendron tulipifera	tuliptree	Tree	FACU	2	2	4	4	3	3	2	2	2	2							8	8
	Other												1	1							1	1
	Pinus strobus	eastern white pine	Tree	FACU			1	1	4	4	4	4							1	1		
	Platanus occidentalis	American sycamore	Tree	FACW							6	6	1	1			1	1	5	5	2	2
	Quercus alba	white oak	Tree	FACU																		
	Quercus coccinea	scarlet oak	Tree								1	1					2	2				
	Quercus nigra	water oak	Tree	FAC															3	3		
	Quercus rubra	northern red oak	Tree	FACU																		
	Quercus sp.						12	12			2	2	3	3	2	2	1	1	4	4	3	3
	Tsuga canadensis	eastern hemlock	Tree	FACU			1	1	2	2			4	4					2	2		
Sum	Performance Standard				13	13	19	19	9	9	22	22	13	13	7	7	12	12	20	20	18	18
Post Mitigation Plan Species	**Carya cordiformis**	**bitternut hickory**	**Tree**	**FACU**			**1**	**1**			**4**	**4**	**5**	**5**	**1**	**1**						
	Corylus americana	**American hazelnut**	**Shrub**	**FACU**													**7**	**7**			**1**	**1**
	Viburnum dentatum	**southern arrowwood**	**Tree**	**FAC**	**3**	**3**					**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**			**1**	**1**
Sum	Proposed Standard				16	16	20	20	9	9	27	27	19	19	9	9	20	20	20	20	20	20
Mitigation Plan Performance Standard	Current Year Stem Count					13		19		9		22		13		7		12		20		18
	Stems/Acre					364		648		364		891		526		202		445		810		729
	Species Count					3		5		3		8		6		2		5		7		5
	Dominant Species Composition (%)					77		63		44		27		31		71		58		25		44
	Average Plot Height (ft.)					2		1		1		1		1		2		2		1		1
	% Invasives					0		0		0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					16		20		9		27		19		9		20		20		20
	Stems/Acre					486		688		364		1093		769		283		769		810		810
	Species Count					4		6		3		10		8		4		7		7		7
	Dominant Species Composition (%)					63		60		44		22		26		56		35		25		40
	Average Plot Height (ft.)					2		1		1		1		1		1		1		1		1
	% Invasives					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 (continued)

Acreage	16.2
Plant	2022-01-12
Supplemental	
Date(s) Mowing	
Survey	2022-02-01
(ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F		Veg Plot 13 F		Veg Plot 14 F		Veg Plot 15 F		Veg Plot 16 F		Veg Plot 1 R	Veg Plot 2 R	Veg Plot 3 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Betula alleghaniensis	yellow birch	Tree	FAC																	
	Betula lenta	sweet birch	Tree	FACU																	
	Betula nigra	river birch	Tree	FACW									1	1	3	3	7	7			
	Betula sp.				4	4			3	3	4	4	3	3			3	3		1	
	Liriodendron tulipifera	tuliptree	Tree	FACU	1	1			5	5	1	1	2	2	4	4	3	3		1	
	Other																				
	Pinus strobus	eastern white pine	Tree	FACU																	1
	Platanus occidentalis	American sycamore	Tree	FACW	2	2					6	6	2	2	1	1	2	2			
	Quercus alba	white oak	Tree	FACU															2		
	Quercus coccinea	scarlet oak	Tree																		
	Quercus nigra	water oak	Tree	FAC																	
	Quercus rubra	northern red oak	Tree	FACU																2	
	Quercus sp.				3	3	2	2	2	2	2	2	1	1	3	3			1	1	
	Tsuga canadensis	eastern hemlock	Tree	FACU									1	1	2	2					
Sum	Performance Standard				10	10	2	2	10	10	13	13	10	10	13	13	15	15	3	5	1
Post Mitigation Plan Species	**Carya cordiformis**	**bitternut hickory**	**Tree**	**FACU**	**1**	**1**			**4**	**4**											
	Corylus americana	**American hazelnut**	**Shrub**	**FACU**	**2**	**2**	**3**	**3**			**2**	**2**	**2**	**2**	**2**	**2**					
	Viburnum dentatum	**southern arrowwood**	**Tree**	**FAC**	**4**	**4**	**13**	**13**					**5**	**5**	**1**	**1**					
Sum	Proposed Standard				17	17	18	18	14	14	15	15	17	17	16	16	15	15	3	5	1
Mitigation Plan Performance Standard	Current Year Stem Count					10		2		10		13		10		13		15	3	5	1
	Stems/Acre					405		40		405		526		405		526		607	81	202	40
	Species Count					4		1		3		4		6		5		4	2	4	1
	Dominant Species Composition (%)					40		100		50		46		30		31		47	67	40	100
	Average Plot Height (ft.)					1		1		1		1		2		1		2	1	1	3
	% Invasives					0		0		0		0		0		0		0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					17		18		14		15		17		16		15	3	5	1
	Stems/Acre					688		688		567		607		688		648		607	81	202	40
	Species Count					7		3		4		5		8		7		4	2	4	1
	Dominant Species Composition (%)					12		72		36		40		29		25		47	67	40	100
	Average Plot Height (ft.)					2		2		1		1		2		1		2	1	1	3
	% Invasives					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.

November 30, 2022

Restoration Systems, LLC
1101 Haynes St. Suite 211
Raleigh, North Carolina
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Kimberly Isenhour
Mitigation Project Manager, Regulatory Division
U.S. Army Corps of Engineers

Subject: Laurel Springs Mitigation Site - request to count replacement tree species towards site success criteria
DMS Project ID No. 100122
Full Delivery Contract No. 7890
RFP No. 16-007725 (Issuance Date 11/13/2018)
USACE Action ID No. SAW-2019-00835
DWR Project No. 2019-0865

Mrs. Isenhour,

Restoration Systems, LLC (RS), Sponsor of the Laurel Springs Mitigation Site (Site), is requesting a modification of the Site's Mitigation Plan to include planted tree/shrub species that were not included in the Site's approved Mitigation Plan. A lack of availability from nurseries of approved Mitigation Plan tree/shrub species required RS to adjust the number of stems planted for some approved species and include five additional species not included in the approved Mitigation Plan – four bare-root and one live-stake species. Table A below is a list of tree/shrub species detailed in the approved Mitigation Plan that were not planted at the Site due to lack of availability.

Table A. Non-planted Species Specified in the Mitigation Plan

Species (Mitigation Plan)	Wetland Indicator	Mit. Plan Stems
Basswood (*Tilia americana*)	FACU	300
White Ash (*Fraxinus americana*)	FACU	400
Black Gum (*Nyssa sylvatica*)	FAC	1,200
Persimmon (*Diospyros virginiana*)	FAC	500
Shadbush (*Amelanchier arborea*)	FAC	500
American elm (*Ulmus americana*)	FACW	1,200
Hackberry (*Celtis laevigata*)	FACW	1,100
Swamp Chestnut Oak (*Quercus michauxii*)	FACW	1,000
Tag alder (*Alnus serrulata*)	FACW	700
	Total =	6,900

Species summarized in Table A, as with others in the approved Mitigation Plan, were selected based on Reference Forest Ecosystem (RFE) data, on-site observations, and community descriptions from Classification of the Natural Communities of North Carolina (Schafale and Weakley 1990) – Montane Alluvial and Acidic Cove Forests.

Of the 6,900 bare-root stems detailed in Table A, 2,450 were supplemented by four species not included in the approved Mitigation Plan: Arrowwood viburnum, Bitternut hickory, American hazelnut, and Red spruce. RS selected these species based on their availability and that they were observed in nearby forest communities. The additional 4,450 stems needed to complete the targeted planting density were comprised of Mitigation Plan approved species. An extra 2,500 stems were live-staked in the stream-side assemblage area, including 300 stems of common ninebark, a species not included in the approved Mitigation Plan. Since live-staked species primarily provide stream-bank stability and do not count toward the stem density performance standard, RS is not proposing common ninebark to be considered for IRT approval. Table B summarizes planted species and their individual quantities within each planting zone and in total.

Table B. As-Built Planted Species and Stems

Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		9.0		4.7		2.5		16.2
Species	Indicator Status	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
~~Basswood (*Tilia americana*)~~	~~FACU~~	~~100~~	~~2%~~	~~200~~	~~6%~~	~~-~~	~~-~~	~~300~~
Cherry birch *(Betula lenta*)	FACU	~~100~~ 500	~~2%~~ 8%	~~400~~ 600	~~13%~~ 18.75%	~~500~~ 1500	~~7%~~ 15.96%	~~1000~~ 2600
Eastern hemlock (*Tsuga canadensis*)	FACU	~~100~~ 400	~~2%~~ 6.4%	~~100~~ 600	~~3%~~ 18.75%	--	--	~~200~~ 1000
Red oak (*Quercus rubra*)	FACU	~~500~~ 650	10.4%	~~300~~ 650	~~9%~~ 20.31%	--	--	~~300~~ 1300
~~White ash (Fraxinus americana)~~	~~FACU~~	~~100~~	~~2%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~400~~
White oak (*Quercus alba*)	FACU	~~100~~ 550	~~2%~~ 8.8%	~~400~~	~~13%~~	550	5.85%	~~500~~ 1100
White pine (*Pinus strobus*)	FACU	~~300~~ 600	~~2%~~ 9.6%	~~400~~	~~13%~~	--	--	~~500~~ 600
Yellow birch *(Betula alleghaniensis*)	FACU	~~100~~ 200	~~2%~~ 3.2%	~~300~~	~~9%~~	~~500~~ 300	~~7%~~ 3.19%	~~900~~ 500
~~Black gum (Nyssa sylvatica)~~	~~FAC~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Persimmon (Diospyros virginiana)~~	~~FAC~~	~~200~~	~~3%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~500~~
Scarlet oak (*Quercus coccinea*)	FAC	~~200~~ 600	~~3%~~ 9.6%	~~100~~ 500	~~3%~~ 15.63%	--	--	~~300~~ 1100
~~Shadbush (Amelanchier arborea)~~	~~FAC~~	~~100~~	~~2%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~500~~
Tulip poplar (*Liriodendron tulipifera*)	FAC	~~600~~ 450	~~10%~~ 7.2%	~~200~~ 600	~~6%~~ 18.75%	~~500~~ 1100	~~7%~~ 11.70%	~~1300~~ 2150
~~American elm (Ulmus americana)~~	~~FACW~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Hackberry (Celtis laevigata)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~500~~	~~7%~~	~~1100~~
River birch (*Betula nigra*)	FACW	~~600~~ 500	~~10%~~ 8%	--	--	~~500~~ 950	~~7%~~ 10.10%	~~1100~~ 1450
~~Swamp chestnut oak (Quercus michauxii)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~1000~~
Sycamore (*Platanus occidentalis*)	FACW	600	~~10%~~ 9.6%	--	--	~~500~~ 1500	~~7%~~ 15.96%	~~1100~~ 2100
~~Tag alder (Alnus serrulata)~~	~~FACW~~	~~300~~	~~5%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~700~~
Silky dogwood (*Cornus amomum*)	FACW	~~200~~	~~3%~~	--	--	~~400~~ 600***	~~6%~~ 6.38%	600
Black willow (*Salix nigra*)	OBL	~~300~~	~~5%~~	--	--	~~400~~ 800***	~~6%~~ 8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
^Common ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Corylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		~~6200~~ **6250**	**100%**	**3200**	**100%**	~~6800~~ **9400**	**100%**	~~**16200**~~ **18850**

^Species Added

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

*** These species were live-staked and planted along the stream channels – A total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.

November 30, 2022

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RS included all planted species in the data collection for the MY0 Monitoring Report. Table 8 within the MY0 Monitoring Report, the DMS vegetation tool, requires providers to select from five options regarding the species status for inclusion in meeting performance standards, "Performance Standard Approval" column:

1. Approved Mit Plan
2. Approved Post Mit Plan
3. Proposed
4. Not Approved – Not Invasive or Exotic
5. Not Approved – Invasive or Exotic

The four additional bare-root species detailed in Table B (Arrowwood viburnum, Bitternut hickory, American hazelnut, and Red spruce) were included in the MY 0 Report as "Proposed" species for inclusion in meeting performance standards – Vegetation Plot Data Table from Vegetation Data Entry Tool, MY 0 Report Table 8, Appendix B.

RS requests the IRT allows these four species to be counted toward the Site's success criteria.

If the IRT concurs that these species may be included to count toward the Site's performance standards, RS will update the four species as "Approved Post Mit Plan" in the MY1 (2022) 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

November 30, 2022

Restoration Systems, LLC
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Kimberly Isenhour
Mitigation Project Manager, Regulatory Division
U.S. Army Corps of Engineers

Subject: Laurel Springs Mitigation Site – Remedial Planting Plan (Q1-2023)
DMS Project ID No. 100122; Full Delivery Contract No. 7890; RFP No. 16-007725 (Issuance Date 11/13/2018)
USACE Action ID No. SAW-2019-00835; DWR Project No. 2019-0865

Mrs. Isenhour,

During the 2022 growing season, Restoration Systems (RS) has observed areas of low stem densities at the Laurel Springs Mitigation Site (Site). Observed areas total 2.67 acres, which includes a 0.107-acre area of encroachment – see attached remedial planting figure. The encroachment area was partially due to a storage shed left within the easement used by the adjacent landowner. RS worked with the neighbor to remove the shed and cleared the area of all debris. Additionally, 6-inch treated fence posts were used to delineate the easement boundary in this area. A new shed was erected approximately 15 feet from the easement.

RS has ordered trees to replant the 2.67 acres at a density of 670 stems per acre. The replant areas are within the Acidic Cove Forest Association. The following species and quantities were secured for Q1-2023 planting.

Targeted Vegetation Associations: Acidic Cove Forest
Area of Replant: 2.67 Acres

Species	Indicator Status	Number of Stems
American elm (*Ulmus americana*)	FACW	600
White Oak (*Quercus alba*)	FACU	600
Persimmon (*Diospyros virginiana*)	FAC	600
Total		**1,800**

These species were listed within the approved mitigation plan but not planted within the Acidic Cove vegetation association during initial planting. These three species will add to the six species planted during initial planting for nine total species within the Acidic Cove vegetation association.

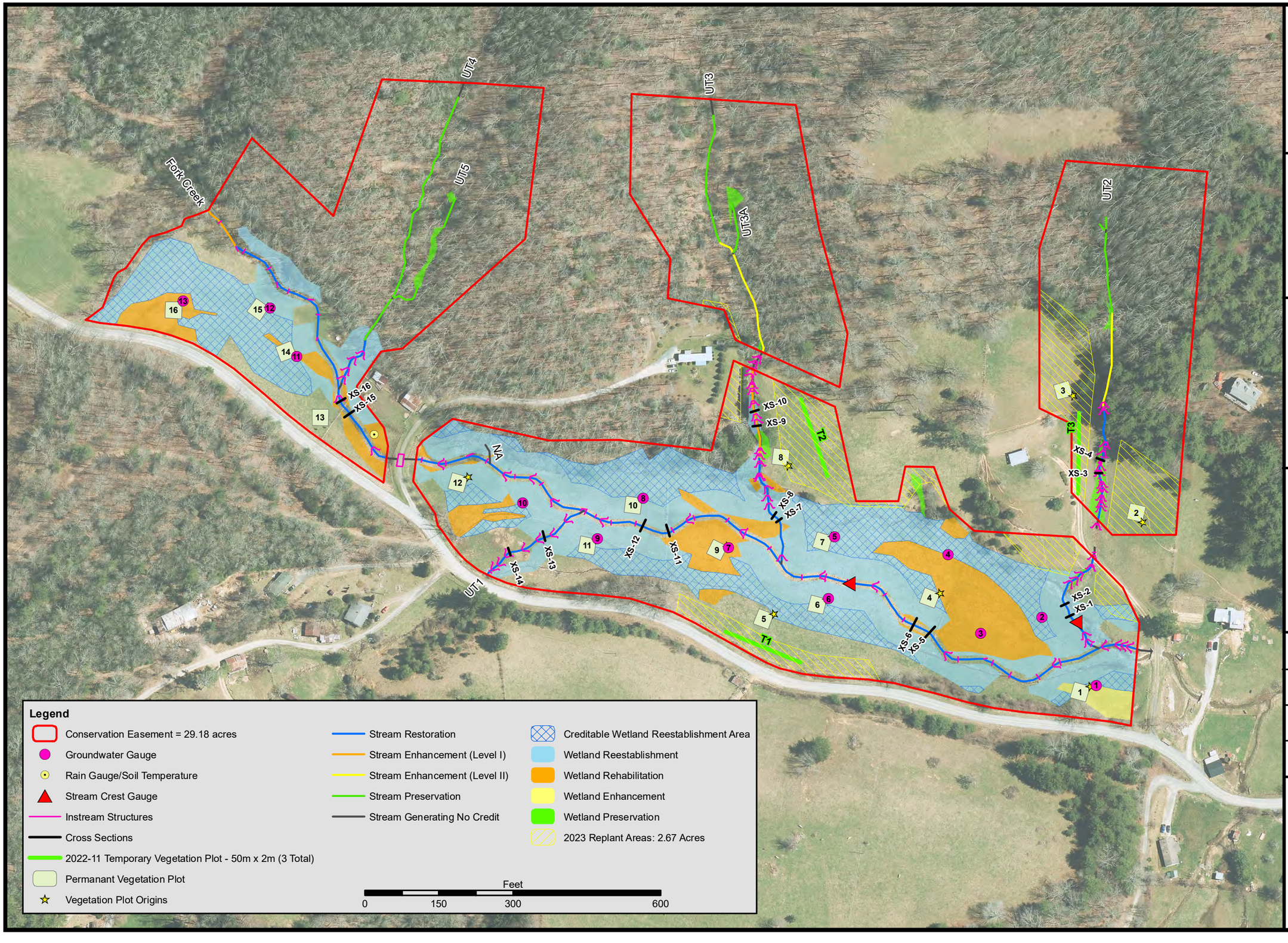
RS recognizes that additional "diversity plantings" may be desired by the IRT, and we welcome the opportunity to discuss a diversity planting effort with the IRT. RS will contact Andrea Leslie and Erin Davis in Q1-2023 to discuss this effort.

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 – Remedial Planting Plan Figure



RESTORATION SYSTEMS | LLC

Prepared for:

NC DEQ
Division of Enviromental Quality

Division of Mitigation Services

Project:

LAUREL SPRINGS MITIGATION SITE

Avery County, NC

Title:

2022/2023 REMEDIAL PLANTING PLAN

2018 NC One Map Imagery

Drawn by: RJH

Date: NOV. 2022

Scale: 1:2,200

Project No.: DMS ID: 100122

FIGURE

A

N

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

Response to DMS Comments
DMS Project ID No. 100122
Full Delivery Contract No. 7890
RFP No. 16-007725
USACE Action ID No. SAW-2019-00835
DWR Project No. 2019-0865

DMS Comments Received (Black Text) & Responses (Blue Text)

1. General: Please continue to provide photos of the upstream and downstream project crossing areas to confirm crossing stability and aquatic organism passage in the MY1 (2022) monitoring report and all future monitoring reports.
   Response: These photos will be provided in each year's monitoring report.

2. General: A supplemental planting effort in the dormant season of 2022/ 2023 was discussed during the August 25, 2022 site visit. If the supplemental planting effort is greater than 20% of the entire project site and/ or the proposed species to be planted were not approved in the mitigation plan, further IRT discussion will be warranted. Any current areas of encroachment should also be replanted during this 2022/ 2023 effort. Please discuss the proposed supplemental planting effort/ planting plan in the MY1 (2022) report.
   Response: Visual observations made in 2022 between site planning the submission of the MY0 report suggest 2.93 acres of upland planting (including small portions of encroachment along the northern easement edge of Tributary 2 - Enhancement I and II areas) may benefit from additional planting to ensure the site is primed to achieve the Site's vegetation success criteria by the conclusion of monitoring period. These areas, totaling 2.93 acres, account of 18.09% of the total planting area 16.2 acres, and was added the MY0 CCPV Figure. Upon review of Year 1 (2022) vegetation monitoring data, RS will finalize any additional planting efforts which would occur in February of 2023.

3. Cover pages: Please also include the issuance date of the RFP on the report covers: RFP 16-007725 (issued 11/13/18).
   Response: This date was added to the cover pages.

4. Table 2 - Summary: Goals, Performance, and Results: The page footer is incorrect and references the Swamp Grape project. Please review and update the report as necessary.
   Response: The page footer was edited.

5. Table 3 - Project Attributes: The Supporting Documentation for the Regulatory Considerations section references incorrect Appendices for this report. Please update.
   Response: The references were clarified by indicating they are found in the Appendices of the Mitigation Plan document.

6. Section 1.2 – Success Criteria Table: The success criteria in the report should match the IRT approved mitigation plan. Please review and update accordingly.
   Response: The success criteria table was updated to match the approved mitigation plan.

7. Section 2 As-Built Condition (Baseline): As discussed during the August 25, 2022 site visit, please provide additional discussion and details about the rock sills added to the site during construction. Additional report discussion of the sills, photos, and typical drawing details should be added to the MY0 report and record drawings as necessary to relay the necessity and function of the added sill structures.
   Response: Section 2.1 was added to explain the necessity and function of the rock sills. It was explained that the sills consist of additional large cobble, they are not engineered or designed to hold grade, and are expected to shift and naturalize with the stream over time. Therefore, typical drawings were not included in the record drawings. Photos of sills have been added to the photo log in Appendix A.

8. Section 4 – Monitoring Year 0 – Data Assessment: The hydrology assessment section references 16 groundwater gauges; however, Figure 1 shows 13 ground water gauges. Please review this section and update as necessary. Please also document any significant monitoring device location changes from the IRT approved mitigation plan (if any).
Response: The text was updated to reflect that 13 groundwater gauges were installed. There were no significant changes in monitoring device locations from what was depicted in the Mitigation Plan.

9. Table 6A: Please also include common species names and percentages planted in the table.
Response: Common names and percentages were added to the table.

10. Table 6B: Please provide the common species names in the table.
Response: Common names were added to the table.

11. Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool: Please review the table in detail and update as necessary. There appears to be species included in the first section of the table that were not identified in the IRT approved mitigation plan.
Response: Table 8 was updated to indicate that *Viburnum dentatum*, *Carya cordiformis*, and *Corylus americana* were planted and counted during as-built vegetation measurements but were not included in the planting list in the approved mitigation plan. Table 8, the DMS vegetation tool, requires providers to select from five options regarding the species status for inclusion in meeting performance standards, "Performance Standard Approval" column:
    1. Approved Mit Plan
    2. Approved Post Mit Plan
    3. Proposed
    4. Not Approved – Not Invasive or Exotic
    5. Not Approved – Invasive or Exotic

    The four additional species detailed in Table B were included as "Proposed" species for inclusion in meeting performance standards – Vegetation Plot Data Table from Vegetation Data Entry Tool, MY 0 Report Table 8, Appendix B. If the IRT concurs that these species may be included to count toward the Site's performance standards, RS will update the four species as "Approved Post Mit Plan" in the MY1 (2022) report.

12. Table 11. Project Timeline: Please update the completion date for the MY-0 Baseline report (September 2022).
Response: Table 11 was updated.

Comments Based on August 25, 2022 DMS Site Visit:

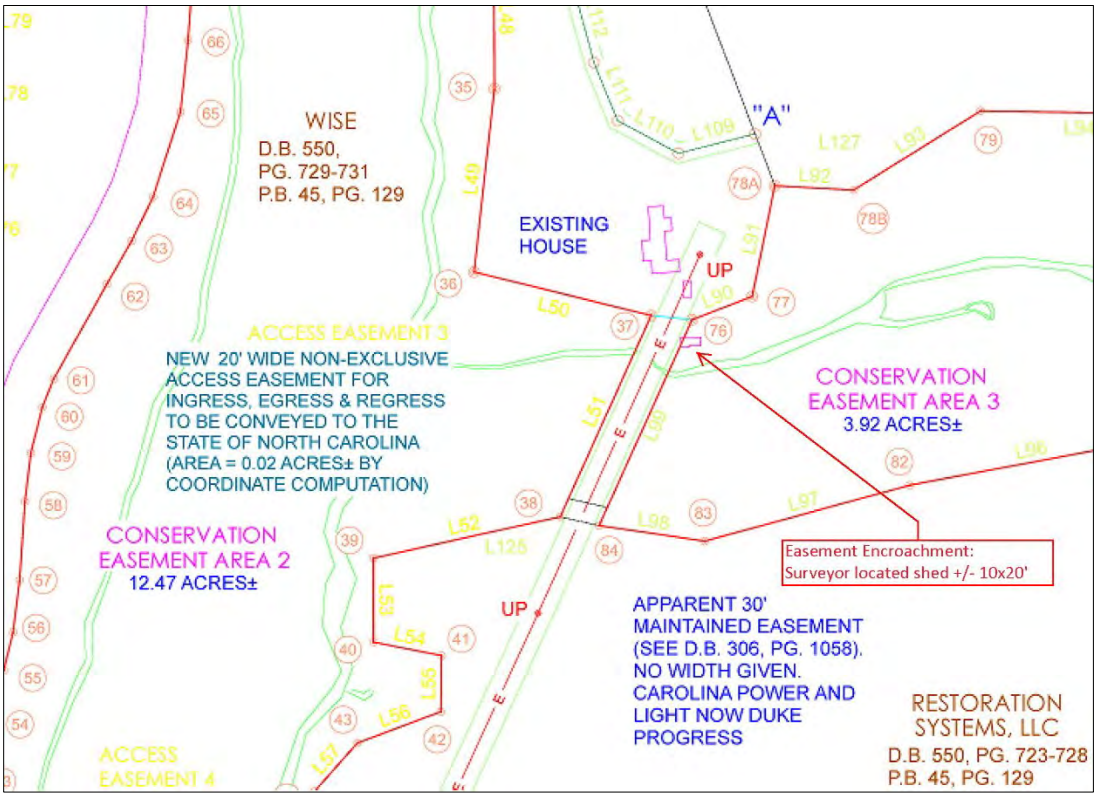
13. Existing mowing and lawn maintenance encroachment was observed near the residence adjacent to UT3. In addition, this area was not clearly marked as specified in the RFP (16- 007725). Please conduct a full boundary assessment and walk the entire conservation easement boundary to confirm that rebar and stamped aluminum caps are installed on all easement corners. Any missing corners identified, or corners disturbed during construction should be reinstalled by a PLS and stamped per the recorded plat.
Response: K2 Designs, our contracted surveyor, visited the Site on 9/22 to verify the integrity of the site boundary, locate rebar/stamped caps, and replace/add easement signage as needed.

14. The boundary assessment should also confirm that 6-foot-tall durable witness posts and conservation easement signs are located at each corner of the conservation easement boundary. Posts must be made of material that will last a minimum of 20 years. Please refer to RFP 16-007725 (Task 2 Property) for the required boundary marking specifications.
Response: On most boundary lines, NC DMS signs were attached to either a treated wooden posts or metal T-posts to mark the boundary and corner caps. In heavily wooded or rockery terrain, NC DMS

signage was affixed to mature hardwood trunks in close proximity to the corner or boundary.

15. Lastly, a residential shed and equipment were noted in the vicinity of UT3 near the mowing and lawn maintenance encroachment. Please confirm that the shed and equipment are not located within the conservation easement. Please complete the full boundary assessment during MY1 (2022) and report findings and completed survey monumentation and marking updates in the MY1 (2022) report. This boundary assessment and marking effort should be completed before requested payment for Task 6 (MY0).

Response: K2 Designs, our contracted surveyor, visited the Site on 9/22 to verify the integrity of the site boundary, locate rebar/stamped caps, and replace/add easement signage as needed. During this review, it was confirmed, that the small (approximately 10x20) shed identified by DMS during the site visit is currently located within the easement. RS has offered, and the landowner has agreed, to construct a new shed, outside of the easement boundary, and to remove the old shed and equipment from the easement. This work is being schedule and will be completed before the final Year 1 Monitoring Report.



16. Areas of straw waddles were utilized to stabilize the site during and after construction. Once these areas are fully stabilized, please remove the plastic netting associated with the straw waddles from the site.

Response: Straw waddles in areas that were deemed stable were removed.

17. Several tires were observed within the conservation easement along UT3. In addition, t- posts and areas of barbed wire were observed along UT3 within the conservation easement. Please remove any debris or internal fencing from within the conservation easement during MY1 (2022).

Response: Debris and internal fencing were removed from the easement.

18. DMS observed minimal woody stems along the soil farm road that was decommissioned along UT3. Please assess this area during the MY1 (2022) monitoring effort and supplementally plant this area if

warranted.
Response: Please see response to Comment No. 2

19. Some areas of Japanese knotweed and multiflora rose were observed on the site. Japanese knotweed was noted near the top of Fork Creek and minimal amounts of multiflora rose were observed during the site visit. Please continue to treat invasives during MY1 (2022) and the monitoring term. Japanese knotweed is considered a high threat invasive by the IRT.
Response: Site-wide invasive species treatment occurred during the week of September 12. RS will provide a full account of invasive species treatment during MY1 (2022) within the annual monitoring report.

Digital Deliverable Comments:

20. The spatial data submission is complete and accurate; of note is the location of groundwater gauges not located in credited wetlands and a majority of the others on the edge of credited wetlands. The spatial data is consistent with the locations depicted in the MY 0 Map. If these locations are adjusted during the review phase or additional wells are requested by the IRT, please submit a revised file.
Response: If gauges are moved or added, a revised shapefile will be submitted to DMS.

21. Photos were submitted for vegetation plots and cross sections only, please verify there are no additional photo points required per the approved monitoring plan. Recommend adding project photo points of the upstream and downstream project crossing areas in the revised submittal.
Response: There are no additional photo points required per the approved monitoring plan, however, the IRT has requested crossing photos which were included in the photo log (Appendix F). These photos are included in the digital submittal.

MY0 FINAL MONITORING REPORT

LAUREL SPRINGS STREAM AND WETLAND MITIGATION SITE

Avery County, North Carolina
French Broad River Basin
Cataloging Unit 06010108

DMS Project No. 100122
Full Delivery Contract No. 7890
DMS RFP No. 16-007725 (issued 11/13/18)
USACE Action ID No. SAW-2019-00835
DWR Project No. 2019-0865

Data Collection: October 2021-February 2022
Submission: December 2022

Prepared for:

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

Prepared by:

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Raleigh, North Carolina 27604
Contact: Raymond Holz
919-755-9490 (phone)
919-755-9492 (fax)

And

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603
Contact: Grant Lewis
919-215-1693 (phone)

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LIST OF REPOPRT TABLES

APPENDICES

1 PROJECT SUMMARY

Restoration Systems, LLC has established the North Carolina Division of Mitigation Services (NCDMS) Laurel Springs Stream and Wetland Mitigation Site (Site). The Site is on two contiguous parcels along the cold-water Fork Creek and unnamed tributaries to Fork Creek in the Southern Crystalline Ridge and Mountains Ecoregion of North Carolina. Located in the French Broad River Basin, cataloging unit 06010108, the Site is in the Targeted Local Watershed (TLW) 06010108010020 and North Carolina Division of Water Resources (NCDWR) subbasin number 04-03-06. The Site is not located in a Local Watershed Plan (LWP), Regional Watershed Plan (RWP), or Targeted Resource Area (TRA). Site watersheds range from approximately 0.02 of a square mile (12 acres) on UT2 to 1.32 square miles (847 acres) at the Site's outfall.

1.1 Project Background, Components, and Structure

Located approximately 8 miles southwest of Linville and 7 miles northeast of Spruce Pine in southern Avery County, the Site encompasses 29.19 acres. Mitigation work within the Site included 1) stream restoration, 2) stream enhancement (Level I), 3) stream enhancement (Level II), 4) stream preservation, 5) wetland reestablishment, 6) wetland rehabilitation, 7) wetland enhancement, 8) wetland preservation, and 9) vegetation planting. The Site is expected to provide 4231.827 cold water stream credits and 3.688 riparian wetland credits by closeout (Table 1, Page 2). A conservation easement was granted to the State of North Carolina and recorded at the Avery County Register of Deeds on October 19, 2020.

Before construction, land use at the Site was characterized by disturbed forest, cow pasture, and hay fields. Site design was completed in February 2021. Construction started on July 12, 2021 and ended within a final walkthrough on October 15, 2021. The Site was planted on January 12-13, 2022. Completed project activities, reporting history, completion dates, and project contacts are summarized in Tables 11-12 (Appendix E).

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Table 1. Laurel Springs Stream and Wetland Mitigation Site (ID-100122) 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								
Fork Cr - A	91	92	Cold	EI	1.50000	60.667		
Fork Cr - B	2250	2242	Cold	R	1.00000	2,250.000		
UT 1	234	233	Cold	R	1.00000	234.000		
UT 2A	25	25	Cold	P	10.00000	2.500		
UT 2 - A	184	184	Cold	P	10.00000	18.400		
UT 2 - B	198	199	Cold	EII	2.50000	79.200		
UT 2 - C	467	463	Cold	R	1.00000	467.000		
UT 3A	103	103	Cold	P	10.00000	10.300		
UT 3 - A	265	265	Cold	P	10.00000	26.500		
UT 3 - B	248	250	Cold	EII	5.00000	49.600		
UT 3 – C	183	183	Cold	EI	1.50000	122.000		
UT 3 - D	233	223	Cold	R	1.00000	233.000		
UT 4 - A	541	541	Cold	P	10.00000	54.100		
UT 4 - B	112	110	Cold	R	1.00000	112.000		
UT 5 - A	60	60	Cold	P	10.00000	6.000		
UT 5 - B	67	67	Cold	P	10.00000	6.700		
					Total:	**3,731.967**		
Wetland								
Wetland Reestablish	7.656	7.656	R	REE	1.00000	7.656		
Wetland Rehabilitation	1.845	1.845	R	RH	NA*	0.000		
Wetland Enhancement	0.148	0.148	R	E	NA*	0.000		
Wetland Preservation	0.198	0.198	R	P	NA*	0.000		
					Total:	**7.656**		

*Wetland Rehabilitation, Enhancement, and Preservation acreage are not being included in credit calculations. These areas are being utilized by the wider buffer tool to generate additional stream credit

Project Credits

	Stream			Riparian	Non-Rip	Coastal
Restoration Level	Warm	Cool	Cold	Wetland	Wetland	Marsh
Restoration			3,296.000			
Re-establishment				3.688**		
Rehabilitation						
Enhancement						
Enhancement I			182.667			
Enhancement II			128.800			
Creation						
Preservation			124.500			
Wider Buffer Tool			499.860			
Totals	**0.000**	**0.000**	**4,231.827**	**3.688**	**0.000**	**0.000**

**** DMS contract is for 3.688 WMUs; therefore, excess wetland credit has been used for wider buffer tool calculations.**

Total Stream Credit **4,231.827**
Total Wetland Credit **3.688**

Table 2. Summary: Goals, Performance, and Results

Goals	Objectives	Success Criteria
(1) HYDROLOGY		
Minimize downstream flooding to the maximum extent possible.	• Construct a new channel at historic floodplain elevation to restore overbank flows • Remove drain tiles and agriculture ditches • Plant woody riparian buffer • 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
Increase stream stability within the Site so that channels are neither aggrading nor degrading.	• Construct channels with the proper pattern, dimension, and longitudinal profile • Remove livestock from the property • Construct stable channels with the appropriate substrate • Upgrade piped channel crossings • Plant woody riparian buffer • Stabilize stream banks	• Cross-section measurements indicate a stable channel with the appropriate substrate • Visual documentation of stable channels and structures • BHR not to exceed 1.2 • < 10% change in BHR in any given year • Livestock excluded from the easement • Attain Vegetation Success Criteria
(1) WATER QUALITY		
Remove direct nutrient and pollutant inputs from the Site and reduce contributions to downstream waters.	• Remove agricultural 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		
Improve instream and streamside habitat.	• Construct stable channels with the appropriate substrate • Plant woody riparian buffer to provide organic matter and shade • Construct a new channel at historic floodplain elevation to restore overbank flows • 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 measurements indicate a stable channel with the appropriate substrate • Visual documentation of stable channels and in-stream structures • Attain Wetland Hydrology Success Criteria • Attain Vegetation Success Criteria • Conservation Easement recorded

Table 3. Project Attributes

Project Information					
Project Name	Laurel Springs Site				
Project County	Avery County, North Carolina				
Project Area (acres)	29.19				
Project Coordinates (latitude & latitude)	35.9913, -81.9837				
Planted Area (acres)	16.2				
Project Watershed Summary Information					
Physiographic Province	Blue Ridge				
Project River Basin	French Broad				
USGS HUC for Project (14-digit)	6010108010020				
NCDWR Sub-basin for Project	04-03-06				
Project Drainage Area (acres)	846.7				
Percentage of Project Drainage Area that is Impervious	<2%				
CGIA Land Use Classification	Managed Herbaceous Cover & Hardwood Swamps				
Reach Summary Information					
Parameters	**Fork Cr**	**UT 1**	**UT 2**	**UT3**	**UT 4**
Pre-Project Length (linear feet)	2401	234	926	1002	685
Post-Project Length (linear feet)	2334	233	870	1024	650
Valley Classification & Confinement	Alluvial, moderately confined	Alluvial, moderately confined	Alluvial, confined	Alluvial, confined	Alluvial, confined
Drainage Area (acres)	847	193	12	23	13
NCDWR Stream ID Score	--	--	25.5	22.5	33.5
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial/ Intermittent	Perennial/ Intermittent	Perennial
Thermal Regime	Cold	Cold	Cold	Cold	Cold
NCDWR Water Quality Classification	WS-IV, Tr				
Existing Morphological Description (Rosgen 1996)	Cg 4	Eg 4	Bg 5/6	Bg 5	B 4
Proposed Stream Classification (Rosgen 1996)	Ce 3/4	Ce 3/4	B 3/4	B 3/4	B 4
Existing Evolutionary Stage (Simon and Hupp 1986)	II/III	II/III	IV	II	I/II
Underlying Mapped Soils	Nikwasi loam, Reddies fine sandy loam,	Nikwasi loam	Chandler-Micaville complex	Chandler-Micaville complex	Chandler-Micaville complex
Drainage Class	poorly, moderately well	poorly	somewhat excessively	somewhat excessively	somewhat excessively
Hydric Soil Status	hydric, nonhydric (may contain hydric inclusions)	hydric	nonhydric	nonhydric	nonhydric
Parameters	**Fork Cr**	**UT 1**	**UT 2**	**UT3**	**UT 4**
Valley Slope	0.0271	0.0291	0.1047	0.0992	0.0992
FEMA Classification	NA	NA	NA	NA	NA
Native Vegetation Community	Montane Alluvial Forest and Swamp Forest-Bog Complex				
Watershed Land Use/Land Cover (Site)	87% forest, 11% agricultural land, <2% low density residential/impervious surface				
Watershed Land Use/Land Cover (Reference Channel)	95% forest, 3% agricultural land, <2% low density residential/impervious surface				
Percent Composition of Exotic Invasive Vegetation	<5%				

Wetland Summary Information	
Parameters	**Wetlands**
Wetland acreage	8.3 acre drained & 2.61 acres degraded
Wetland Type	Riparian riverine
Mapped Soil Series	Nikwasi
Drainage Class	Poorly drained
Hydric Soil Status	Hydric
Source of Hydrology	Groundwater, stream overbank
Hydrologic Impairment	Incised streams, compacted soils, livestock, ditches, drain tile
Native Vegetation Community	Montane Alluvial Forest and Swamp Forest-Bog Complex
% Composition of Exotic Invasive Vegetation	<5%
Restoration Method	Hydrologic, vegetative, livestock
Enhancement Method	Vegetative, livestock

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States-Section 401	Yes	Yes	JD Package (Mitigation Plan, App D)
Waters of the United States-Section 404	Yes	Yes	JD Package (Mitigation Plan, App D)
Endangered Species Act	Yes	Yes	CE Document (Mitigation Plan, App E)
Historic Preservation Act	Yes	Yes	CE Document (Mitigation Plan, App E)
Coastal Zone Management Act	No	--	NA
FEMA Floodplain Compliance	Yes	Yes	CE Document (Mitigation Plan, App E)
Essential Fisheries Habitat	No	--	CE Document (Mitigation Plan, App E)

1.2 Success Criteria

Monitoring and success criteria for stream restoration should relate to project goals and objectives identified from on-site NC SAM and NC WAM 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.

Table A. Success Criteria

Streams
• All streams must maintain an Ordinary High-Water Mark (OHWM), per RGL 05-05. • Continuous surface flow must be documented in intermittent reaches each year for at least 30 consecutive days. • Bank height ratio (BHR) cannot exceed 1.2 at any measured cross-section. • BHR at any measure riffle cross-section should not change by more than 10% from baseline condition during any given monitoring period. • The stream 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. • Intermittent streams will demonstrate at least 30-days consecutive flow.
Wetland Hydrology
• Annual 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 6 feet in height at year 5 and 8 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. • Areas of herbaceous vegetation establishment will have a minimum of four species present.

2 AS-BUILT CONDITION (BASELINE)

Construction started on July 12, 2021 and ended within a final walkthrough on October 15, 2021. The Site was planted on January 12-13, 2022. As-built and MY0 data collection occurred between October 2021 and February 2022.

In general, no significant issues arose during the construction of the Site. A sealed half-size set of record drawings are provided in Appendix G, which includes the post-construction survey, alignments, structures, and monitoring features. These include redlines for any significant field adjustments made during construction that differ from the design plans. Where needed, adjustments were made during construction based on field evaluations and are listed below.

Table B. Deviations from Construction Plans

Location	Deviation	Explanation
Fork Creek sta. 0+32	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 1+08	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 1+72	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 2+37	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 3+22	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 7+32	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 7+83	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 8+28	Log vane added	Field conditions required additional bank protection
Fork Creek sta. 8+68	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 9+35	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 10+01	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 10+98	J-hook constructed instead of cross vane	Conflict with the UT-1 confluence necessitated the removal of the right arm of the cross vane.
Fork Creek sta. 11+11	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 11+65	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 12+17	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 12+99	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 13+49	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 14+20	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 14+65	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 15+25	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 16+19	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 16+64	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 17+13	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 17+96	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 18+63	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 20+02	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 20+53	Log vane added	Field conditions required additional bank protection
Fork Creek sta. 20+73	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 21+28	Log vane not constructed; rock sill constructed instead	Field conditions did not require bank protection, but slope required structure.
Fork Creek sta. 21+83	Rock sill added	Slope in field conditions required structure
Fork Creek sta. 22+37	Rock sill added	Slope in field conditions required structure
UT-1 sta. 0+05	Log cross vane not constructed	Structure header in conflict with pipe outlet
UT-1 sta. 0+09	Rock sill added	Slope in field conditions required structure
UT-1 sta. 0+13	Cross vane added	Slope in field conditions required structure
UT-2 sta. 9+18	Rock sill added	Slope in field conditions required structure

Additional activities that occurred at the Site included the following.

- Planting 16.2 acres of the Site with 16,850 stems on January 12-13, 2022 – planted species are included in Table 6A (Appendix B).
- Applying a permanent seed mix at 1 lb. per acre across the Site. A species list is included in Table 6B (Appendix B).

2.1 Inclusion of Rock Sills on Fork Creek

During the final stages of construction, several large-scale rain events began to move riffle bed material on Fork Creek, especially at the tops of riffles. Concerned by the amount of movement of newly constructed riffle systems, onsite construction managers decided to install large cobble (#1 stone and larger) at the tops of riffles along the reach. These are not engineered structures and are not designed to hold grade. Their purpose is to reduce the movement of riffle bed material until roots take hold, and they are expected to shift and naturalize with the stream over time. Thus far, the sills are functioning as designed and all reach riffles are stable. Sample photos of rock sills are included in Appendix A.

2.2 Modification of Fork Creek Crossings

During construction, concern grew regarding the Fork Creek engineered aluminum box culvert crossing and the amount of fill required to construct the crossing; in essence its construction would require the placement of 5-6 feet of fill on the Fork Creek floodplain would be required to install the culvert and have an approximate amount of fill on top of the culvert for the access road. After discussions/investigations with the construction contractor and engineer, Worth Creech from Restoration Systems discussed the situation with Travis Wilson (NC Wildlife Resources Commission) and a proposed a modification of the aluminum box culvert to a spanned bridge crossing which would reduce the amount of fill by 3.8-feet. Subsequently, Mr. Creech sent the Inter-Agency Review Team an email on May 18, 2021 (Appendix F) which included modified construction sheets.

3 PROJECT MONITORING – 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 31st of each monitoring year data is collected. The monitoring schedule is summarized in the following table.

Table C. 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
Visual Assessment	X	X	X	X	X	X	X
Report Submittal	X	X	X	X	X	X	X

3.1 Monitoring

The monitoring parameters are summarized in the following table.

Table D. 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 16 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.
Bankfull Events	Continuous monitoring of surface water gauges and/or trail camera	Continuous recording through the monitoring period	One surface water gauge on UT2	Surface water data for each monitoring period
	Visual/Physical Evidence	Continuous through the monitoring period	One crest gauge on Fork Creek	Visual evidence, photo documentation, and/or rain data.
Wetland Parameters				
Parameter	**Method**	**Schedule/Frequency**	**Number/Extent**	**Data Collected/Reported**
Wetland Reestablishment	Groundwater gauges	Yearly with the growing season defined as March 1-October 22	13 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 acres (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	16 plots & three (3) random transects spread across the Site	Species, height, planted vs. volunteer, stems/acre

Note: Volunteer species on the approved planting list must be established for 2 years to count towards success and will be subject to height standards.

4 MONITORING YEAR 0 – DATA ASSESSMENT

Annual monitoring and site visits were conducted between October 2021 and February 2022 to assess the condition of the project. Stream, wetland, and vegetation criteria for the Site follow the approved success criteria presented in the Mitigation Plan and summarized in Section 1.3; monitoring methods are detailed in Section 3.0.

4.1 Stream Assessment

Morphological surveys for MY0 were conducted on October 26-27, 2021. All streams within the Site are stable and functioning as designed. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data. No stream areas of concern were identified during MY0.

4.2 Hydrology Assessment

13 groundwater monitoring gauges were installed throughout the Site's wetlands. Hydrologic data will be collected and reported during MY1 (2022).

4.3 Vegetative Assessment

The MY0 vegetative survey was completed on February 1, 2022. Fourteen of the nineteen species planted were included in the approved Mitigation Plan planting list. RS is requesting a modification of the Site's Mitigation Plan to include planted tree/shrub species that were not included in the Site's approved Mitigation Plan. A lack of availability from nurseries of approved Mitigation Plan tree/shrub species required RS to adjust the number of stems plated for some approved species and include four additional species not included in the approved Mitigation Plan. Table E below is a list of tree/shrub species detailed in the approved Mitigation Plan that were not planted at the Site.

Table E. Non-planted Species Specified in the Mitigation Plan

Species (Mitigation Plan)	Wetland Indicator	Mit. Plan Stems
Basswood (*Tilia americana*)	FACU	300
White Ash (*Fraxinus americana*)	FACU	400
Black Gum (*Nyssa sylvatica*)	FAC	1,200
Persimmon (*Diospyros virginiana*)	FAC	500
Shadbush (*Amelanchier arborea*)	FAC	500
American elm (*Ulmus americana*)	FACW	1,200
Hackberry (*Celtis laevigata*)	FACW	1,100
Swamp Chestnut Oak (*Quercus michauxii*)	FACW	1,000
Tag alder (*Alnus serrulata*)	FACW	700
	Total =	6,900

Species summarized in Table E, as with others in the approved Mitigation Plan, were selected based on Reference Forest Ecosystem (RFE) data, on-site observations, and community descriptions from Classification of the Natural Communities of North Carolina (Schafale and Weakley 1990) – Montane Alluvial and Acidic Cove Forests.

To replace the 6,900 stems detailed in Table E, 2,450 were supplemented by four species not included in the approved Mitigation Plan: Arrowwood viburnum, Bitternut hickory, American hazelnut, and Red spruce. RS selected these species based on their availability and that they were observed in nearby forest communities. The additional 4,450 stems needed to complete the targeted planting density were comprised of Mitigation Plan approved species. Table F summarizes planted species and their individual quantities within each planting zone and in total.

Table F. As-Built Planted Species and Stems

Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		9.0		4.7		2.5		16.2
Species	Indicator Status	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
~~Basswood (*Tilia americana*)~~	~~FACU~~	~~100~~	~~2%~~	~~200~~	~~6%~~	-	-	~~300~~
Cherry birch *(Betula lenta*)	FACU	~~100~~ 500	~~2%~~ 8%	~~400~~ 600	~~13%~~ 18.75%	~~500~~ 1500	~~7%~~ 15.96%	~~1000~~ 2600
Eastern hemlock (*Tsuga canadensis*)	FACU	~~100~~ 400	~~2%~~ 6.4%	~~100~~ 600	~~3%~~ 18.75%	--	--	~~200~~ 1000
Red oak (*Quercus rubra*)	FACU	~~500~~ 650	10.4%	~~300~~ 650	~~9%~~ 20.31%	--	--	~~300~~ 1300
~~White ash (Fraxinus americana)~~	~~FACU~~	~~100~~	~~2%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~400~~
White oak (*Quercus alba*)	FACU	~~100~~ 550	~~2%~~ 8.8%	~~400~~	~~13%~~	550	5.85%	~~500~~ 1100
White pine (*Pinus strobus*)	FACU	~~300~~ 600	~~2%~~ 9.6%	~~400~~	~~13%~~	--	--	~~500~~ 600
Yellow birch *(Betula alleghaniensis*)	FACU	~~100~~ 200	~~2%~~ 3.2%	~~300~~	~~9%~~	~~500~~ 300	~~7%~~ 3.19%	~~900~~ 500
~~Black gum (Nyssa sylvatica)~~	~~FAC~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Persimmon (Diospyros virginiana)~~	~~FAC~~	~~200~~	~~3%~~	~~300~~	~~9%~~	~~--~~	~~--~~	~~500~~
Scarlet oak (*Quercus coccinea*)	FAC	~~200~~ 600	~~3%~~ 9.6%	~~100~~ 500	~~3%~~ 15.63%	--	--	~~300~~ 1100
~~Shadbush (Amelanchier arborea)~~	~~FAC~~	~~100~~	~~2%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~500~~
Tulip poplar (*Liriodendron tulipifera*)	FAC	~~600~~ 450	~~10%~~ 7.2%	~~200~~ 600	~~6%~~ 18.75%	~~500~~ 1100	~~7%~~ 11.70%	~~1300~~ 2150
~~American elm (Ulmus americana)~~	~~FACW~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Hackberry (Celtis laevigata)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~500~~	~~7%~~	~~1100~~
River birch (*Betula nigra*)	FACW	~~600~~ 500	~~10%~~ 8%	--	--	~~500~~ 950	~~7%~~ 10.10%	~~1100~~ 1450
~~Swamp chestnut oak (Quercus michauxii)~~	~~FACW~~	~~600~~	~~10%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~1000~~
Sycamore (*Platanus occidentalis*)	FACW	600	~~10%~~ 9.6%	--	--	~~500~~ 1500	~~7%~~ 15.96%	~~1100~~ 2100
~~Tag alder (Alnus serrulata)~~	~~FACW~~	~~300~~	~~5%~~	~~--~~	~~--~~	~~400~~	~~6%~~	~~700~~
Silky dogwood (*Cornus amomum*)	FACW	~~200~~	~~3%~~	--	--	~~400~~ 600***	~~6%~~ 6.38%	600
Black willow (*Salix nigra*)	OBL	~~300~~	~~5%~~	--	--	~~400~~ 800***	~~6%~~ 8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
^Common ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Corylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		~~6200~~ **6250**	**100%**	**3200**	**100%**	~~6800~~ **9400**	**100%**	~~**16200**~~ **18850**

^Species Added

* Planted at a density of 680 stems/acre.

** Planted at a density of 2720 stems/acre.

*** These species were live staked and planted along the stream channels – Total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.

When including 3 species that are currently proposed for IRT approval, vegetation monitoring resulted in a sitewide stem density average of 688 planted stems per acre, well above the interim requirement of 320 stems per acre required at MY3. Additionally, all 16 fixed vegetation plots met the interim success criteria. Please refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table, and Appendix B for Vegetation Plot Data.

During the 2022 growing season, Restoration Systems (RS) has observed areas of low stem densities at the Laurel Springs Mitigation Site (Site). Observed areas total 2.67 acres, which includes a 0.107-acre area of encroachment – see attached remedial planting figure. The encroachment area was partially due to a storage shed left within the easement used by the adjacent landowner. RS worked with the neighbor to remove the shed and cleared the area of all debris. Additionally, 6-inch treated fence posts were used to delineate the easement boundary in this area. A new shed was erected approximately 15 feet from the easement.

RS has ordered trees to replant the 2.67 acres at a density of 670 stems per acre. The replant areas are within the Acidic Cove Forest Association. The following species and quantities were secured for Q1-2023 planting.

Targeted Vegetation Associations: Acidic Cove Forest
Area of Replant: 2.67 Acres

Species	Indicator Status	Number of Stems
American elm (*Ulmus americana*)	FACW	600
White Oak (*Quercus alba*)	FACU	600
Persimmon (*Diospyros virginiana*)	FAC	600
Total		**1,800**

These species were listed within the approved mitigation plan but not planted within the Acidic Cove vegetation association during initial planting. These three species will add to the six species planted during initial planting for nine total species within the Acidic Cove vegetation association.

At the request for the IRT, three temporary vegetation plots were measured in November 2022 and within the proposed supplemental planting areas. Data is included in Table 8, Appendix B of this submittal and . RS plans to monitor 3 random temporary vegetation plots for the remainder of the monitoring period or until otherwise requested by the IRT. Josh Merritt of RS walked the former soil path along UT3 and observed living planted stems. No mowing or vehicular access occurred along the decommissioned soil path in 2022, and planted stems are establishing. Josh oversaw the planting of two rows along the soil path during site planting. RS will continue to visually monitor this area. If planted stems do not survive into year two (2023) monitoring, RS will propose replanting the decommissioned road with potted trees/shrubs during the 2023/2024 dormant season.

4.4 Monitoring Year 0 Summary

Overall, the Site looks good, is performing as intended, and is on track to meet success criteria. All vegetation plots are on track to exceed the MY3 interim requirement of 320 planted stems per acre, and all streams within the Site are stable and are meeting project goals.

During the MY0 site visit with the NCDMS, it was noted that a small (approximately 10’x20’) shed was located within the easement and UT3. Through discussions with DMS and the landowner, it was agreed

the best course of action was to decommission and remove the shed as opposed to modifying the conservation easement. RS has offered, and the landowner has agreed, to construct a new shed, outside of the easement boundary, and to remove the old shed and equipment from the easement. This work is being schedule and will be completed before the final Year 1 Monitoring Report.

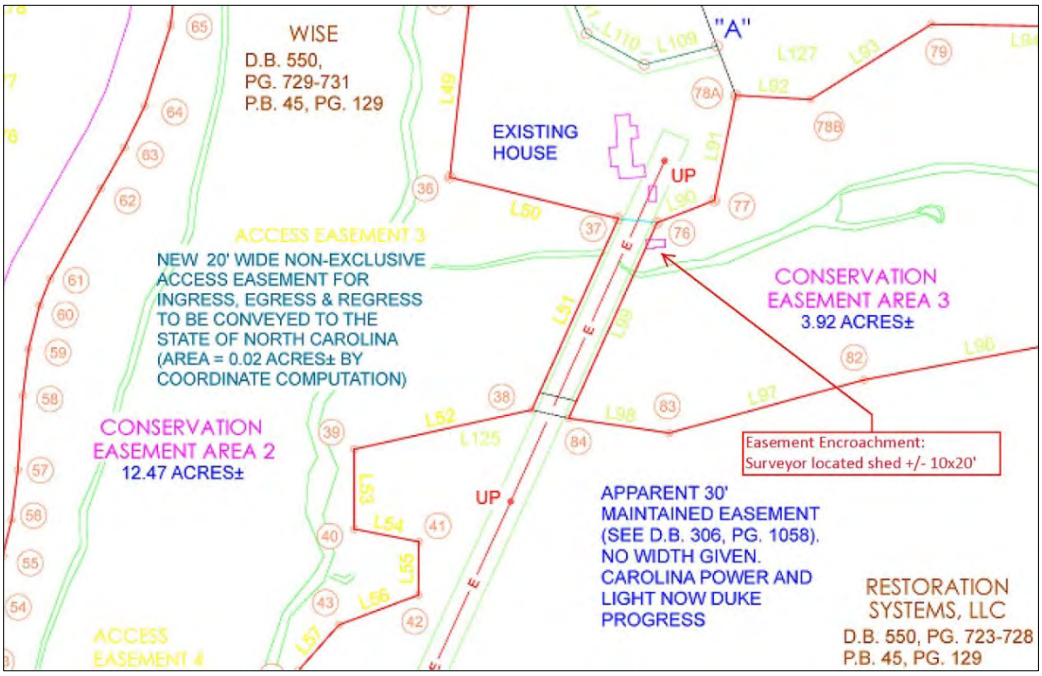

Figure 1 – Location of shed within the Site's conservation easement

5 REFERENCES

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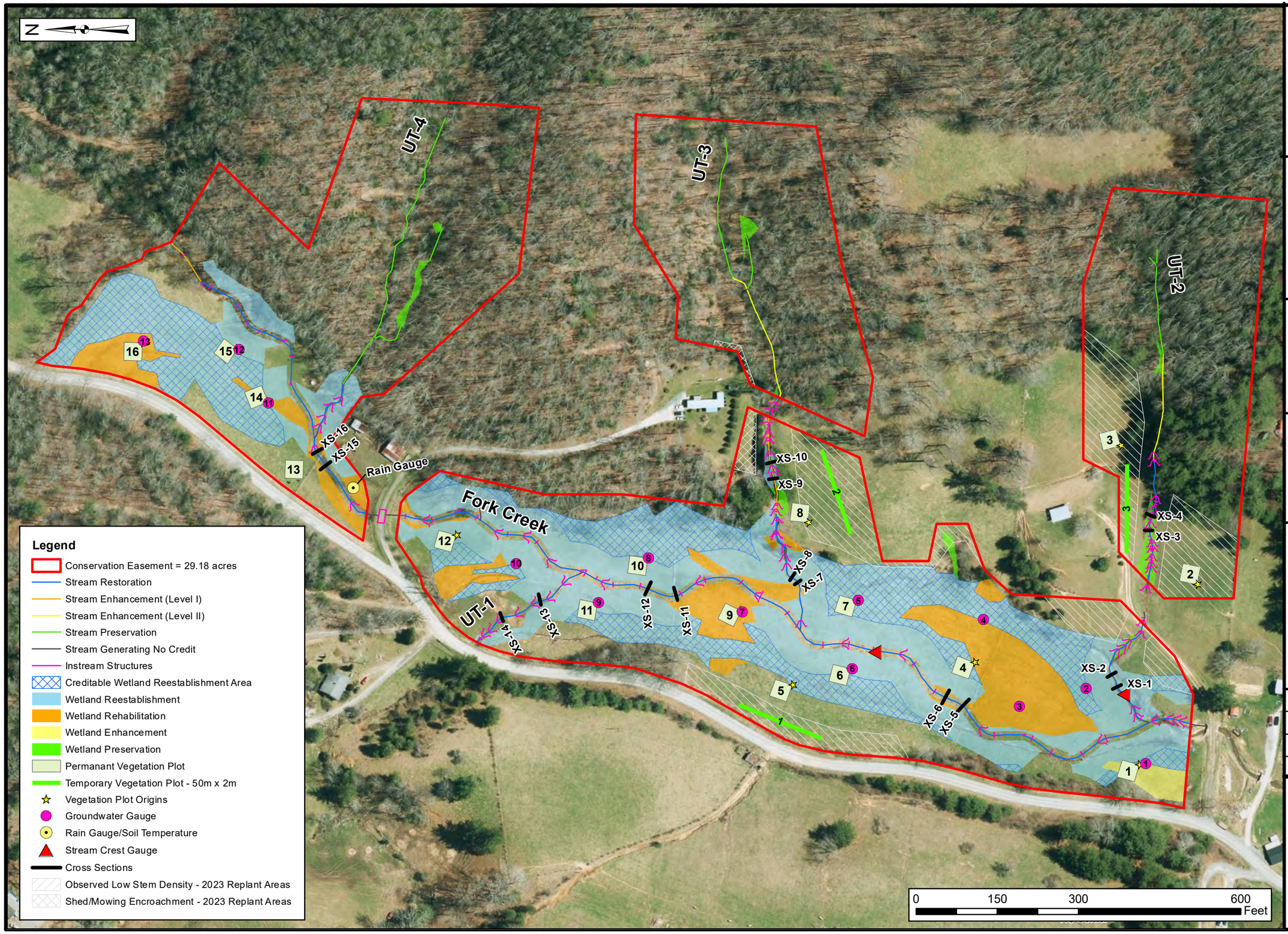
Appendix A: Visual Assessment Data

Figure 1. Current Conditions Plan View
Table 4A-E. Visual Stream Morphology Stability Assessment Table
Table 5. Vegetation Condition Assessment Table
Vegetation Plot Photographs
Photo Log



Legend

- Conservation Easement = 29.18 acres
- Stream Restoration
- Stream Enhancement (Level I)
- Stream Enhancement (Level II)
- Stream Preservation
- Stream Generating No Credit
- Instream Structures
- Creditable Wetland Reestablishment Area
- Wetland Reestablishment
- Wetland Rehabilitation
- Wetland Enhancement
- Wetland Preservation
- Permanant Vegetation Plot
- Temporary Vegetation Plot - 50m x 2m
- Vegetation Plot Origins
- Groundwater Gauge
- Rain Gauge/Soil Temperature
- Stream Crest Gauge
- Cross Sections
- Observed Low Stem Density - 2023 Replant Areas
- Shed/Mowing Encroachment - 2023 Replant Areas

Axiom Environmental, Inc.

Prepared for:

RESTORATION SYSTEMS | LLC

Project:

LAUREL SPRINGS MITIGATION SITE

Avery County, NC

Title:

CURRENT CONDITIONS PLAN VIEW

Notes:

1. Background Imagery Source: 2018 aerial photography provided by the NC OneMap program (online, provided by the NC Geographic Information Coordination Council)

Drawn by:	PHP
Date:	NOV 2022
Scale:	1:2000
Project No.:	19-006

FIGURE

1

Table 4A. Visual Stream Stability Assessment

Reach Fork Creek

Assessed Stream Length 2334

Assessed Bank Length 4668

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.	45	45		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)	45	45		100%

Table 4B. Visual Stream Stability Assessment

Reach UT 1

Assessed Stream Length 233

Assessed Bank Length 466

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 2

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.	18	18		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)	18	18		100%

Table 4D. Visual Stream Stability Assessment

Reach UT 3

Assessed Stream Length 656

Assessed Bank Length 1312

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.	16	16		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)	16	16		100%

Table 4E. Visual Stream Stability Assessment

Reach UT 4

Assessed Stream Length 110

Assessed Bank Length 220

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.	3	3		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)	3	3		100%

Table 5. Visual Vegetation Assessment

Planted acreage **16.2** Survey Date: February 1, 2022

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	2.67	16.5%
	Total		2.67	16.5%
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		2.67	16.5%

Easement Acreage **29.19**

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	2 Encroachments noted (0.107 acre)	

Laurel Springs Site
MY0 (2022) Vegetation Monitoring Photographs (taken February 1, 2022)

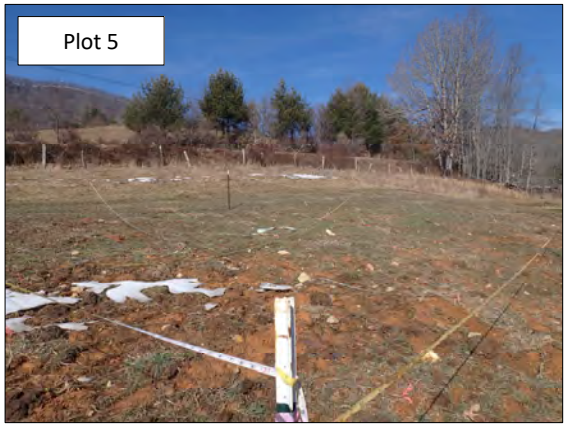
Plot 1

Plot 2

Plot 3

Plot 4

Plot 5



Plot 6

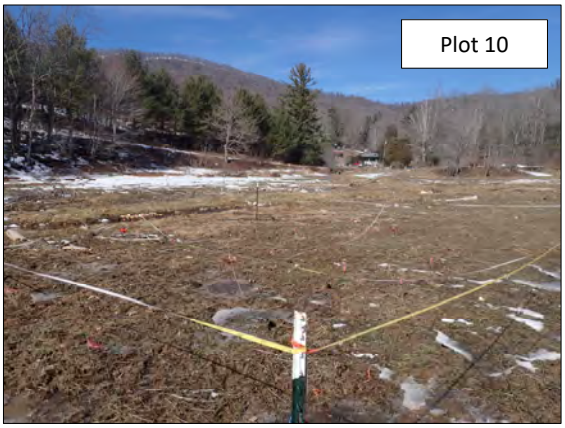
Plot 7

Plot 8

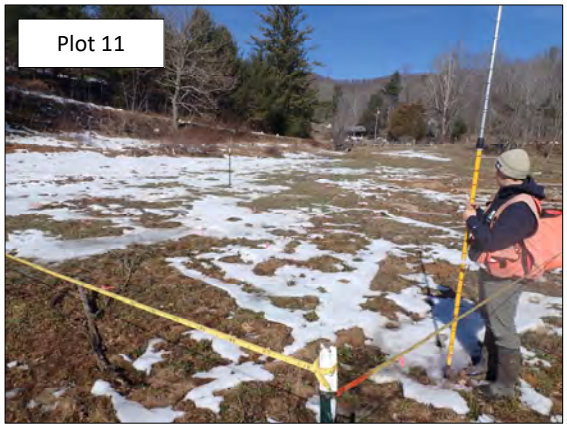
Laurel Springs Site
MY0 (2022) Vegetation Monitoring Photographs (taken February 1, 2022)

Plot 9

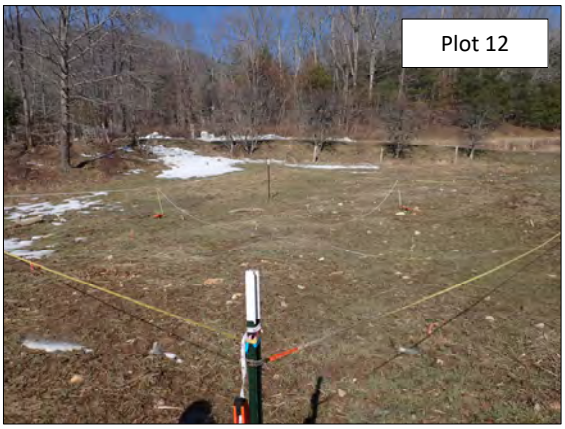
Plot 10



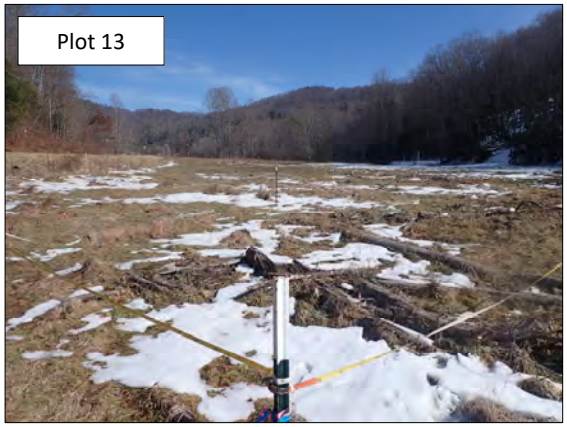
Plot 11



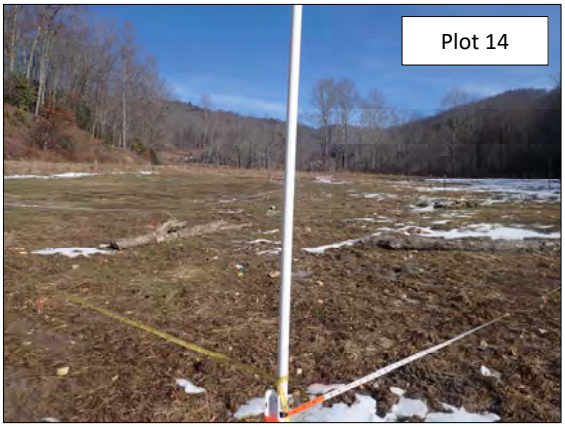
Plot 12



Plot 13



Plot 14



Plot 15

Plot 16

Fork Creek crossing facing downstream – October 2021

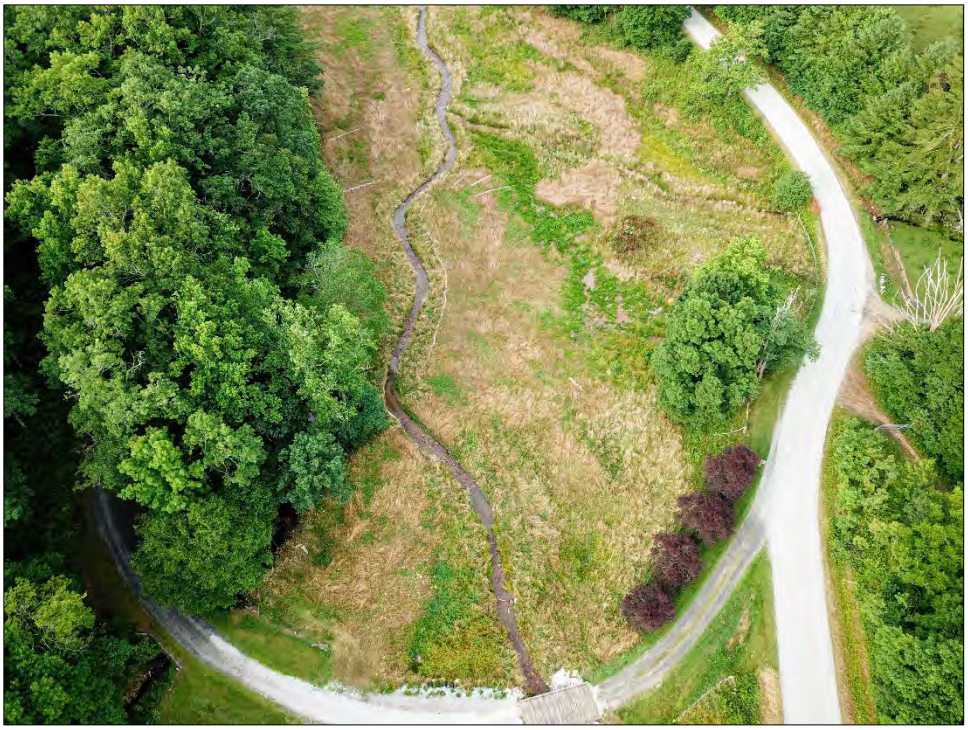
Fork Creek crossing facing upstream – October 2021

UT-2 crossing facing downstream – October 2021

UT-2 crossing facing upstream – October 2021

Upper extent of Site (Fork Creek), facing downstream – July 13, 2022

Upper extent of Site (Fork Creek), facing downstream – July 13, 2022



Downstream of Fork Creek crossing & UT1 confluence, facing downstream – July 13, 2022

UT3 facing upstream – July 13, 2022

Downstream extent of Site (Fork Creek), UT2 confluence, facing downstream – July 13, 2022

Downstream extent of Site (Fork Creek), UT2 confluence, facing downstream – July 13, 2022

Fork Creek and UT2 confluence – July 13, 2022

Upstream of UT2 – July 13, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Fork Creek – Rock sill, typical – August 25, 2022

Appendix B: Vegetation Data

Table 6A. Planted Bare-Root Woody Vegetation
Table 6B. Permanent Seed Mix
Table 7. Vegetation Plot Counts and Densities
Table 8. Vegetation Plot Data Table from Vegetation Data Entry Tool

Table 6A. Planted Bare Root Woody Vegetation
Laurel Springs Mitigation Site

Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		9.0		4.7		2.5		16.2
Species	Indicator Status	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
Cherry birch *(Betula lenta*)	FACU	500	8%	600	18.75%	1500	15.96%	2600
Eastern hemlock (*Tsuga canadensis*)	FACU	400	6.4%	600	18.75%	--	--	1000
Red oak (*Quercus rubra*)	FACU	650	10.4%	650	20.31%	--	--	1300
White oak (*Quercus alba*)	FACU	550	8.8%			550	5.85%	1100
White pine (*Pinus strobus*)	FACU	600	9.6%			--	--	600
Yellow birch *(Betula alleghaniensis*)	FACU	200	3.2%			300	3.19%	500
Scarlet oak (*Quercus coccinea*)	FAC	600	9.6%	500	15.63%	--	--	1100
Tulip poplar (*Liriodendron tulipifera*)	FAC	450	7.2%	600	18.75%	1100	11.70%	2150
River birch (*Betula nigra*)	FACW	500	8%	--	--	950	10.10%	1450
Sycamore (*Platanus occidentalis*)	FACW	600	9.6%	--	--	1500	15.96%	2100
Silky dogwood (*Cornus amomum*)	FACW			--	--	600***	6.38%	600
Black willow (*Salix nigra*)	OBL			--	--	800***	8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	4.26%	400
^Common ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Corylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		**6250**	**100%**	**3200**	**100%**	**9400**	**100%**	**18850**

^Species added post mitigation plan approval
* Planted at a density of 680 stems/acre.
** Planted at a density of 2720 stems/acre.
*** These species were live staked and planted along the stream channels – Total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.

Table 6B. Permanent Seed Mix
Laurel Springs Stream and Wetland Mitigation Site

Scientific Name	Common Name	%	Scientific Name	Common Name	%
Asclepias incarnata	Swamp milkweed	0.3	*Helianthus angustifolius*	Narrowleaf sunflower	0.8
Agrostis gigantea	Redtop	16	*Heliopsis helianthoides*	False sunflower	1.2
Agrostis hyemalis	Winter bentgrass	4	*Hibiscus moscheutos*	Swamp rose mallow	0.8
Agrostis stolonifera	Creeping bentgrass	4	*Juncus effusus*	Soft rush	0.6
Carex lurida	Shallow sedge	3.22	*Lespedeza capitata*	Round-headed bush clover	0.8
Carex vulpinoidea	Fox sedge	10	*Lespedeza virginica*	Slender lespedeza	0.8
Chamaecrista fasciculata	Partridge pea	1.6	*Liatris spicata*	Dense blazing star	0.8
Chamaecrista nictitans	Sensitive partridge pea	0.8	*Mimulus ringens*	Allegheny monkeyflower	0.06
Chrysanthemum leucanthemum	Oxeye daisy	4	*Monarda fistulosa*	Wild bergamot	0.2
Coreopsis lanceolata	Lance-leaved coreopsis	4	*Panicum virgatum*	Switchgrass	4
Coreopsis tinctoria	Plains coreopsis	4	*Pycnanthemum tenuifolium*	Slender mountain mint	0.2
Cosmos bipinnatus	Garden cosmos	0.8	*Rhexia virginica*	Handsome-Harry	0.06
Desmodium canadense	Showy tick-trefoil	0.8	*Rudbeckia hirta*	Black-eyed Susan	4
Echinacea purpurea	Purple coneflower	2.4	*Scirpus cyperinus*	Woolgrass	0.06
Elymus virginicus	Virginia wildrye	8.6	*Silphium perfoliatum*	Cup plant	0.8
Eupatorium coelestinum	Blue mistflower	0.4	*Symphyotrichum puniceum*	Purplestem aster	0.1
Eupatorium perfoliatum	Common boneset	2.5	*Tridens flavus*	Purpletop tridens	16
Glyceria striata	Fowl manna grass	0.1	*Vernonia noveboracensis*	New York ironweed	0.2
Helenium autumnale	Common sneezeweed	0.2	*Verbena hastata*	Blue vervain	0.8
			Total		100

Table 7. Planted Vegetation Totals
Laurel Springs Stream and Wetland Mitigation Site

Plot #	Planted Stems/Acre	Success Criteria Met?
1	648	Yes
2	810	Yes
3	364	Yes
4	1093	Yes
5	769	Yes
6	364	Yes
7	810	Yes
8	810	Yes
9	810	Yes
10	688	Yes
11	729	Yes
12	567	Yes
13	607	Yes
14	688	Yes
15	648	Yes
16	607	Yes
Average Planted Stems/Acre	**688**	**Yes**

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

Planted Acreage	16.2
Date of Initial Plant	2022-01-12
Date(s) of Supplemental Plant(s)	
Date(s) Mowing	
Date of Current Survey	2022-02-01
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	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Betula alleghaniensis	yellow birch	Tree	FAC													1	1				
	Betula lenta	sweet birch	Tree	FACU	1	1					2	2							1	1		
	Betula nigra	river birch	Tree	FACW	10	10					3	3										
	Betula sp.						1	1			2	2	2	2	5	5	7	7	4	4	4	4
	Liriodendron tulipifera	tuliptree	Tree	FACU	2	2	4	4	3	3	2	2	2	2							8	8
	Other												1	1							1	1
	Pinus strobus	eastern white pine	Tree	FACU			1	1	4	4	4	4							1	1		
	Platanus occidentalis	American sycamore	Tree	FACW							6	6	1	1			1	1	5	5	2	2
	Quercus alba	white oak	Tree	FACU																		
	Quercus coccinea	scarlet oak	Tree								1	1					2	2				
	Quercus nigra	water oak	Tree	FAC															3	3		
	Quercus rubra	northern red oak	Tree	FACU																		
	Quercus sp.						12	12			2	2	3	3	2	2	1	1	4	4	3	3
	Tsuga canadensis	eastern hemlock	Tree	FACU			1	1	2	2			4	4					2	2		
Sum	Performance Standard				13	13	19	19	9	9	22	22	13	13	7	7	12	12	20	20	18	18
Post Mitigation Plan Species	**Carya cordiformis**	**bitternut hickory**	**Tree**	**FACU**			**1**	**1**			**4**	**4**	**5**	**5**	**1**	**1**						
	Corylus americana	**American hazelnut**	**Shrub**	**FACU**													**7**	**7**			**1**	**1**
	Viburnum dentatum	**southern arrowwood**	**Tree**	**FAC**	**3**	**3**					**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**			**1**	**1**
Sum	Proposed Standard				16	16	20	20	9	9	27	27	19	19	9	9	20	20	20	20	20	20
Mitigation Plan Performance Standard	Current Year Stem Count					13		19		9		22		13		7		12		20		18
	Stems/Acre					364		648		364		891		526		202		445		810		729
	Species Count					3		5		3		8		6		2		5		7		5
	Dominant Species Composition (%)					77		63		44		27		31		71		58		25		44
	Average Plot Height (ft.)					2		1		1		1		1		2		2		1		1
	% Invasives					0		0		0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					16		20		9		27		19		9		20		20		20
	Stems/Acre					486		688		364		1093		769		283		769		810		810
	Species Count					4		6		3		10		8		4		7		7		7
	Dominant Species Composition (%)					63		60		44		22		26		56		35		25		40
	Average Plot Height (ft.)					2		1		1		1		1		1		1		1		1
	% Invasives					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 (continued)

Acreage	16.2
Plant	2022-01-12
Supplemental	
Date(s) Mowing	
Survey	2022-02-01
(ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F		Veg Plot 13 F		Veg Plot 14 F		Veg Plot 15 F		Veg Plot 16 F		Veg Plot 1 R	Veg Plot 2 R	Veg Plot 3 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Betula alleghaniensis	yellow birch	Tree	FAC																	
	Betula lenta	sweet birch	Tree	FACU																	
	Betula nigra	river birch	Tree	FACW									1	1	3	3	7	7			
	Betula sp.				4	4			3	3	4	4	3	3			3	3		1	
	Liriodendron tulipifera	tuliptree	Tree	FACU	1	1			5	5	1	1	2	2	4	4	3	3		1	
	Other																				
	Pinus strobus	eastern white pine	Tree	FACU																	1
	Platanus occidentalis	American sycamore	Tree	FACW	2	2					6	6	2	2	1	1	2	2			
	Quercus alba	white oak	Tree	FACU															2		
	Quercus coccinea	scarlet oak	Tree																		
	Quercus nigra	water oak	Tree	FAC																	
	Quercus rubra	northern red oak	Tree	FACU																2	
	Quercus sp.				3	3	2	2	2	2	2	2	1	1	3	3			1	1	
	Tsuga canadensis	eastern hemlock	Tree	FACU									1	1	2	2					
Sum	Performance Standard				10	10	2	2	10	10	13	13	10	10	13	13	15	15	3	5	1
Post Mitigation Plan Species	**Carya cordiformis**	**bitternut hickory**	**Tree**	**FACU**	**1**	**1**			**4**	**4**											
	Corylus americana	**American hazelnut**	**Shrub**	**FACU**	**2**	**2**	**3**	**3**			**2**	**2**	**2**	**2**	**2**	**2**					
	Viburnum dentatum	**southern arrowwood**	**Tree**	**FAC**	**4**	**4**	**13**	**13**					**5**	**5**	**1**	**1**					
Sum	Proposed Standard				17	17	18	18	14	14	15	15	17	17	16	16	15	15	3	5	1
Mitigation Plan Performance Standard	Current Year Stem Count					10		2		10		13		10		13		15	3	5	1
	Stems/Acre					405		40		405		526		405		526		607	81	202	40
	Species Count					4		1		3		4		6		5		4	2	4	1
	Dominant Species Composition (%)					40		100		50		46		30		31		47	67	40	100
	Average Plot Height (ft.)					1		1		1		1		2		1		2	1	1	3
	% Invasives					0		0		0		0		0		0		0	0	0	0
Post Mitigation Plan Performance Standard	Current Year Stem Count					17		18		14		15		17		16		15	3	5	1
	Stems/Acre					688		688		567		607		688		648		607	81	202	40
	Species Count					7		3		4		5		8		7		4	2	4	1
	Dominant Species Composition (%)					12		72		36		40		29		25		47	67	40	100
	Average Plot Height (ft.)					2		2		1		1		2		1		2	1	1	3
	% Invasives					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

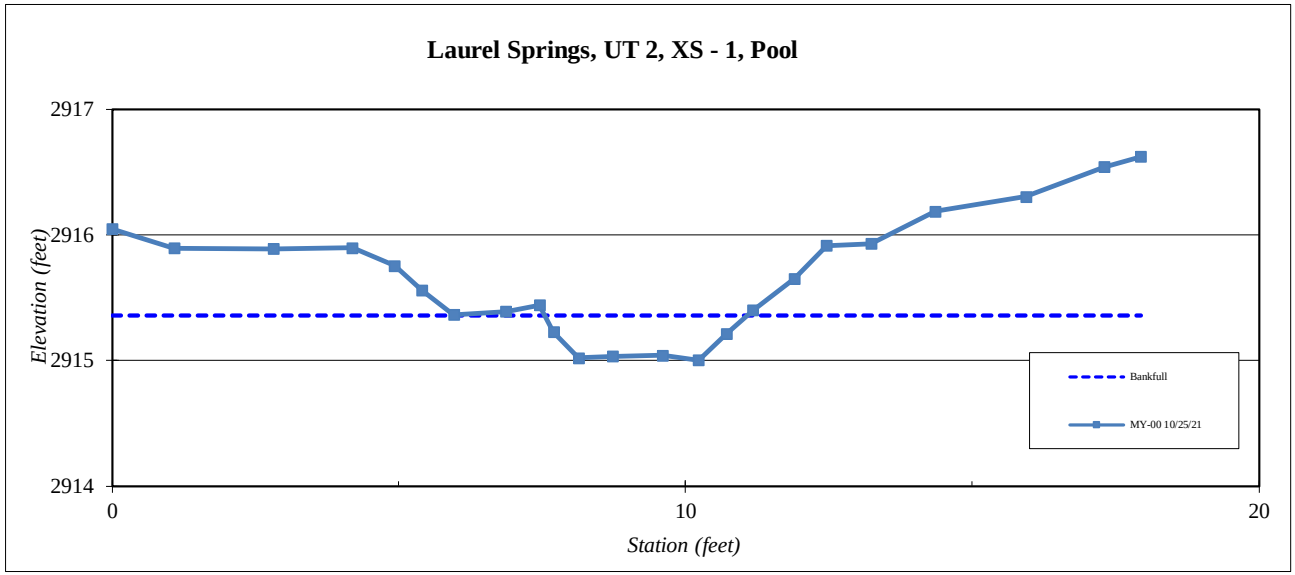
Cross-Sections with Annual Overlays
Longitudinal Profile
Table 9A-D. Baseline Stream Data Summary Tables
Table 10A-B. Cross-Section Morphology Monitoring Summary

Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT2, XS -1, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2915.9
1.1	2915.7
2.8	2915.7
4.2	2915.7
4.9	2915.5
5.4	2915.3
6.0	2915.1
6.9	2915.1
7.5	2915.2
7.7	2914.9
8.1	2914.7
8.7	2914.7
9.6	2914.7
10.2	2914.7
10.7	2914.9
11.2	2915.1
11.9	2915.4
12.5	2915.7
13.2	2915.7
14.4	2916.0
15.9	2916.16
17.3	2916.4
17.9	2916.5

SUMMARY DATA	
Bankfull Elevation:	2915.1
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2914.7
LTOB Elevation:	2915.1
LTOB Max Depth:	0.4
LTOB Cross Sectional Area:	1.1

Stream Type	E/C 5

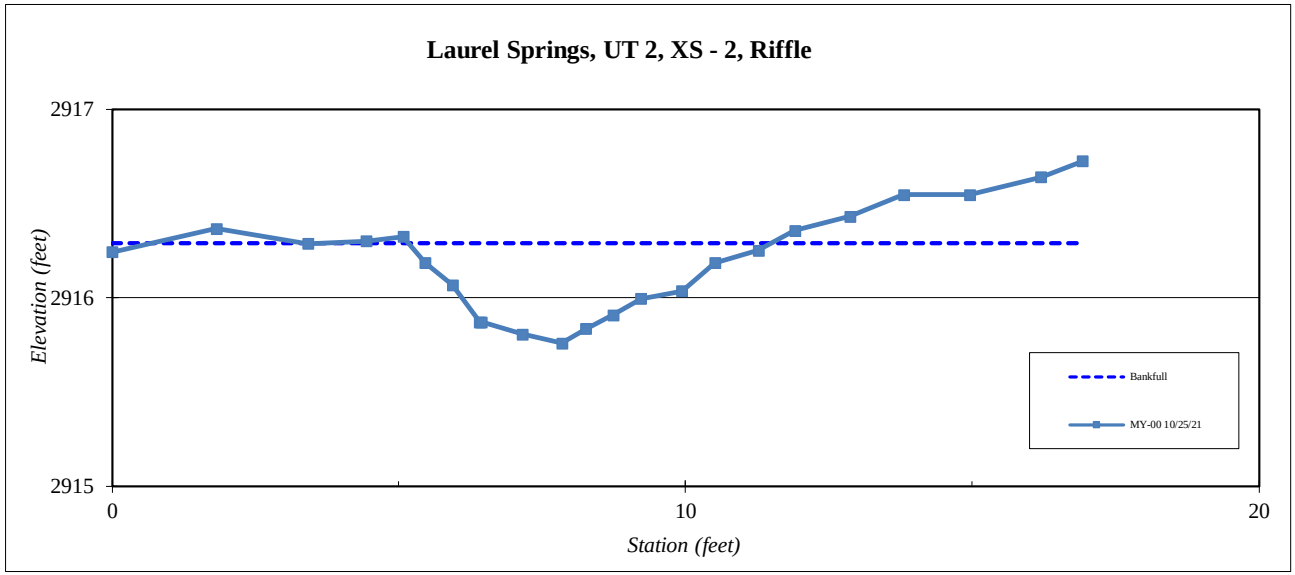


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT2, XS -2, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2916.1
1.8	2916.2
3.4	2916.1
4.4	2916.2
5.1	2916.2
5.5	2916.0
5.9	2915.9
6.4	2915.7
6.4	2915.7
7.2	2915.6
7.8	2915.5
8.3	2915.6
8.7	2915.7
9.2	2915.8
9.9	2915.9
10.5	2916.0
11.3	2916.1
11.9	2916.2
12.9	2916.3
13.8	2916.4
15.0	2916.43
16.2	2916.5
16.9	2916.6

SUMMARY DATA	
Bankfull Elevation:	2916.1
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2915.5
LTOB Elevation:	2916.1
LTOB Max Depth:	0.6
LTOB Cross Sectional Area:	2.1

Stream Type	E/C 5

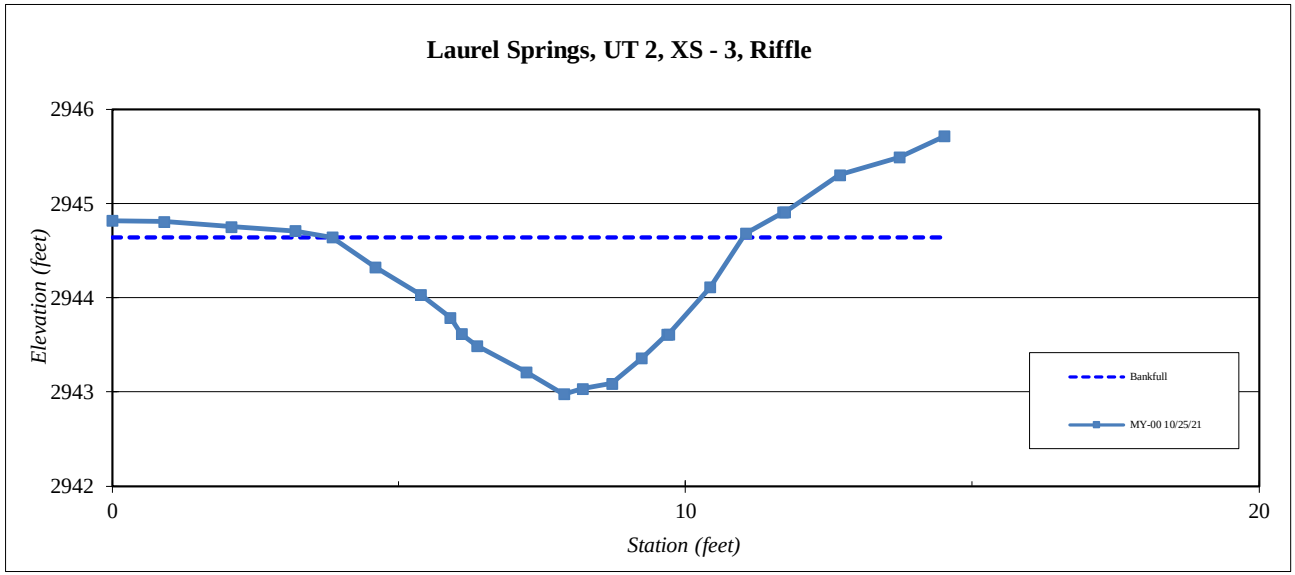


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT2, XS -3, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2945.0
0.9	2945.0
2.1	2944.9
3.2	2944.9
3.8	2944.8
4.6	2944.4
5.4	2944.1
5.9	2943.8
6.1	2943.6
6.4	2943.5
7.2	2943.2
7.9	2942.9
8.2	2943.0
8.7	2943.0
9.2	2943.3
9.7	2943.6
9.7	2943.6
10.4	2944.2
11.0	2944.8
11.7	2945.1
11.7	2945.10
12.7	2945.5
13.7	2945.8
14.5	2946.0

SUMMARY DATA	
Bankfull Elevation:	2944.8
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2942.9
LTOB Elevation:	2944.8
LTOB Max Depth:	1.9
LTOB Cross Sectional Area:	7.7

Stream Type	E/C 5

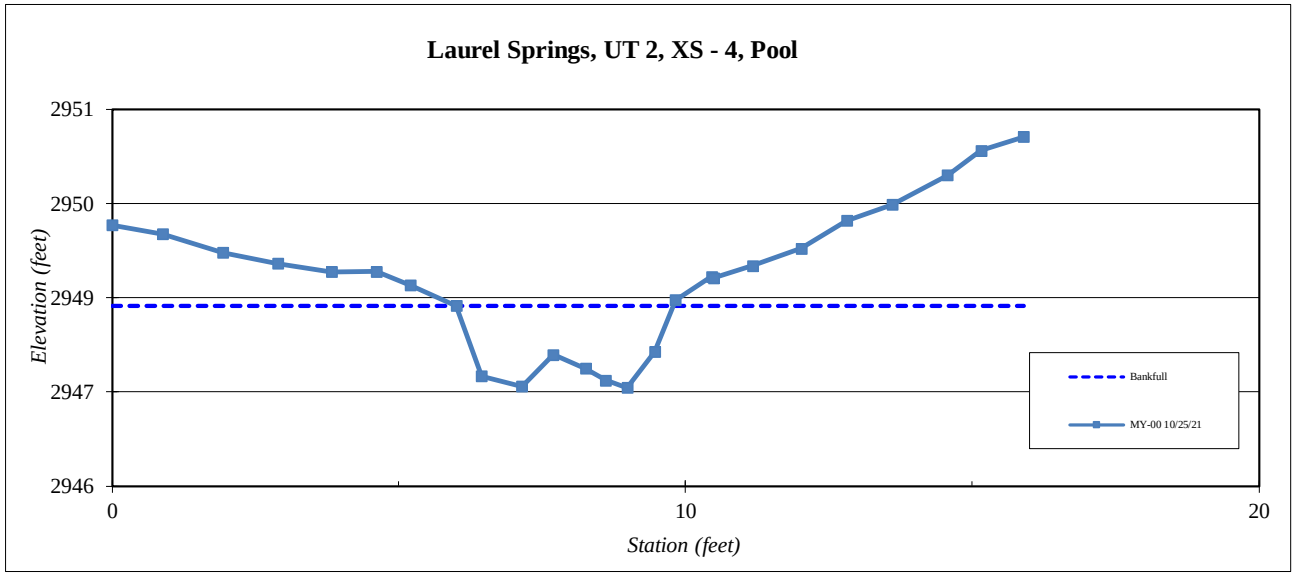


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT2, XS -4, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2949.5
0.9	2949.4
1.9	2949.1
2.9	2949.0
3.8	2948.9
4.6	2948.9
5.2	2948.7
6.0	2948.5
6.4	2947.7
7.1	2947.5
7.7	2947.9
8.3	2947.8
8.6	2947.6
9.0	2947.5
9.5	2947.9
9.8	2948.6
10.5	2948.8
10.5	2948.8
11.2	2949.0
12.0	2949.2
12.8	2949.52
13.6	2949.7
14.6	2950.1
15.2	2950.4
15.9	2950.5

SUMMARY DATA	
Bankfull Elevation:	2948.5
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2947.5
LTOB Elevation:	2915.1
LTOB Max Depth:	1.0
LTOB Cross Sectional Area:	2.7

Stream Type	E/C 5

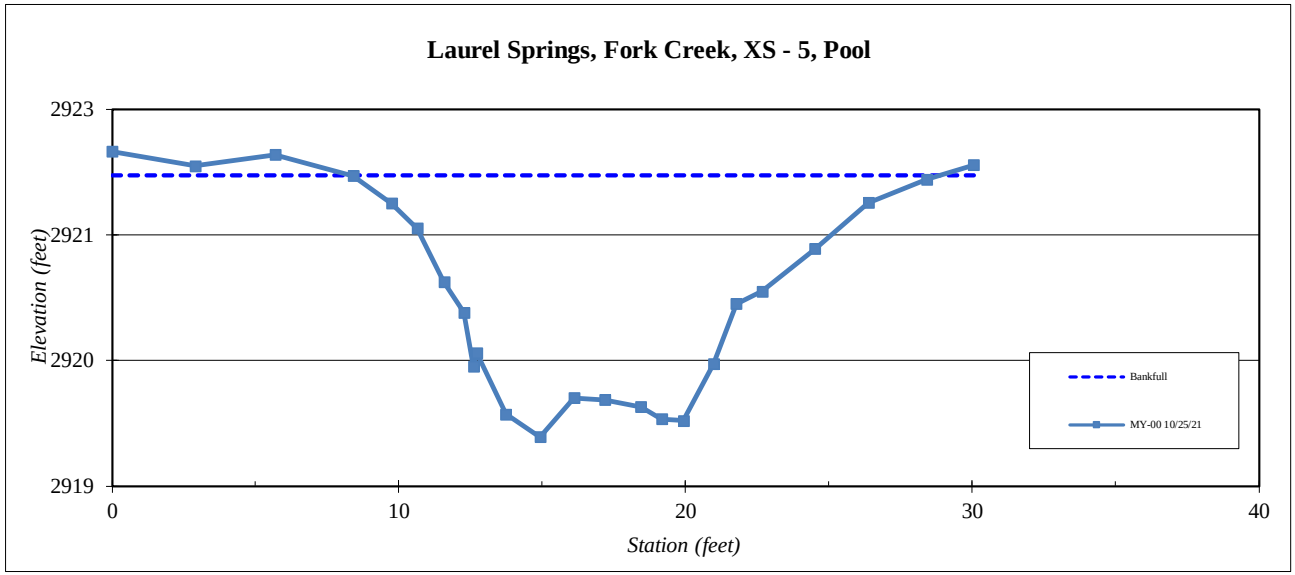


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -5, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2922.2
2.9	2922.1
5.7	2922.2
8.4	2922.0
9.8	2921.7
10.6	2921.5
11.6	2921.0
12.3	2920.8
12.6	2920.3
12.7	2920.4
13.7	2919.8
14.9	2919.6
16.1	2920.0
17.2	2920.0
18.4	2919.9
19.2	2919.8
19.9	2919.8
21.0	2920.3
21.8	2920.8
22.7	2921.0
24.5	2921.34
26.4	2921.8
28.4	2922.0
30.1	2922.1

SUMMARY DATA	
Bankfull Elevation:	2922.0
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2919.6
LTOB Elevation:	2922.0
LTOB Max Depth:	2.4
LTOB Cross Sectional Area:	24.6

Stream Type	E/C 5

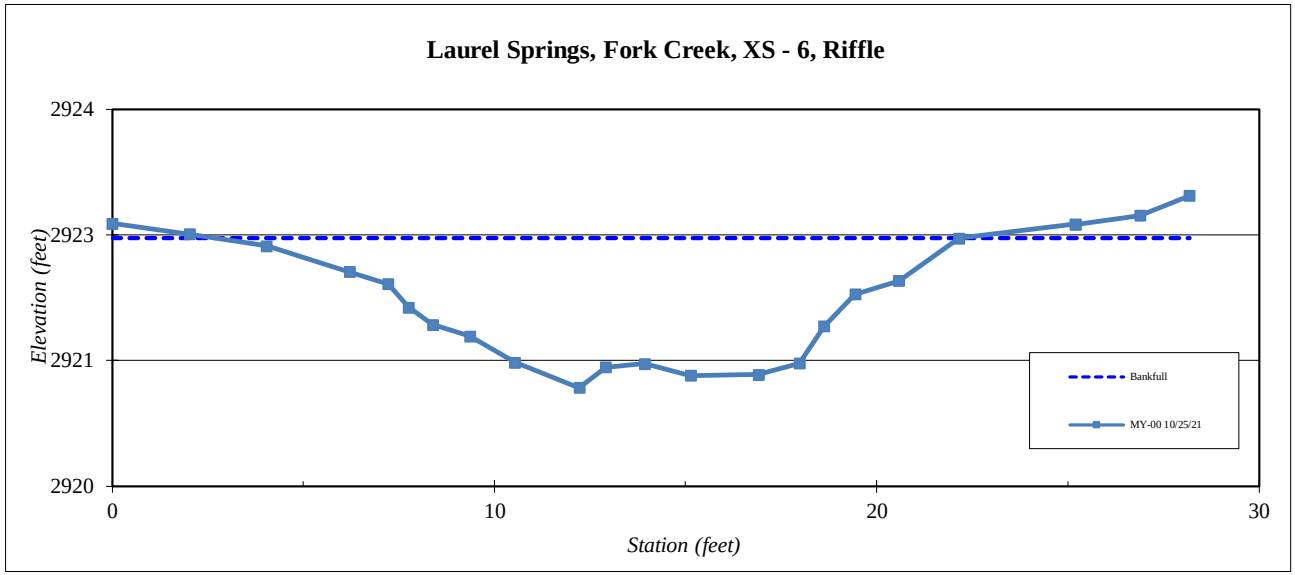


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -6, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2922.7
2.0	2922.6
4.0	2922.5
6.2	2922.3
7.2	2922.2
7.8	2921.9
8.4	2921.8
9.4	2921.7
10.5	2921.4
12.2	2921.2
12.9	2921.4
13.9	2921.4
15.1	2921.3
16.9	2921.3
18.0	2921.4
18.6	2921.8
19.4	2922.1
20.6	2922.2
22.2	2922.6
25.2	2922.7
25.2	2922.69
26.9	2922.8
28.2	2923.0

SUMMARY DATA	
Bankfull Elevation:	2922.6
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2921.2
LTOB Elevation:	2922.6
LTOB Max Depth:	1.3
LTOB Cross Sectional Area:	14.6

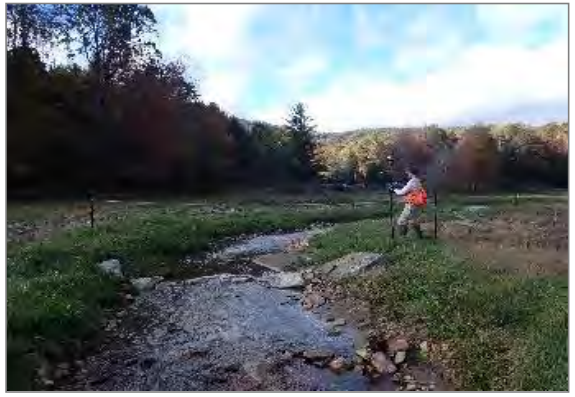
Stream Type	E/C 5



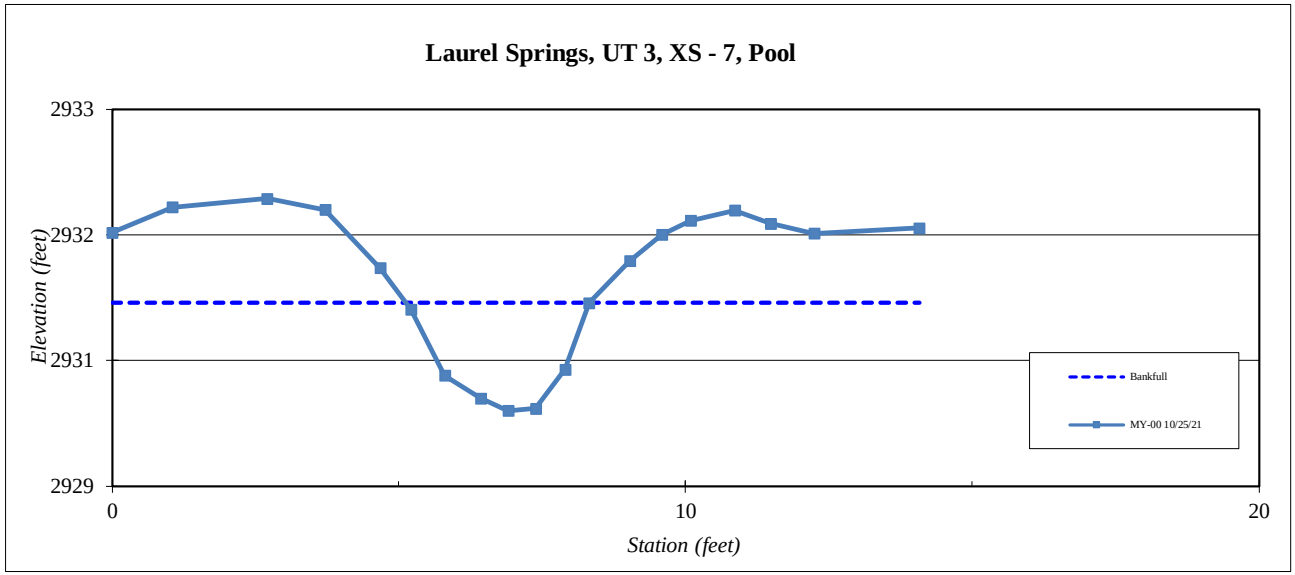
Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT3, XS -7, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2931.7
1.1	2931.9
2.7	2932.0
3.7	2931.9
4.7	2931.3
5.2	2931.0
5.8	2930.4
6.4	2930.2
6.9	2930.1
7.4	2930.1
7.9	2930.4
8.3	2931.0
9.0	2931.4
9.6	2931.6
10.1	2931.8
10.9	2931.9
11.5	2931.7
12.2	2931.7
14.1	2931.7

SUMMARY DATA	
Bankfull Elevation:	2931.0
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2930.1
LTOB Elevation:	2931.0
LTOB Max Depth:	1.0
LTOB Cross Sectional Area:	2.1



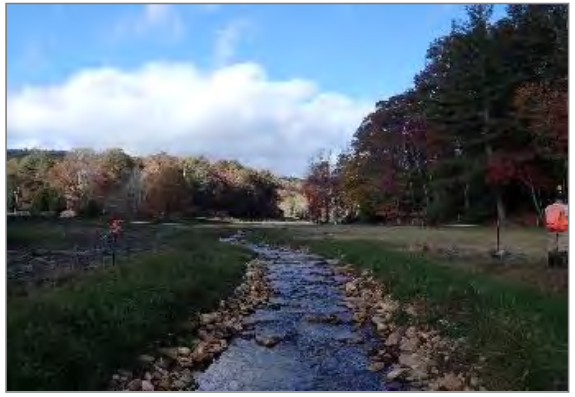
Stream Type	E/C 5



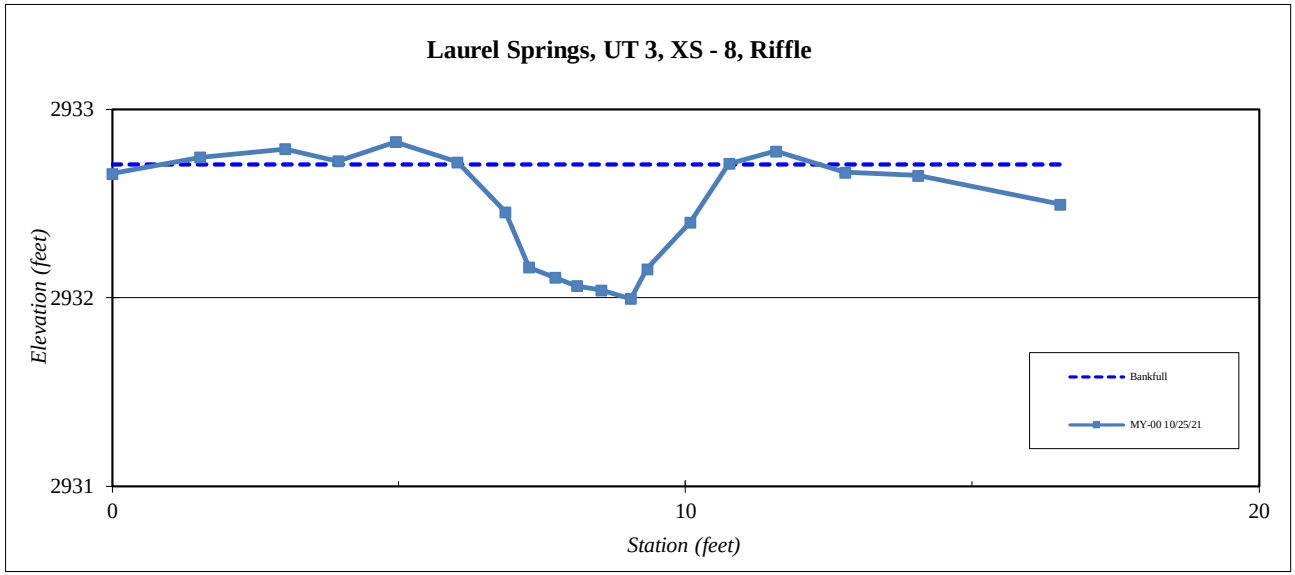
Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT3, XS -8, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2932.4
1.5	2932.5
3.0	2932.5
3.9	2932.5
4.9	2932.6
6.0	2932.5
6.9	2932.2
7.3	2931.8
7.7	2931.8
8.1	2931.7
8.5	2931.7
9.0	2931.6
9.3	2931.8
10.1	2932.1
10.8	2932.4
11.6	2932.5
12.8	2932.4
14.1	2932.4
16.5	2932.2

SUMMARY DATA	
Bankfull Elevation:	2932.4
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2931.6
LTOB Elevation:	2932.4
LTOB Max Depth:	0.8
LTOB Cross Sectional Area:	2.3



Stream Type	E/C 5

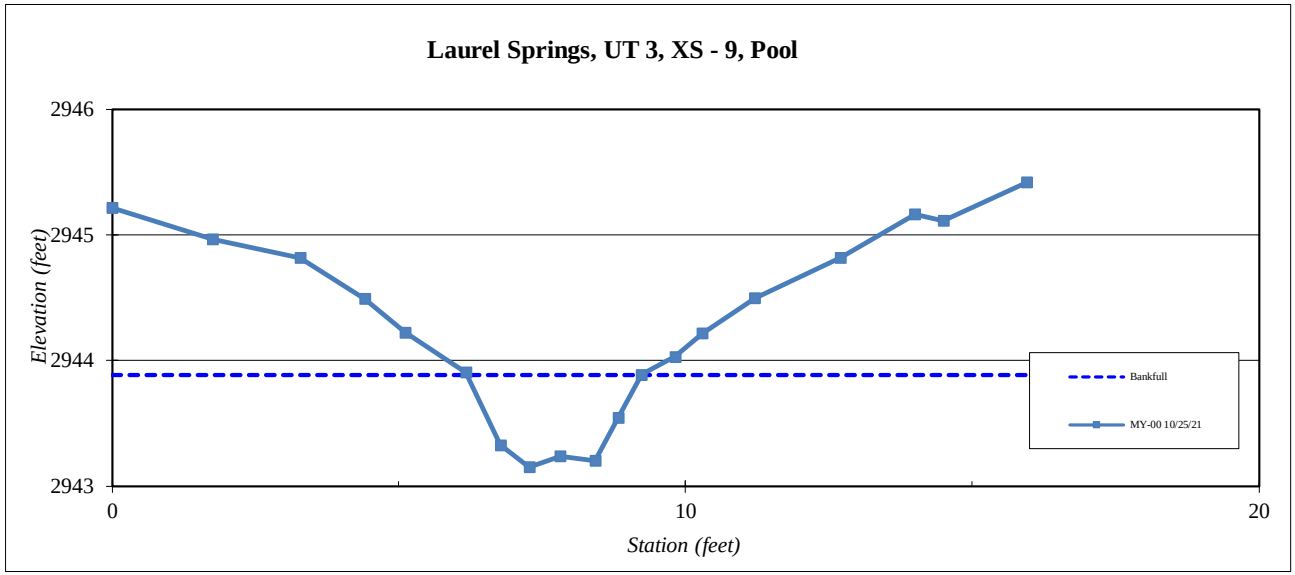


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT3, XS -9, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2945.4
1.8	2945.2
3.3	2945.0
4.4	2944.6
5.1	2944.3
6.2	2944.0
6.8	2943.3
7.3	2943.1
7.8	2943.2
8.4	2943.2
8.8	2943.6
9.2	2943.9
9.8	2944.1
10.3	2944.3
11.2	2944.6
12.7	2945.0
14.0	2945.4
14.5	2945.3
16.0	2945.7

SUMMARY DATA	
Bankfull Elevation:	2944.0
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2943.1
LTOB Elevation:	2944.0
LTOB Max Depth:	0.8
LTOB Cross Sectional Area:	1.8

Stream Type	E/C 5

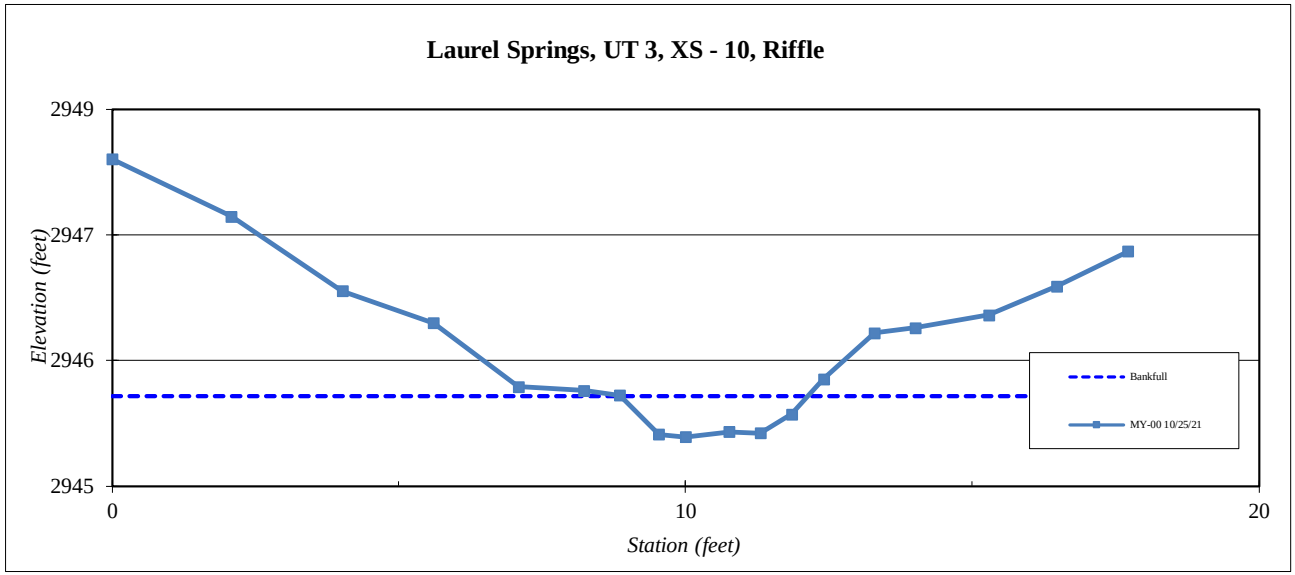


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT3, XS -10, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2948.2
2.1	2947.6
4.0	2947.0
5.6	2946.7
7.1	2946.1
8.2	2946.1
8.9	2946.0
9.5	2945.7
10.0	2945.6
10.8	2945.7
11.3	2945.7
11.9	2945.9
12.4	2946.2
13.3	2946.6
14.0	2946.6
15.3	2946.7
16.5	2947.0
17.7	2947.3

SUMMARY DATA	
Bankfull Elevation:	2946.0
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2945.6
LTOB Elevation:	2946.0
LTOB Max Depth:	0.4
LTOB Cross Sectional Area:	0.9

Stream Type	E/C 5

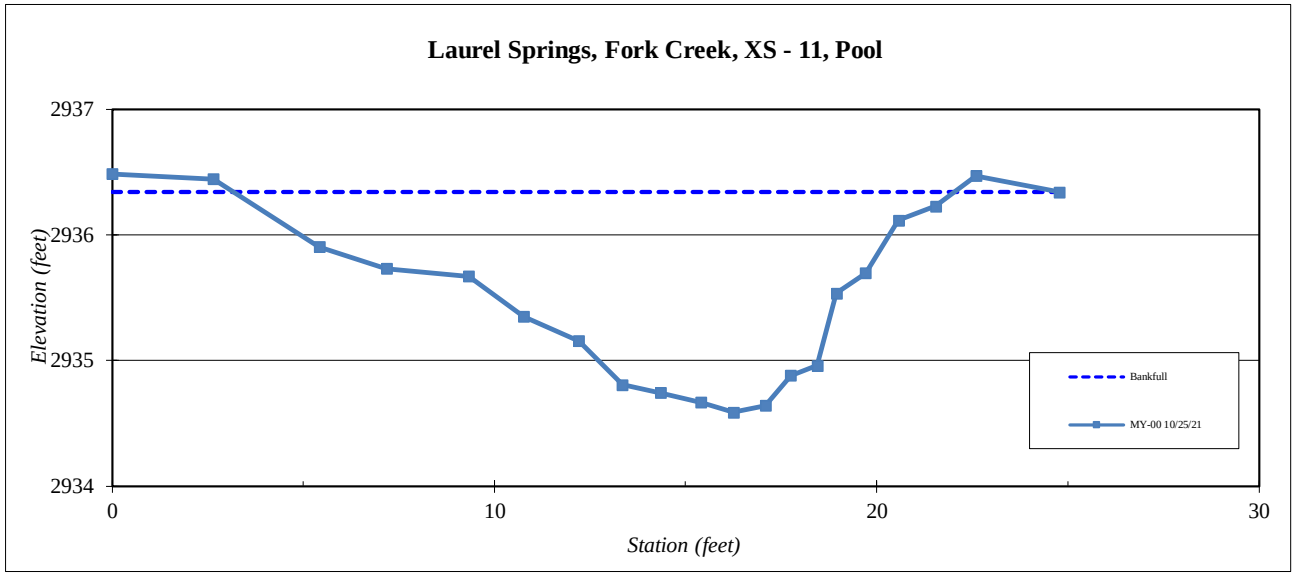


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -11, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2936.7
2.6	2936.7
5.4	2936.1
7.2	2935.9
9.3	2935.8
10.8	2935.4
12.2	2935.2
13.4	2934.8
14.3	2934.7
15.4	2934.7
16.3	2934.6
17.1	2934.6
17.7	2934.9
18.4	2935.0
19.0	2935.6
19.7	2935.8
20.6	2936.3
21.5	2936.4
22.6	2936.7
24.8	2936.5

SUMMARY DATA	
Bankfull Elevation:	2936.6
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2934.6
LTOB Elevation:	2936.6
LTOB Max Depth:	2.0
LTOB Cross Sectional Area:	19.3

Stream Type	E/C 5

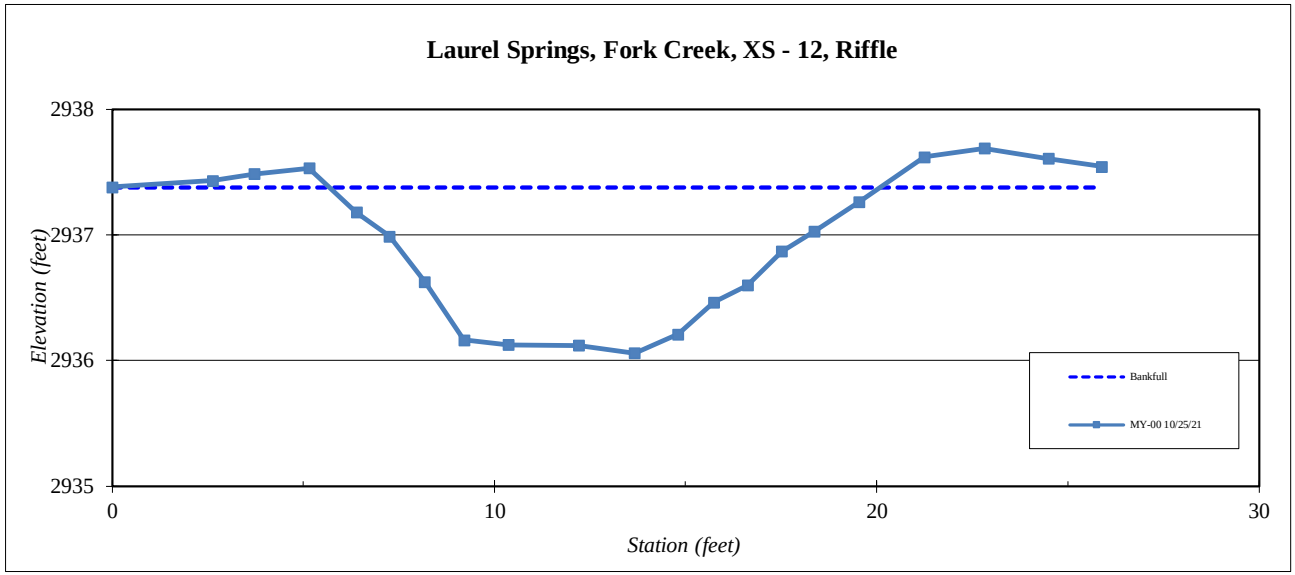


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -12, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2937.7
2.6	2937.8
3.7	2937.8
5.1	2937.9
6.4	2937.5
7.3	2937.3
8.2	2936.9
9.2	2936.3
10.4	2936.3
12.2	2936.3
13.7	2936.2
14.8	2936.4
15.7	2936.7
16.6	2936.8
17.5	2937.1
18.4	2937.3
19.5	2937.6
21.2	2938.0
22.8	2938.1
24.5	2938.0
25.9	2937.91

SUMMARY DATA	
Bankfull Elevation:	2937.7
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2936.2
LTOB Elevation:	2937.7
LTOB Max Depth:	1.5
LTOB Cross Sectional Area:	13.4

Stream Type	E/C 5

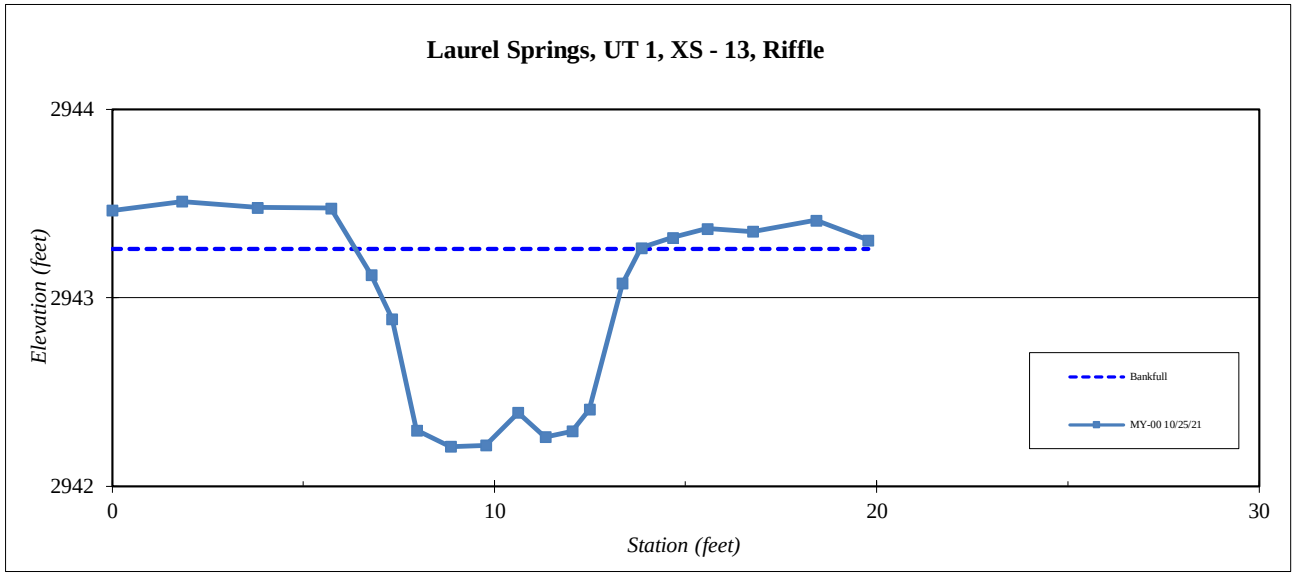


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT1, XS -13, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2943.5
1.8	2943.5
3.8	2943.5
5.7	2943.5
6.8	2943.1
7.3	2942.8
8.0	2942.2
8.9	2942.1
9.8	2942.1
10.6	2942.3
11.3	2942.1
12.0	2942.1
12.5	2942.3
13.3	2943.0
13.8	2943.2
14.7	2943.3
15.6	2943.4
16.8	2943.3
18.4	2943.4
19.8	2943.3

SUMMARY DATA	
Bankfull Elevation:	2943.2
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2942.1
LTOB Elevation:	2943.2
LTOB Max Depth:	1.2
LTOB Cross Sectional Area:	6.2

Stream Type	E/C 5

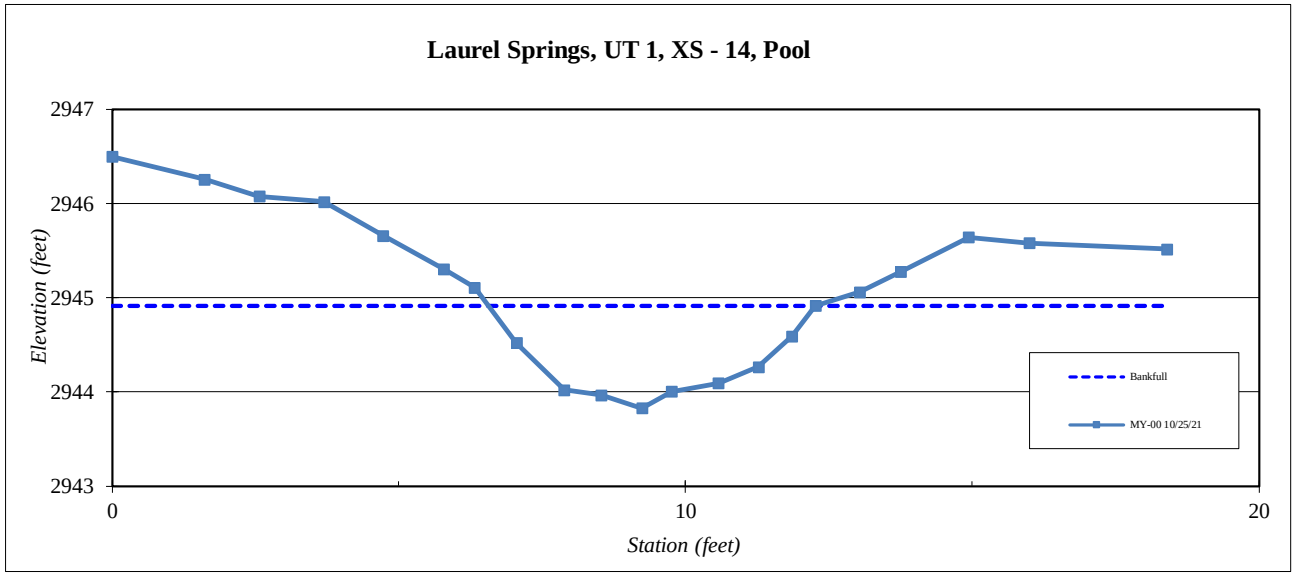


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	UT1, XS -14, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2946.9
1.6	2946.6
2.6	2946.4
3.7	2946.4
4.7	2946.0
5.8	2945.6
6.3	2945.3
7.1	2944.7
7.9	2944.1
8.5	2944.0
9.2	2943.9
9.8	2944.1
10.6	2944.2
11.3	2944.4
11.9	2944.7
12.3	2945.1
13.0	2945.3
13.8	2945.5
14.9	2945.9
16.0	2945.9
18.4	2945.79

SUMMARY DATA	
Bankfull Elevation:	2945.1
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2943.9
LTOB Elevation:	2945.1
LTOB Max Depth:	1.2
LTOB Cross Sectional Area:	4.6

Stream Type	E/C 5

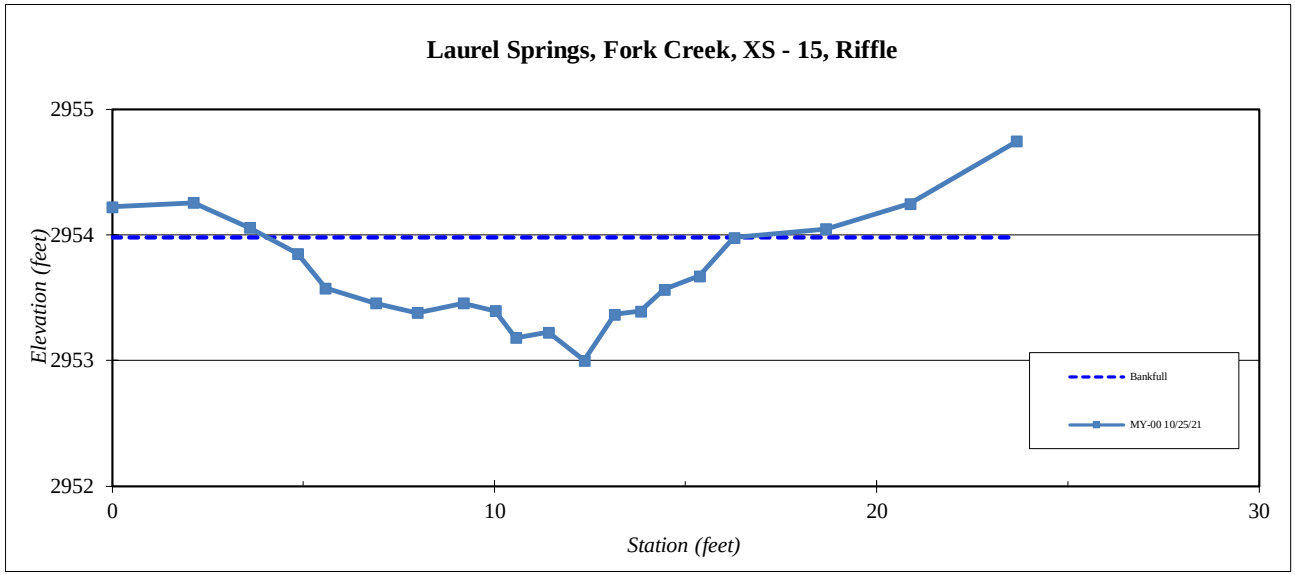


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -15, Riffle
Feature	Riffle
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2954.5
2.1	2954.5
3.6	2954.3
4.9	2954.1
5.6	2953.8
6.9	2953.6
8.0	2953.6
9.2	2953.6
10.0	2953.6
10.6	2953.3
11.4	2953.4
12.4	2953.1
13.1	2953.5
13.8	2953.6
14.4	2953.8
15.4	2953.9
16.3	2954.2
18.7	2954.3
20.9	2954.5
23.7	2955.1

SUMMARY DATA	
Bankfull Elevation:	2954.2
Bank Hieght Ratio:	1.0
Thalweg Elevation:	46.9
LTOB Elevation:	2954.2
LTOB Max Depth:	1.1
LTOB Cross Sectional Area:	7.1

Stream Type	E/C 5

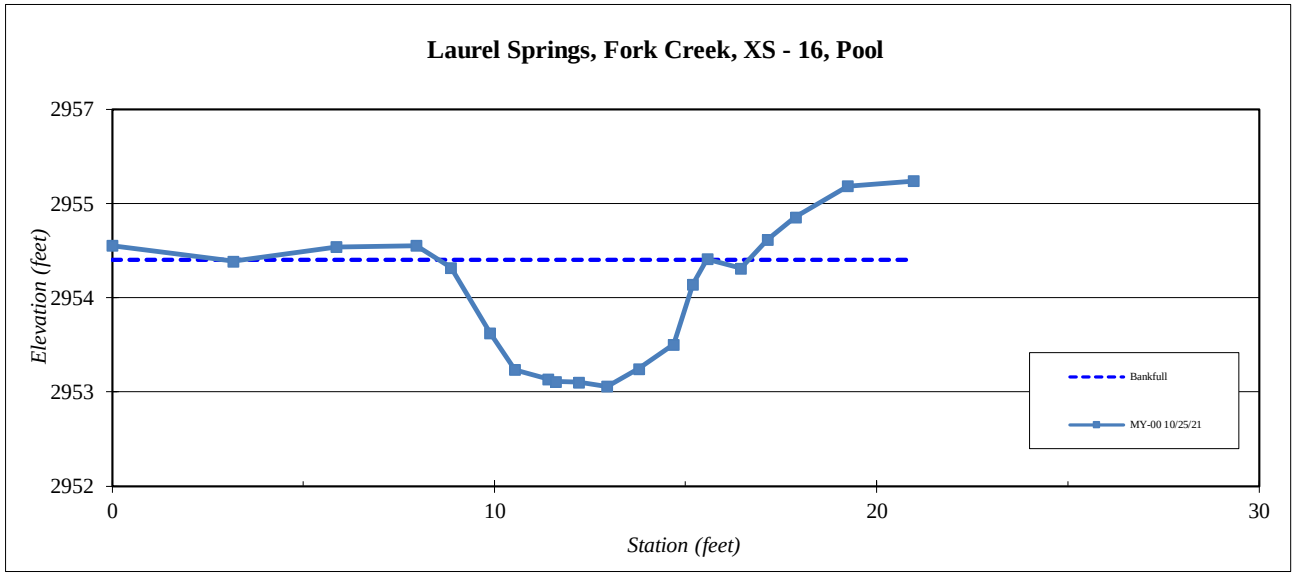


Site	Laurel Springs
Watershed:	French Broad River Basin, 06010108
XS ID	Fork Creek, XS -16, Pool
Feature	Pool
Date:	10/25/2021
Field Crew:	Perkinson, Keith

Station	Elevation
0.0	2954.9
3.2	2954.7
5.9	2954.9
8.0	2954.9
8.9	2954.6
9.9	2953.8
10.5	2953.4
11.4	2953.3
11.6	2953.2
12.2	2953.2
12.9	2953.2
13.8	2953.4
14.7	2953.7
15.2	2954.4
15.6	2954.7
16.4	2954.6
17.1	2954.9
17.9	2955.2
19.2	2955.6
21.0	2955.7

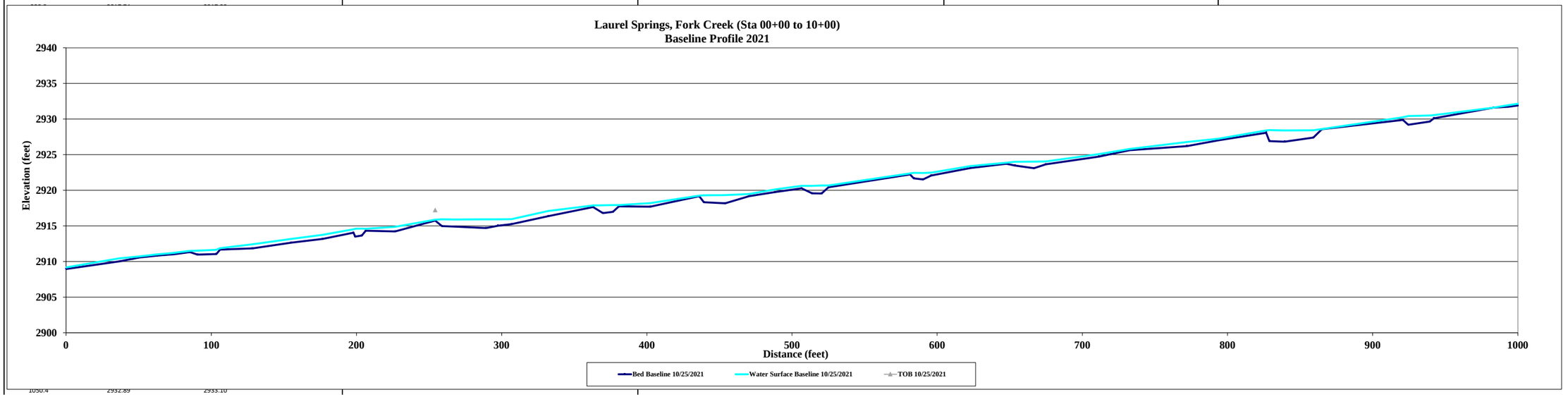
SUMMARY DATA	
Bankfull Elevation:	2954.7
Bank Hieght Ratio:	1.0
Thalweg Elevation:	2953.2
LTOB Elevation:	2954.7
LTOB Max Depth:	1.5
LTOB Cross Sectional Area:	7.4

Stream Type	E/C 5



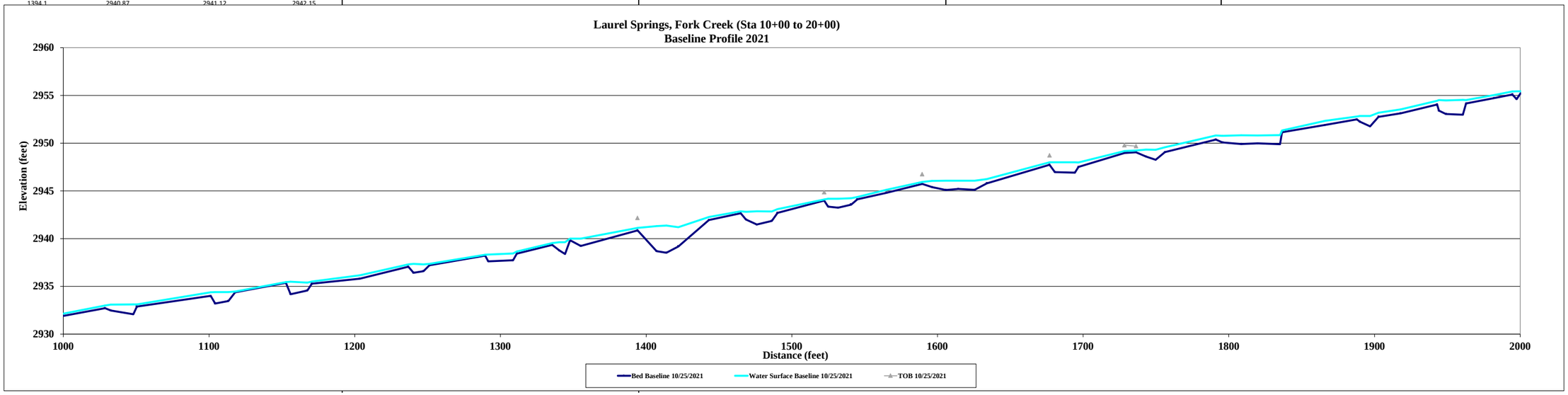
Project Name	Laurel Springs - Baseline (2021) Profile
Reach	Fork Creek (Sta 00+00 to 10+00)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
0.0	2908.95	2909.17													
36.7	2910.01	2910.44													
50.7	2910.57	2910.73													
62.3	2910.82	2910.99													
74.4	2911.03	2911.21													
85.3	2911.32	2911.50													
90.4	2910.97	2911.53													
103.4	2911.05	2911.66													
106.1	2911.67	2911.87													
128.5	2911.86	2912.43													
155.0	2912.65	2913.18													
176.6	2913.18	2913.75													
197.9	2914.05	2914.51													
199.1	2913.50	2914.59													
203.6	2913.64	2914.62													
206.3	2914.32	2914.60													
226.6	2914.22	2914.88													
254.2	2915.74	2915.88	2917.21												
258.8	2914.97	2915.92													
268.3	2914.90	2915.90													
289.1	2914.70	2915.92													
297.4	2915.02	2915.92													
306.8	2915.26	2915.95													
332.2	2916.38	2917.09													
363.0	2917.66	2917.88													
369.7	2916.80	2917.89													
376.6	2916.97	2917.92													



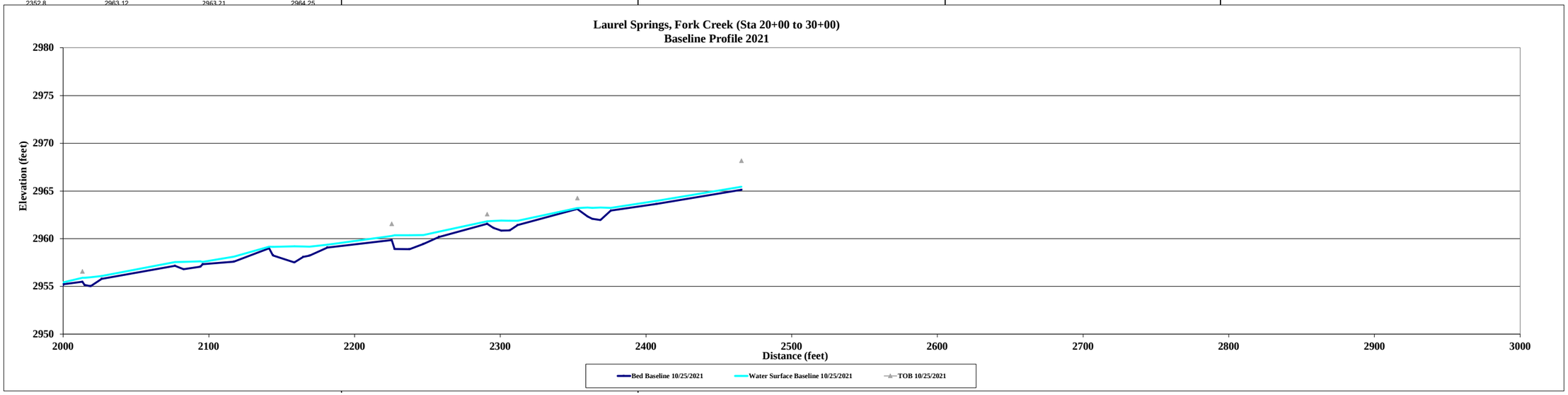
Project Name	Laurel Springs - Baseline (2021) Profile
Reach	Fork Creek (Sta 10+00 to 20+00)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
993.5	2931.72	2931.94													
1028.5	2932.71	2933.00													
1032.5	2932.48	2933.09													
1048.0	2932.07	2933.11													
1050.4	2932.89	2933.10													
1101.1	2934.00	2934.38													
1104.2	2933.19	2934.39													
1113.2	2933.47	2934.40													
1117.9	2934.37	2934.45													
1152.7	2935.36	2935.45													
1155.9	2934.17	2935.49													
1167.4	2934.57	2935.40													
1170.5	2935.28	2935.50													
1203.5	2935.81	2936.15													
1236.7	2937.06	2937.29													
1240.3	2936.41	2937.35													
1247.2	2936.60	2937.30													
1251.3	2937.20	2937.35													
1289.5	2938.22	2938.31													
1291.6	2937.62	2938.32													
1308.6	2937.73	2938.45													
1311.3	2938.43	2938.66													
1335.5	2939.35	2939.53													
1340.4	2938.76	2939.63													
1344.4	2938.39	2939.62													
1347.7	2939.84	2939.99													
1355.1	2939.24	2940.00													
1394.1	2940.87	2941.12	2942.15												



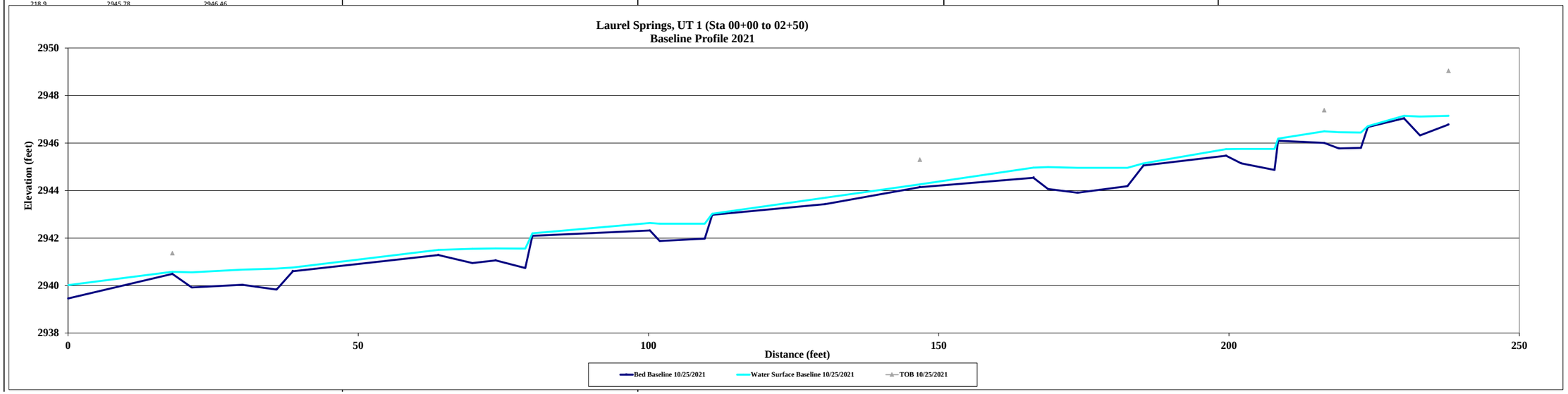
Project Name	Laurel Springs - Baseline (2021) Profile
Reach	Fork Creek (Sta 20+00 to 30+00)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
1997.5	2954.62	2955.44													
2000.3	2955.23	2955.44													
2013.2	2955.49	2955.91	2956.57												
2014.7	2955.15	2955.91													
2018.8	2955.04	2955.96													
2026.5	2955.80	2956.09													
2076.7	2957.16	2957.55													
2082.6	2956.81	2957.58													
2094.2	2957.08	2957.63													
2095.7	2957.33	2957.58													
2117.0	2957.60	2958.12													
2141.3	2959.01	2959.16													
2144.0	2958.25	2959.15													
2158.7	2957.52	2959.21													
2164.7	2958.10	2959.18													
2169.1	2958.24	2959.17													
2181.3	2959.08	2959.37													
2225.4	2959.87	2960.29	2961.55												
2227.4	2958.92	2960.36													
2237.7	2958.91	2960.37													
2247.2	2959.45	2960.38													
2257.9	2960.18	2960.74													
2291.0	2961.57	2961.83	2962.56												
2295.3	2961.14	2961.86													
2300.6	2960.85	2961.89													
2306.4	2960.87	2961.89													
2312.0	2961.44	2961.89													
2352.8	2963.12	2963.21	2964.25												



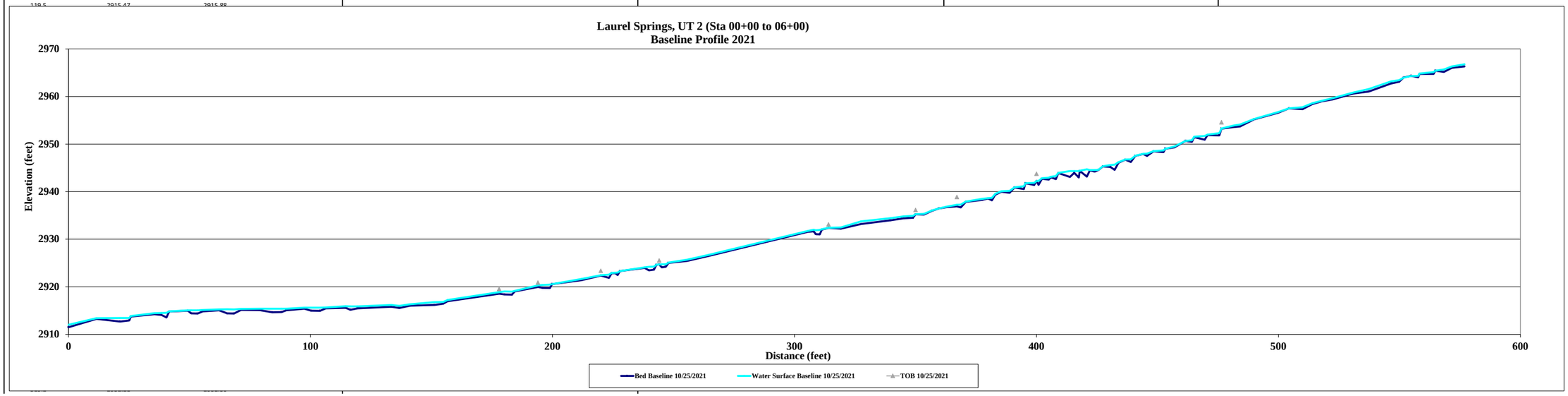
Project Name	Laurel Springs - Baseline (2021) Profile
Reach	UT 1 (Sta 00+00 to 02+50)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
0.0	2939.46	2940.02													
18.0	2940.50	2940.58	2941.37												
21.3	2939.92	2940.56													
30.0	2940.03	2940.67													
35.9	2939.83	2940.72													
38.7	2940.61	2940.76													
63.8	2941.29	2941.50													
69.7	2940.95	2941.55													
73.7	2941.07	2941.57													
78.8	2940.74	2941.56													
80.0	2942.10	2942.20													
100.2	2942.32	2942.63													
101.9	2941.88	2942.61													
109.7	2941.98	2942.61													
111.0	2942.98	2943.03													
130.5	2943.43	2943.70													
146.7	2944.14	2944.26	2945.30												
166.3	2944.54	2944.97													
168.8	2944.07	2944.99													
173.9	2943.91	2944.96													
182.5	2944.19	2944.96													
185.3	2945.06	2945.15													
199.5	2945.47	2945.75													
202.1	2945.15	2945.76													
207.8	2944.87	2945.75													
208.4	2946.10	2946.19													
216.4	2946.01	2946.50	2947.38												
218.9	2945.78	2946.46													



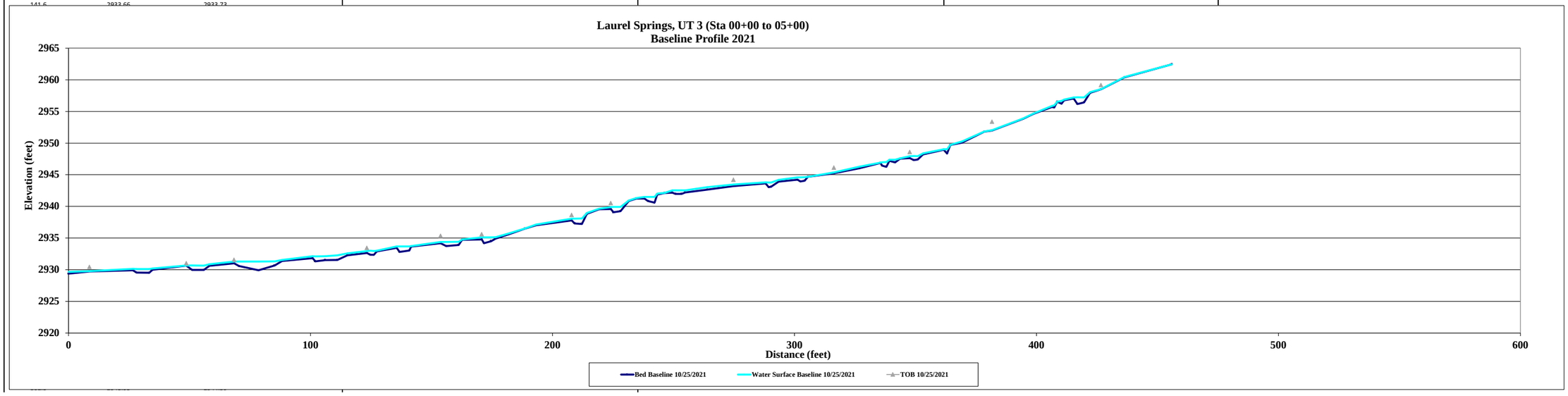
Project Name	Laurel Springs - Baseline (2021) Profile
Reach	UT 2 (Sta 00+00 to 06+00)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
0.0	2911.49	2912.01													
11.5	2913.26	2913.41													
21.2	2912.69	2913.43													
25.1	2912.92	2913.42													
25.7	2913.75	2913.84													
35.4	2914.23	2914.45													
38.4	2914.09	2914.50													
40.5	2913.56	2914.54													
41.5	2914.77	2914.81													
49.3	2914.97	2915.05													
50.7	2914.43	2915.06													
53.3	2914.38	2915.05													
55.5	2914.82	2915.13													
62.1	2915.04	2915.25													
65.6	2914.40	2915.26													
68.4	2914.39	2915.25													
71.3	2915.13	2915.35													
79.0	2915.08	2915.37													
84.2	2914.64	2915.37													
88.0	2914.69	2915.38													
90.0	2915.07	2915.40													
97.4	2915.37	2915.59													
100.2	2914.97	2915.62													
103.9	2914.94	2915.60													
106.3	2915.46	2915.63													
114.5	2915.56	2915.89													
116.4	2915.17	2915.89													
118.5	2915.47	2915.88													



Project Name	Laurel Springs - Baseline (2021) Profile
Reach	UT 3 (Sta 00+00 to 05+00)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
0.0	2929.37	2929.67													
8.7	2929.73	2929.78	2930.44												
26.6	2929.92	2930.13													
28.1	2929.55	2930.12													
33.3	2929.51	2930.11													
34.7	2929.99	2930.21													
48.7	2930.64	2930.67	2931.02												
51.1	2929.98	2930.67													
55.9	2929.98	2930.66													
58.2	2930.63	2930.86													
68.4	2931.00	2931.30	2931.55												
70.4	2930.58	2931.29													
78.5	2929.90	2931.28													
85.2	2930.68	2931.33													
88.2	2931.38	2931.54													
100.9	2931.84	2932.13													
102.0	2931.32	2932.11													
106.1	2931.53	2932.14													
111.1	2931.55	2932.26													
115.2	2932.29	2932.60													
123.3	2932.64	2932.96	2933.44												
124.7	2932.36	2933.00													
126.2	2932.35	2932.95													
127.4	2932.90	2933.02													
135.6	2933.46	2933.68													
136.8	2932.80	2933.68													
140.9	2933.05	2933.68													
141.6	2933.66	2933.73													



Project Name	Laurel Springs - Baseline (2021) Profile
Reach	UT 4 (Sta 00+00 to 01+50)
Feature	Profile
Date	10/25/21
Crew	Perkinson, Keith

2021 Baseline Survey				As needed				As needed				As needed			
Station	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**	**Station**	**Bed Elevation**	**Water Elevation**	**TOB**
0.0	2954.71	2954.97													
4.3	2954.82	2955.13													
10.3	2954.98	2955.19	2955.68												
13.6	2954.92	2955.19													
18.6	2954.59	2955.19													
25.2	2954.84	2955.20													
34.8	2954.85	2955.27													
38.0	2954.57	2955.30													
39.5	2954.80	2955.31													
41.4	2955.34	2955.40													
54.8	2955.32	2955.75	2956.25												
60.7	2955.00	2955.76													
63.4	2954.83	2955.73													
68.3	2955.39	2955.74													
75.6	2955.27	2955.74	2956.15												
81.8	2954.36	2955.75													
87.7	2954.75	2955.75													
90.7	2955.28	2955.74													
113.0	2955.36	2955.77	2956.14												

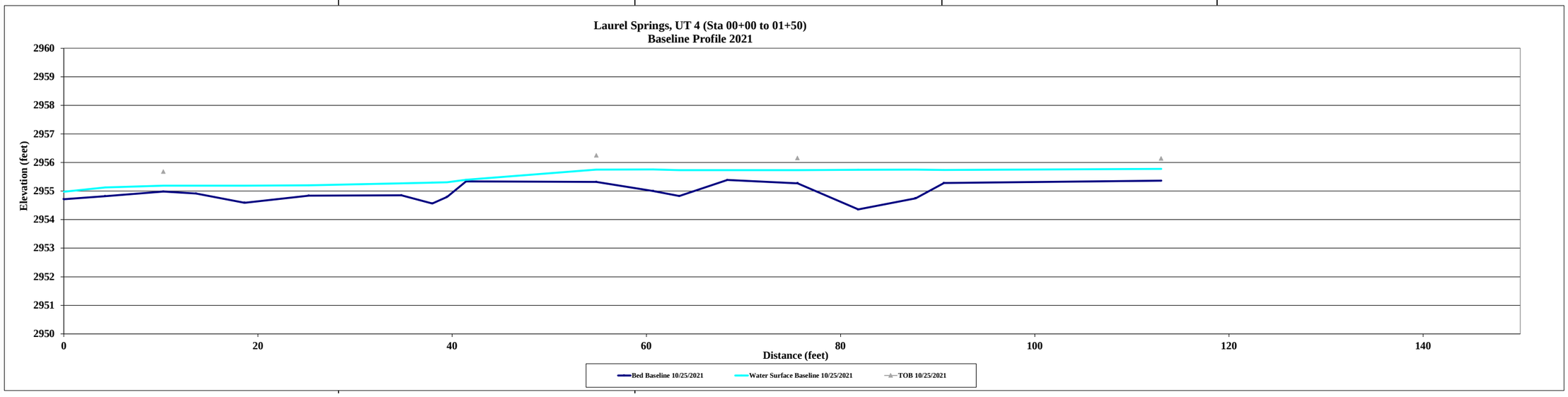


Table 9A. Baseline Stream Data Summary Laurel Springs - Fork Creek										
Parameter	**Pre-Existing Condition (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	11.7	17.2		25.1		15.1	17.4	12.3	19.7	3
Floodprone Width (ft)	18	100		100		50	150	200	200	3
Bankfull Mean Depth (ft)	0.8	1.1		1.6		1.1	1.3	0.6	0.9	3
Bankfull Max Depth (ft)	1.2	2.1		2.5		1.4	1.9	1.1	1.5	3
Bankfull Cross Sectional Area (ft^2)	18.9	18.9		18.9		7.3	18.9	7.1	14.6	3
Width/Depth Ratio	7.3	15.9		31.4		12	16	15.5	26.6	3
Entrenchment Ratio	0.9	5.1		8.5		3.3	8.6	10.2	16.2	3
Bank Height Ratio	**1**	**1.3**		**2.8**		**1**	**1.2**	**1.0**	**1.0**	3
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Cg					Ce		Ce		
Bankfull Discharge (cfs)	99					99		99		
Sinuosity (ft)	1.05					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.0258					0.0236		0.0236		
Other										

Table 9B. Baseline Stream Data Summary Laurel Springs - UT 1										
Parameter	**Pre-Existing Condition (applicaple)**					**Design**		**Monitoring Baseline (MY0)**		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	6.4	8.1		15.36		9.9	11.4	7.5	7.5	1
Floodprone Width (ft)	16	100		100		50	150	100.0	100.0	1
Bankfull Mean Depth (ft)	0.5	1		1.3		0.7	0.8	0.8	0.8	1
Bankfull Max Depth (ft)	1.4	2		2.4		0.9	1.2	1.2	1.2	1
Bankfull Cross Sectional Area (ft^2)	8.1	8.1		8.1		8.1	8.1	6.2	6.2	1
Width/Depth Ratio	4.9	8.2		30.6		12	16	8.9	8.9	1
Entrenchment Ratio	2	8.8		15.6		5.1	13.2	13.4	13.4	1
Bank Height Ratio	**1**	**1.5**		**2.1**		**1**	**1.2**	**1.0**	**1.0**	1
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Eg					Ce		Ce		
Bankfull Discharge (cfs)	39.5					39.5		39.5		
Sinuosity (ft)	1.01					1.15		1.15		
Water Surface Slope (Channel) (ft/ft)	0.0288					0.0253		0.0253		
Other										

Table 9C. Baseline Stream Data Summary
Laurel Springs - UT 2

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	4.4	5.8		9.8		4.6	5.4	6.7	7.2	2
Floodprone Width (ft)	11	17		22		20	30	75.0	75.0	2
Bankfull Mean Depth (ft)	0.2	0.4		0.4		0.3	0.4	0.3	1.1	2
Bankfull Max Depth (ft)	0.5	0.8		0.8		0.4	0.6	0.6	1.9	2
Bankfull Cross Sectional Area (ft^2)	1.8	1..8		1.8		1.8	1.8	2.1	7.7	2
Width/Depth Ratio	11	17.4		49		12	16	7.7	21.3	2
Entrenchment Ratio	2	2.3		4.5		4.3	5.6	10.5	11.2	2
Bank Height Ratio	**1**	**1.5**		**2**		**1**	**1.2**	**1.0**	**1.0**	2
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Bg					B		Bc		
Bankfull Discharge (cfs)	7.7					7.7		7.7		
Sinuosity (ft)	1.02					1.05		1.05		
Water Surface Slope (Channel) (ft/ft)	0.1026					0.0997		0.0997		
Other										

Table 9D. Baseline Stream Data Summary
Laurel Springs - UT 3

Parameter	Pre-Existing Condition (applicaple)					Design		Monitoring Baseline		
Riffle Only	Min	Mean	Med	Max	n	Min	Max	Min	Max	n
Bankfull Width (ft)	3	3.7		4.2		4.9	5.7	3.3	4.7	2
Floodprone Width (ft)	5.5	6		50		20	30	7.0	75.0	2
Bankfull Mean Depth (ft)	0.5	0.6		0.7		0.4	0.4	0.3	0.5	2
Bankfull Max Depth (ft)	0.7	0.8		1.4		0.5	0.6	0.4	0.8	2
Bankfull Cross Sectional Area (ft^2)	2	2		2		2	2	0.9	2.3	2
Width/Depth Ratio	4.3	6.2		8.4		12	16	9.7	12.1	2
Entrenchment Ratio	1.5	2		11.9		4.1	5.3	2.1	16.0	2
Bank Height Ratio	**1.4**	**1.7**		**2.6**		**1**	**1.2**	**1.0**	**1.0**	2
Max part size (mm) mobilized at bankfull										
Rosgen Classification	Bg					B		Bc		
Bankfull Discharge (cfs)	8.7					8.7		8.7		
Sinuosity (ft)	1.04					1.05		1.05		
Water Surface Slope (Channel) (ft/ft)	0.0954					0.0945		0.0945		
Other										

Table 10A. Monitoring Data - Cross Section Morphology Monitoring Summary
(Laurel Springs/ DMS:100122)

	UT 2 - Cross Section 1 (Pool)							UT 2 - Cross Section 2 (Riffle)							UT 2 - Cross Section 3 (Riffle)							UT 2 - Cross Section 4 (Pool)							Fork Cr - Cross Section 5 (Pool)						
	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	2915.09							2916.14							2944.80							2948.50							2921.99						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							1.00							1.00							1.00							1.00						
Thalweg Elevation	2914.69							2915.539							2942.9							2947.52							2919.647						
LTOB[2] Elevation	2915.09							2916.136							2944.80							2948.50							2921.994						
LTOB[2] Max Depth (ft)	0.40							0.60							1.88							0.99							2.35						
LTOB[2] Cross Sectional Area (ft[2])	1.1							2.1							7.7							2.7							24.5						
	Fork Cr - Cross Section 6 (Pool)							UT 3 - Cross Section 7 (Pool)							UT 3 - Cross Section 8 (Riffle)							UT 3 - Cross Section 9 (Pool)							UT 3 - Cross Section 10 (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	2922.56							2930.97							2932.44							2943.97							2946.02						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							1.00							1.00							1.00							1.00						
Thalweg Elevation	2921.22							2930.078							2931.64							2943.12							2945.65						
LTOB[2] Elevation	2922.56							2930.97							2932.44							2943.97							2946.02						
LTOB[2] Max Depth (ft)	1.34							0.89							0.81							0.85							0.37						
LTOB[2] Cross Sectional Area (ft[2])	14.4							1.9							2.3							1.8							0.9						
	Fork Cr - Cross Section 11 (Pool)																																			
	MY0	MY1	MY2	MY3	MY5	MY7	MY+																													
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	2936.55																																			
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00																																			
Thalweg Elevation	2934.57																																			
LTOB[2] Elevation	2936.55																																			
LTOB[2] Max Depth (ft)	1.98																																			
LTOB[2] Cross Sectional Area (ft[2])	19.2																																			

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
(Laurel Springs/ DMS:100122)

	Fork Cr - Cross Section 12 (Riffle)							UT 1 - Cross Section 13 (Riffle)							UT 1 - Cross Section 14 (Pool)							Fork Cr - Cross Section 15 (Riffle)							Fork Cr - Cross Section 16 (Pool)						
	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	2937.72							2943.24							2945.11							2954.23							2954.72						
Bank Height Ratio_Based on AB Bankfull[1] Area	1.00							1.00							1.00							1.00							1.00						
Thalweg Elevation	2936.23							2942.061							2943.9							2953.12							2953.19						
LTOB[2] Elevation	2937.72							2943.244							2945.11							2954.23							2954.72						
LTOB[2] Max Depth (ft)	1.49							1.18							1.23							1.10							1.53						
LTOB[2] Cross Sectional Area (ft[2])	13.5							6.2							4.6							7.1							7.4						
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])																																				
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

Groundwater Gauge Soil Profiles

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/ Coordinates: GW-1 35.992426, -81.982968

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-8	10YR 3/1	98	10YR 4/6	2	Loam
8-14	10YR 5/1	85	10YR 4/6	15	Silt Loam
14+	10YR 3/1	98	10YR 4/6	2	Loamy Sand

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-2 35.992716, -81.982503

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-8	10YR 4/1	90	10YR 5/6	5	Fine sandy loam
			10YR 3/3	5	
8-14	10YR 5/1	85	10YR 4/6	15	Silt loam
14+	10YR 3/1	98	10YR 4/6	2	Loamy sand

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-3 35.993052, -81.982629

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-6	10YR 4/1	90	10YR 5/1	10	Fine Sandy Loam
6-9	10YR 3/4	95	10YR 5/1	5	Fine Sandy Loam
9-18	10YR 5/1	90	10YR 5/6	10	Sandy Clay

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-4 35.993248, -81.981995

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-6	10YR 4/1	80	10YR 5/1	15	Fine Sandy Loam
			10yr 5/6	5	
6-15	10YR 4/1	90	10YR 6/1	10	Sand
15	10YR 5/1	100	-	-	Sandy Clay

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-5 35.993883, -81.981995

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-8	10YR 6/1	60	10YR 6/6	40	Saprolite
8-16	10YR 5/1	95	10YR 5/6	5	Sandy Clay Loam
16+	10YR 4/1	100	-	-	Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

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218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-6 35.993906, -81.982422

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-3	10YR 4/1	95	10YR 4/1	5	Sandy Loam
3-9	10YR 6/1	80	10YR 6/6	20	Fine Sandy Loam
9-18	10YR 5/1	95	10YR 4/6	5	Sandy Loam
18+	10 YR 3/1	100	-	-	Silt Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-7 35.994471, -81.98209

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-3	10YR 4/1	90	10YR 5/6	10	
3-18	10YR 6/1	60	10YR 6/6	40	Sand
18+	10YR 5/1	100	-	-	Loamy Sand

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-8 35.994956, -81.981771

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-10	10YR 5/6	100	-	-	Loam
10-18	10YR 5/1	95	10YR 5/6	5	Silt Loam
18+	10YR 5/1	95	10YR 5/6	5	Clay Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-9 35.995203, -81.982058

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-22+	10yr 4/1	95	10YR 5/6	5	Sandy Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-10 35.995626, -81.981828

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-15	10YR 4/3	40	10YR 3/1	40	Loam
			10YR 5/1	20	
15-22	10YR 4/2	80	10YR 5/6	20	Silty Clay Loam
22+	10YR 3/1	100	-	-	Silt Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-11 35.996909, -81.980872

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-6	10YR 4/1	95	10YR 4/6	5	Silt Clay
6-26	10YR 4/1	95	10YR 4/6	5	Sandy Clay Loam
26+	10YR 4/1	100	-	-	Silt Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-12 35.997065, -81.980544

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-20	10YR 4/1	80	10YR 5/4	20	Silty Loam
20+	10yr 3/1	100	-	-	Sandy Clay Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

AXIOM ENVIRONMENTAL, INC
218 Snow Avenue
Raleigh, North Carolina 27603
919-215-1693

SOIL BORING LOG

Project/Site: Laurel Springs 19-009

County, State: Avery, North Carolina

Sampling Point/
Coordinates: GW-13 35.997551, -81.980512

Investigator: G. Lewis

Notes:

Depth (inches)	Matrix		Mottling		Texture
	Color	%	Color	%	
0-8	10YR 2/1	95	10YR 5/6	5	Silt Loam
8-20	10YR 4/1	90	10YR 4/6	10	Silt Loam
20+	10YR 4/1	100	-	-	Silty Clay Loam

North Carolina Licensed Soil Scientist

Number: 1233

Signature: W Grant Lewis

Name/Print: W. Grant Lewis

Appendix E: Project Timeline and Contact Info

Table 11. Project Timeline
Table 12. Project Contacts

Table 11. Project Timeline

Activity or Deliverable	Data Collection Complete	Task Completion or Deliverable Submission
Technical Proposal (RFP No. 16-007725)	Mar-19	Mar-19
Institution Date (NCDMS Contract No. 100122)	NA	17-May-19
Mitigation Plan	Jul-20	11-Feb-21
Construction Plan (Grading) Completed	NA	18-Feb-21
Planting Completed	NA	13-Jan-22
As-built Survey Completed	25-Oct-20	Jun-22
MY-0 Baseline Report	Feb-22	Nov-22
MY1+ Monitoring Reports		
Remediation Items (e.g. beaver removal, supplements, repairs etc.)		
Encroachment		

Table 12. Project Contacts

Laurel Springs/100115	
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: Other Data

Fork Creek Culvert to Bridge Revision – Email with exchange with IRT members, May 19, 2021
Preconstruction Benthic Results
Preconstruction Benthic Habitat Assessment Data Forms

Ray Holz

From: Leslie, Andrea J <andrea.leslie@ncwildlife.org>
Sent: Wednesday, May 19, 2021 4:04 PM
To: Worth Creech; Todd Tugwell; Kim Browning; Davis, Erin B; Haywood, Casey M CIV (USA)
Cc: Wiesner, Paul; John Hamby; 'Grant Lewis'; Kenan Jernigan; Wilson, Travis W.; Stubbs, Rebecca; Alex Baldwin; Ray Holz
Subject: RE: [External] DMS 100122 Laurel Springs Site Crossing update

Much better solution, thanks Worth.

Andrea Leslie
Mountain Habitat Conservation Coordinator
NC Wildlife Resources Commission
645 Fish Hatchery Rd., Building B
Marion, NC 28752
828-400-4223 (cell)
www.ncwildlife.org

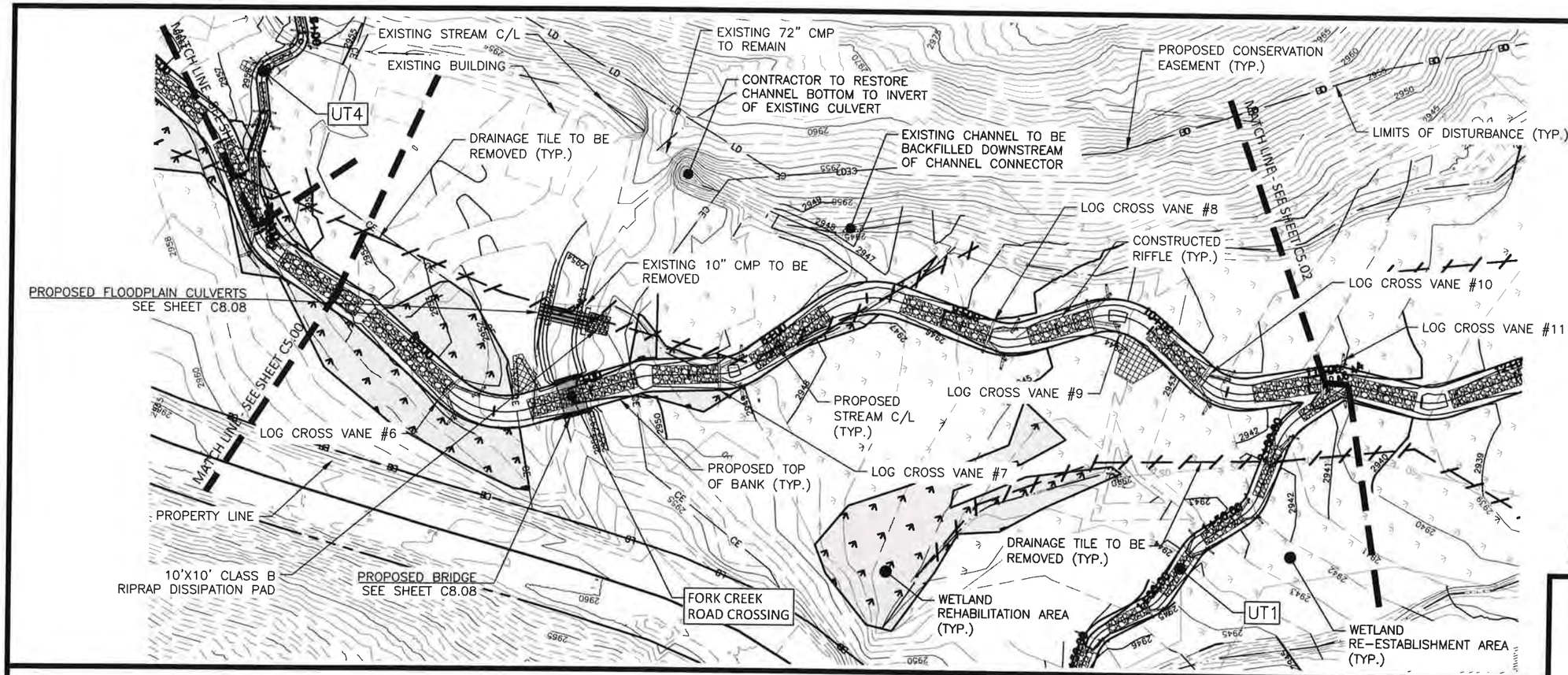
From: Worth Creech <worth@restorationsystems.com>
Sent: Wednesday, May 19, 2021 3:47 PM
To: Todd Tugwell <todd.tugwell@usace.army.mil>; Kim Browning <Kimberly.D.Browning@usace.army.mil>; Davis, Erin B <erin.davis@ncdenr.gov>; Leslie, Andrea J <andrea.leslie@ncwildlife.org>; Haywood, Casey M CIV (USA) <Casey.M.Haywood@usace.army.mil>
Cc: Wiesner, Paul <paul.wiesner@ncdenr.gov>; John Hamby <jhamby@restorationsystems.com>; 'Grant Lewis' <glewis@axiomenvironmental.org>; Kenan Jernigan <kjernigan@axiomenvironmental.org>; Wilson, Travis W. <travis.wilson@ncwildlife.org>; Stubbs, Rebecca <rstubbs@mcadamsco.com>; Alex Baldwin <abaldwin@restorationsystems.com>; Ray Holz <rholz@restorationsystems.com>
Subject: [External] DMS 100122 Laurel Springs Site Crossing update

Hello,

Through some discussions with our contractor, engineer and Travis Wilson, we have revised the main crossing on Fork Creek from a rather oversized aluminum arched crossing to an engineered bridge with flood plain pipes. The bridge eliminates the need to raise the driveway across the floodplain another 3' which would have created an artificial dam across the entire floodplain. The new crossing will raise the existing road elevations ½ to 1', and will include 4- 18" floodplain pipes. All flood modeling shows this is the best option. The stream will be fully restored under the bridge. We have updated the plan sheets for construction (attached). Updates are the Cover Sheet, C5.01, C6.04, C6.05, and C8.08. The bridge and footers are being designed by a separate NC Licensed structural engineer and will be presented in the as-built.

Please let me know if you have any questions, Worth

Worth Creech | Restoration Systems, LLC
1101 Haynes St. Suite 211 | Raleigh, NC 27604
office: 919.334.9114 | mobile: 919.389.3888
email: worth@restorationsystems.com



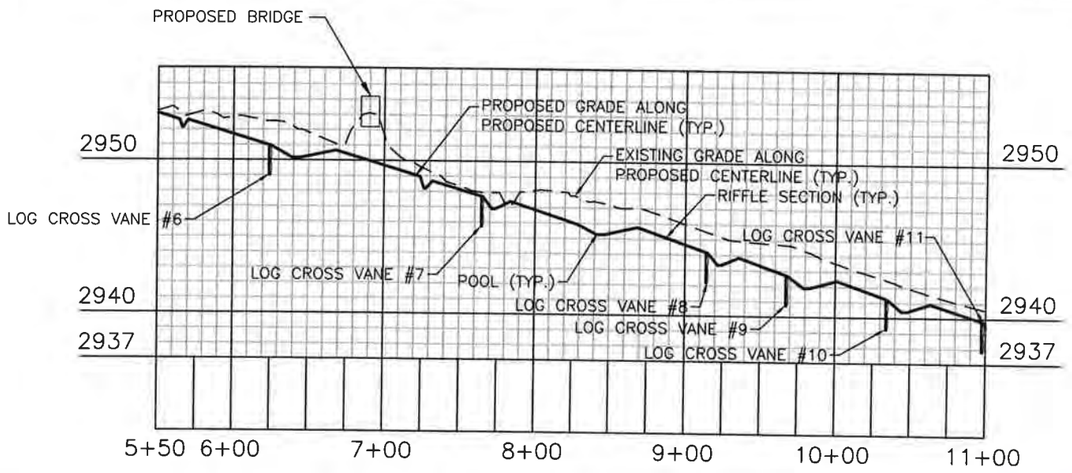
FORK CREEK STRUCTURE LOCATIONS		
STRUCTURE TYPE	STATION	ELEVATION
LOG CROSS VANE #6	6+24.77	2950.95
LOG CROSS VANE #7	7+65.04	2947.68
LOG CROSS VANE #8	9+14.60	2944.14
LOG CROSS VANE #9	9+67.85	2942.70
LOG CROSS VANE #10	10+34.80	2941.22
LOG CROSS VANE #11	10+98.31	2939.79

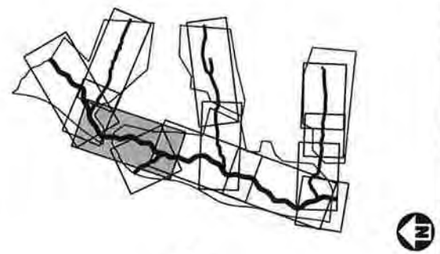
GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.

TOTAL DISTURBED AREA = 27.53 AC.





VICINITY MAP

1" = 1000'

SEAL 049073 ENGINEER REBECCA STUBBS 5.13.21

The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

LAUREL SPRINGS MITIGATION PLAN

CONSTRUCTION DRAWINGS

AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	RHW
SCALE	1"=60' / 1"=100'
DATE	05.14.2021

PLAN AND PROFILE

FORK CREEK

STA. 05+00 THRU STA. 11+00

C5.01

PROPOSED CONSERVATION EASEMENT

EXISTING CHANNEL TO BE FILLED

LIMITS OF DISTURBANCE

ROCK FLOODPLAIN OUTLET (TYP.)

CHANNEL PLUG (TYP.)

EXISTING CHANNEL TO BE REMAIN

MATCH LINE - SEE SHEET C6.05

UT4

FORK CREEK

STAGING AREA (TYP.)

PROPOSED CONSTRUCTION ENTRANCE

MARSH TREATMENT AREA (TYP.)

LITTLE BUCK HILL ROAD

PROPERTY LINE

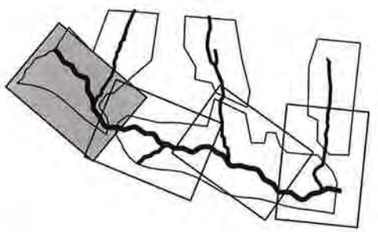
NOTE:
TWO ROWS OF SILT FENCE SHALL BE INSTALLED AROUND STAGING/STOCKPILE AREAS PER THE E&SC NOTES.

GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.

TOTAL DISTURBED AREA = 27.53 AC.



VICINITY MAP

1" = 1000'

NORTH CAROLINA PROFESSIONAL SEAL 049073 ENGINEER REBECCA STUBBS 5.17.21

MCADAMS

The John R. McAdams Company, Inc.
2905 Meridian Parkway
Durham, NC 27713

phone 919. 361. 5000
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LAUREL SPRINGS MITIGATION PLAN

CONSTRUCTION DRAWINGS

AVERY COUNTY, NORTH CAROLINA

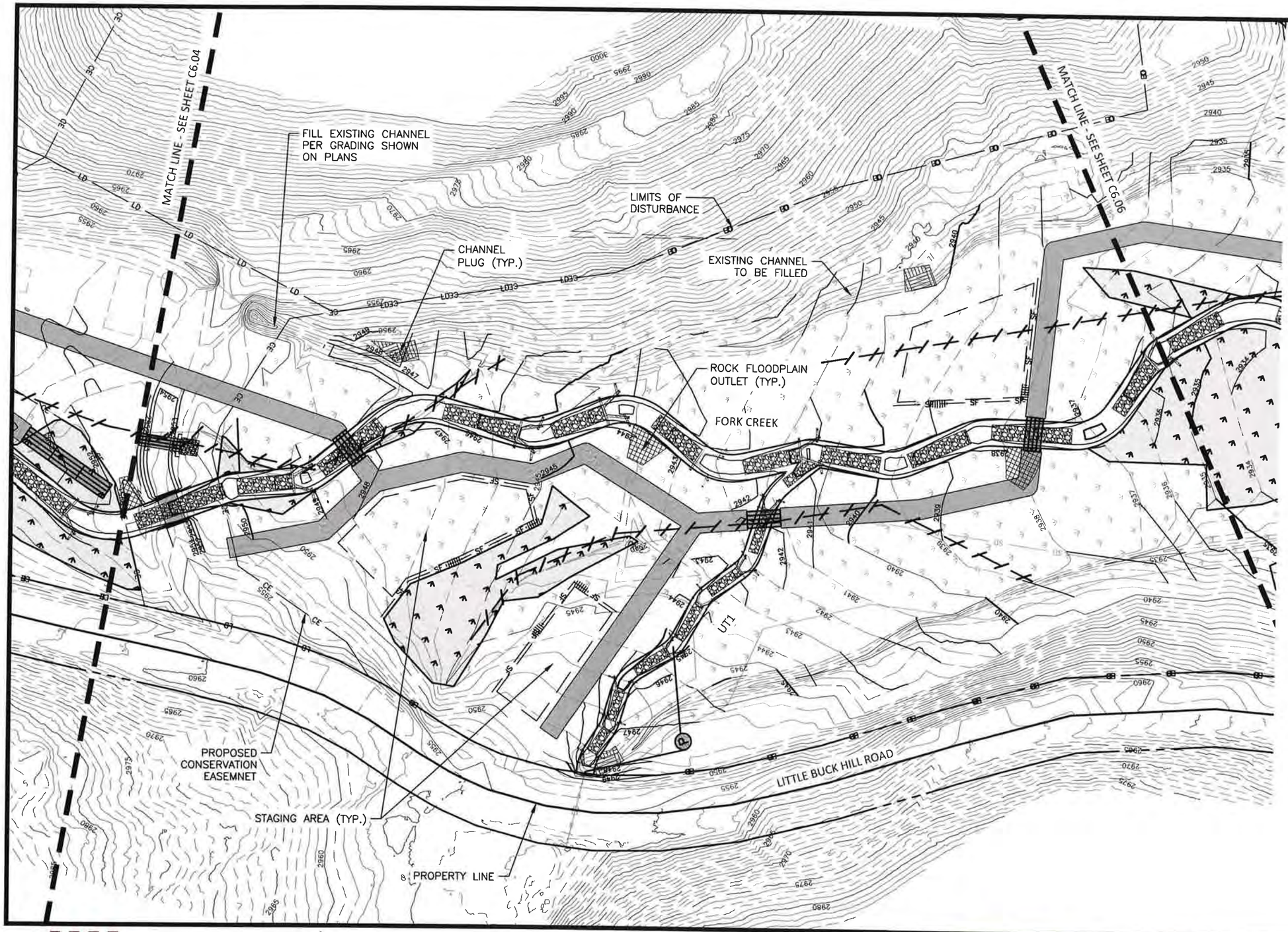
RESTORATION SYSTEMS | LLC

Axiom Environmental, Inc.

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-EC1
CHECKED BY	RAS
DRAWN BY	RHW
SCALE	1"=60'
DATE	05.14.2021

EROSION CONTROL PLAN

C6.04



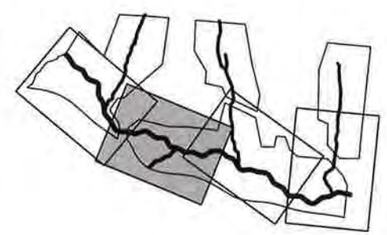
NOTE:
TWO ROWS OF SILT FENCE SHALL BE INSTALLED AROUND STAGING/STOCKPILE AREAS PER THE E&SC NOTES.

GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.

TOTAL DISTURBED AREA = 27.53 AC.



VICINITY MAP

1" = 1000'

NORTH CAROLINA PROFESSIONAL SEAL 049073 ENGINEER REBECCA STUBBS 5-17-21

McADAMS

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LAUREL SPRINGS MITIGATION PLAN

CONSTRUCTION DRAWINGS

AVERY COUNTY, NORTH CAROLINA

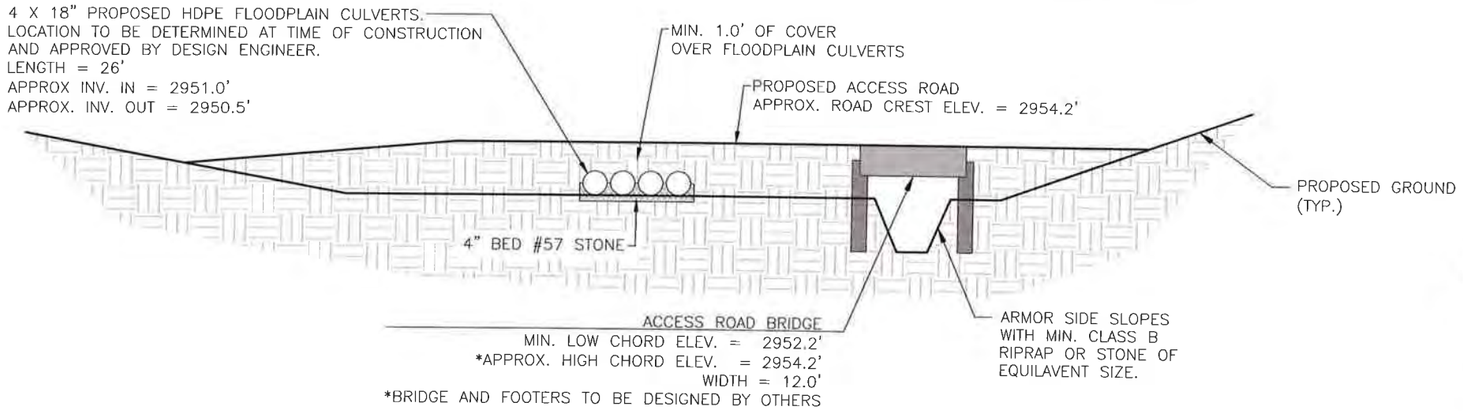
RESTORATION SYSTEMS | LLC

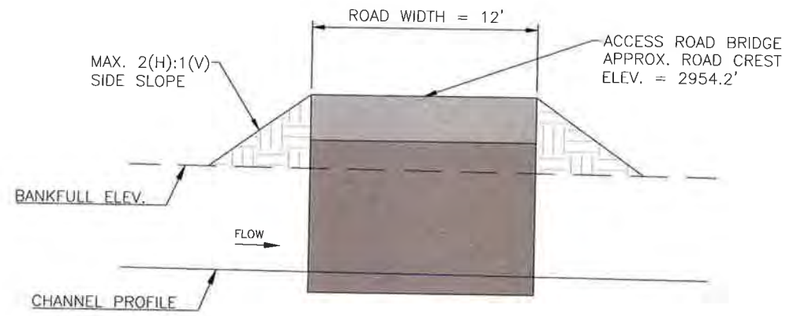
Axiom Environmental, Inc.

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-EC1
CHECKED BY	RAS
DRAWN BY	RHW
SCALE	1"=60'
DATE	05.14.2021

EROSION CONTROL PLAN

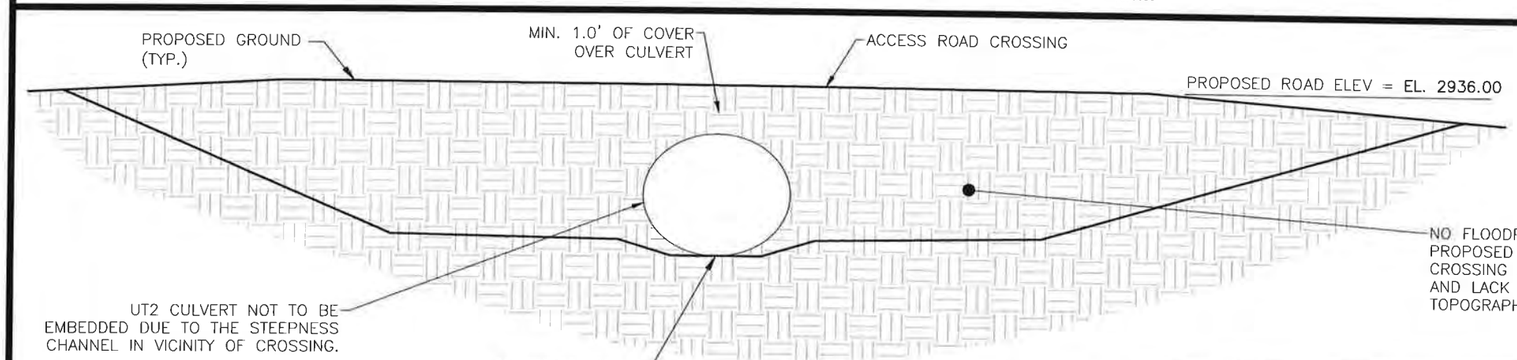
C6.05

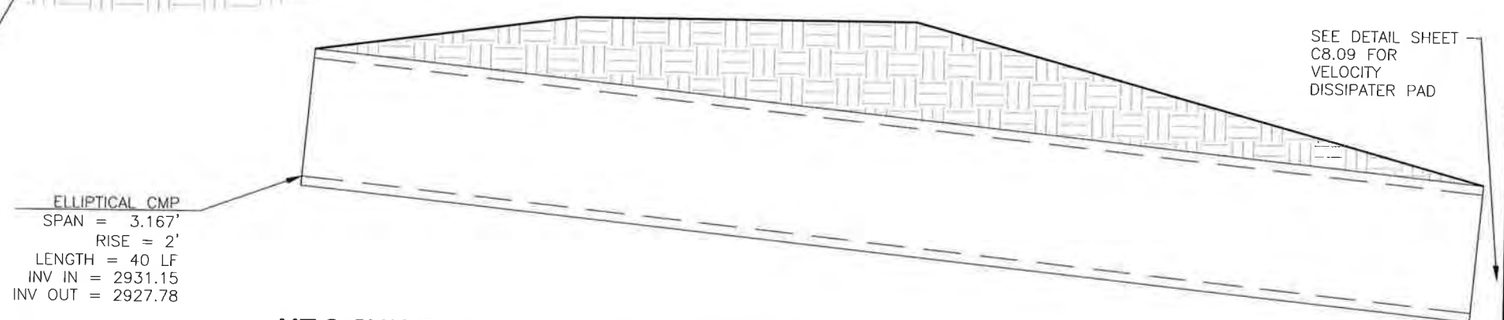




FORK CREEK BRIDGE CROSSING

N.T.S.





UT 2 CULVERT CROSSING

N.T.S.

GENERAL NOTES

1. INSTALL PERMANENT CROSSING WHILE CONSTRUCTION LOCATION WITHIN STREAM HAS BEEN DEWATERED.
2. IF UNABLE TO INSTALL WHILE LOCATION IS DRY, PLACE MATTING ON EXPOSED SOILS.
3. CONTRACTOR TO INSTALL CROSSING PIPE AND HEADWALL TO MANUFACTURER'S SPECIFICATION THIS INCLUDES SPECIFIED BEDDING AND BACKFILL REQUIREMENTS.
4. ALL MATERIAL TO BE PLACED AND COMPACTED WITHIN ROAD EMBANKMENT SHALL BE FREE FROM ROOTS, STUMPS, WOOD, STONES GREATER THAN 6", AND FROZEN OR OTHER OBJECTIONABLE MATERIAL.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049073 REBECCA STUBBS 5.17.21

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LAUREL SPRINGS MITIGATION PLAN

CONSTRUCTION DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-D1
CHECKED BY	RAS
DRAWN BY	RHW
SCALE	N.T.S.
DATE	05.14.2021

CULVERT DETAILS

C8.08

PAI ID NO			54834	54835	54836
STATION			UT-1	T-2	Fork Crk
DATE			7/10/2020	7/10/2020	7/10/2020
SPECIES	T.V.	F.F.G.			
MOLLUSCA					
Gastropoda					
Mesogastropoda					
Pleuroceridae	2.7				
Elimia sp.	2.7	SC			1
ARTHROPODA					
Insecta					
Ephemeroptera					
Baetidae		CG			
Baetis pluto	3.4		3		4
Baetis tricaudatus	1.5	CG	3		11
Labiobaetis frondalis	4.6				1
Plauditus sp.		CG	6		7
Ephemerellidae		SC			
Drunella tuberculata	0	SC	27		24
Ephemerella sp.	2.1	SC	1		
Eurylophella sp.	4	SC			2
Teloganopsis deficiens	2.6	SC			8
Heptageniidae		SC			
Heptagenia julia	1.9	SC	2		1
Odonata					
Cordulegastridae		P			
Cordulegaster sp.	5.7	P		8	
Plecoptera					
Leuctridae		SH			
Leuctra sp.	1.5	SH	2	2	3
Peltoperlidae		SH			
Peltoperla sp.				1	2
Perlodidae		P			
Isoperla sp.	3.2	P	2		
Malirekus hastatus	1	P			2
Trichoptera					
Hydropsychidae		FC			
Diplectrona modesta	2.3	FC		1	
Hydropsyche sp.		FC	1		1
Lepidostomatidae		SH			
Lepidostoma sp.	1	FC	2	1	
Philopotamidae		FC			
Dolophilodes distinctus	1	FC	1		1
Rhyacophilidae		P			
Rhyacophila fuscula	1.6	P			1
Coleoptera					
Dryopidae					
Helichus basalis	*0.5*	SC	1		
Elmidae		CG			
Optioservus ovalis	*2.1*	SC	1		
Optioservus sp.	*2.1*	SC			4
Stenelmis crenata	*7.8*		1		
Diptera					
Chironomidae					
Cricotopus sp.					1
Eukiefferiella claripennis gp.	*6.2*	CG			1
Paralauterborniella nigrohalteralis	*4.9*	CG		1	
Parametriocnemus sp.	*3.9*	CG			1
Polypedilum aviceps	*3.6*	SH			1
Tanytarsus sp.	*6.6*	FC	1		
Dixidae		CG			
Dixa sp.	*2.5*	CG		1	1
Simuliidae		FC			
Simulium sp.	*4.9*	FC			3
Simulium venustum complex	*7.3*			2	
Tabanidae		PI		1	
Tipulidae		SH			
Hexatoma sp.	*3.5*	P	1		1
TOTAL NO. OF ORGANISMS			**55**	**18**	**82**
TOTAL NO. OF TAXA			**16**	**9**	**23**
EPT TAXA			**11**	**4**	**14**
BIOTIC INDEX ASSIGNED VALUES			**1.70**	**4.07**	**2.02**

19-009

Laurel Springs Fork Creek Precon Benthics

3/06 Revision 6

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Biological Assessment Unit, DWQ **TOTAL SCORE**

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream Fork Creek Location/road: Little Buck Hill (Road Name) County Avery

Date 7/10/20 **CC#** 06010108 Basin French Broad Subbasin 04-03-06

Observer(s) AXE Type of Study: ☐ Fish ☑ Benthos ☐ Basinwide ☐ Special Study (Describe) _____

Latitude 35.993948 Longitude -81.982281 Ecoregion: ☑ MT ☐ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature ___ °C DO ___ mg/l Conductivity (corr.) ___ µS/cm pH ___

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: 55 %Forest 5 %Residential 40 %Active Pasture ___ % Active Crops
___ %Fallow Fields ___ % Commercial ___ %Industrial ___ %Other - Describe: ___

Watershed land use : ☑ Forest ☑ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 2 Channel (at top of bank) 2.5 **Stream Depth:** (m) Avg 1 Max ___
☑ Width variable ☐ Large river >25m wide
Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 1

Bank Angle: 70 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)
☐ Channelized Ditch
☑ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☐ Channel filled in with sediment
☐ Recent overbank deposits ☑ Bar development ☐ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☑ N ☑ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions : ☐ High ☑ Normal ☐ Low
Turbidity: ☑ Clear ☑ Slightly Turbid ☐ Turbid ☐ Tannic ☑ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☑ **YES** ☐ **NO Details** _____
Channel Flow Status
Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☐
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☑
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☐
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: warm & humid **Photos:** ☑ N ☐ Y ☐ Digital ☐ 35mm

Remarks: Pre construction sampling for proposed stream and wetland restoration

CSFC

I. Channel Modification

	Score
A. channel natural, frequent bends	5
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	(2)
E. no bends, completely channelized or rip rapped or gabioned, etc	0

☑ Evidence of dredging ☑ Evidence of desnagging=no large woody debris in stream ☐ Banks of uniform shape/height

Remarks _____ Subtotal 2

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as Rare, Common, or Abundant.

C **Rocks** R **Macrophytes** F **Sticks and leafpacks** R **Snags and logs** C **Undercut banks or root mats**

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	20	16	12	8
3 types present	19	15	11	7
2 types present	18	(14)	10	6
1 type present	17	13	9	5
No types present	0			

☑ No woody vegetation in riparian zone Remarks _____ Subtotal 14

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

	Score
A. substrate with good mix of gravel, cobble and boulders	
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	(12)
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	11
3. embeddedness 40-80%	6
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	3
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks _____ Subtotal 12

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

	Score
A. Pools present	
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	(10)
b. pools about the same size (indicates pools filling in)	8
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	6
b. pools about the same size	4
B. Pools absent	0

Subtotal 10

☑ Pool bottom boulder-cobble=hard ☐ Bottom sandy-sink as you walk ☐ Silt bottom ☐ Some pools over wader depth

Remarks _____

Page Total 38

CSFE

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	(16)	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent.....	0	

Channel Slope: ☑Typical for area ☑Steep=fast flow ☐Low=like a coastal stream Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion..	7	7
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	(2)	(2)
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0
		Total 4

Remarks _____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	2
E. **No canopy** and no shading.....	(0)

Remarks _____ Subtotal 0

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

FACE UPSTREAM Dominant vegetation: ☐ Trees ☐ Shrubs ☑ Grasses ☐ Weeds/old field ☐Exotics (kudzu, etc)	Lft. Bank Score	Rt. Bank Score
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	(5)	(5)
2. width 12-18 meters.....	4	4
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0
		Total 10

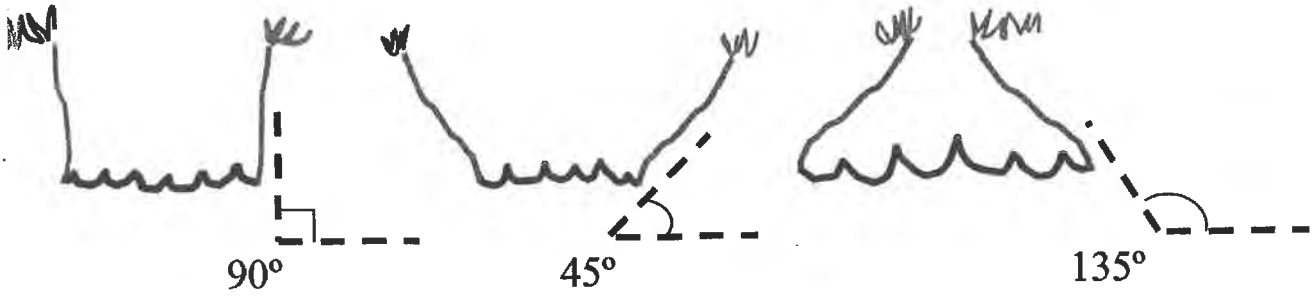
Remarks _____

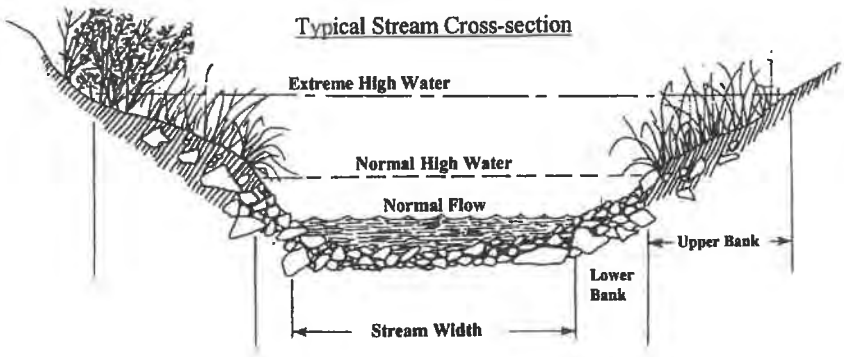
Page Total 14

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 52

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments:

19-009

Laurel Springs UT 1

3/06 Revision 6

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Biological Assessment Unit, DWQ **TOTAL SCORE** 61

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream UT 1 Location/road: Little Buck Mill (Road Name) County Ashe

Date 7/10/20 **CC#** 06010108 Basin French Broad Subbasin 04-03-06

Observer(s) AYE Type of Study: ☐ Fish ☑ Benthos ☐ Basinwide ☐ Special Study (Describe)

Latitude Longitude Ecoregion: ☑ MT ☐ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature °C DO mg/l Conductivity (corr.) µS/cm pH

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: 40 %Forest 5 %Residential 55 %Active Pasture % Active Crops
%Fallow Fields % Commercial %Industrial %Other - Describe:

Watershed land use : ☐ Forest ☑ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 1.1 Channel (at top of bank) 1.2 **Stream Depth:** (m) Avg 1.2 Max 1.5
☐ Width variable ☐ Large river >25m wide

Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 1.5

Bank Angle: 90 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)

☐ Channelized Ditch
☑ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☐ Channel filled in with sediment
☐ Recent overbank deposits ☐ Bar development ☐ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☑ N ☐ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions: ☐ High ☑ Normal ☐ Low
Turbidity: ☐ Clear ☐ Slightly Turbid ☐ Turbid ☐ Tannic ☑ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☑ **YES** ☐ **NO Details**

Channel Flow Status

Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☑
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☐
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☐
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: hot + humid **Photos:** ☑ N ☐ Y ☐ Digital ☐ 35mm

Remarks:

LSQT

I. Channel Modification

	Score
A. channel natural, frequent bends	5
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	(2)
E. no bends, completely channelized or rip rapped or gabioned, etc.	0

☑ Evidence of dredging ☑ Evidence of desnagging=no large woody debris in stream ☐ Banks of uniform shape/height

Remarks _____ Subtotal 2

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as Rare, Common, or Abundant.

A **Rocks** R **Macrophytes** R **Sticks and leafpacks** R **Snags and logs** C **Undercut banks or root mats**

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	20	16	12	8
3 types present	19	15	11	7
2 types present	18	(14)	10	6
1 type present	17	13	9	5
No types present	0			

☐ No woody vegetation in riparian zone Remarks _____ Subtotal 14

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

	Score
A. substrate with good mix of gravel, cobble and boulders	
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	12
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	(11)
3. embeddedness 40-80%	6
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	3
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks _____ Subtotal 11

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

	Score
A. Pools present	
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	10
b. pools about the same size (indicates pools filling in)	8
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	(6)
b. pools about the same size	4
B. Pools absent	0

Subtotal 6

☑ Pool bottom boulder-cobble=hard ☐ Bottom sandy-sink as you walk ☐ Silt bottom ☐ Some pools over wader depth

Remarks _____

Page Total 33

CSUT1

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	16	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent.....	0	

Channel Slope: ☑Typical for area ☑Steep=fast flow ☐Low=like a coastal stream Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM

	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion..	7	7
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	2	2
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0

Total 4

Remarks _____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	2
E. **No canopy** and no shading.....	0

Remarks _____ Subtotal 0

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

FACE UPSTREAM

Dominant vegetation: ☐ Trees ☐ Shrubs ☑ Grasses ☐ Weeds/old field ☐Exotics (kudzu, etc)

	Lft. Bank Score	Rt. Bank Score
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	5	5
2. width 12-18 meters.....	4	4
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0

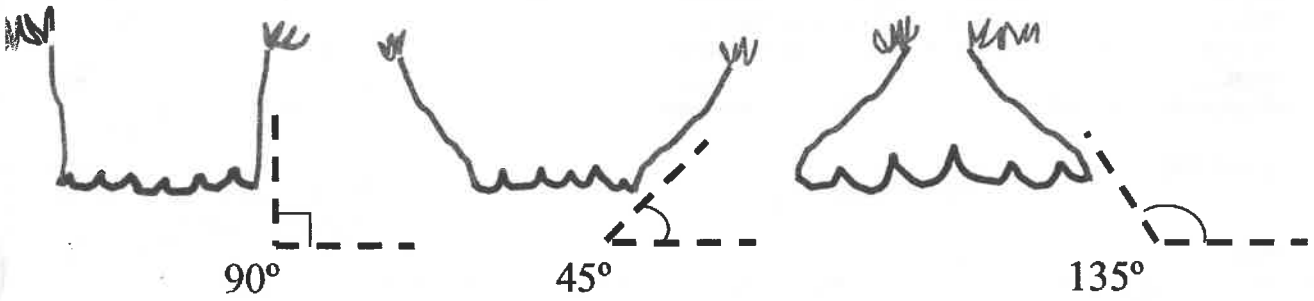
Remarks _____ Total 8

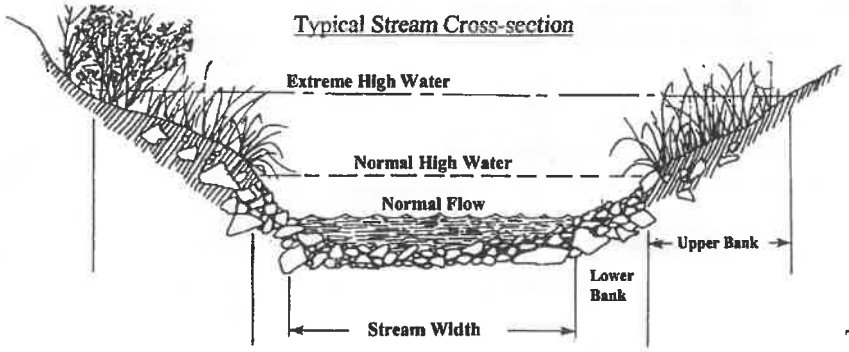
Page Total 28

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 61

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments: _____

_____

_____

_____

_____

19-009 Laurel Springs UT2

3/06 Revision 6

Habitat Assessment Field Data Sheet
Mountain/ Piedmont Streams

Biological Assessment Unit, DWQ **TOTAL SCORE** 55

Directions for use: The observer is to survey a **minimum of 100 meters with 200 meters preferred** of stream, preferably in an **upstream** direction starting above the bridge pool and the road right-of-way. The segment which is assessed should represent average stream conditions. To perform a proper habitat evaluation the observer needs to get into the stream. To complete the form, select the description which best fits the observed habitats and then circle the score. If the observed habitat falls in between two descriptions, select an intermediate score. A final habitat score is determined by adding the results from the different metrics.

Stream UT2 Location/road: Little Buck Mtn (Road Name) County Avery

Date 7/10/20 **CC#** 06010108 Basin French Broad Subbasin 04-03-06

Observer(s) AXE Type of Study: ☐ Fish ☑ Benthos ☐ Basinwide ☐ Special Study (Describe)

Latitude 35.992395 Longitude -81.981569 Ecoregion: ☑ MT ☐ P ☐ Slate Belt ☐ Triassic Basin

Water Quality: Temperature — °C DO — mg/l Conductivity (corr.) — µS/cm pH —

Physical Characterization: Visible land use refers to immediate area that you can see from sampling location - include what you estimate driving thru the watershed in watershed land use.

Visible Land Use: ✓ %Forest ✓ %Residential ✓ %Active Pasture ____% Active Crops
____%Fallow Fields ____% Commercial ____%Industrial ____%Other - Describe:

Watershed land use : ☑ Forest ☑ Agriculture ☐ Urban ☐ Animal operations upstream

Width: (meters) Stream 0.4 Channel (at top of bank) 0.4 **Stream Depth:** (m) Avg 0.2 Max 0.3
☑ Width variable ☐ Large river >25m wide

Bank Height (from deepest part of riffle to top of bank-first flat surface you stand on): (m) 0.4

Bank Angle: 70 ° or ☐ NA (Vertical is 90°, horizontal is 0°. Angles > 90° indicate slope is towards mid-channel, < 90° indicate slope is away from channel. NA if bank is too low for bank angle to matter.)

☐ Channelized Ditch
☐ Deeply incised-steep, straight banks ☐ Both banks undercut at bend ☑ Channel filled in with sediment
☐ Recent overbank deposits ☐ Bar development ☑ Buried structures ☐ Exposed bedrock
☐ Excessive periphyton growth ☐ Heavy filamentous algae growth ☐ Green tinge ☐ Sewage smell
Manmade Stabilization: ☐ N ☑ Y: ☐ Rip-rap, cement, gabions ☐ Sediment/grade-control structure ☐ Berm/levee
Flow conditions : ☐ High ☑ Normal ☐ Low
Turbidity: ☐ Clear ☑ Slightly Turbid ☐ Turbid ☑ Tannic ☐ Milky ☐ Colored (from dyes)
Good potential for Wetlands Restoration Project?? ☑ **YES** ☐ **NO Details** Grassy swale in pasture

Channel Flow Status
Useful especially under abnormal or low flow conditions.

A. Water reaches base of both lower banks, minimal channel substrate exposed	☐
B. Water fills >75% of available channel, or <25% of channel substrate is exposed	☑
C. Water fills 25-75% of available channel, many logs/snags exposed	☐
D. Root mats out of water	☐
E. Very little water in channel, mostly present as standing pools	☐

Weather Conditions: Clear + hot **Photos:** ☑ N ☐ Y ☐ Digital ☐ 35mm

Remarks:

CS 472

I. Channel Modification

	Score
A. channel natural, frequent bends	5
B. channel natural, infrequent bends (channelization could be old)	4
C. some channelization present	3
D. more extensive channelization, >40% of stream disrupted	(2)
E. no bends, completely channelized or rip rapped or gabioned, etc	0

☑ Evidence of dredging ☐ Evidence of desnagging=no large woody debris in stream ☐ Banks of uniform shape/height

Remarks _____ Subtotal 2

II. Instream Habitat: Consider the percentage of the reach that is favorable for benthos colonization or fish cover. If >70% of the reach is rocks, 1 type is present, circle the score of 17. Definition: leafpacks consist of older leaves that are packed together and have begun to decay (not piles of leaves in pool areas). Mark as Rare, Common, or Abundant.

R Rocks R Macrophytes R Sticks and leafpacks R Snags and logs R Undercut banks or root mats

AMOUNT OF REACH FAVORABLE FOR COLONIZATION OR COVER

	>70% Score	40-70% Score	20-40% Score	<20% Score
4 or 5 types present	20	16	12	8
3 types present	19	15	11	7
2 types present	18	14	10	6
1 type present	17	13	9	(5)
No types present	0			

☑ No woody vegetation in riparian zone Remarks _____ Subtotal 5

III. Bottom Substrate (silt, sand, detritus, gravel, cobble, boulder) Look at entire reach for substrate scoring, but only look at riffle for embeddedness, and use rocks from all parts of riffle-look for "mud line" or difficulty extracting rocks.

	Score
A. substrate with good mix of gravel, cobble and boulders	
1. embeddedness <20% (very little sand, usually only behind large boulders)	15
2. embeddedness 20-40%	12
3. embeddedness 40-80%	8
4. embeddedness >80%	3
B. substrate gravel and cobble	
1. embeddedness <20%	14
2. embeddedness 20-40%	11
3. embeddedness 40-80%	6
4. embeddedness >80%	2
C. substrate mostly gravel	
1. embeddedness <50%	8
2. embeddedness >50%	4
D. substrate homogeneous	
1. substrate nearly all bedrock	3
2. substrate nearly all sand	(3)
3. substrate nearly all detritus	2
4. substrate nearly all silt/ clay	1

Remarks _____ Subtotal 3

IV. Pool Variety Pools are areas of deeper than average maximum depths with little or no surface turbulence. Water velocities associated with pools are always slow. Pools may take the form of "pocket water", small pools behind boulders or obstructions, in large high gradient streams, or side eddies.

	Score
A. Pools present	
1. Pools Frequent (>30% of 200m area surveyed)	
a. variety of pool sizes	10
b. pools about the same size (indicates pools filling in)	8
2. Pools Infrequent (<30% of the 200m area surveyed)	
a. variety of pool sizes	6
b. pools about the same size	(4)
B. Pools absent	0

Subtotal 4

☐ Pool bottom boulder-cobble=hard ☑ Bottom sandy-sink as you walk ☐ Silt bottom ☐ Some pools over wader depth

Remarks _____

Page Total 14

LS_UT2

V. Riffle Habitats

Definition: Riffle is area of reaeration-can be debris dam, or narrow channel area.

	Riffles **Frequent** Score	Riffles **Infrequent** Score
A. well defined riffle and run, riffle as wide as stream and extends 2X width of stream....	(16)	12
B. riffle as wide as stream but riffle length is not 2X stream width	14	7
C. riffle not as wide as stream and riffle length is not 2X stream width	10	3
D. riffles absent.....	0	

Channel Slope: ☐Typical for area ☑Steep=fast flow ☐Low=like a coastal stream

Subtotal 16

VI. Bank Stability and Vegetation

FACE UPSTREAM	Left Bank Score	Rt. Bank Score
A. Banks stable		
1. little evidence of erosion or bank failure(except outside of bends), little potential for erosion..	7	7
B. Erosion areas present		
1. diverse **trees**, shrubs, grass; plants healthy with good root systems.....	6	6
2. few trees or small trees and **shrubs**; vegetation appears generally healthy.....	5	5
3. sparse **mixed** vegetation; plant types and conditions suggest poorer soil binding.....	3	3
4. mostly **grasses**, few if any trees and shrubs, high erosion and failure potential at high flow..	(2)	(2)
5. little or no bank vegetation, mass erosion and bank failure evident.....	0	0

Total 4

Remarks _____

VII. Light Penetration Canopy is defined as tree or vegetative cover directly above the stream's surface. Canopy would block out sunlight when the sun is directly overhead. Note shading from mountains, but not use to score this metric.

	Score
A. Stream with **good** canopy with some breaks for light penetration	10
B. Stream with **full canopy** - breaks for light penetration absent.....	8
C. Stream with **partial** canopy - sunlight and shading are essentially equal.....	7
D. Stream with **minimal** canopy - full sun in all but a few areas.....	(2)
E. **No canopy** and no shading.....	0

Remarks _____ Subtotal 2

VIII. Riparian Vegetative Zone Width

Definition: Riparian zone for this form is area of natural vegetation adjacent to stream (can go beyond floodplain). Definition: A break in the riparian zone is any place on the stream banks which allows sediment or pollutants to directly enter the stream, such as paths down to stream, storm drains, uprooted trees, otter slides, etc.

FACE UPSTREAM

Dominant vegetation: ☐ Trees ☐ Shrubs ☐ Grasses ☑ Weeds/old field ☐Exotics (kudzu, etc)

	Lft. Bank Score	Rt. Bank Score
A. Riparian zone **intact** (no breaks)		
1. width > 18 meters.....	5	(5)
2. width 12-18 meters.....	(4)	4
3. width 6-12 meters.....	3	3
4. width < 6 meters.....	2	2
B. Riparian zone **not intact** (breaks)		
1. breaks rare		
a. width > 18 meters.....	4	4
b. width 12-18 meters.....	3	3
c. width 6-12 meters.....	2	2
d. width < 6 meters.....	1	1
2. breaks common		
a. width > 18 meters.....	3	3
b. width 12-18 meters.....	2	2
c. width 6-12 meters.....	1	1
d. width < 6 meters.....	0	0

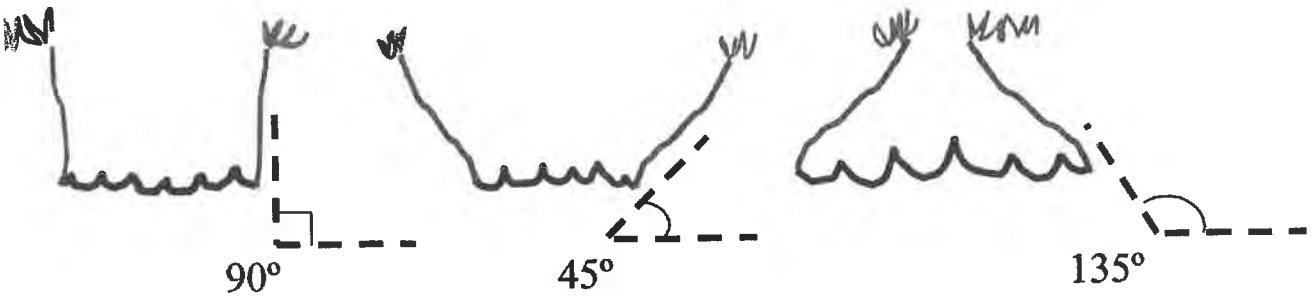
Remarks _____ Total 19

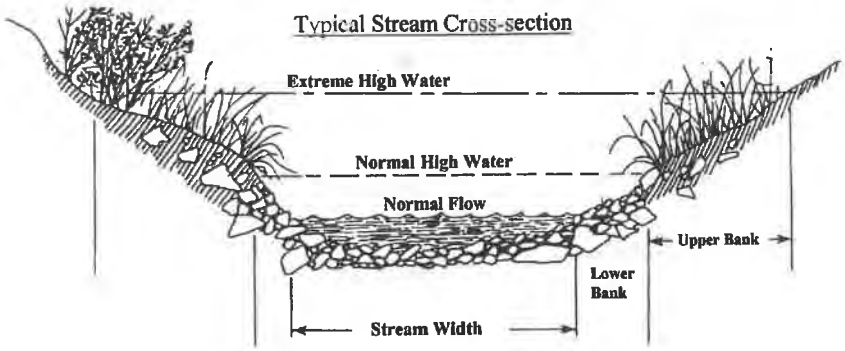
Page Total 41

☐ Disclaimer-form filled out, but score doesn't match subjective opinion-atypical stream. **TOTAL SCORE** 55

Supplement for Habitat Assessment Field Data Sheet

Diagram to determine bank angle:





This side is 45° bank angle.

Site Sketch:

Other comments:

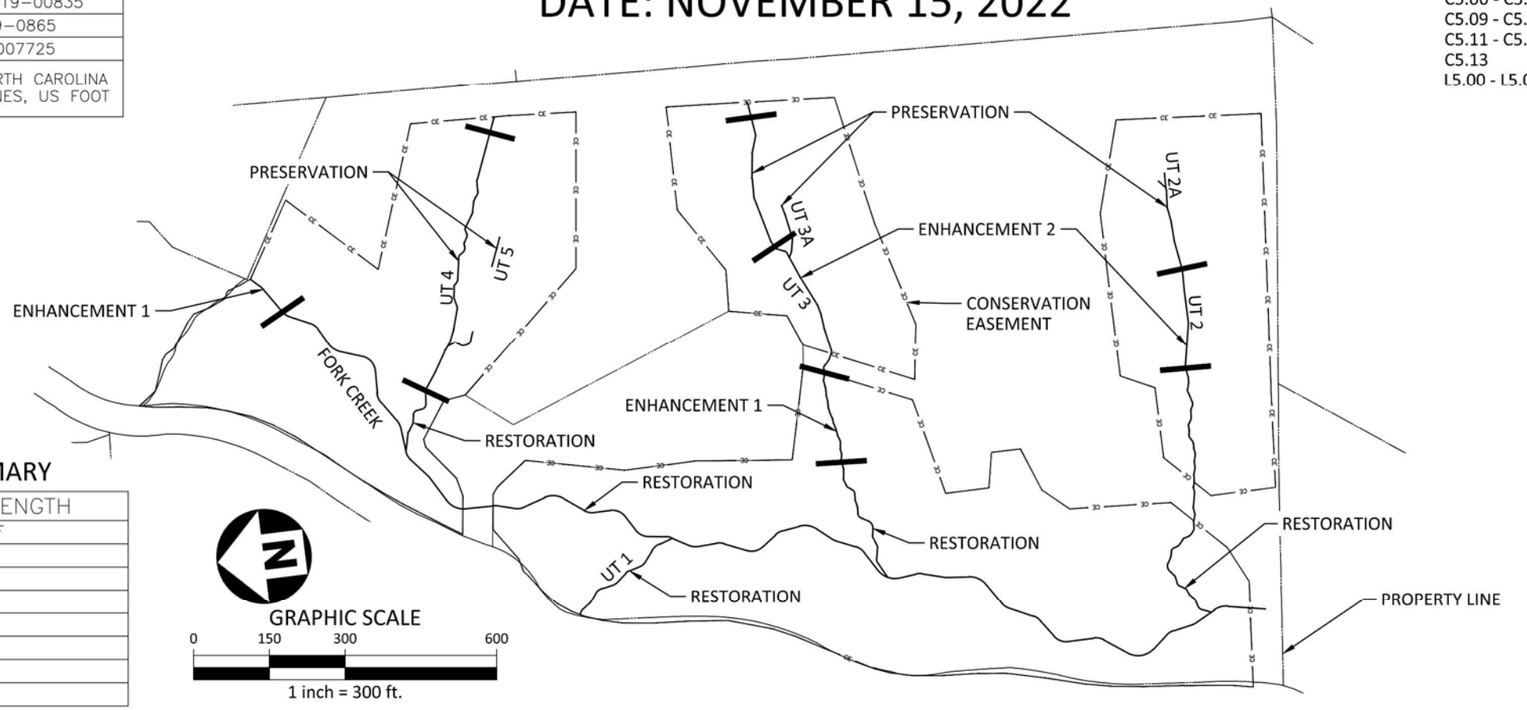
Appendix G: Record Drawings (As-Built Survey)

NC DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF MITIGATION SERVICES

AS-BUILT DRAWINGS
LAUREL SPRINGS SITE
AVERY COUNTY
DATE: NOVEMBER 15, 2022

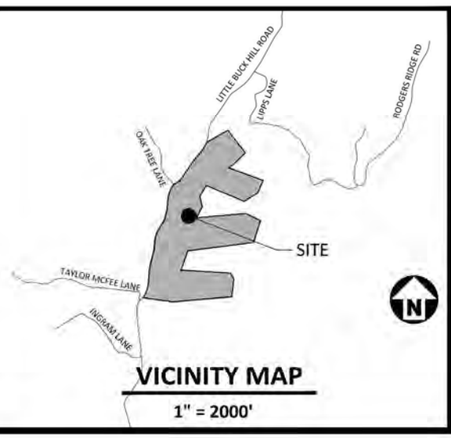
SITE DATA TABLE	
RIVER BASIN	FRENCH BROAD
8-DIGIT HUC	6010108
TOTAL DISTURBED AREA	27.53 AC
DMS PROJECT ID NO.	100122
FULL DELIVERY CONTRACT NO.	7890
USACE ACTION ID NO.	SAW-2019-00835
DWR PROJECT NO.	2019-0865
RFP NO.	16-007725
COORDINATE SYSTEM	NAD83 NORTH CAROLINA STATE PLANES, US FOOT

SHEET INDEX



AS-BUILT MITIGATION SUMMARY

TRIBUTARY	AS-BUILT LENGTH
FORK CREEK	2,334 LF
UT1	235 LF
UT2	851 LF
UT2A	25 LF
UT3	921 LF
UT3A	103 LF
UT4	657 LF
UT5	127 LF



RESTORATION LEVEL	STREAM (LF)	RIPARIAN WETLAND (AC)	NON-RIPARIAN WETLAND (AC)
RESTORATION	3,286	–	–
ENHANCEMENT I	274	–	–
ENHANCEMENT II	449	–	–
PRESERVATION	1,244	0.198*	–
REESTABLISHMENT	–	7.656	–
REHABILITATION	–	1.845*	–
ENHANCEMENT	–	0.148*	–
TOTALS	5,253	9.847	–

*TOTAL STREAM MITIGATION UNITS INCLUDE UNITS FROM THE WIDER BUFFER TOOL
*WETLAND REHABILITATION, ENHANCEMENT, PRESERVATION, AND SOME RE-ESTABLISMENT ARE NOT CREDIT GENERATING.

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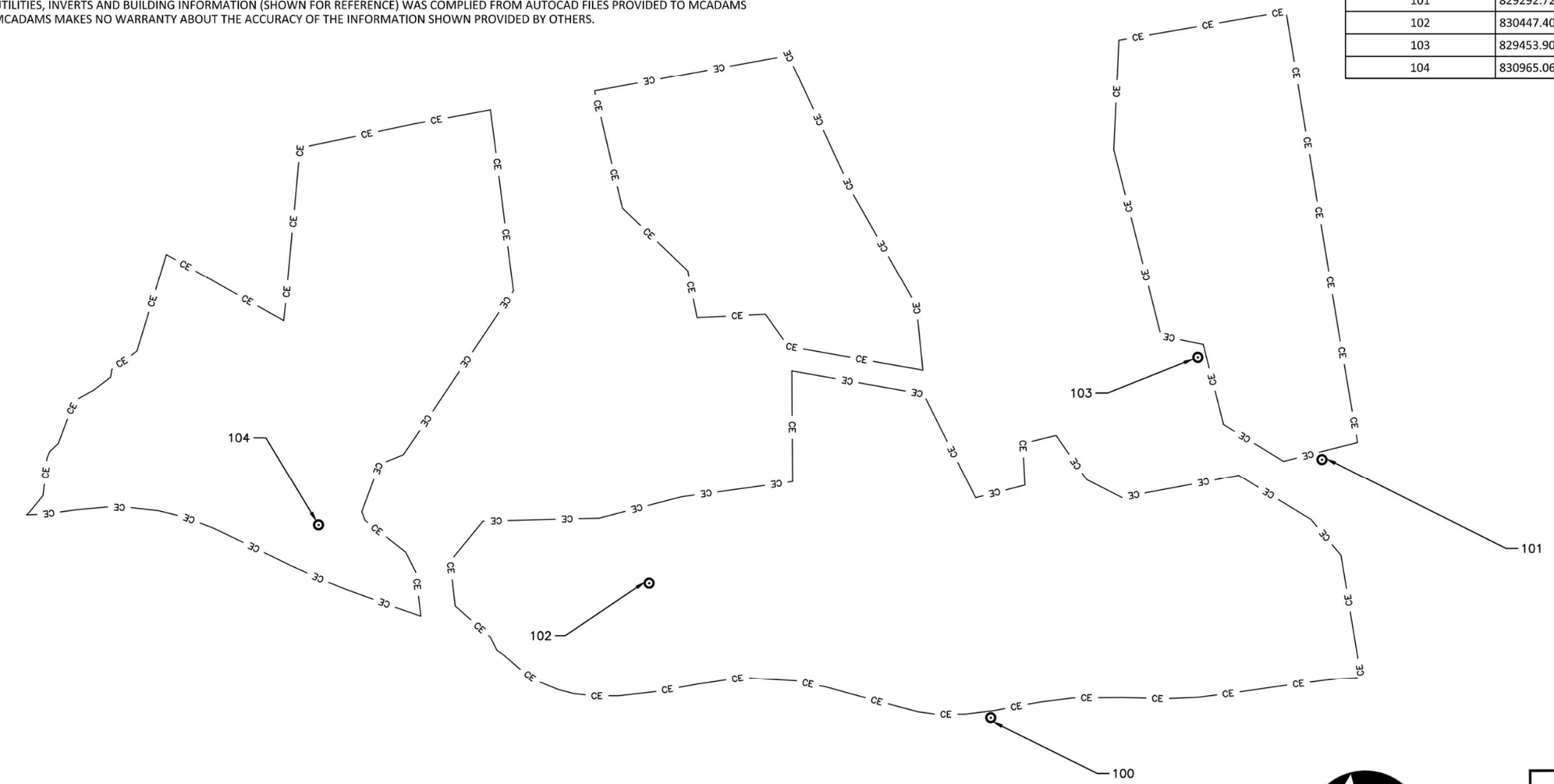
AXIOM ENVIRONMENTAL, INC.
218 SNOW AVENUE
RALEIGH, NC 27603
CONTACT: GRANT LEWIS
PHONE: 919. 215. 1693

CLIENT
RESTORATION SYSTEMS, LLC
1101 HAYNES ST, SUITE 211
RALEIGH, NC 27604
CONTACT: WORTH CREECH
PHONE: 919. 389. 3888

GENERAL NOTES:

1. COORDINATE SYSTEM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT
2. TOPOGRAPHY AND SPOT ELEVATIONS SHOWN ARE FROM AN ACTUAL FIELD SURVEY COMPLETED BY K2 DESIGN GROUP.
3. PLANIMETRICS, UTILITIES, INVERTS AND BUILDING INFORMATION (SHOWN FOR REFERENCE) WAS COMPLIED FROM AUTOCAD FILES PROVIDED TO MCADAMS FROM OTHERS. MCADAMS MAKES NO WARRANTY ABOUT THE ACCURACY OF THE INFORMATION SHOWN PROVIDED BY OTHERS.

CONTROL POINT LOCATIONS			
CONTROL POINT	NORTHING	EASTING	ELEVATION
100	829943.8048	1117697.5263	2951.36
101	829292.7246	1117983.3841	2948.17
102	830447.4092	1118061.3990	2941.26
103	829453.9034	1118202.3079	2973.08
104	830965.0697	1118294.5656	2958.02



GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

RECORD DRAWINGS ONLY
NORTH CAROLINA
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SEAL
049073
ENGINEER
REBECCA STUBBS
Rebecca Stubbs
Jan 18 2022 8:43 PM
Rebecca Stubbs, PE

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19010-ESMT
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1" = 60'
DATE	07.18.2022

CONSERVATION EASEMENT AND CONTROL POINTS EXHIBIT

C1.00

LEGEND AND SYMBOLS

- EXISTING MAJOR CONTOUR (250)
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (250)
- PROPOSED MINOR CONTOUR
- PROPOSED CONSERVATION EASEMENT (CE — CE)
- EXISTING PROPERTY LINE
- EXISTING OVERHEAD UTILITY EASEMENT
- PROPOSED STREAM CENTERLINE
- PROPOSED TOP OF BANK


PROPOSED LOG CROSS VANE


PROPOSED LOG VANE

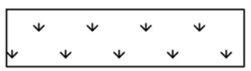

PROPOSED STEP SILL

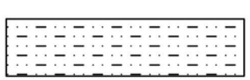

PROPOSED STEP POOL


PROPOSED DROP STRUCTURE


WETLAND REHABILITATION AREA


WETLAND RE—ESTABLISHMENT AREA


WETLAND PRESERVATION AREA


MARSH TREATMENT AREA

AS-BUILT LEGEND AND SYMBOLS

- MAJOR CONTOUR (250)
- MINOR CONTOUR
- STREAM CENTERLINE
- TOP OF BANK


LOG CROSS VANE

LOG VANE


ROCK SILL


LOG J—HOOK


STREAM CULVERT


MONITORING — VEGETATION PLOT

MONITORING — CROSS SECTION


MONITORING — STREAM GAGUE

MONITORING — GROUNDWATER WELL

MONITORING — RAIN GAGUE

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

RS Restoration Systems, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	NTS
DATE	07.18.2022

LEGEND AND SYMBOLS

C1.01

RESTORATION SYSTEMS, LLC
PARCEL NO. 181200891385

WISE, EUGENE G.
PARCEL NO. 181300803670

UT 2A
UT 3A
UT 3
UT 2
UT 5
UT 4
UT 1

UT2 ROAD CROSSING
WETLAND PRESERVATION AREA (TYP.)
WETLAND RE-ESTABLISHMENT AREA (TYP.)
WETLAND REHABILITATION AREA (TYP.)
OVERHEAD UTILITY EASEMENT
GRAVEL ACCESS ROAD
MONITORING GROUNDWATER WELL (TYP.)
FORK CREEK
FORK CREEK ROAD CROSSING
MONITORING CROSS SECTION (TYP.)
MONITORING RAIN GAUGE (TYP.)
MARSH TREATMENT AREA (TYP.)
MONITORING VEGETATION PLOT (TYP.)

GRAPHIC SCALE
0 75 150 300
1 inch = 150 ft.

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Rebecca Stubbs
Rebecca Stubbs, PE on 8/8/2022 8:08 PM
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AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

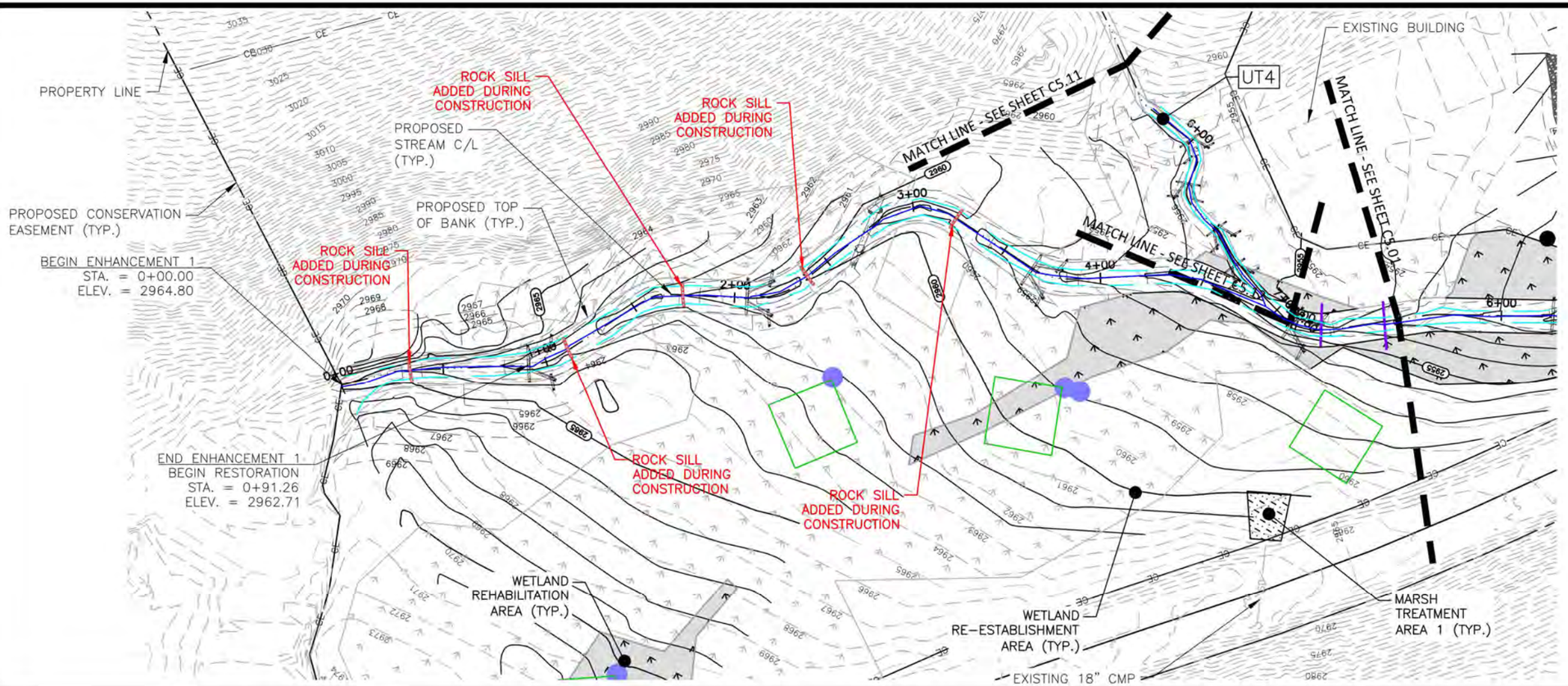
RESTORATION SYSTEMS LLC

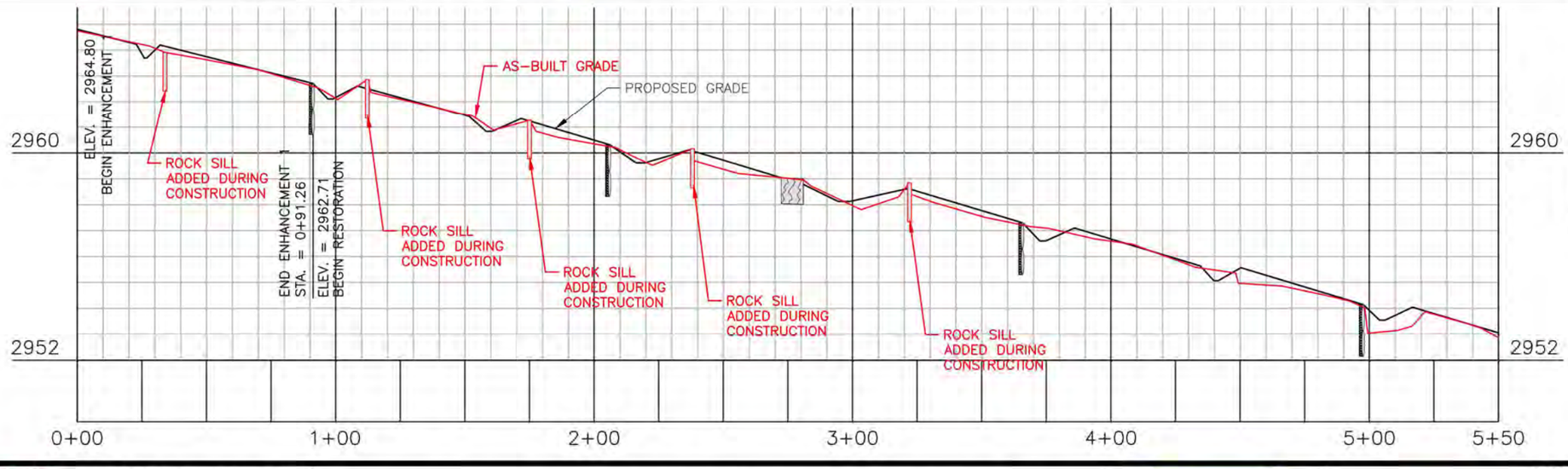
Axiom Environmental, Inc.

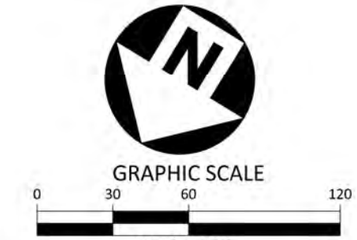
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1" = 150'
DATE	07.18.2022

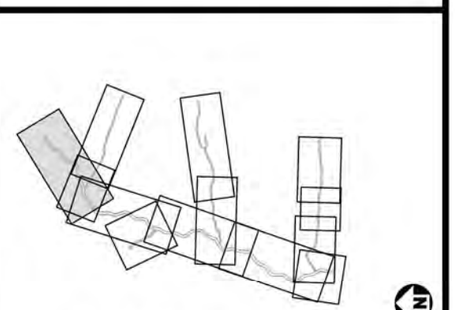
PROJECT OVERVIEW

C1.02









VICINITY MAP
1" = 1000'

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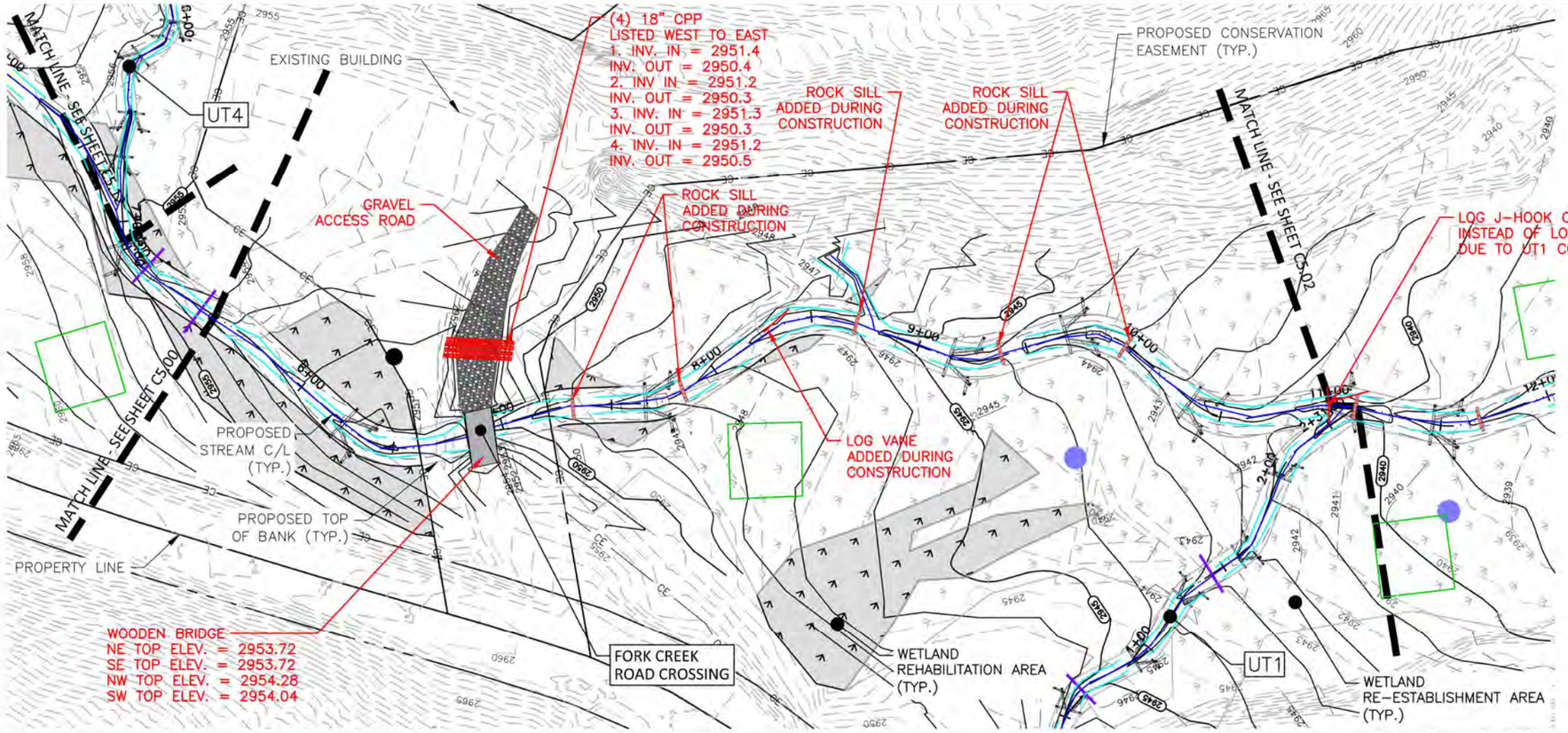
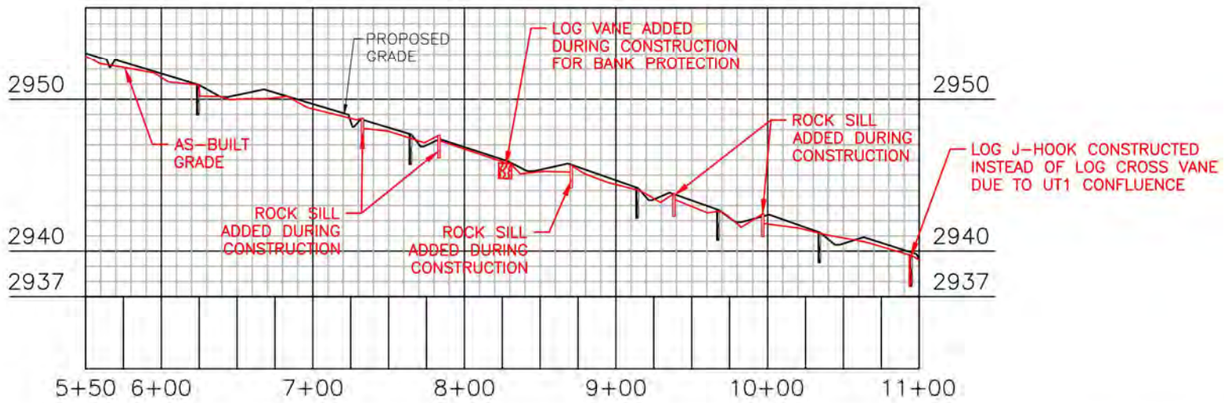
PLAN INFORMATION

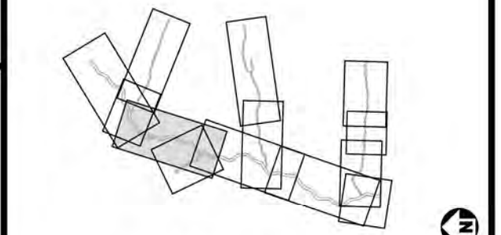
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	07.18.2022

PLAN AND PROFILE
FORK CREEK
STA. 00+00 THRU STA. 5+50

C5.00







VICINITY MAP
1" = 1000'

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

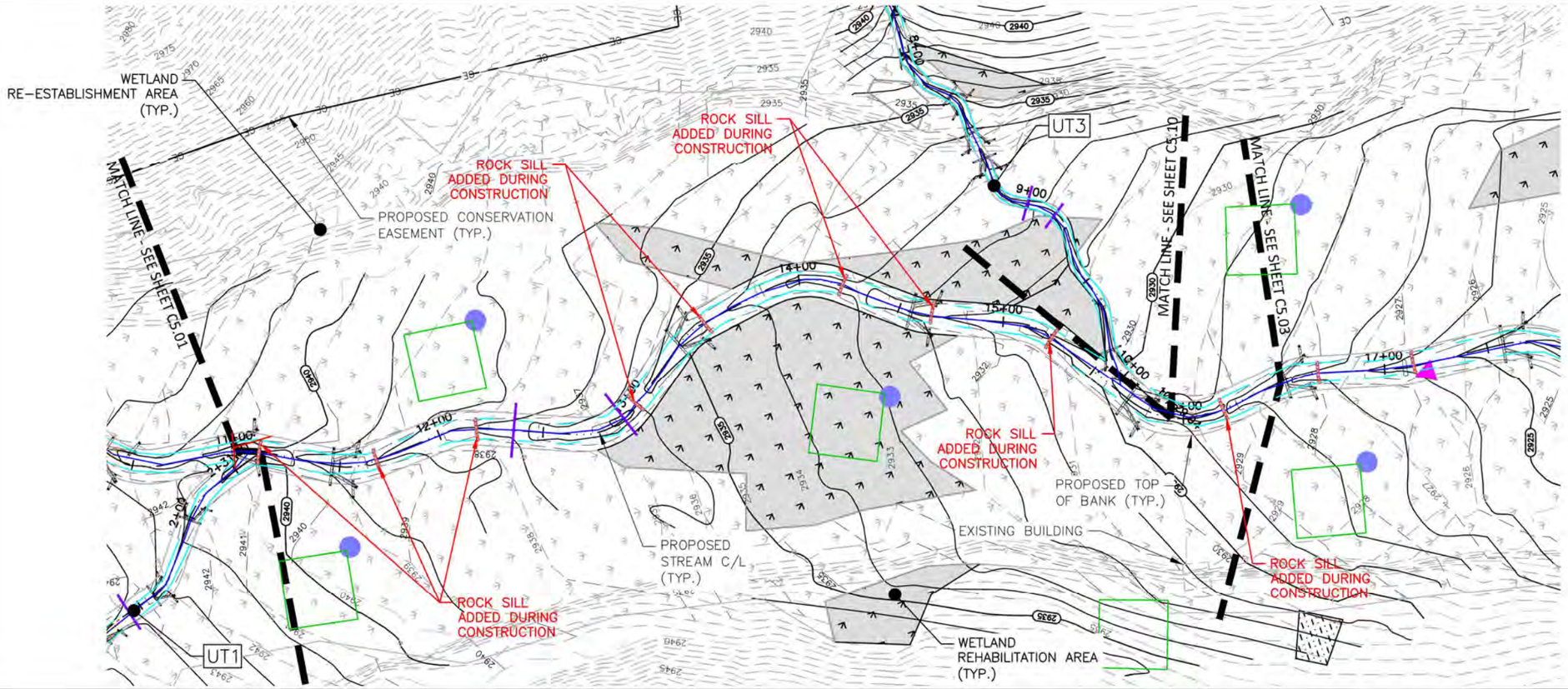
Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	07.18.2022

PLAN AND PROFILE
FORK CREEK
STA. 05+00 THRU STA. 11+00

C5.01



GRAPHIC SCALE

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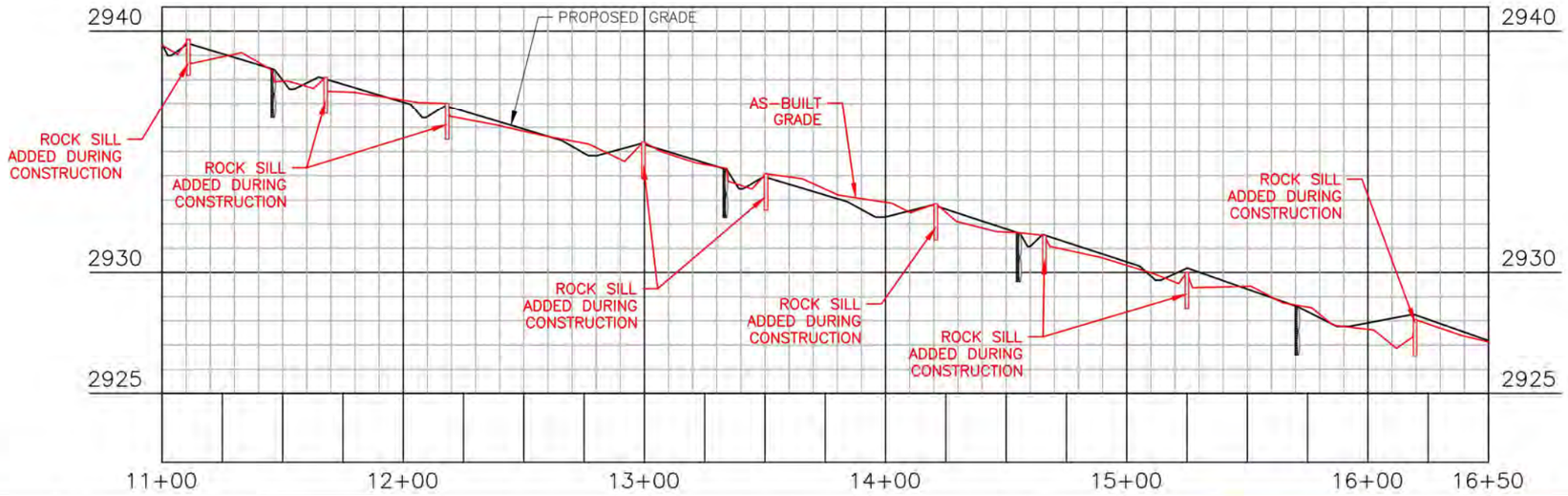
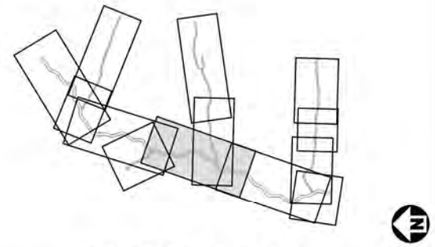
1 inch = 60 ft.





VICINITY MAP

1" = 1000'

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PLAN INFORMATION

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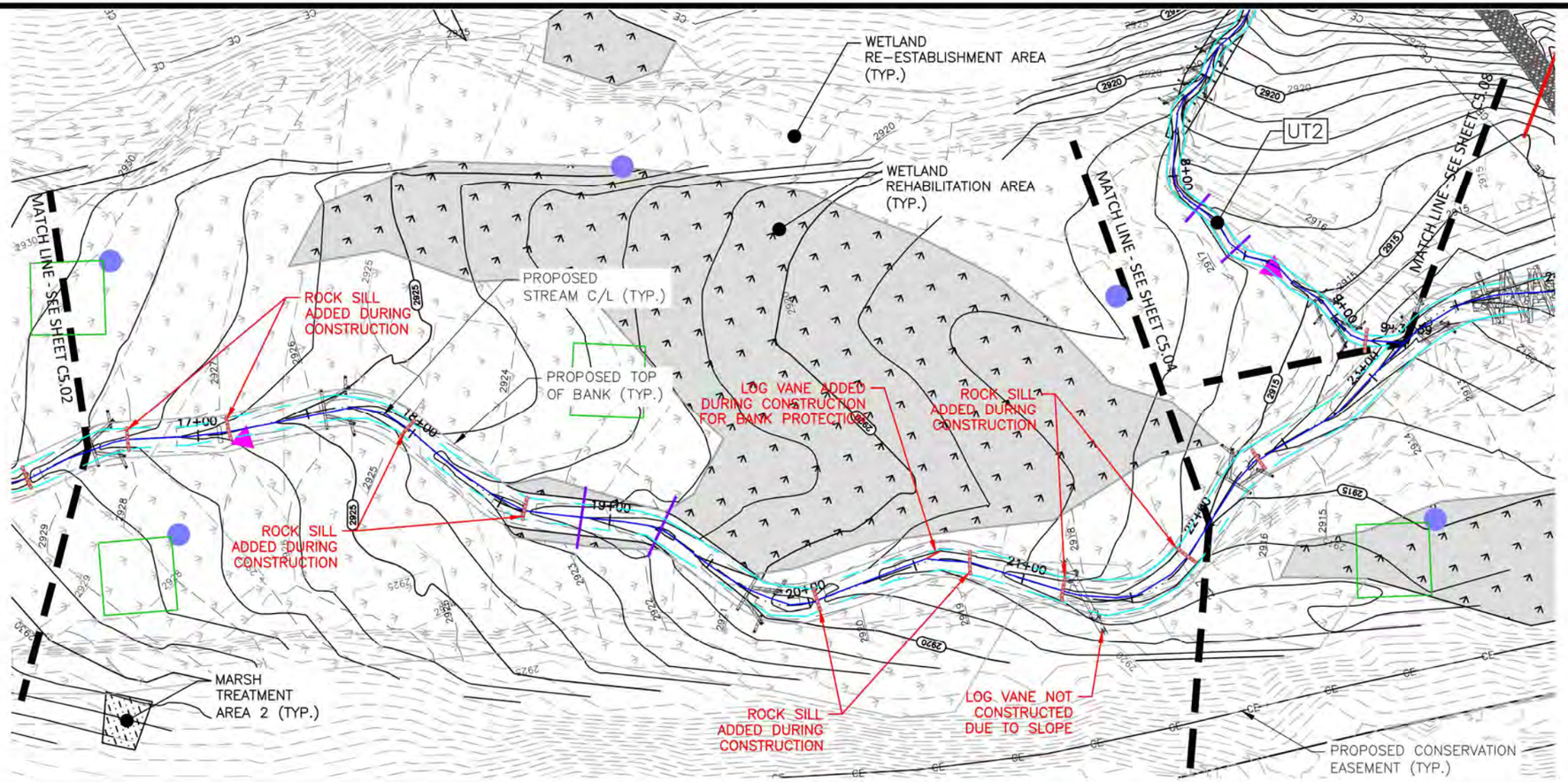
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=60'
DATE	07.18.2022

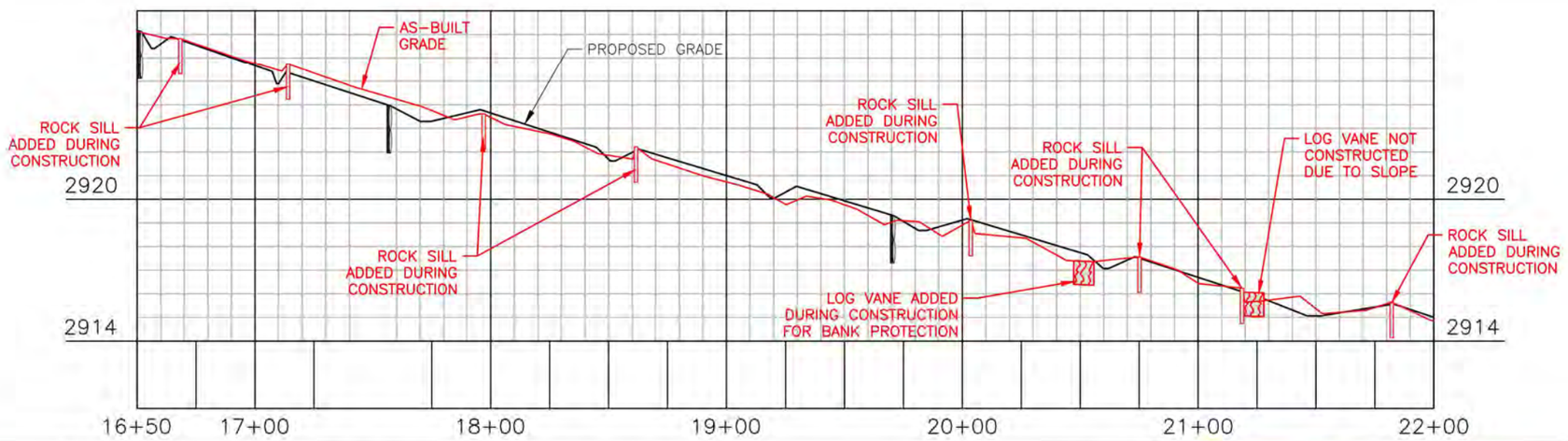
PLAN AND PROFILE

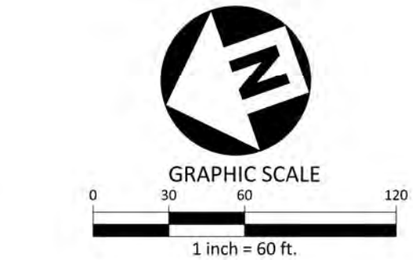
FORK CREEK

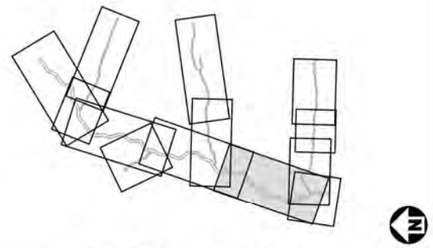
STA. 11+00 THRU STA. 16+50

C5.02









VICINITY MAP

1" = 1000'

RECORD DRAWINGS ONLY
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PROFESSIONAL
Rebecca Stubbs
Rebecca Stubbs, PE
Jul 18 2022 8:24 PM
049073
ENGINEER
SEAL
REBECCA STUBBS
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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

Axiom Environmental, Inc.

PLAN INFORMATION

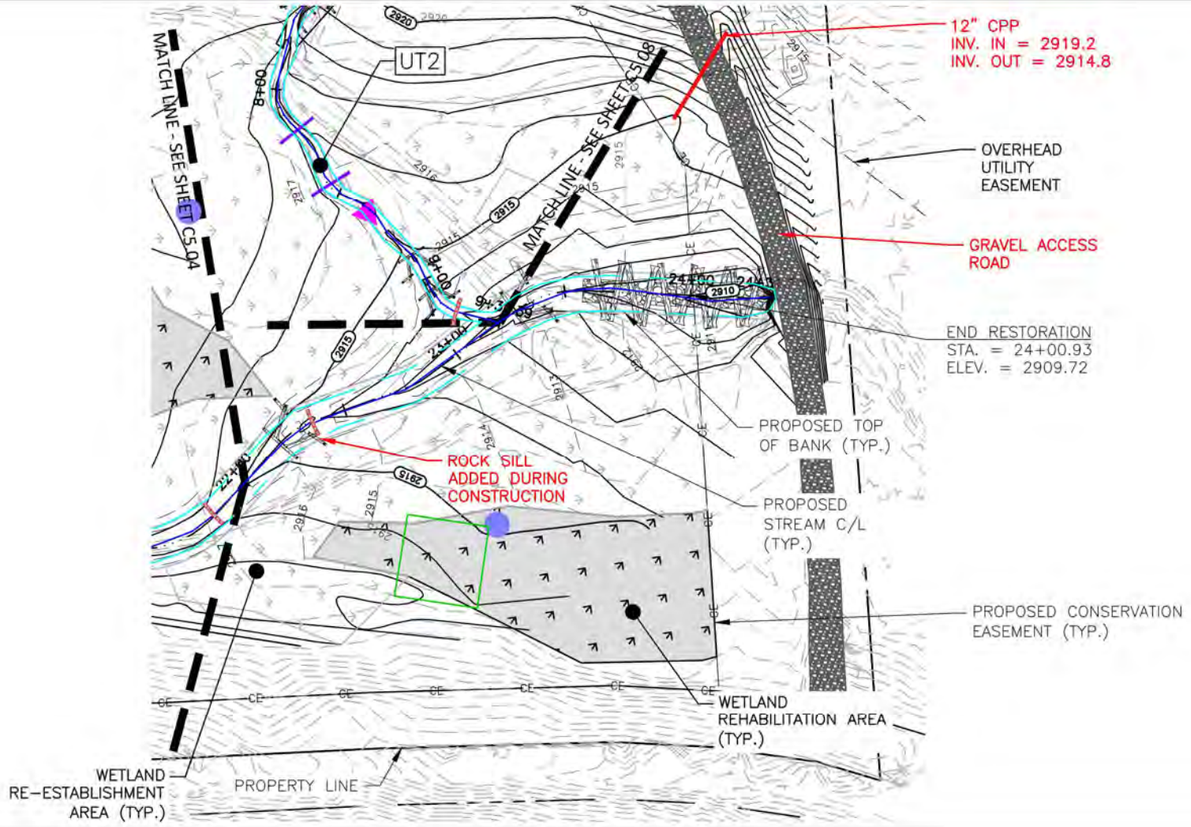
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=60'
DATE	07.18.2022

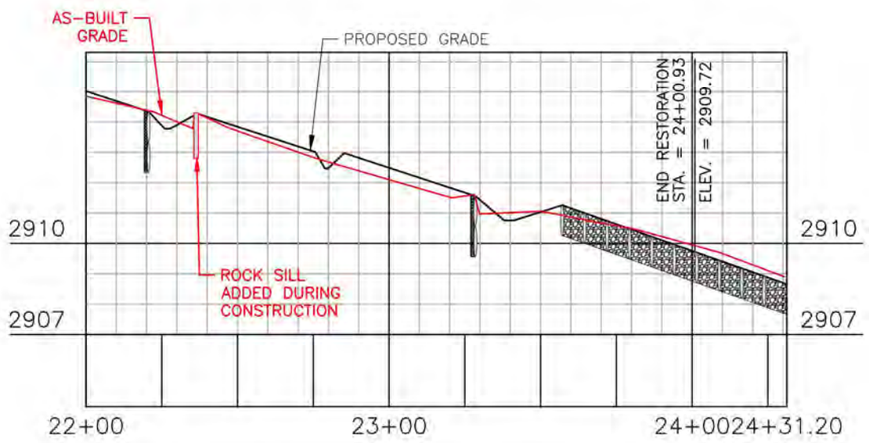
PLAN AND PROFILE

FORK CREEK

STA. 16+50 THRU STA. 22+00

C5.03





GRAPHIC SCALE

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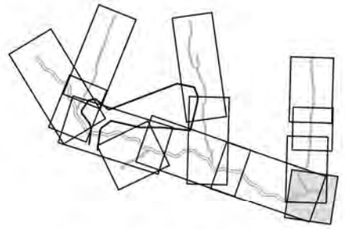
1 inch = 60 ft.



VICINITY MAP

1" = 1000'

RECORD DRAWINGS ONLY
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PROFESSIONAL
SEAL
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ENGINEER
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Rebecca Stubbs PE
Rebecca Stubbs
Jul 18 2022 3:05 PM

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

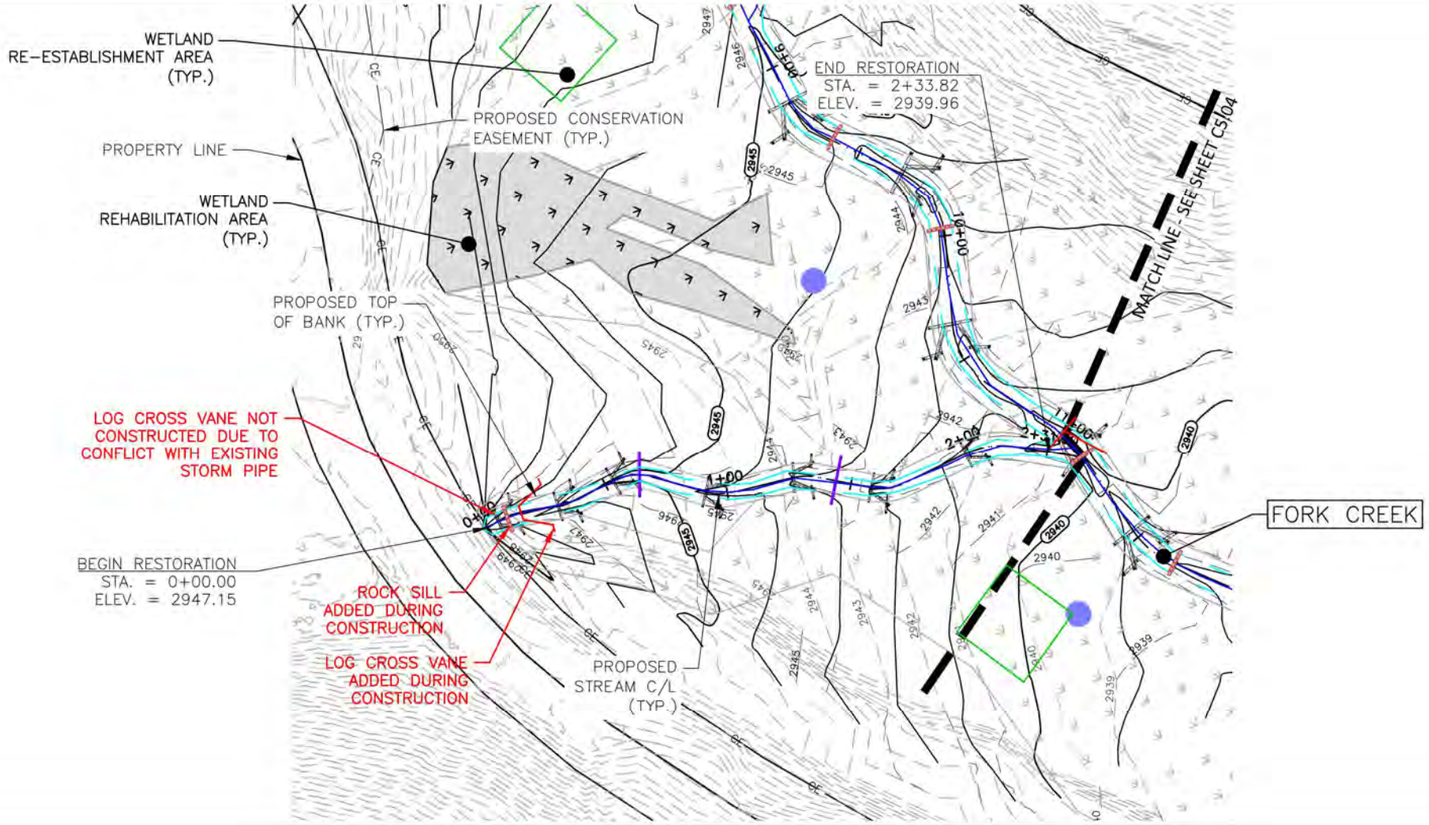
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	07.18.2022

PLAN AND PROFILE

FORK CREEK

STA. 22+00 THRU STA. 24+31.20

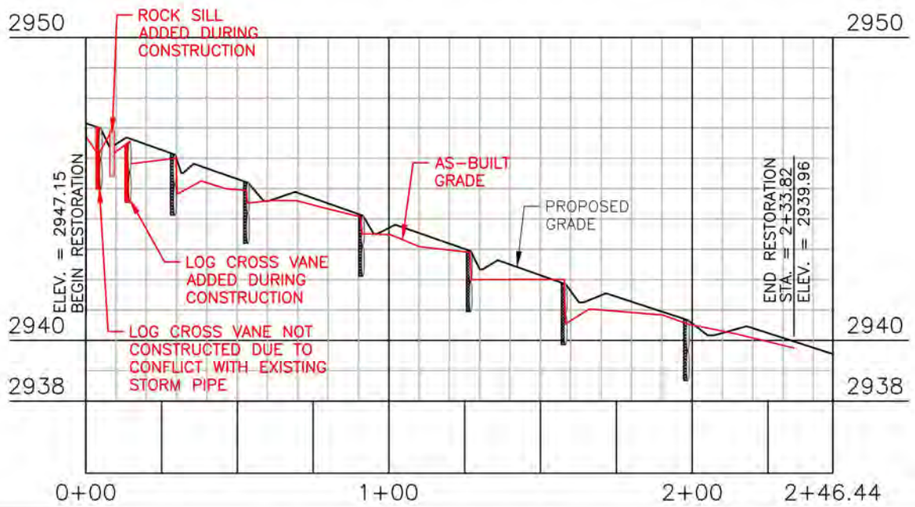
C5.04

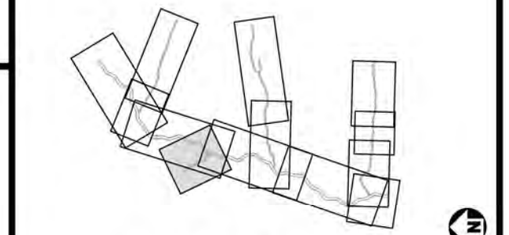


GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.





VICINITY MAP

1" = 1000'

RECORD DRAWINGS ONLY
NORTH CAROLINA PROFESSIONAL SEAL 049073 ENGINEER REBECCA STUBBS
Rebecca Stubbs, PE Jul 18 2022 3:05 PM
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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

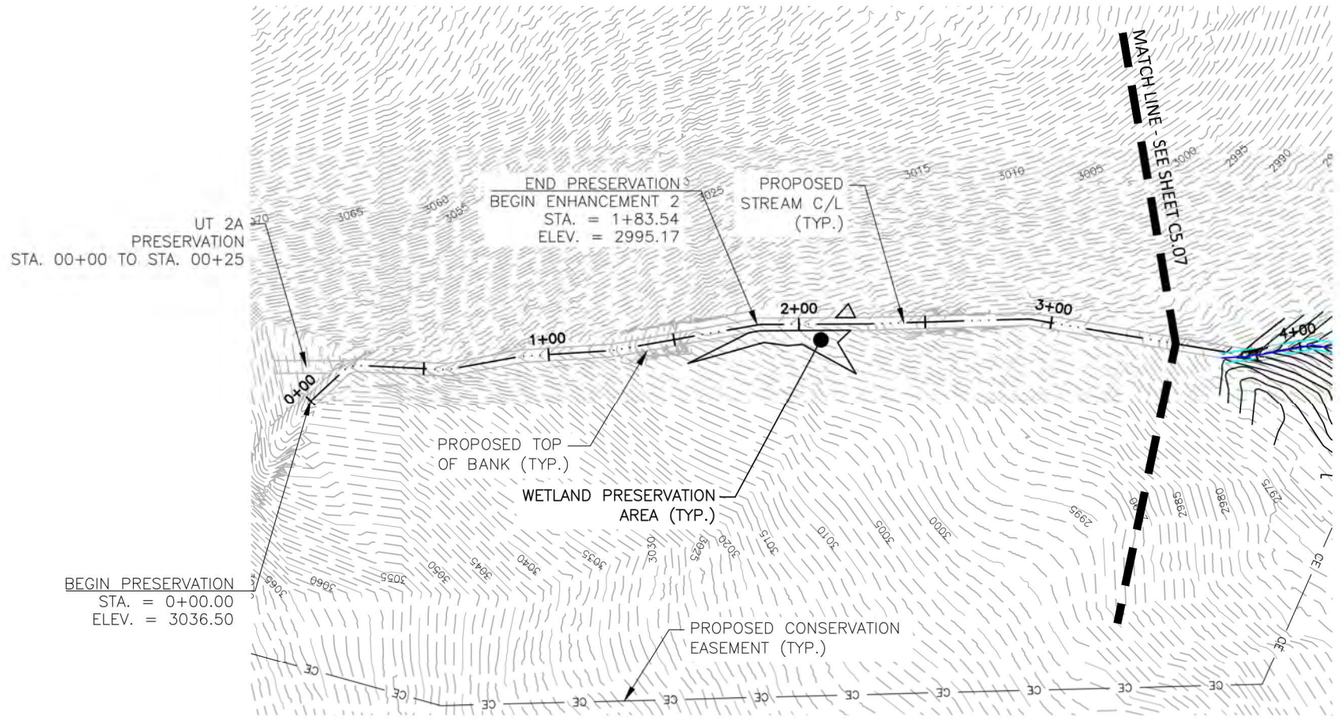
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	07.18.2022

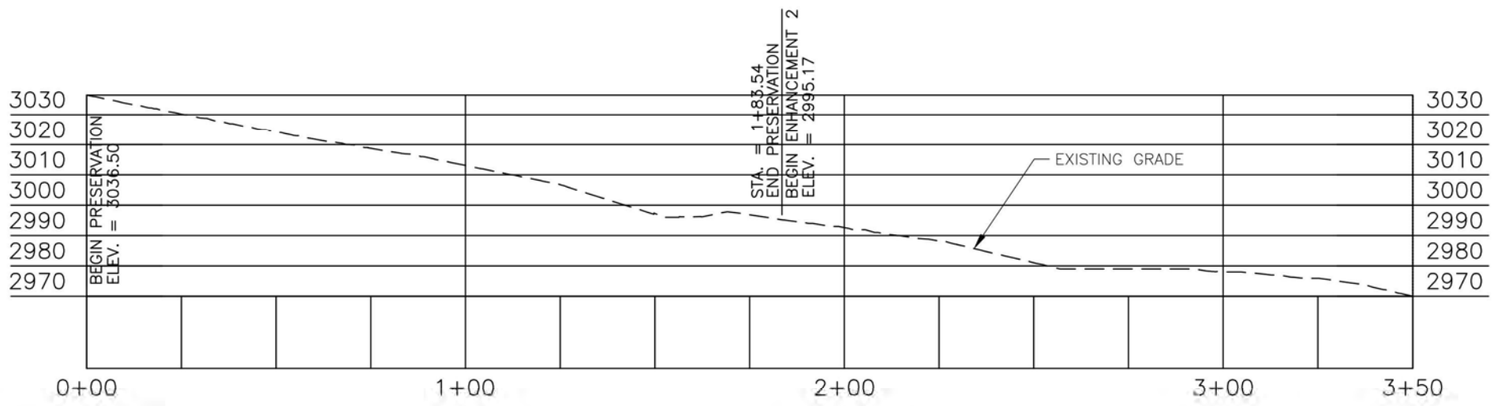
PLAN AND PROFILE

UT1

STA. 00+00 THRU STA. 2+46.66

C5.05

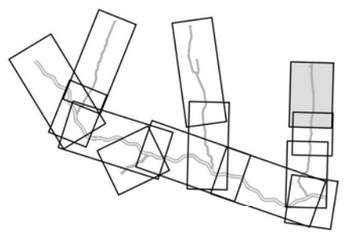




GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.



VICINITY MAP

1" = 1000'

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

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PLAN INFORMATION

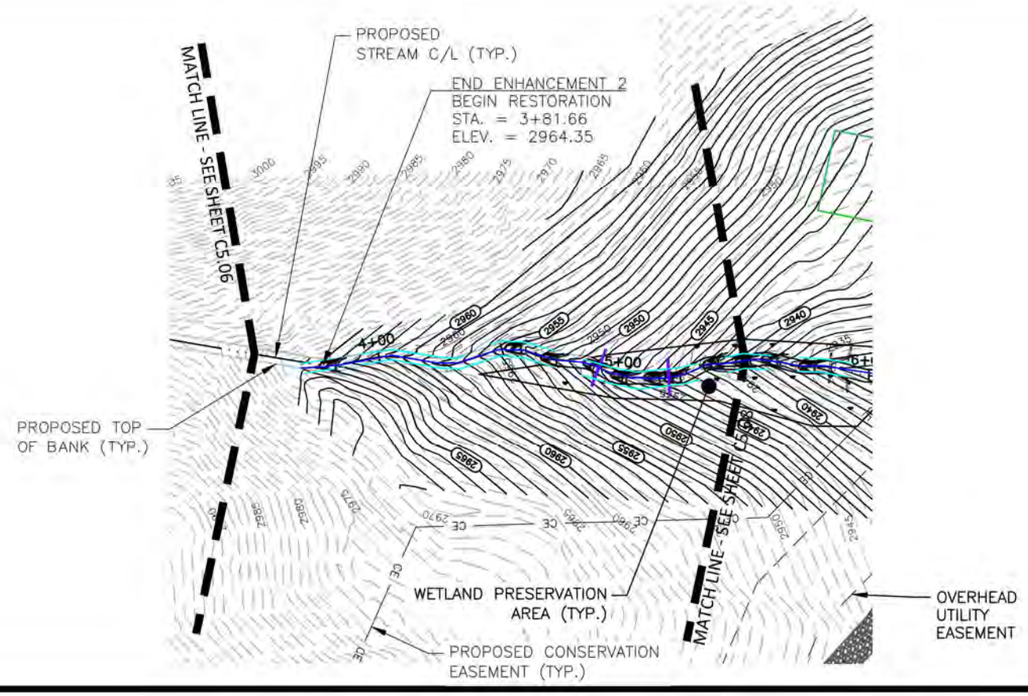
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=40'
DATE	07.18.2022

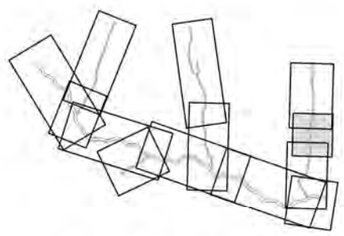
PLAN AND PROFILE

UT2

STA. 00+00 THRU STA. 03+50

C5.06





VICINITY MAP
1" = 1000'

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

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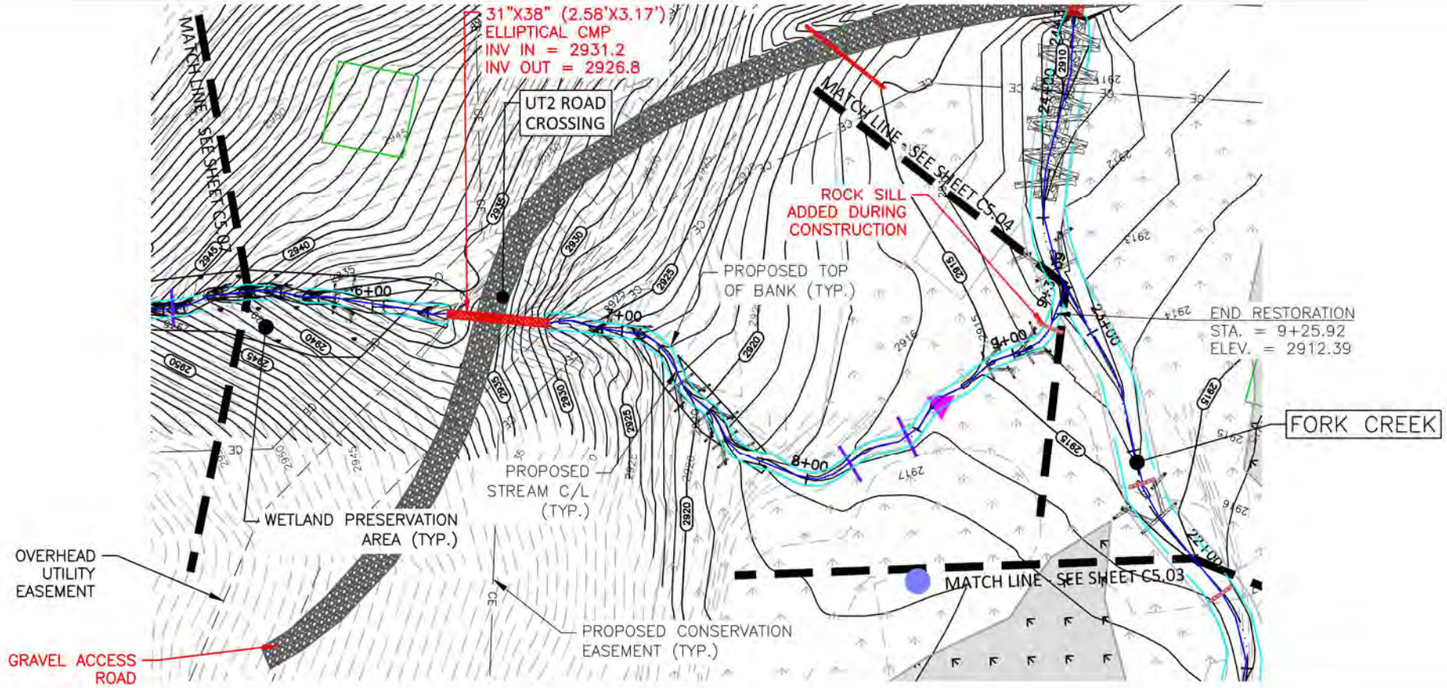
PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	07.18.2022

PLAN AND PROFILE
UT2
STA. 03+50 THRU STA. 05+50

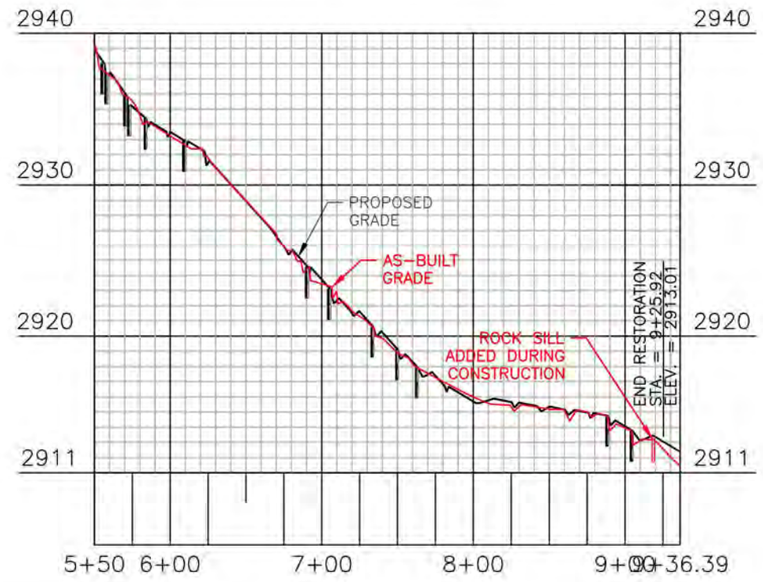
C5.07

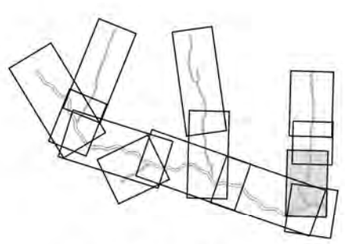


GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.





VICINITY MAP

1" = 1000'

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ENGINEER
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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

Axiom Environmental, Inc.

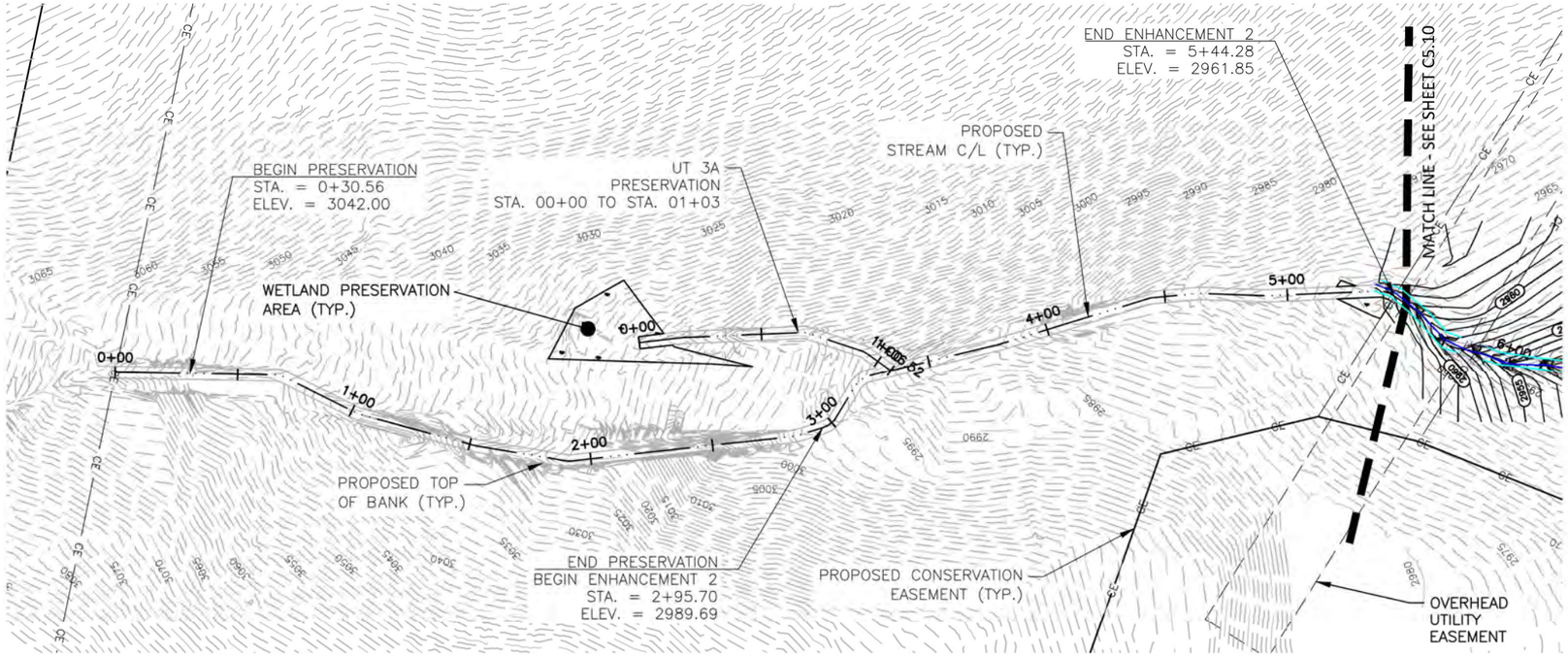
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	07.18.2022

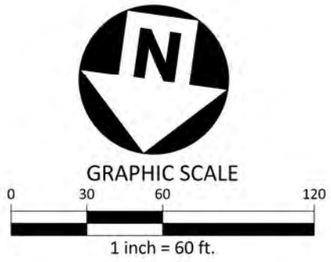
PLAN AND PROFILE

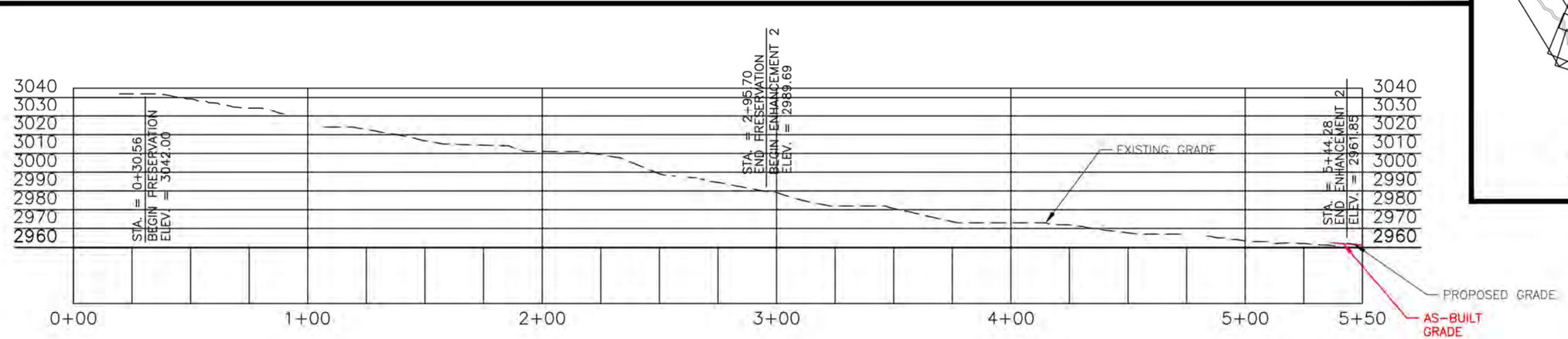
UT2

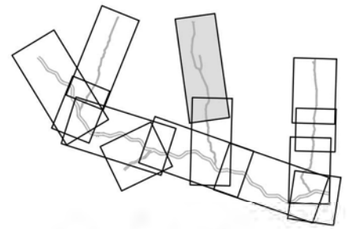
STA. 05+50 THRU STA. 9+36.39

C5.08









VICINITY MAP
1" = 1000'

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

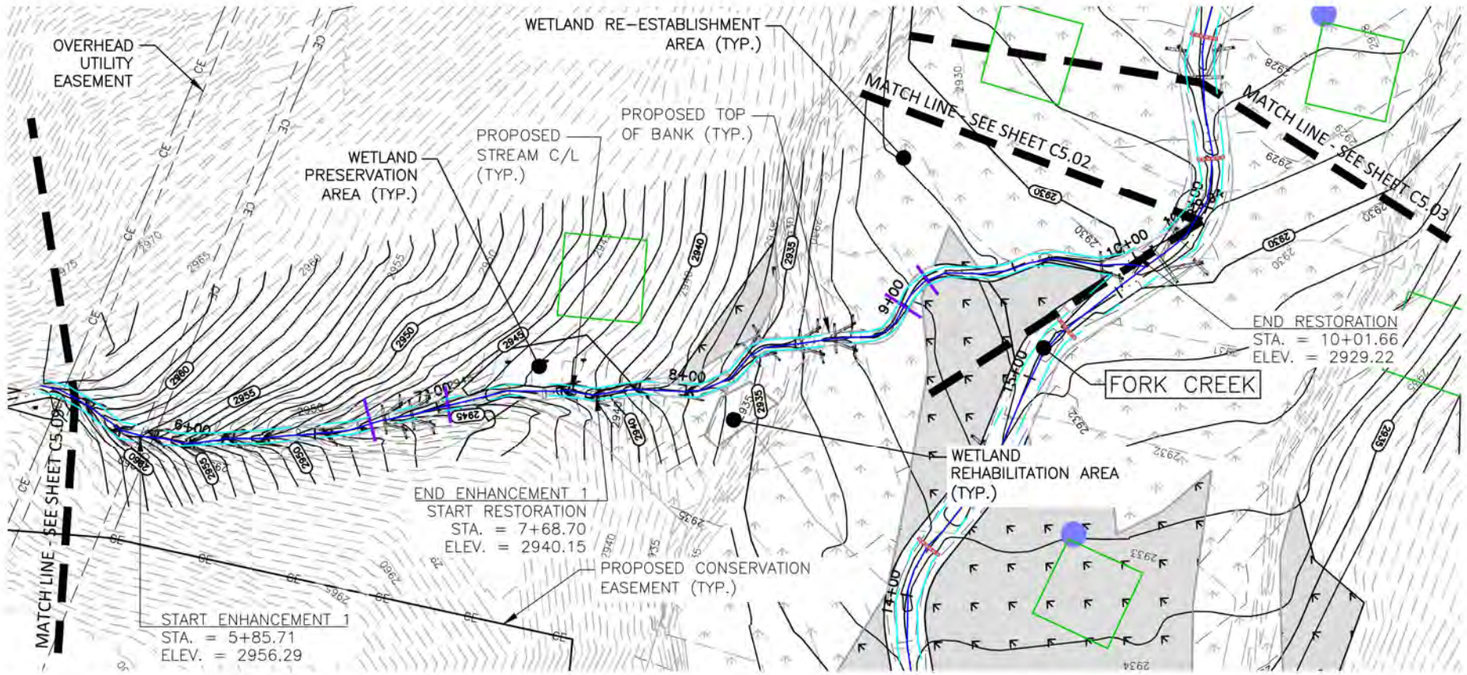
RESTORATION SYSTEMS, LLC

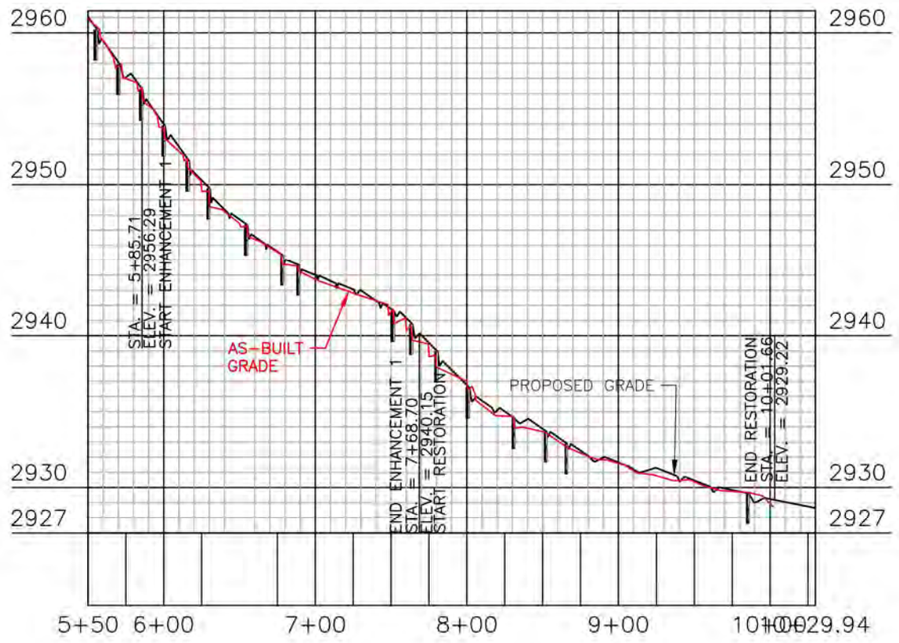
Axiom Environmental, Inc.

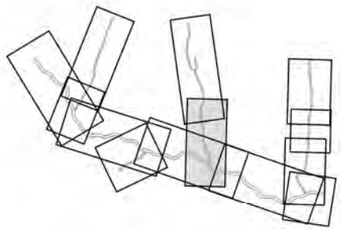
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	07.18.2022

PLAN AND PROFILE
UT3
STA. 00+00 THRU STA. 05+50

C5.09







VICINITY MAP
1" = 1000'

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

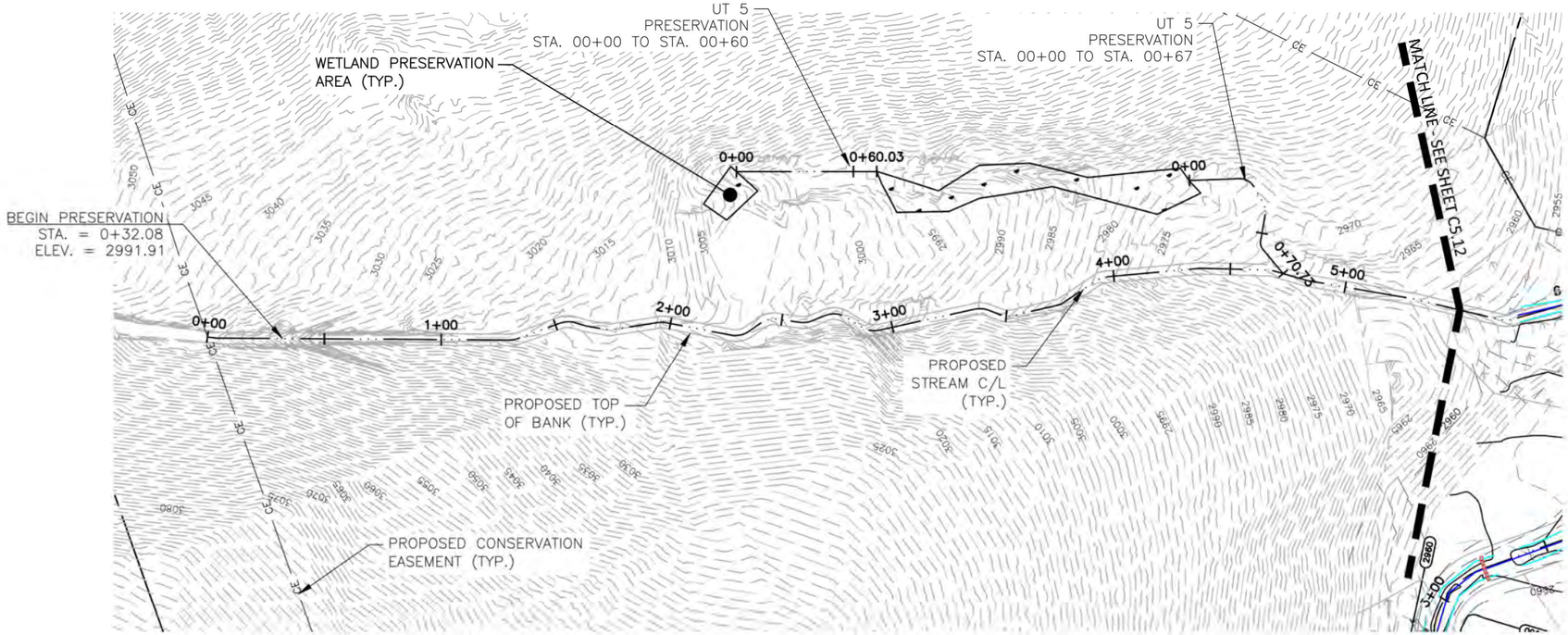
RESTORATION SYSTEMS LLC

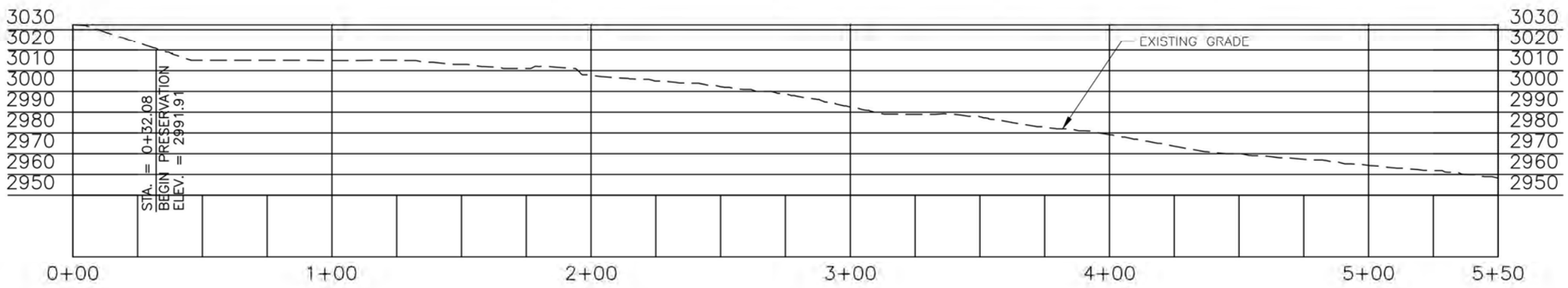
Axiom Environmental, Inc.

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	07.18.2022

PLAN AND PROFILE
UT3
STA. 05+50 THRU STA. 10+29.24

C5.10

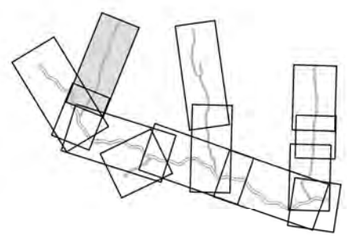




GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.



VICINITY MAP

1" = 1000'

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ENGINEER
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Rebecca Stubbs
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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS

AVERY COUNTY, NORTH CAROLINA

Axiom Environmental, Inc.

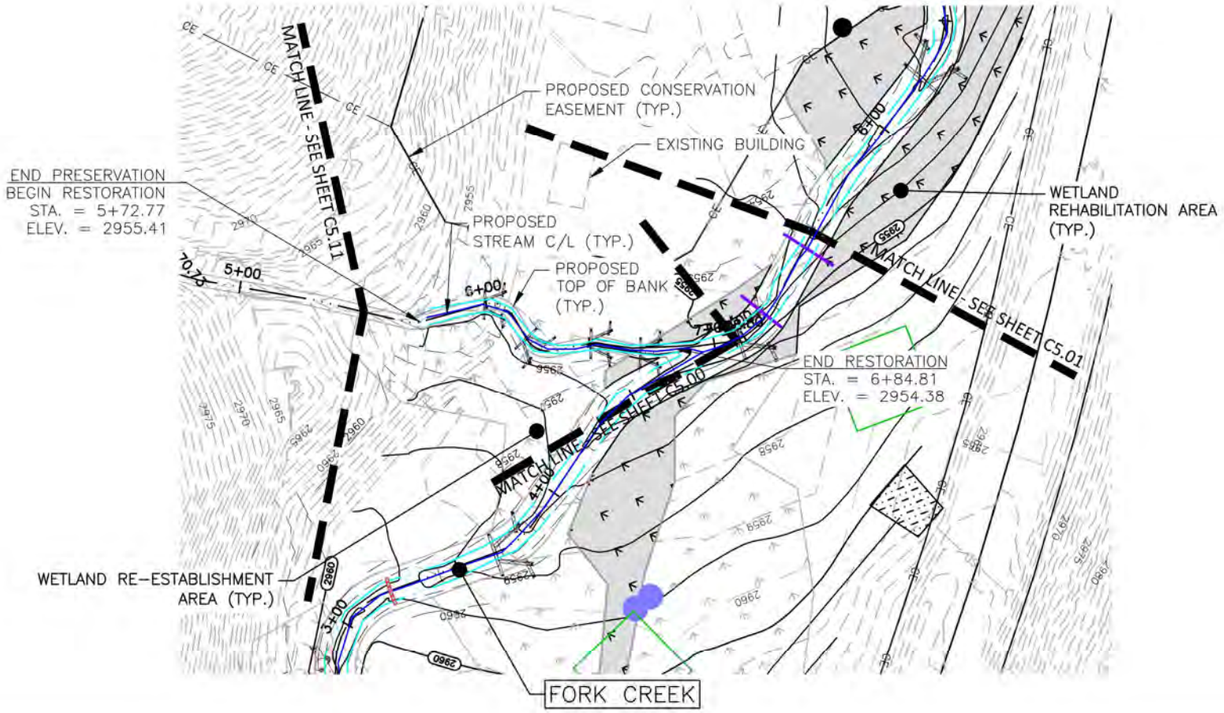
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	07.18.2022

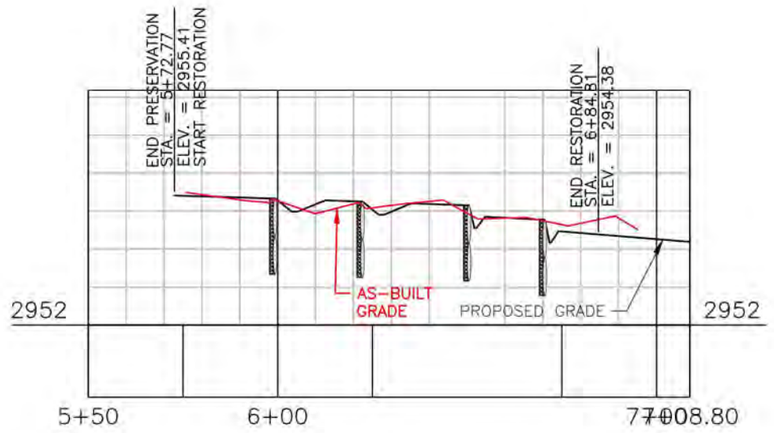
PLAN AND PROFILE

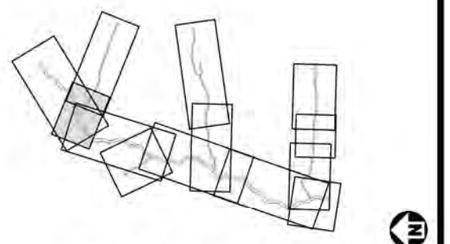
UT4

STA. 00+00 THRU STA. 05+50

C5.11







VICINITY MAP
1" = 1000'

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Rebecca Stubbs
Rebecca Stubbs, PE 7/18/2022 8:40 PM
049073
ENGINEER
REBECCA STUBBS
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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS, LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
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SCALE	1"=60' / 1"=40'
DATE	07.18.2022

PLAN AND PROFILE
UT4
STA. 05+50 THRU STA. 07+08.80

C5.12

PROPOSED CONSERVATION EASEMENT

31"X38" (2.58'X3.17')
ELLIPTICAL CMP
INV IN = 2931.2
INV OUT = 2926.8

PROPERTY LINE

12" CPP
INV. IN = 2919.2
INV. OUT = 2914.8

OVERHEAD UTILITY EASEMENT

UT2 ROAD CROSSING

GRAVEL ACCESS ROAD

GRAPHIC SCALE
0 15 30 60
1 inch = 30 ft.

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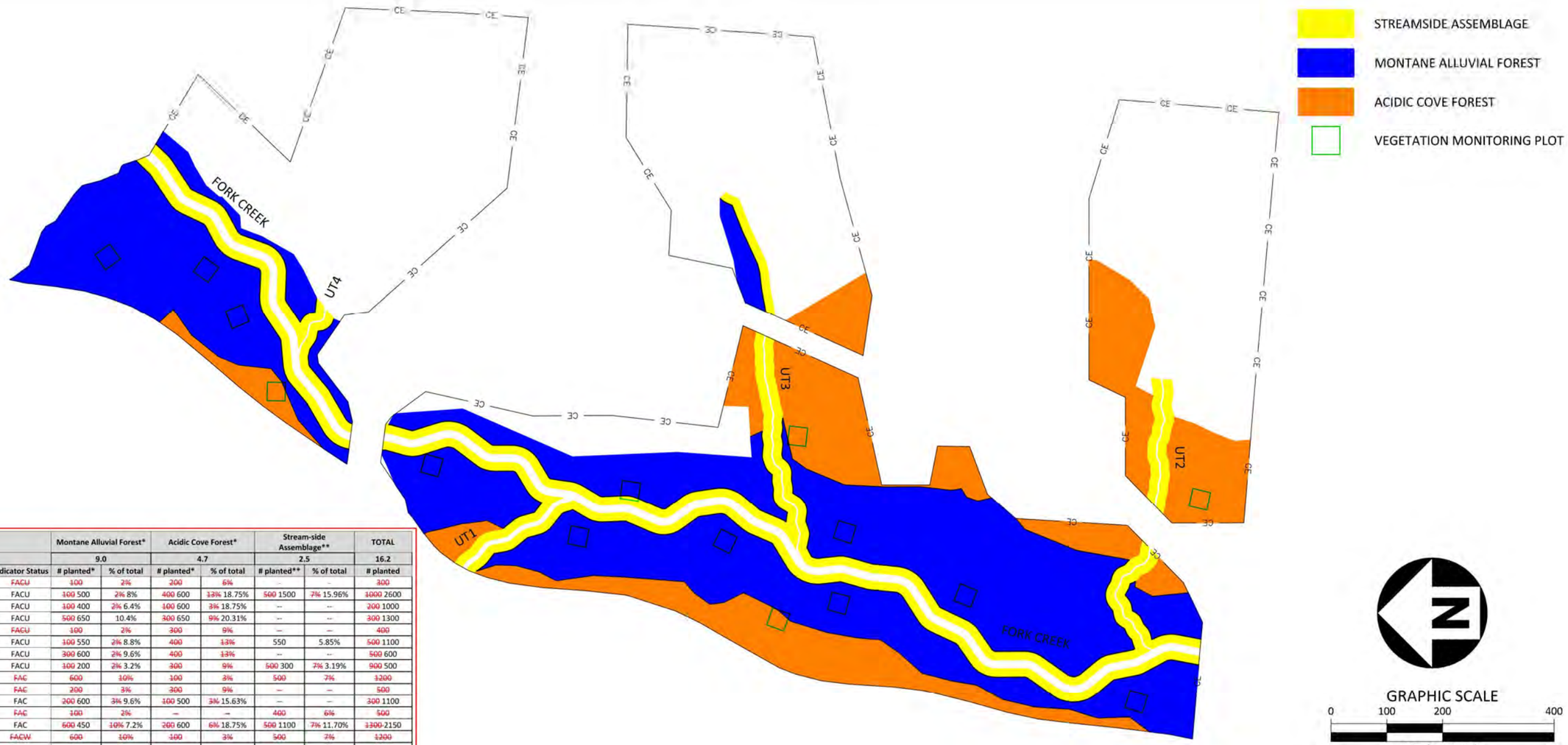
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	07.18.2022

DRIVEWAY GRADING

C5.13



Vegetation Association		Montane Alluvial Forest*		Acidic Cove Forest*		Stream-side Assemblage**		TOTAL
Area (acres)		9.0		4.7		2.5		16.2
Species	Indicator Status	# planted*	% of total	# planted*	% of total	# planted**	% of total	# planted
~~Basswood (*Tilia americana*)~~	~~FACU~~	~~100~~	~~2%~~	~~200~~	~~6%~~	-	-	~~300~~
Cherry birch (*Betula lenta*)	FACU	~~100~~ 500	~~2%~~ 8%	~~400~~ 600	~~13%~~ 18.75%	~~500~~ 1500	~~7%~~ 15.96%	~~1000~~ 2600
Eastern hemlock (*Tsuga canadensis*)	FACU	~~100~~ 400	~~2%~~ 6.4%	~~100~~ 600	~~3%~~ 18.75%	--	--	~~200~~ 1000
Red oak (*Quercus rubra*)	FACU	~~500~~ 650	10.4%	~~300~~ 650	~~9%~~ 20.31%	--	--	~~300~~ 1300
~~White Ash (*Fraxinus americana*)~~	~~FACU~~	~~100~~	~~2%~~	~~300~~	~~9%~~	--	--	~~400~~
White Oak (*Quercus alba*)	FACU	~~100~~ 550	~~2%~~ 8.8%	~~400~~	~~13%~~	550	5.85%	~~500~~ 1100
White pine (*Pinus strobus*)	FACU	~~300~~ 600	~~2%~~ 9.6%	~~400~~	~~13%~~	--	--	~~500~~ 600
Yellow birch (*Betula alleghaniensis*)	FACU	~~100~~ 200	~~2%~~ 3.2%	~~300~~	~~9%~~	~~500~~ 300	~~7%~~ 3.19%	~~900~~ 500
~~Black Gum (*Nyssa sylvatica*)~~	~~FAC~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Persimmon (*Diospyros virginiana*)~~	~~FAC~~	~~200~~	~~3%~~	~~300~~	~~9%~~	--	--	~~500~~
Scarlet Oak (*Quercus coccinea*)	FAC	~~200~~ 600	~~3%~~ 9.6%	~~100~~ 500	~~3%~~ 15.63%	--	--	~~300~~ 1100
~~Shadbush (*Amelanchier arborea*)~~	~~FAC~~	~~100~~	~~2%~~	--	--	~~400~~	~~6%~~	~~500~~
Tulip poplar (*Liriodendron tulipifera*)	FAC	~~600~~ 450	~~10%~~ 7.2%	~~200~~ 600	~~6%~~ 18.75%	~~500~~ 1100	~~7%~~ 11.70%	~~1300~~ 2150
~~American elm (*Ulmus americana*)~~	~~FACW~~	~~600~~	~~10%~~	~~100~~	~~3%~~	~~500~~	~~7%~~	~~1200~~
~~Hackberry (*Celtis laevigata*)~~	~~FACW~~	~~600~~	~~10%~~	--	--	~~500~~	~~7%~~	~~1100~~
River birch (*Betula nigra*)	FACW	~~600~~ 500	~~10%~~ 8%	--	--	~~500~~ 950	~~7%~~ 10.10%	~~1100~~ 1450
~~Swamp Chestnut Oak (*Quercus michauxii*)~~	~~FACW~~	~~600~~	~~10%~~	--	--	~~400~~	~~6%~~	~~1000~~
Sycamore (*Platanus occidentalis*)	FACW	600	~~10%~~ 9.6%	--	--	~~500~~ 1500	~~7%~~ 15.96%	~~1100~~ 2100
~~Tag alder (*Alnus serrulata*)~~	~~FACW~~	~~300~~	~~5%~~	--	--	~~400~~	~~6%~~	~~700~~
Silky Dogwood (*Cornus amomum*)	FACW	~~200~~	~~3%~~	--	--	~~400~~ 600***	~~6%~~ 6.38%	600
Black willow (*Salix nigra*)	OBL	~~300~~	~~5%~~	--	--	~~400~~ 800***	~~6%~~ 8.51%	800
Elderberry (*Sambucus nigra*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
Buttonbush (*Cephalanthus occidentalis*)	OBL	--	--	--	--	400***	~~6%~~ 4.26%	400
^Common Ninebark (*Physocarpus opulifolius*)	FACW	--	--	--	--	300***	3.19%	300
^Arrowwood viburnum (*Viburnum dentatum*)	FAC	400	6.4%			400	4.26%	800
^Bitternut hickory (*Carya cordiformis*)	FACU	800	12.8%					800
^American hazelnut (*Corylus americana*)	FACU					600	6.38%	600
^Red spruce (*Picea rubens*)	FACU			250	7.81%			250
TOTAL		~~6200~~ 6250	100%	3200	100%	~~6800~~ 9400	100%	~~16200~~ 18850

^Species Added
* Planted at a density of 680 stems/acre.
** Planted at a density of 2720 stems/acre.
*** These species were live staked and planted along the stream channels – Total of 2500 live stakes were planted in addition to the 6900 bare-root Stream-Side Assemblage planting.

GRAPHIC SCALE
0 100 200 400
1 inch = 200 ft.

RECORD DRAWINGS ONLY
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Rebecca Stubbs, PE
049073
ENGINEER
REBECCA STUBBS
Rebecca Stubbs
Nov 15 2022 8:16 PM

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LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-LS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=200'
DATE	11.15.2022

PLANTING PLAN

L5.00

TEMPORARY SEEDING SCHEDULE:

TEMPORARY SEEDING SHALL BE APPLIED AS NEEDED DURING CONSTRUCTION TO STABILIZE BARE OR DISTURBED AREAS OF SOIL AND AT THE COMPLETION OR ALL GRADING AND EARTHWORK ACTIVITIES WITHIN A PARTICULAR AREA OF THE SITE. PERMANENT SEED MAY BE DISTRIBUTED WITH TEMPORARY SEED UPON THE FINAL APPLICATION OF TEMPORARY SEED.

SEEDING DATE	SEEDING MIXTURE	APPLICATION RATE
AUG 15 - MAY 15	ANNUAL RYE (GRAIN)	30 LBS/AC
AUG 15 - MAY 15	WINTER WHEAT	30 LBS/AC
MAY 15 - AUG 15	GERMAN MILLET	10 LBS/AC
MAY 15 - AUG 15	BROWNTOP MILLET	10 LBS/AC

SEEDING METHODS

1. EVENLY APPLY SEED USING A CYCLONE SEEDER, DRILL, CULTIPACKER SEEDER, OR HYDROSEEDER. THIS MUST BE DONE WITHIN 48 HOURS OF LAND DISTURBING ACTIVITIES.
2. MULCH WITH CLEAN WHEAT STRAW.
3. AFTER SEEDING, APPLY MULCH TO AREAS UNDER HARSH CONDITIONS SUCH AS AREAS THAT HAVE BEEN GRADED, OR THOSE WHICH WILL RECEIVE CONCENTRATED FLOWS. AREAS CONSIDERED TO BE UNDER HARSH CONDITIONS WILL BE CONSIDERED THE AREAS GRADED FOR THE WETLAND VALLEY.
4. RESEED AND MULCH AREAS WHERE SEEDLING EMERGENCE IS LESS THAN 80% COVERAGE, OR WHERE EROSION OCCURS, AS SOON AS POSSIBLE. DO NOT MOW. PROTECT FROM TRAFFIC AS MUCH AS POSSIBLE.

NOTES

1. TEMPORARY ANNUAL SEED SELECTION SHOULD BE BASED ON SEASON OF PROJECT INSTALLATION.
2. A SINGLE SPECIES FOR TEMPORARY COVER IS ACCEPTABLE
3. IN SOME CASES WHERE SEASONS OVERLAP, A MIXTURE OF TWO OR MORE SPECIES MAY BE NECESSARY. HOWEVER, APPLICATION RATES SHOULD NOT EXCEED THE TOTAL RECOMMENDED RATE PER ACRE.
4. TEMPORARY SEED SHOULD BE MIXED AND APPLIED SIMULTANEOUSLY WITH THE PERMANENT SEED MIX IF OPTIMAL PLANTING DATES ALLOW.

PERMANENT SEEDING SCHEDULE:

PLANT MATERIAL SELECTION
1. REFER TO THE TABLES ON THIS SHEET FOR APPROPRATE SELECTION OF NATIVE PERMANENET SEEDS.
2. PERMANENT SEED MIXTURE SHOULD BE APPLIED USING AN APPLICATION RATE AND METHOD RECOMMENDED BY THE NURSERY.

SEEDBED PREPRATION
1. DISTURBED SOILS WITHIN THE RIPARIAN AREAS MUST BE AMMENDED TO PROVIDE AN OPTIMUM ENVORONMENT FR SEE GERMINATION AND SEEDNG GROWTH.
2. THE pH OF THE SOIL MUST BE SUCH THAT IT IS NOT TOXIC AND NUTRIENTS ARE AVAILABLE.
3. SOIL ANALYSIS SHOULD BE PERFORMED TO DETERMINE NUTRIENT AND LIME NEEDS OF EACH SITE.
4. APROPRIATE pH LEVELS ARE BETWEEN 5.5 AND 7.0
5. RIPARIAN BUFFERS REGULATED FOR NUTRIENT MANAGEMENT MAY BE LIMITED TO A SINGLE APPLICATION OF FERTILIZER.
6. SUITABLE MECHANICAL MEANS SUCH AS DISKING, RAKING, AND HARROWING MUST BE EMPLOYED TO LOOSEN COMPACTED SOILS PRIOR TO SEEDING.

PLANTING
1. APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DROP-TYPE SPREADER, DRILL, OR HYDROSEEDER ON A FIRM, FRIABLE SEEDBED.
2. IN FINE SOILS, SEEDS SHOULD BE DRILLED 0.25-0.5 INCHES. IN COURSE SAND SOILS, SEEDS SHOULD BE PLANTED NO MORE THAN 0.75 INCHES.

MULCH
1. MULCH ALL PLANTING AREAS IMMEDIATELY AFTER SEEDING.
2. IF PLANTING ON STREAMBANKS STEEPER THAN 10% OR OTHER AREAS SUBJEC TO FLOODING, A BIODEGRADEABLEL ROLLED EROSION CONTROL PRODUCT IS RECOMMENDED TO HOLD SEED AND SOIL IN PLACE.

MAINTENANCE
1. THE RECOMMENEDED PERMANENT GRASS SPECIES MAY REQIRE TWO YEARS FOR ESTABLISHMENT DEPENDIG ON SITE CONDITIONS.
2. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS, SOIL AMENDMENTS, AND RE-SEEEDINGS.
3. IF WEEDY EXOTIC SPECIES HAVE TAKEN OVER AREAS AFTER THE FIRST GROING SEASON, THE INVASIVE SPECIES MUST BE ERADICATED TO ALLOW STAIVE SPECIES TO GROW.
4. MONITORING THE SITE UNTIL LONG-TERM STABILITY HAS BEEN ESTABLISHED.

PERMANENT SEEDING MIXTURE (2 LB/ACRE)	
Name	Percent of Seed Mix
Agrostis alba	20
Tridens flavus	20
Agrostis hyemalis	5
Agrostis stolonifera	5
Chrysanthemum leucanthemum	5
Coreopsis lanceolata	5
Coreopsis tinctoria	5
Elymus virginicus	5
Panicum clandestinum	5
Rudbeckia hirta	5
Echinacea purpurea	3
Eupatorium perfoliatum	3
Chamaecrista fasciculata	2
Chamaecrista nictitans	1
Cosmos bipinnatus	1
Desmodium canadense	1
Helianthus angustifolius	1
Heliopsis helianthoides	1
Hibiscus moscheutos	1
Lespedeza capitata	1
Lespedeza virginica	1
Liatris spicata	1
Silphium perfoliatum	1
Verbena hastata	1
Eupatorium coelestinum	0.5
Monarda fistulosa	0.25
Pycanthemum tenuifolium	0.25

*ERNST SEEDS "ERNMX-305, NC FACW MIX"

PERMANENT STREAM BANK SEEDING MIXTURE (4 LB/ACRE)	
Name	Percent of Seed Mix
Panicum rigidulum	35
Panicum anceps	23
Elymus virginicus	20
Carex lurida	12
Juncus effusus	3
Helenium flexuosum	2
Hibiscus moscheutos	2
Scirpus cyperinus	2
Juncus tenuis	1

Planted Permanent Seed Mix			
Species	**Percentage**	**Species**	**Percentage**
Asclepias incarnata	0.3	*Helianthus angustifolius*	0.8
Agrostis gigantea	16	*Heliopsis helianthoides*	1.2
Agrostis hyemalis	4	*Hibiscus moscheutos*	0.8
Agrostis stolonifera	4	*Juncus effusus*	0.6
Carex lurida	3.22	*Lespedeza capitata*	0.8
Carex vulpinoidea	10	*Lespedeza virginica*	0.8
Chamaecrista fasciculata	1.6	*Liatris spicata*	0.8
Chamaecrista nictitans	0.8	*Mimulus ringens*	0.06
Chrysanthemum leucanthemum	4	*Monarda fistulosa*	0.2
Coreopsis lanceolata	4	*Panicum virgatum*	4
Coreopsis tinctoria	4	*Pycnanthemum tenuifolium*	0.2
Cosmos bipinnatus	0.8	*Rhexia virginica*	0.06
Desmodium canadense	0.8	*Rudbeckia hirta*	4
Echinacea purpurea	2.4	*Scirpus cyperinus*	0.06
Elymus virginicus	8.6	*Silphium perfoliatum*	0.8
Eupatorium coelestinum	0.4	*Symphyotrichum puniceum*	0.1
Eupatorium perfoliatum	2.5	*Tridens flavus*	16
Glyceria striata	0.1	*Vernonia noveboracensis*	0.2
Helenium autumnale	0.2	*Verbena hastata*	0.8
		TOTAL	**100**

RECORD DRAWINGS ONLY
NORTH CAROLINA PROFESSIONAL SEAL
Rebecca Stubbs
Nov 15 2022 3:46 PM
Rebecca Stubbs, PE 039073
ENGINEER
REBECCA STUBBS
RECORD DRAWINGS ONLY

MCADAMS
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Durham, NC 27713
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fax 919. 361. 2269
license number: C-0293, C-187
www.mcadamsco.com

LAUREL SPRINGS MITIGATION PLAN

AS-BUILT DRAWINGS
AVERY COUNTY, NORTH CAROLINA

RESTORATION SYSTEMS LLC

Axiom Environmental, Inc.

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-LS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	N.T.S.
DATE	11.15.2022

PLANTING NOTES

L5.01

AS-BUILT SURVEY DRAWINGS FOR:

RESTORATION SYSTEMS, LLC
"LAUREL SPRINGS MITIGATION SITE"

THE STATE OF NORTH CAROLINA,
NCDEQ DEPARTMENT OF MITIGATION SERVICES
AVERY COUNTY, NORTH CAROLINA
SPO NOS. 06-CD DMS PROJECT ID NO. 100122

OCTOBER 21, 2022

SURVEYORS CERTIFICATION(S)

Surveyor's disclaimer: No attempt was made to locate any cemeteries, wetlands, hazardous material sites, underground utilities or any other features above, or below ground other than those shown. However, no visible evidence of cemeteries or utilities, aboveground or otherwise, was observed by the undersigned (other than those shown). Wetlands shown hereon were provided by Restoration Systems, LLC.

I certify that the survey is of an existing parcel or parcels of land or one or more existing easements and does not create a new street or change an existing street.

I JOHN A. RUDOLPH , certify that this plat was prepared under my supervision from an actual field survey made under my supervision, of as-built conditions.

That the boundaries not surveyed are clearly indicated as such and were plotted from information as referenced hereon; That the ratio of precision as calculated was 1:7,500+ and that the global navigational satellite system (GNSS) was used to perform this survey and the following information was used:

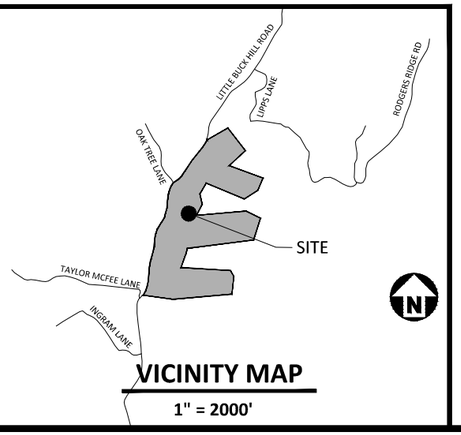
Class of Survey: CLASS B (HORIZONTAL) CLASS B (VERTICAL)
Positional Accuracy: 0.12 feet (HORIZONTAL)
Type of GPS field procedure: RTK
Dates of survey: June 2022
Datum/Epoch: NAD 1983(2011)
Published/Fixed Control Use: OPUS
Geoid Model: 2012B CONUS
Combined Grid Factor: 0.99994318 GROUND TO GRID
Units: US SURVEY FEET

That this plat meets the requirements of the standards of practice for land surveying in North Carolina. Witness my hand and seal this 13th day of September , 2022.

L-4194
Professional Land Surveyor License Number

SEAL OR STAMP

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH



VICINITY MAP
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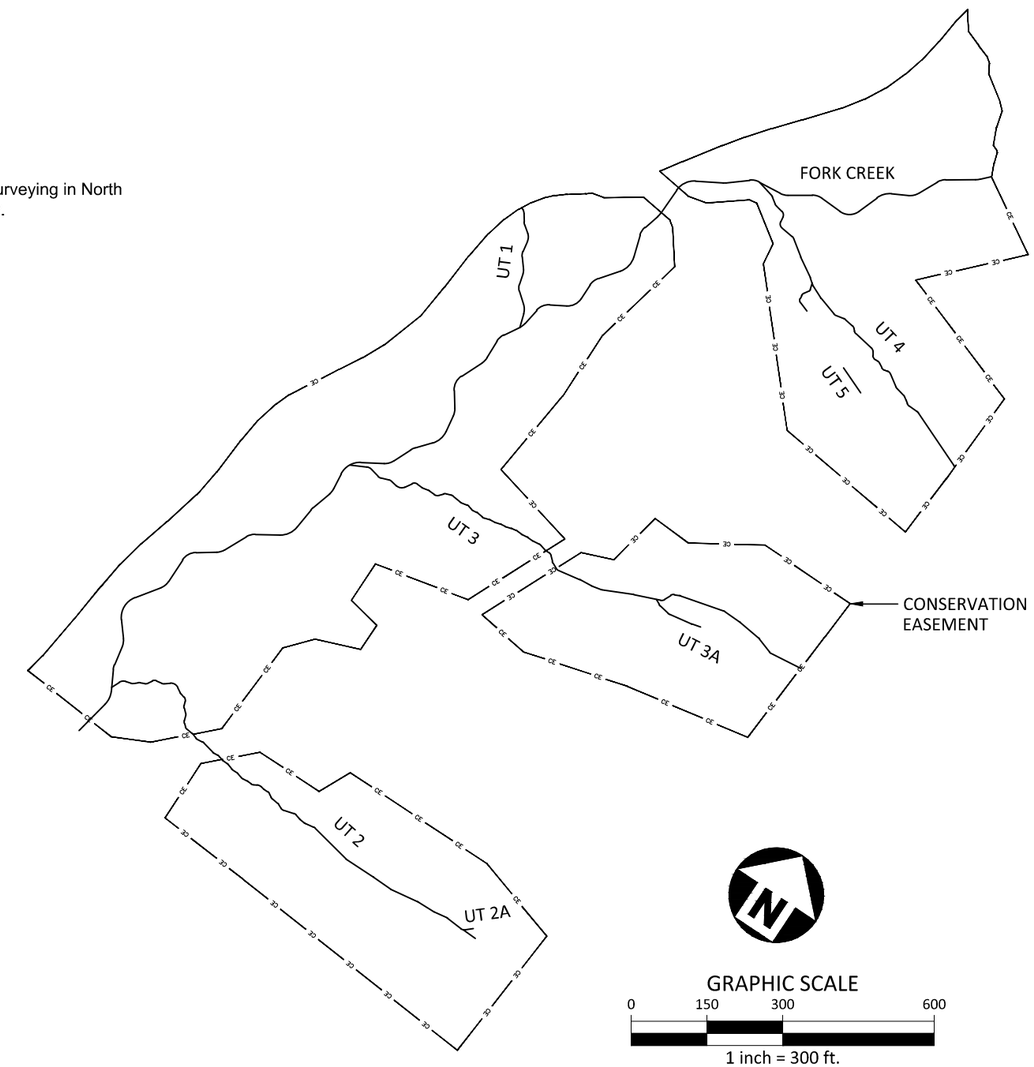


GRAPHIC SCALE
0 150 300 600
1 inch = 300 ft.

GENERAL NOTES:

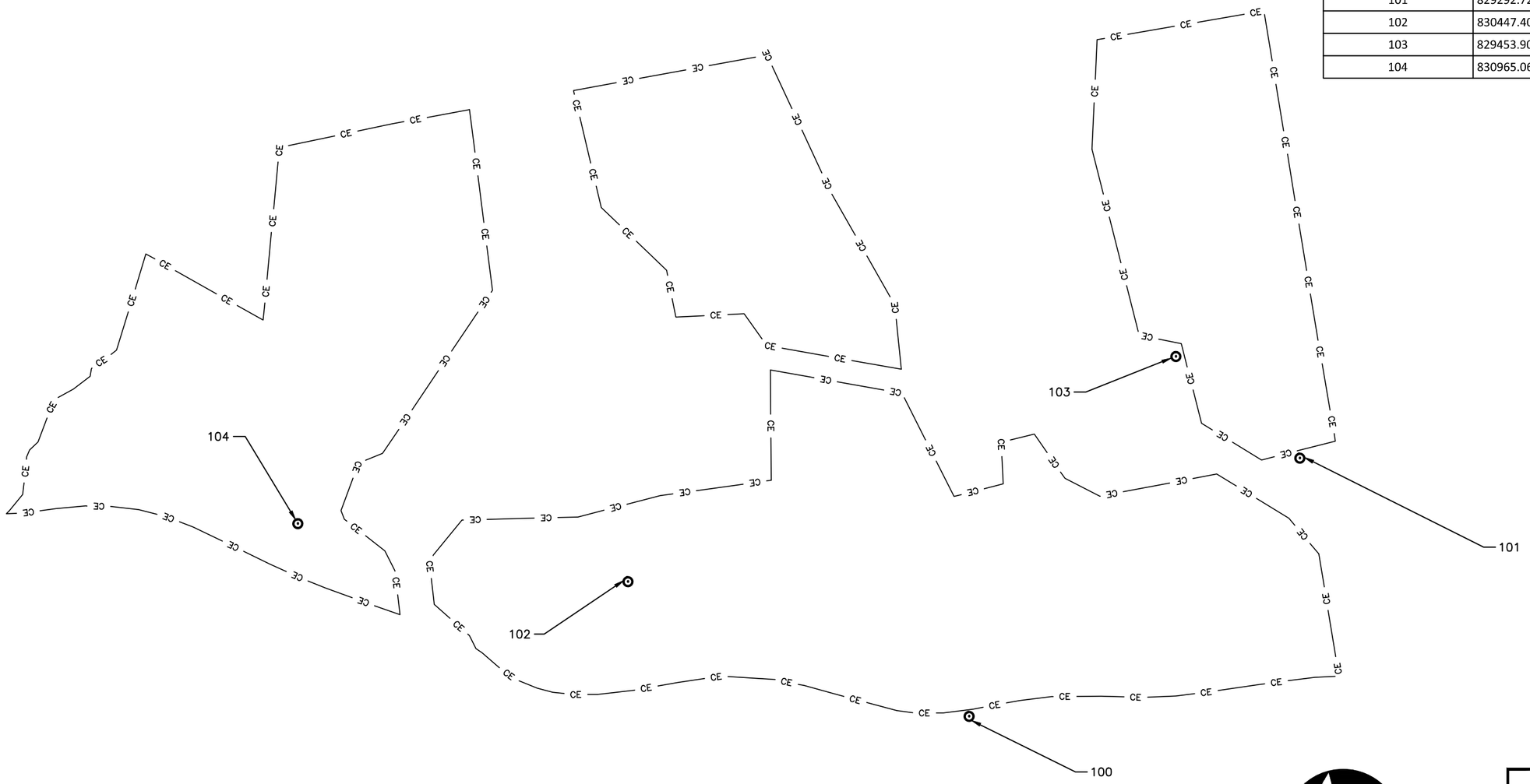
1. THIS IS A TOPOGRAPHIC SURVEY FOR INFORMATIONAL AND DESIGN PURPOSES ONLY. IT SHOULD NOT BE USED FOR CONVEYANCE OR LEGAL PURPOSES.
2. CONSERVATION EASEMENT BOUNDARIES SHOWN HEREON WERE TAKEN FROM PLATS OF SURVEY ENTITLED; "CONSERVATION EASEMENT FOR THE STATE OF NORTH CAROLINA DIVISION OF MITIGATION SERVICES OVER A PORTION OF THE LANDS OF RESTORATION SYSTEMS, LLC (CURRENT OWNER PER D.B. 550, PG. 723-728) DMS PROJECT ID# 100122 SPO NUMBERS 06-CD LAUREL SPRINGS" AND RECORDED IN PLAT BOOK 45, PAGE 136-137 DATED OCTOBER 12, 2020, RECORDED IN THE AVERY COUNTY REGISTRY.
3. THE AREA REPRESENTED IN THIS SURVEY IS NOT LOCATED IN A FLOOD HAZARD BOUNDARY ACCORDING TO FEMA MAP NUMBER 3710181200J, ZONE X, DATED DECEMBER 02, 2008.
4. STATIONING AND STREAM LABELS FOR PLAN AND PROFILES ARE BASED ON FINAL PLANS AND DESIGN CENTERLINES PROVIDED BY RESTORATION SYSTEMS.
5. TOPOGRAPHIC SURVEY WAS NOT CONDUCTED IN AREAS DEEMED FOR MITIGATION TYPE PRESERVATION.

SHEET INDEX

CLIENT
RESTORATION SYSTEMS, LLC
1101 HAYNES ST, SUITE 211
RALEIGH, NC 27604
CONTACT: WORTH CREECH
PHONE: 919. 389. 3888

k2 design group
774 S. Beston Road
La Grange, NC 28551
252.582.3097
www.k2designgroup.com
License # C-2111

CONTROL POINT LOCATIONS			
CONTROL POINT	NORTHING	EASTING	ELEVATION
100	829943.8048	1117697.5263	2951.36
101	829292.7246	1117983.3841	2948.17
102	830447.4092	1118061.3990	2941.26
103	829453.9034	1118202.3079	2973.08
104	830965.0697	1118294.5656	2958.02



GRAPHIC SCALE

0 100 200 400

1 inch = 200 ft.

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH

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RESTORATION SYSTEMS | LLC

LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19010-ESMT
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1" = 60'
DATE	10.19.2022

CONSERVATION EASEMENT AND CONTROL POINTS EXHIBIT

C1.00

LEGEND AND SYMBOLS

MAJOR CONTOUR

MINOR CONTOUR

CE — CE — CONSERVATION EASEMENT

PROPOSED STREAM CENTERLINE

STREAM CENTERLINE

TOP OF BANK

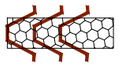
LOG CROSS VANE

LOG VANE

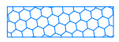
LOG J-HOOK

STEP SILL

ROCK SILL

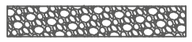


DROP STRUCTURE



STEP POOL SEQUENCE

CULVERT



GRAVEL ROAD

MONITORING – CROSS SECTION

MONITORING – STREAM GAGUE

MONITORING – GROUNDWATER WELL

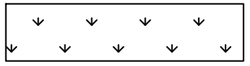
MONITORING – RAIN GAGUE

VP

MONITORING – VEGETATION PLOT

WETLAND REHABILITATION AREA

WETLAND RE-ESTABLISHMENT AREA



WETLAND PRESERVATION AREA

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RESTORATION SYSTEMS | LLC

LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

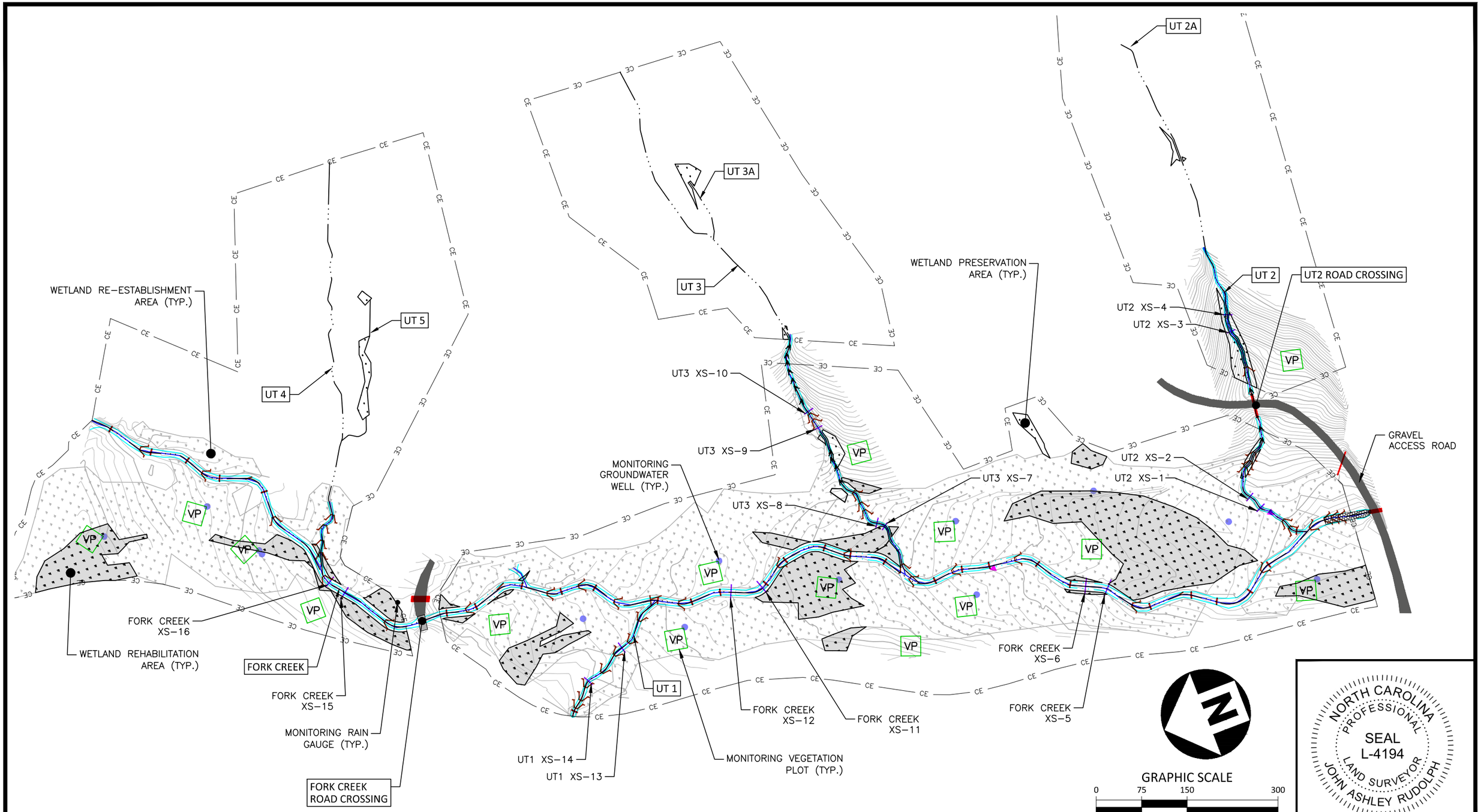
AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	NTS
DATE	10.19.2022

LEGEND AND SYMBOLS

C1.01



GRAPHIC SCALE

0 75 150 300

1 inch = 150 ft.

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LAUREL SPRINGS MITIGATION SITE

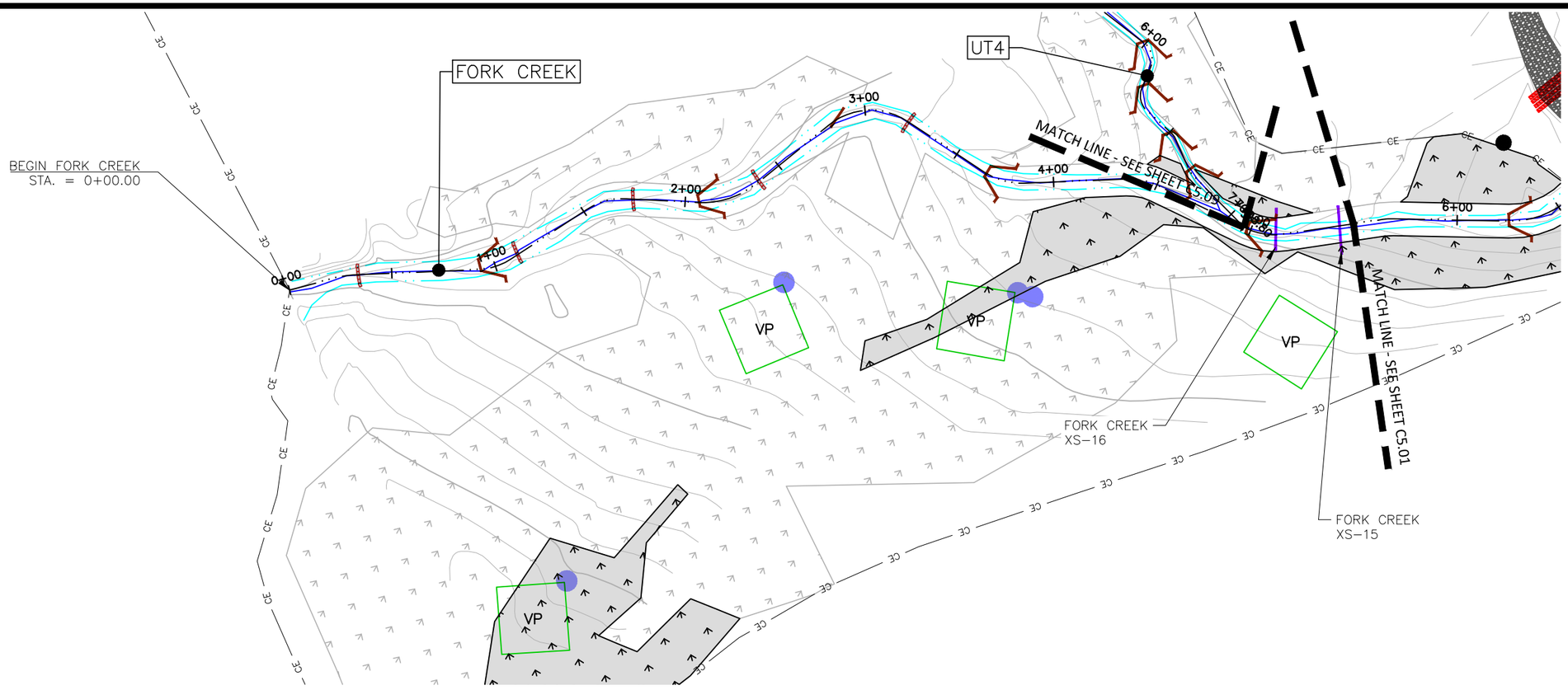
AS-BUILT SURVEY DRAWINGS

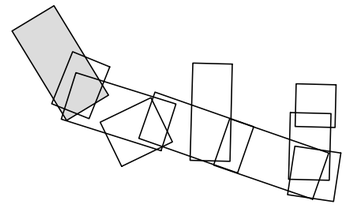
AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1" = 150'
DATE	10.19.2022

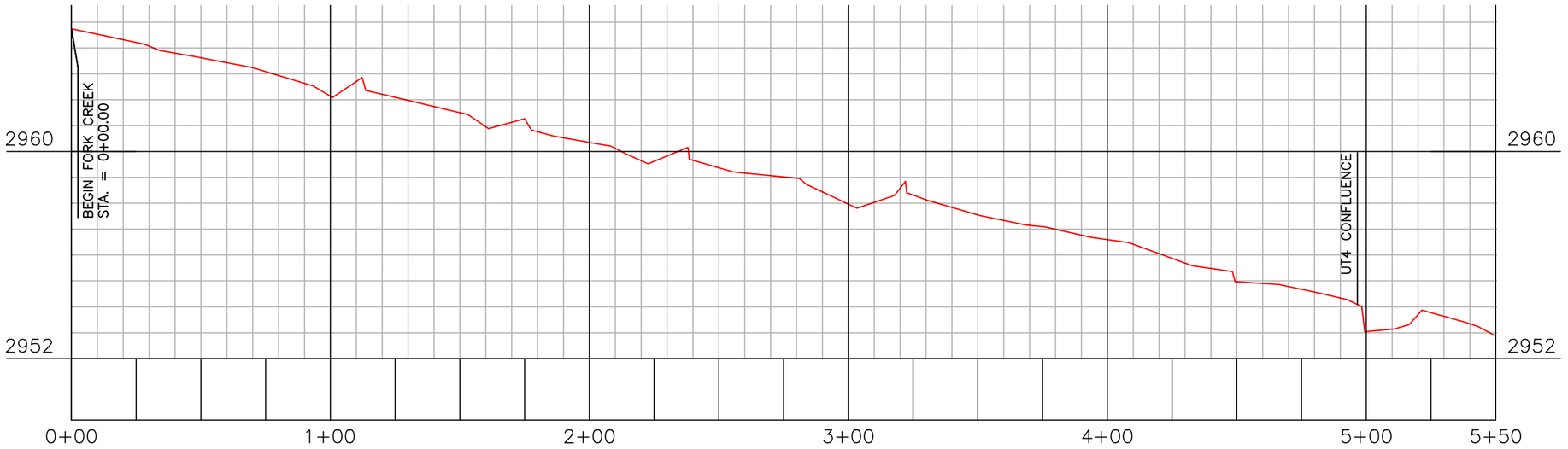
PROJECT OVERVIEW

C1.02





VICINITY MAP
1" = 1000'



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RESTORATION SYSTEMS | LLC

LAUREL SPRINGS MITIGATION SITE

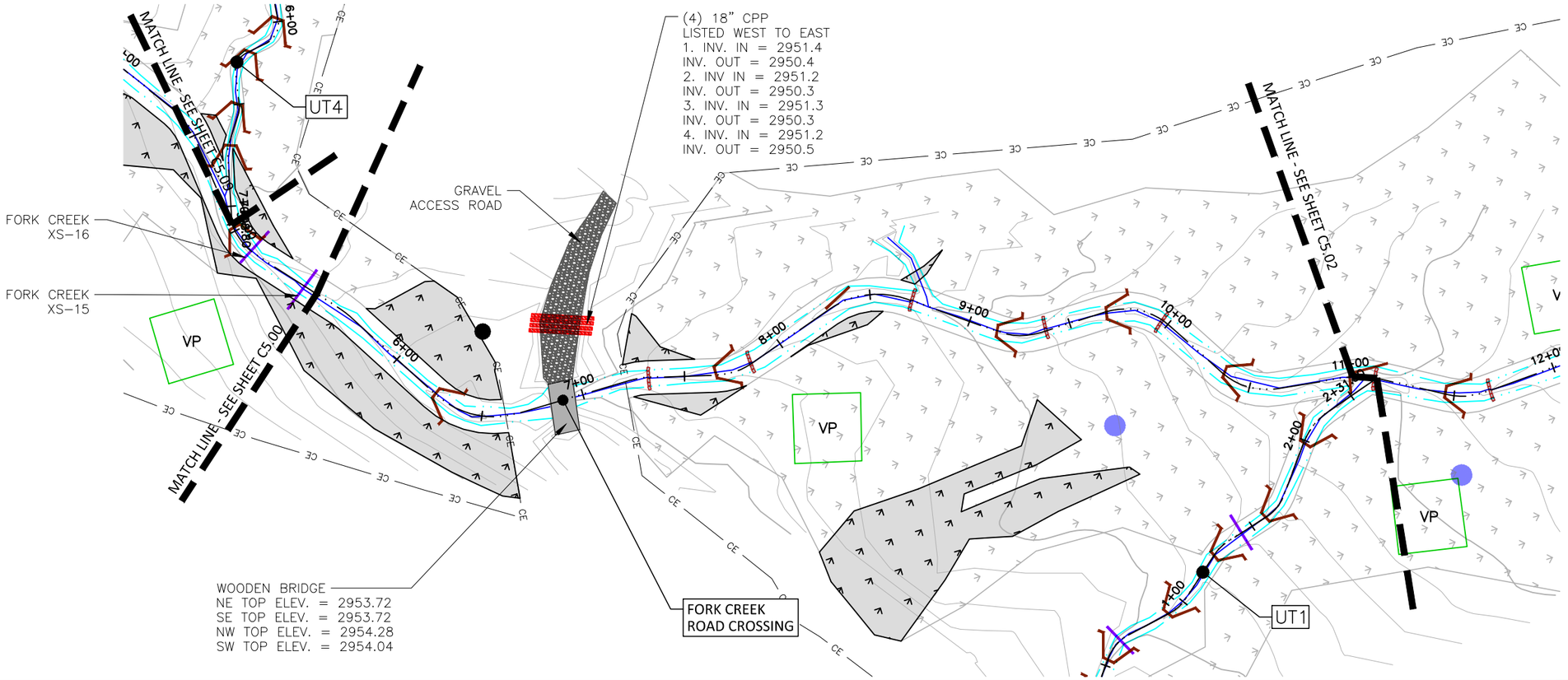
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION

PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	10.19.2022

PLAN AND PROFILE
FORK CREEK
STA. 00+00 THRU STA. 5+50

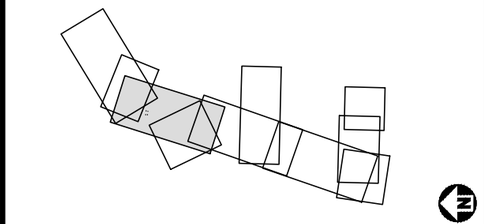
C5.00



GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.



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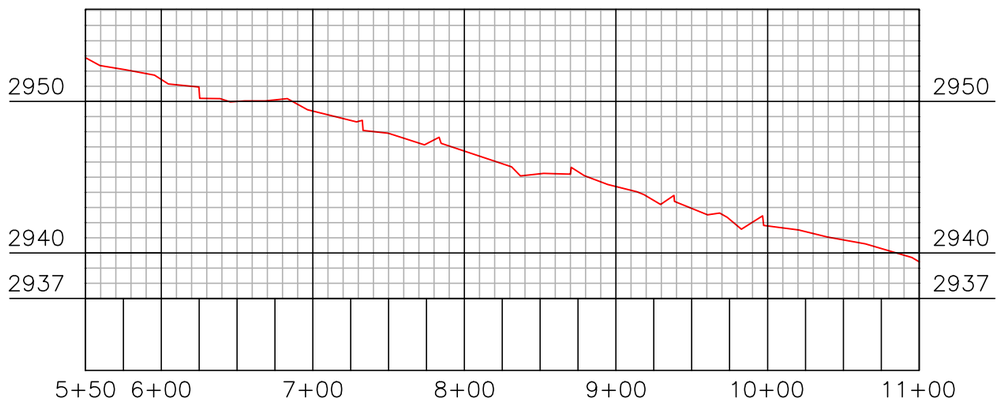
1" = 1000'



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RESTORATION SYSTEMS | LLC

LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION

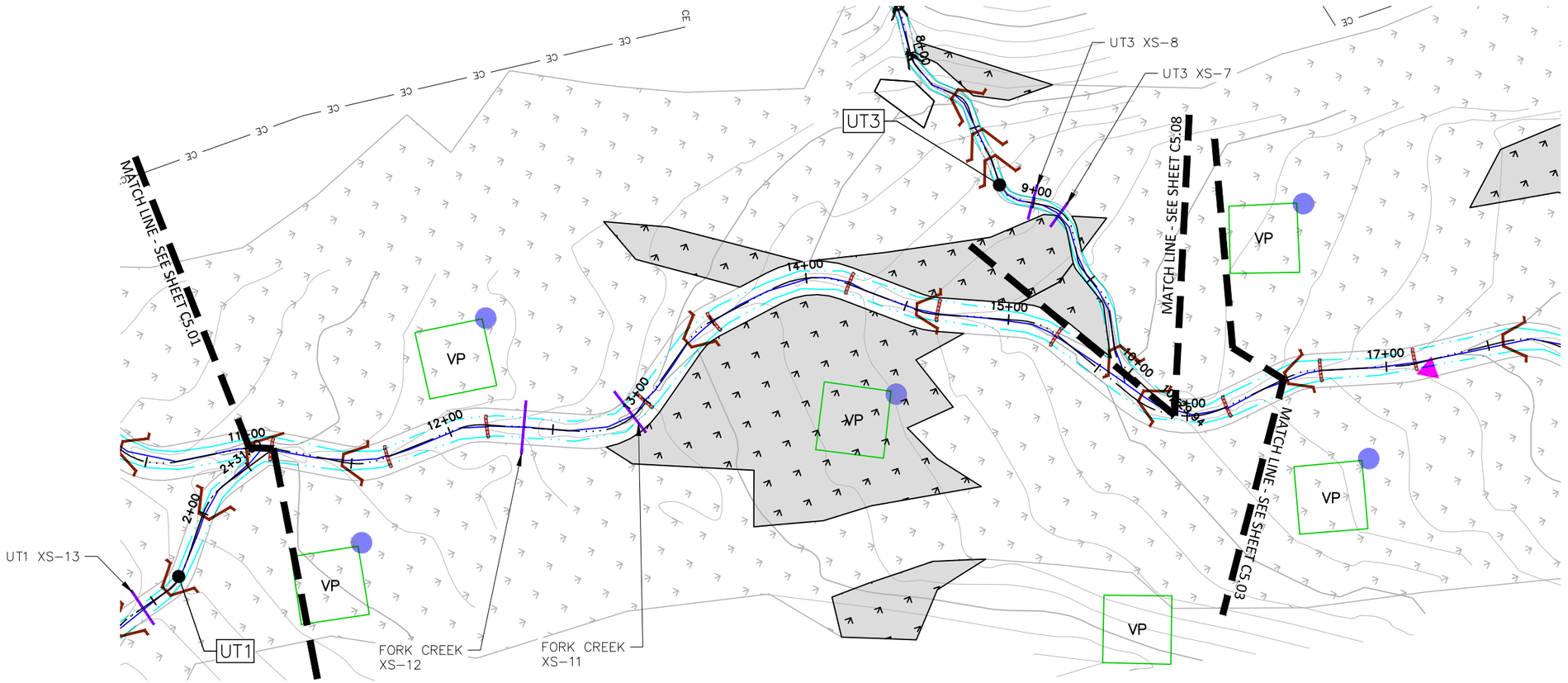
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	10.19.2022

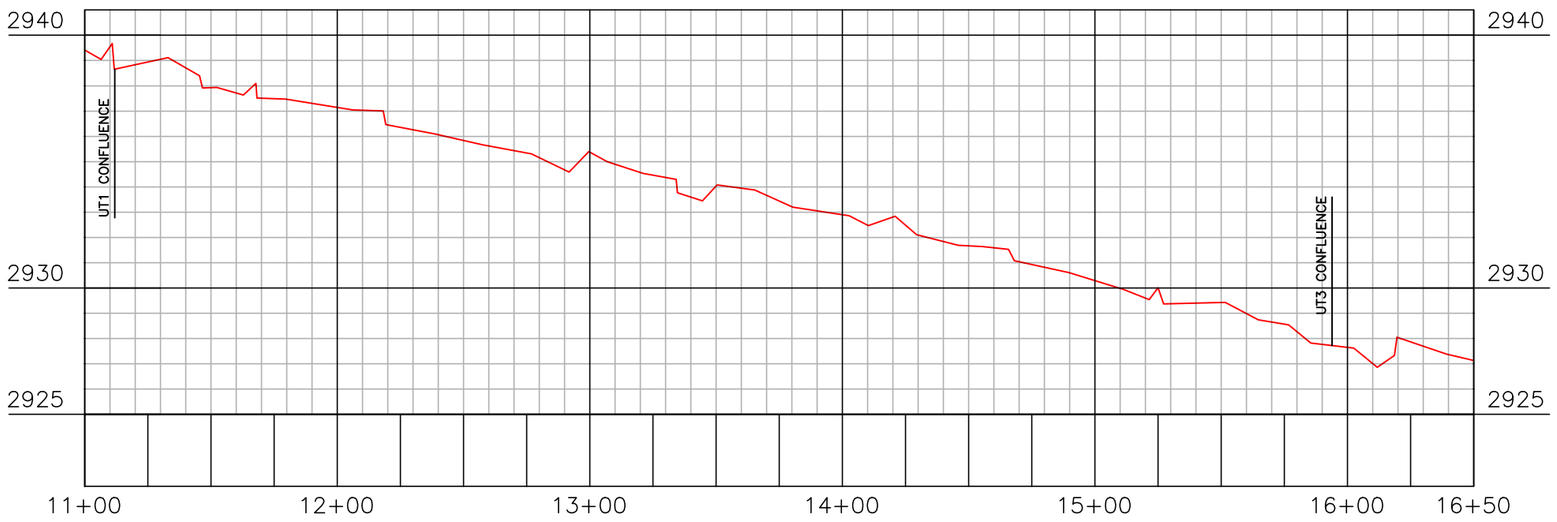
PLAN AND PROFILE

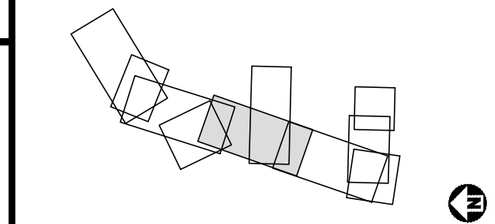
FORK CREEK

STA. 05+00 THRU STA. 11+00

C5.01







VICINITY MAP
1" = 1000'

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH

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RESTORATION SYSTEMS | LLC

LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
PROJECT NO.	AXI-19000
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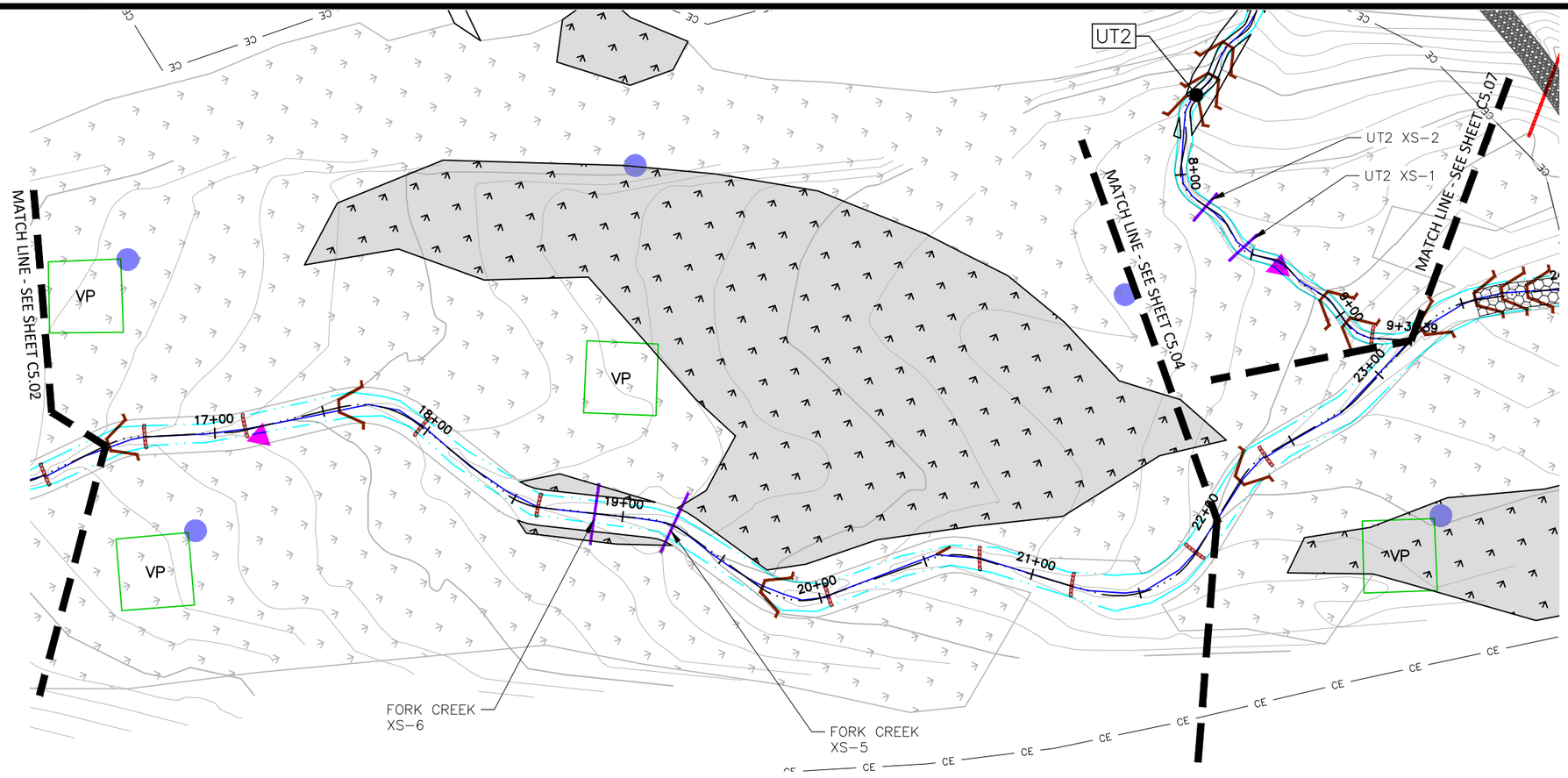
DRAWN BY	CHJ
SCALE	1"=60' / 1"=60'
DATE	10.19.2022

PLAN AND PROFILE
FORK CREEK
STA. 11+00 THRU STA. 16+50

C5.02



GRAPHIC SCALE

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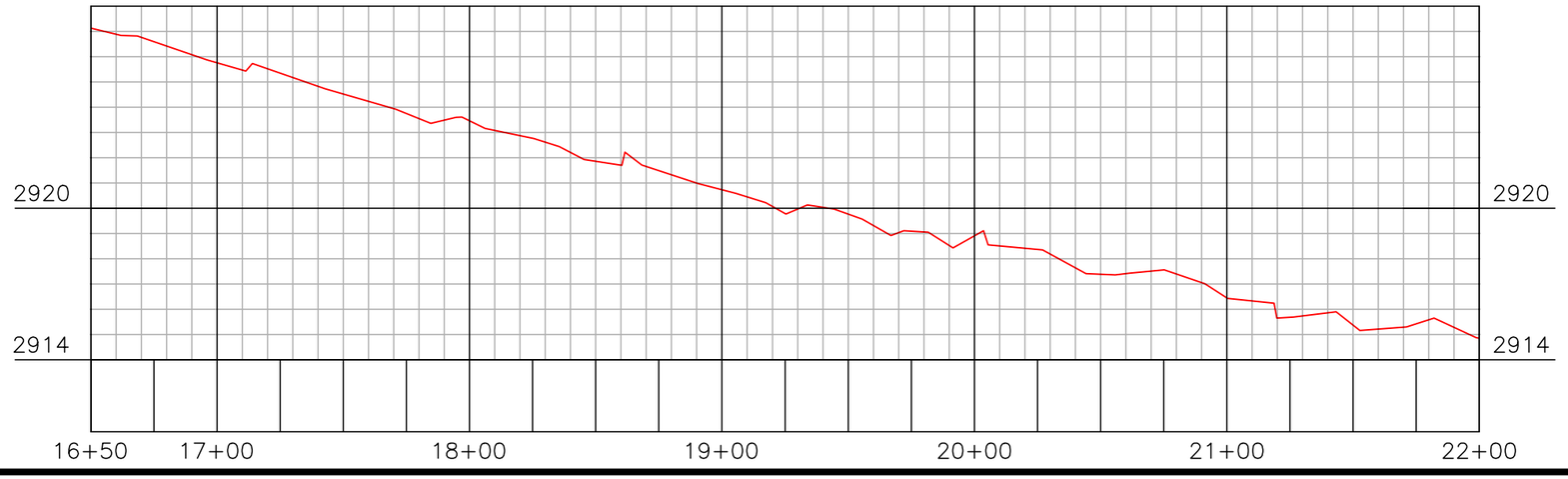
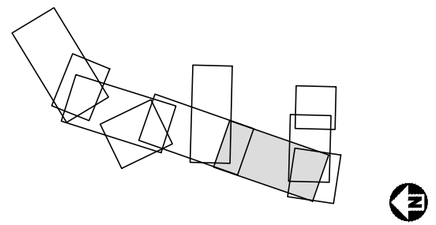
1 inch = 60 ft.





VICINITY MAP

1" = 1000'

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LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

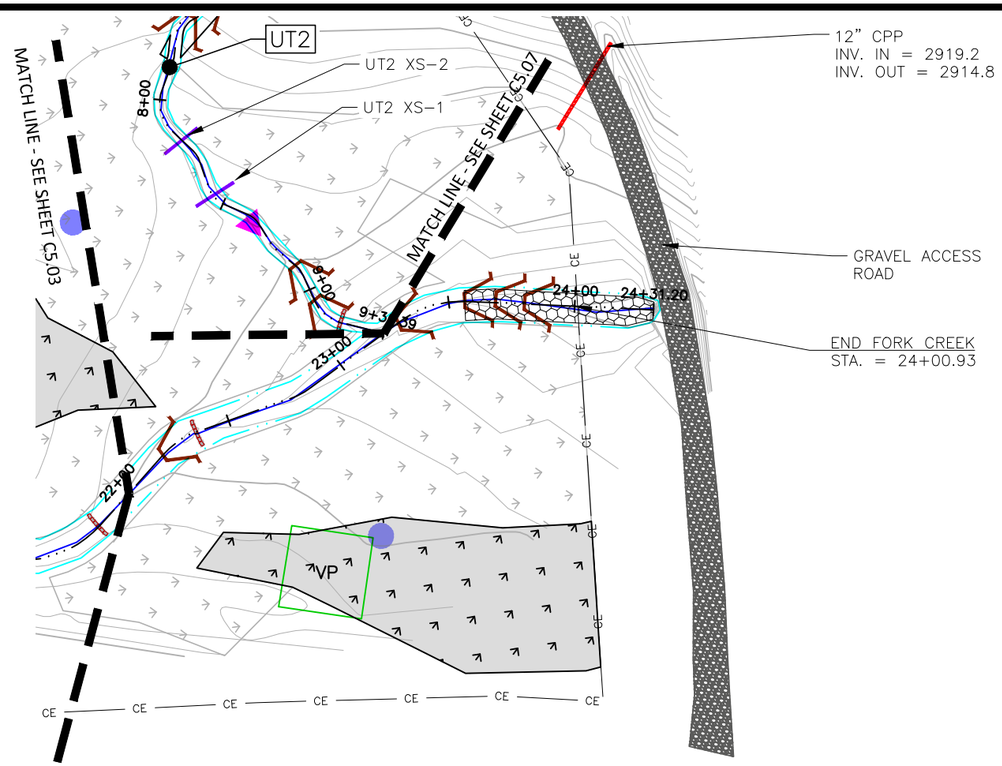
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=60'
DATE	10.19.2022

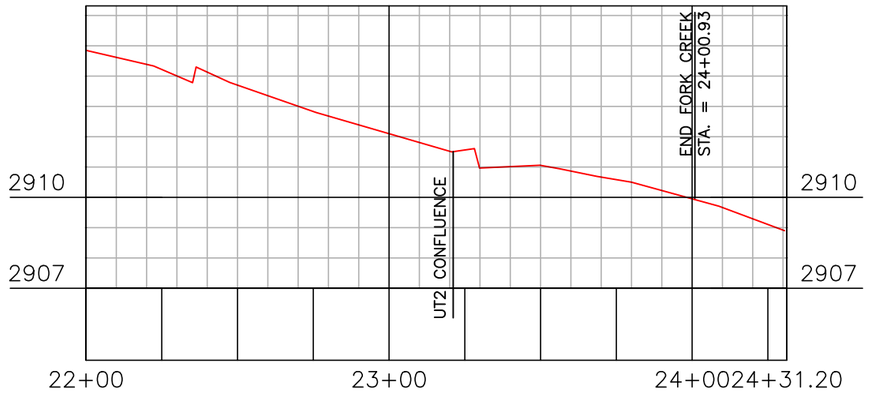
PLAN AND PROFILE

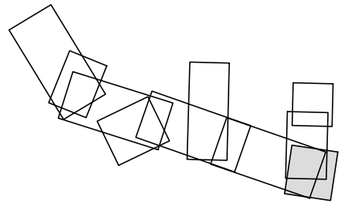
FORK CREEK

STA. 16+50 THRU STA. 22+00

C5.03







VICINITY MAP
1" = 1000'

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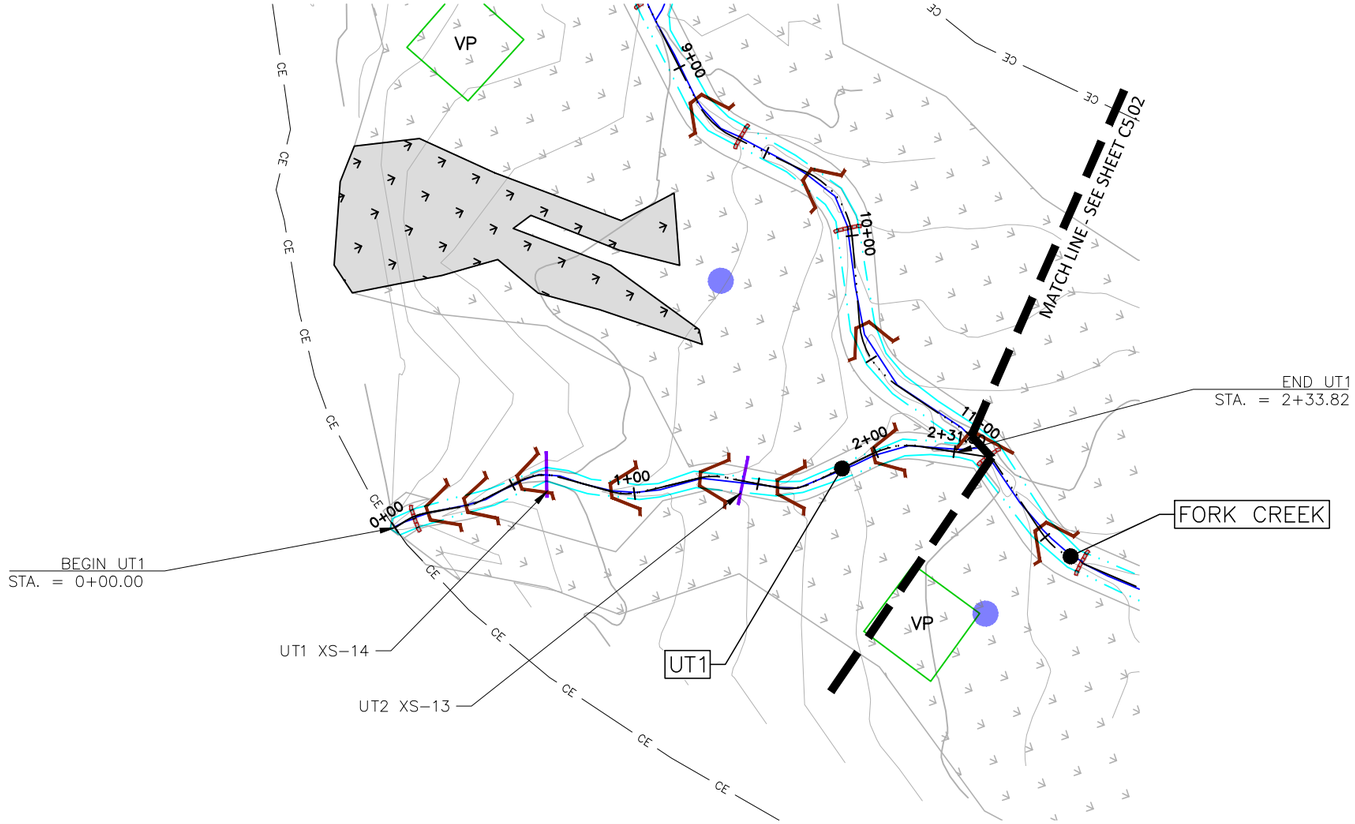
LAUREL SPRINGS MITIGATION SITE

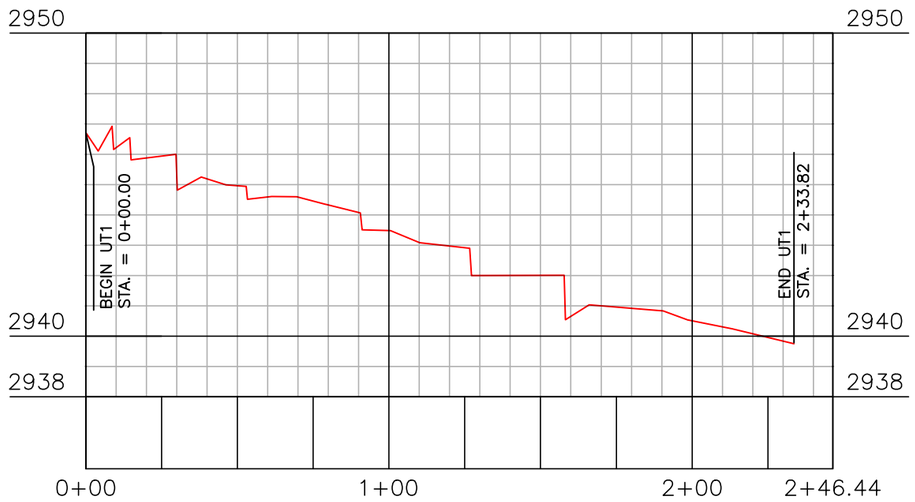
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

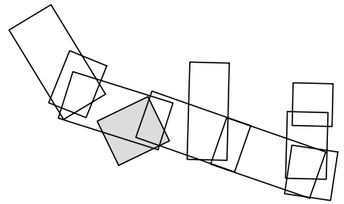
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	10.19.2022

PLAN AND PROFILE
FORK CREEK
STA. 22+00 THRU STA. 24+31.20

C5.04







VICINITY MAP
1" = 1000'

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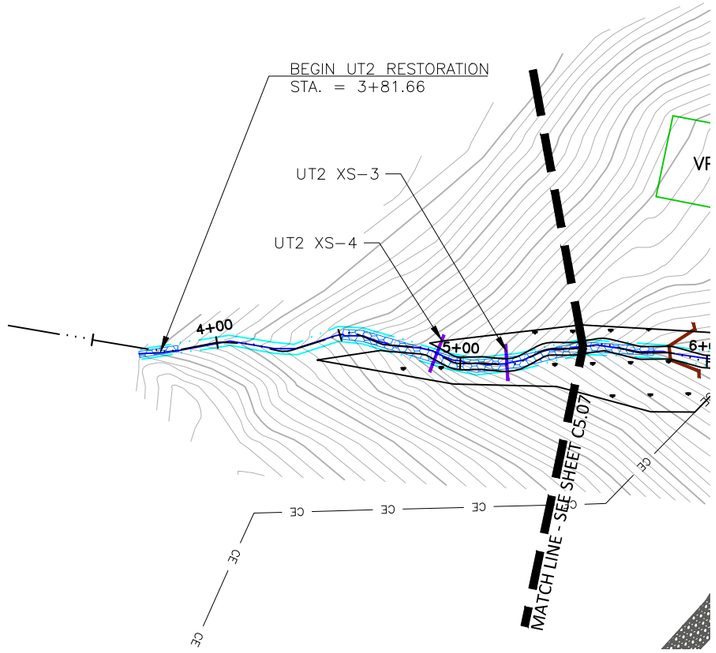
LAUREL SPRINGS MITIGATION SITE

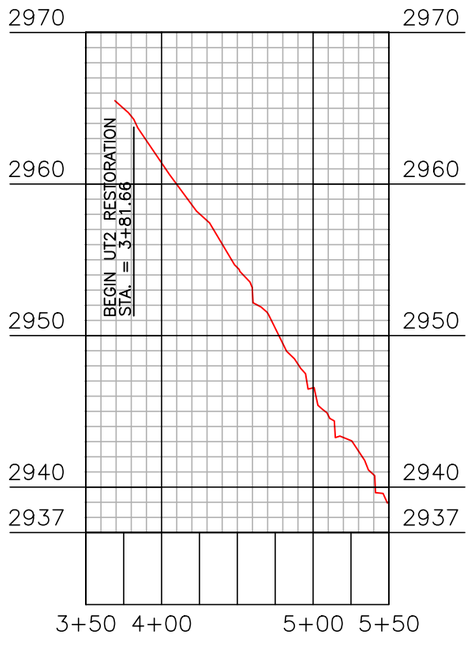
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

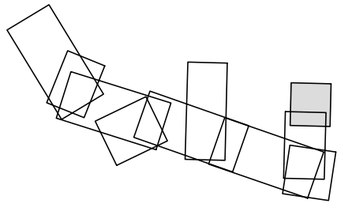
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=50'
DATE	10.19.2022

PLAN AND PROFILE
UT1
STA. 00+00 THRU STA. 2+46.66

C5.05







VICINITY MAP
1" = 1000'

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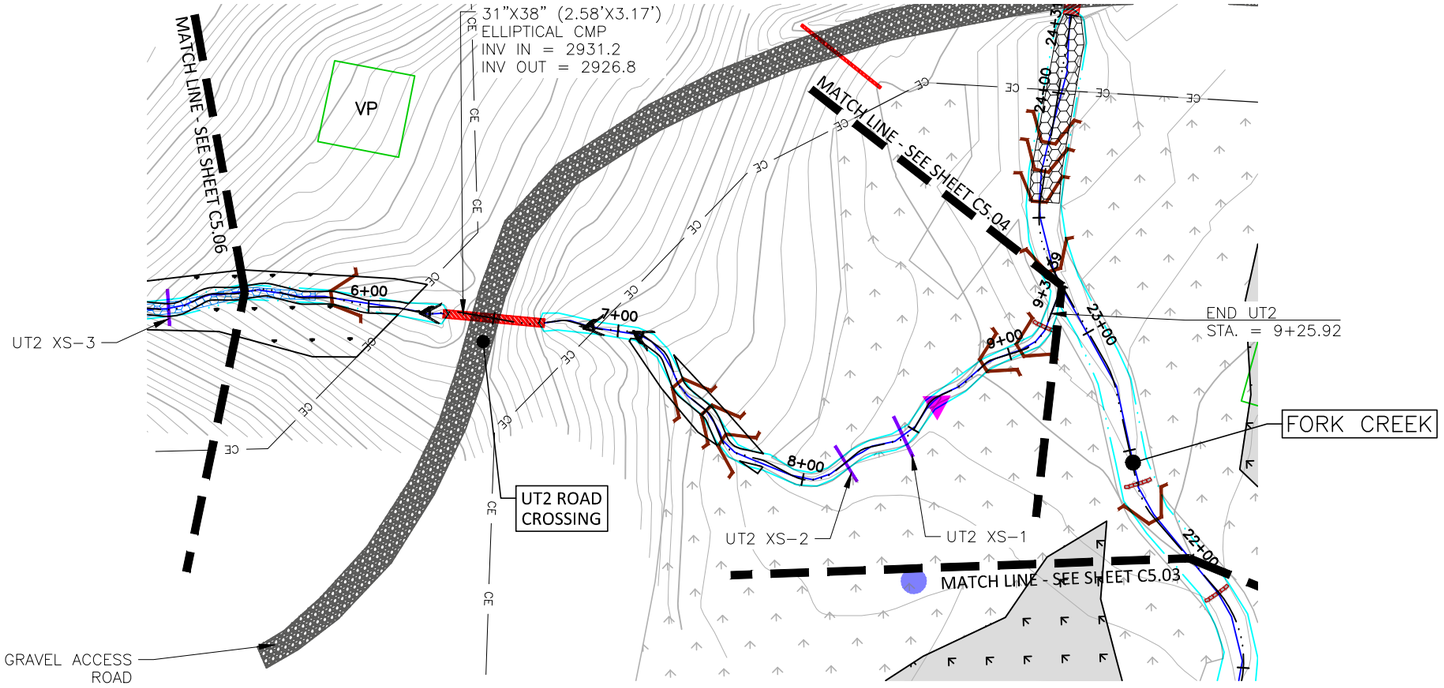
LAUREL SPRINGS MITIGATION SITE

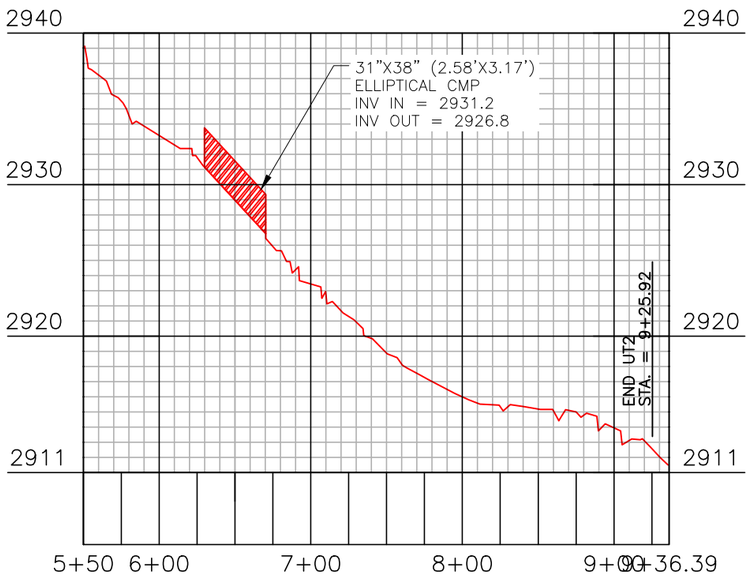
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

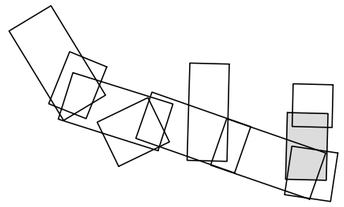
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	10.19.2022

PLAN AND PROFILE
UT2
STA. 03+50 THRU STA. 05+50

C5.06







VICINITY MAP
1" = 1000'

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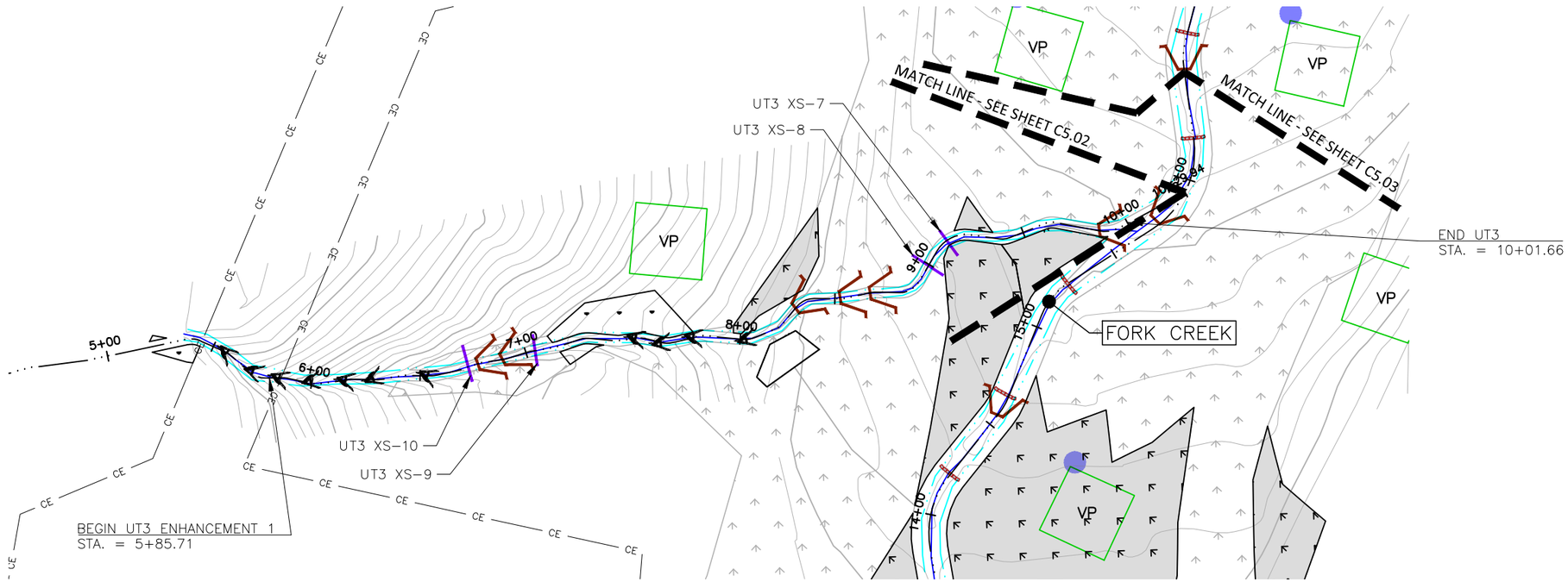
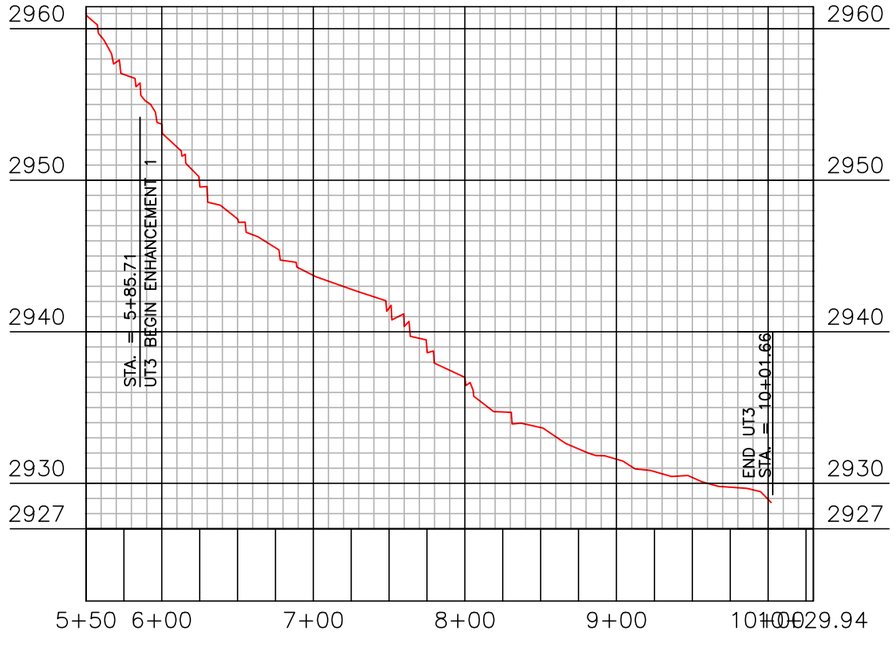
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

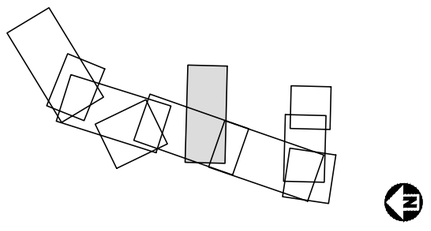
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	10.19.2022

PLAN AND PROFILE
UT2
STA. 05+50 THRU STA. 9+36.39

C5.07







VICINITY MAP
1" = 1000'

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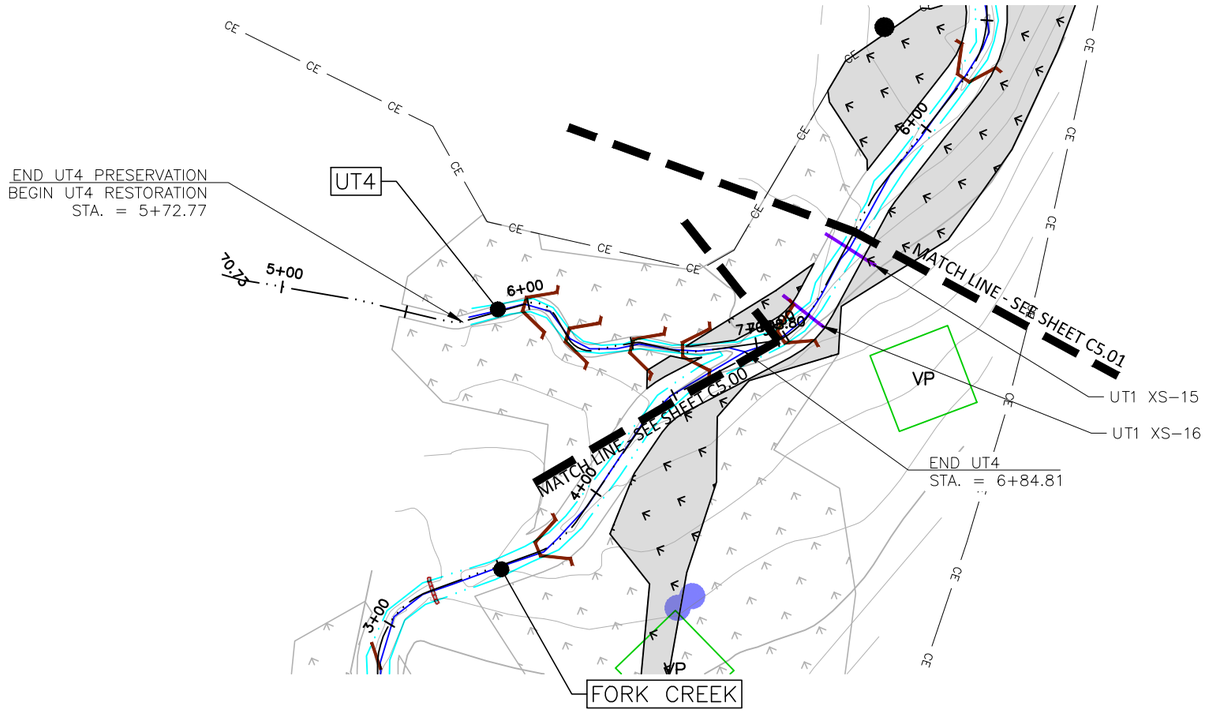
LAUREL SPRINGS MITIGATION SITE

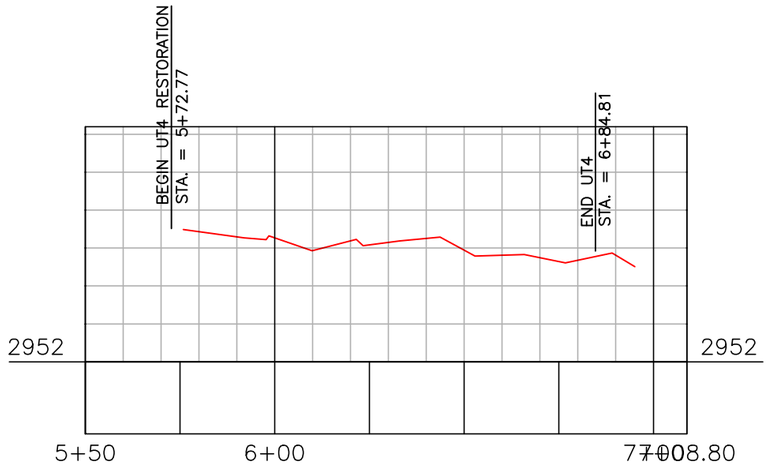
AS-BUILT SURVEY DRAWINGS
AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	10.19.2022

PLAN AND PROFILE
UT3
STA. 05+50 THRU STA. 10+29.24

C5.08

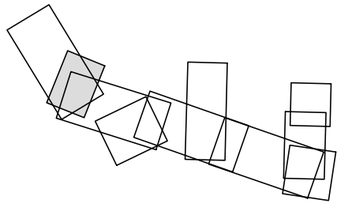




GRAPHIC SCALE

0 30 60 120

1 inch = 60 ft.



VICINITY MAP

1" = 1000'

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LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=40'
DATE	10.19.2022

PLAN AND PROFILE

UT4

STA. 05+50 THRU STA. 07+08.80

C5.09

VP

31"X38" (2.58'X3.17')
ELLIPTICAL CMP
INV IN = 2931.2
INV OUT = 2926.8

6+00

12" CPP
INV. IN = 2919.2
INV. OUT = 2914.8

UT2 ROAD
CROSSING

7+00

GRAVEL ACCESS ROAD

GRAPHIC SCALE
0 15 30 60
1 inch = 30 ft.

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LAUREL SPRINGS MITIGATION SITE

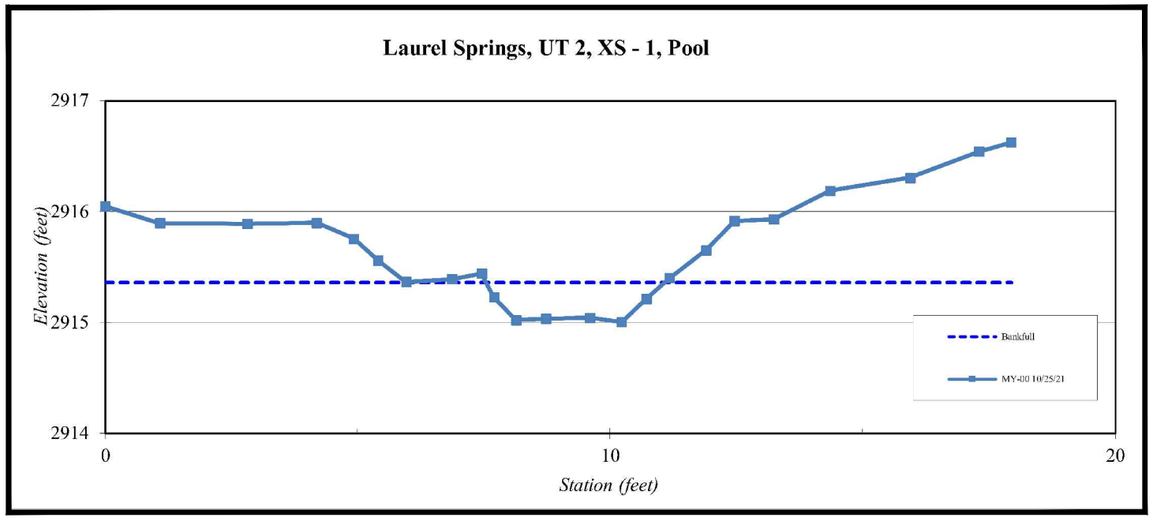
AS-BUILT SURVEY DRAWINGS

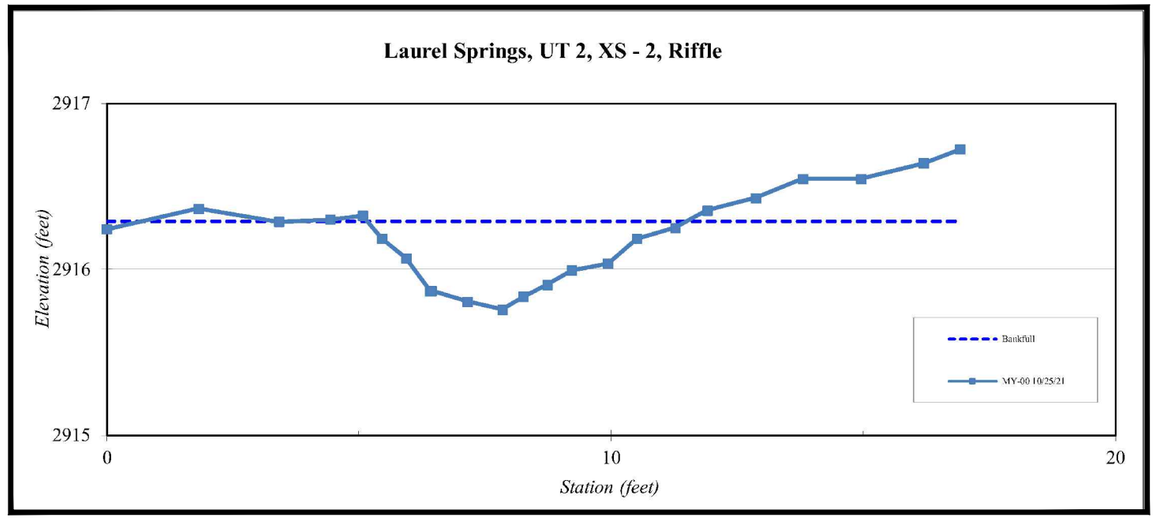
AVERY COUNTY, NORTH CAROLINA

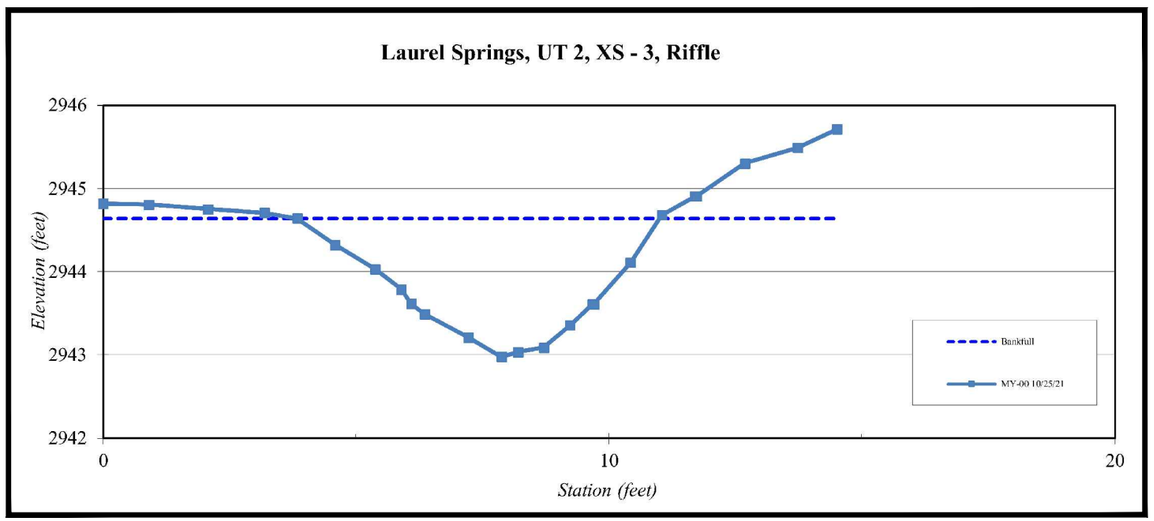
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-P1
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	1"=60' / 1"=100'
DATE	10.19.2022

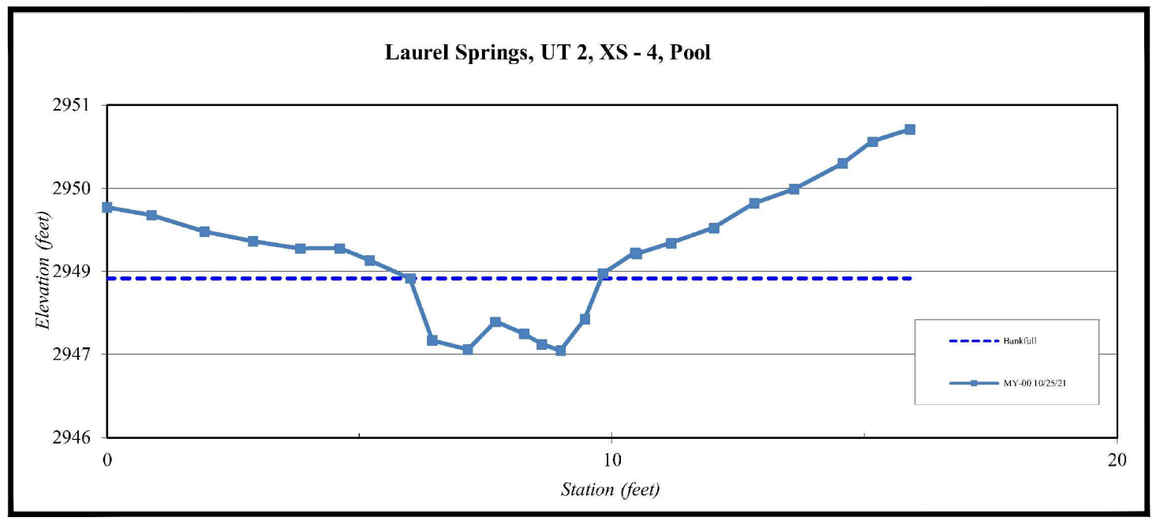
DRIVEWAY GRADING

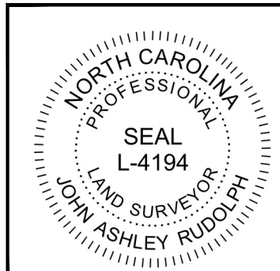
C5.10











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LAUREL SPRINGS MITIGATION SITE

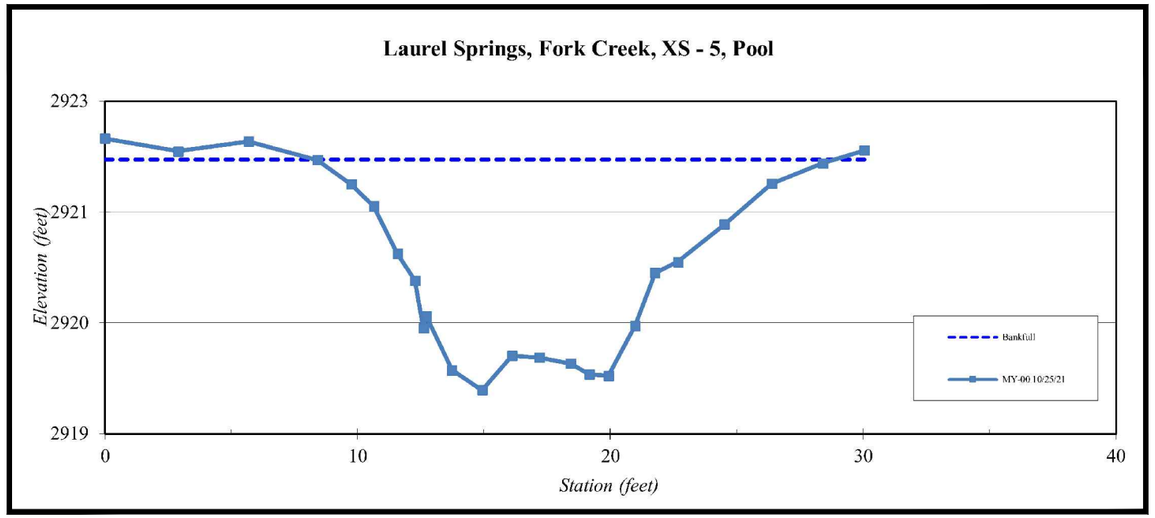
AS-BUILT SURVEY DRAWINGS

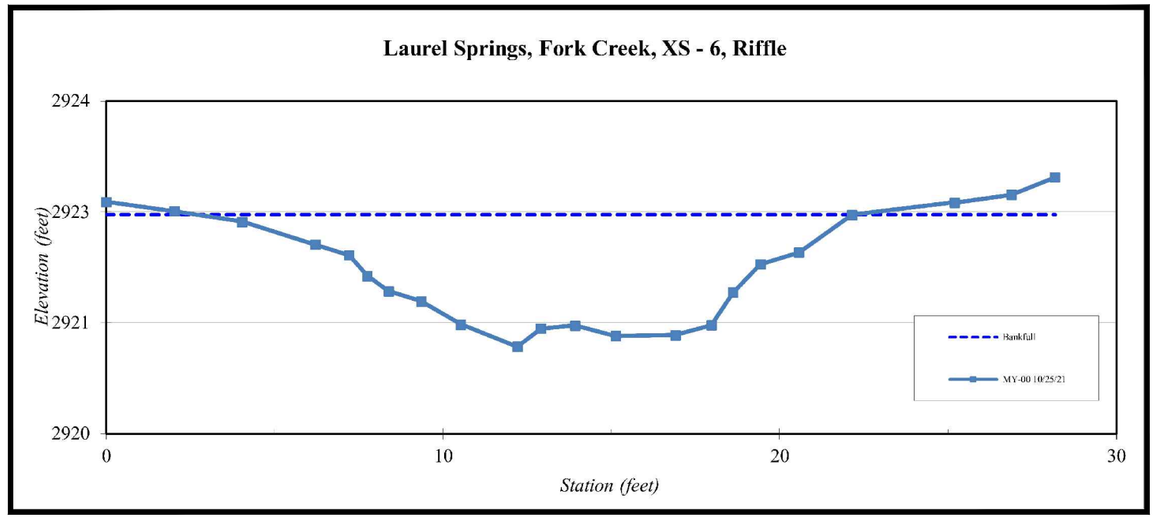
AVERY COUNTY, NORTH CAROLINA

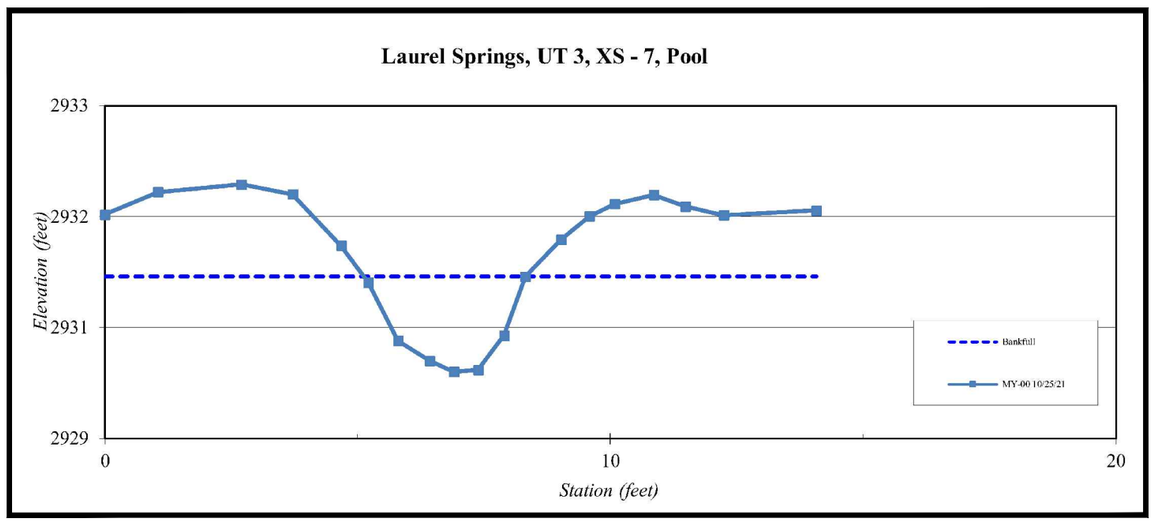
PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-ABS-XS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	N.T.S.
DATE	10.19.2022

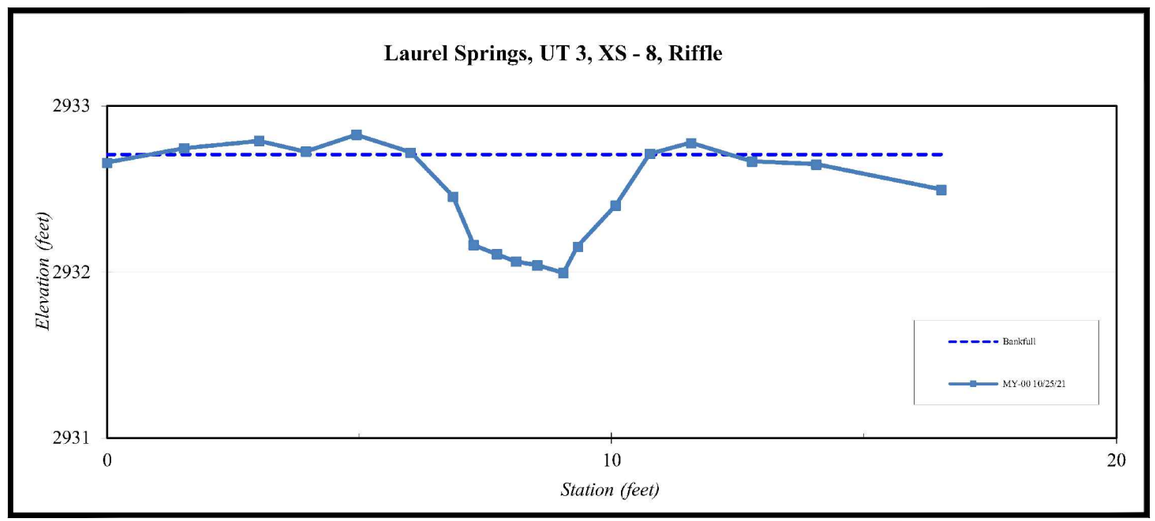
CROSS SECTIONS 1-4

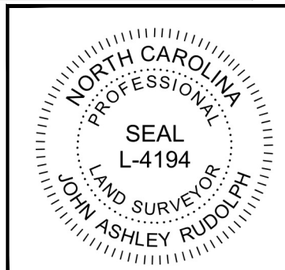
C8.00











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LAUREL SPRINGS MITIGATION SITE

AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION	
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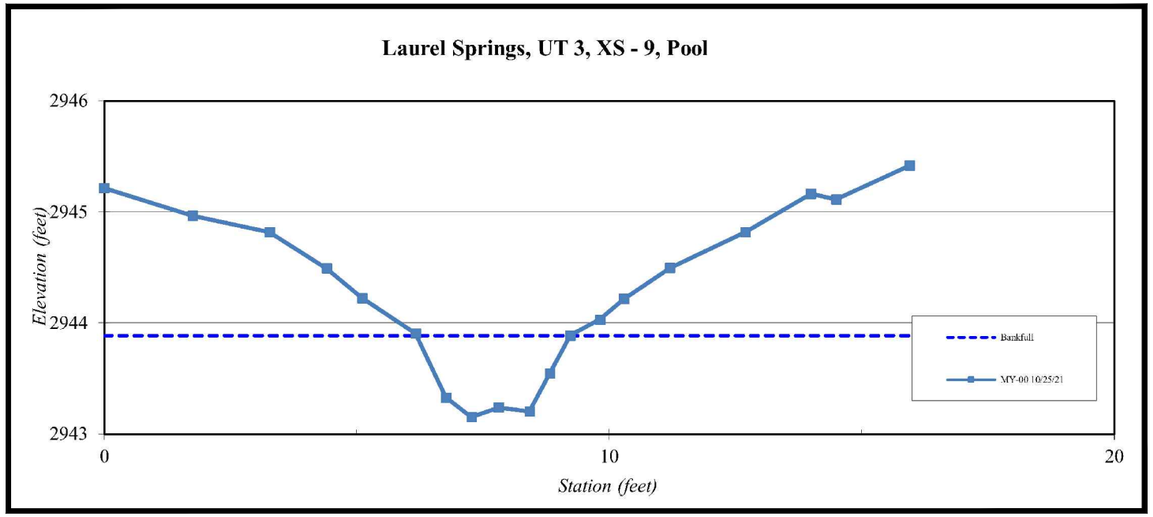
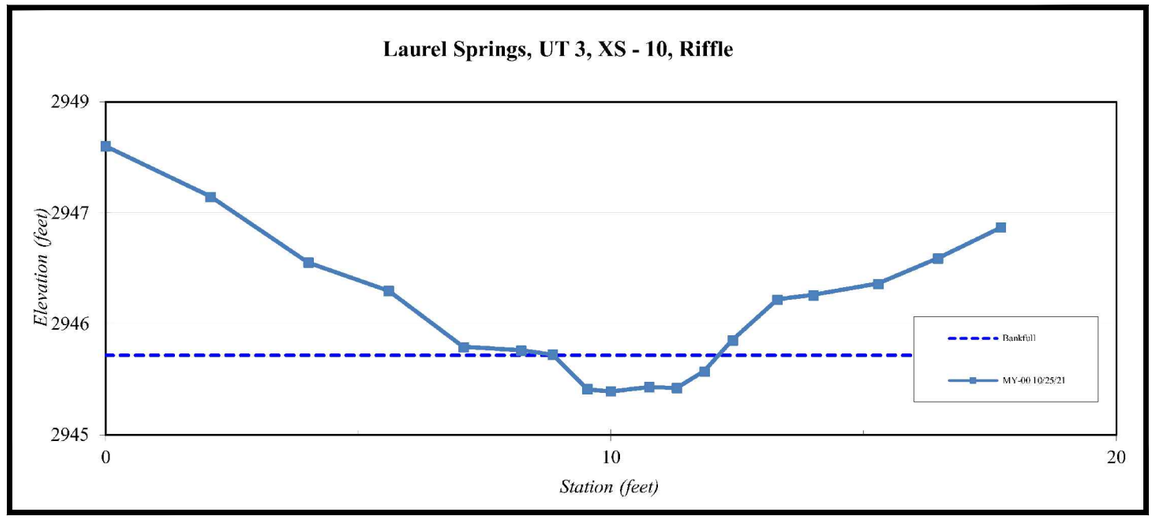
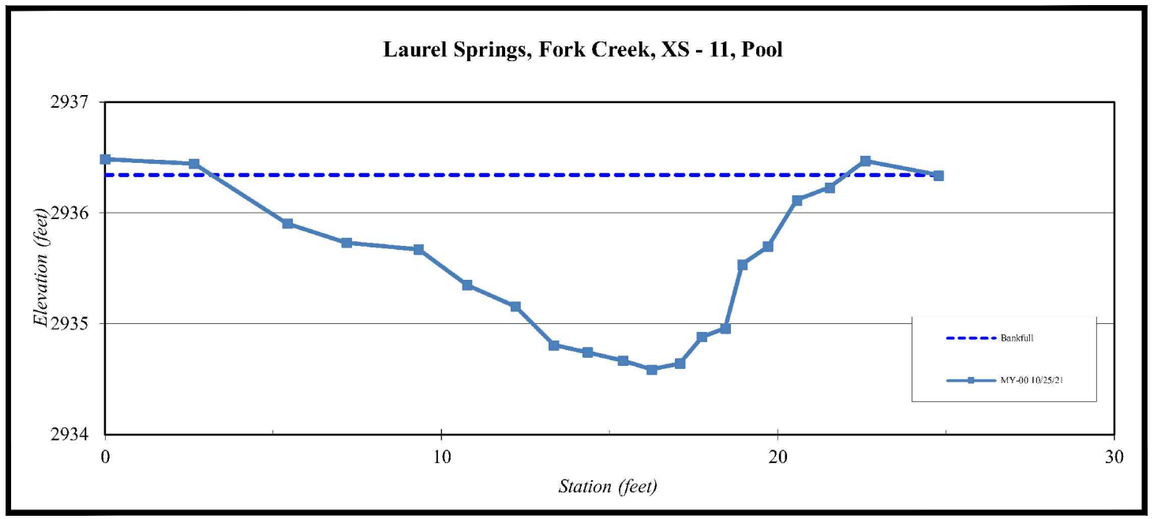
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	N.T.S.
DATE	10.19.2022

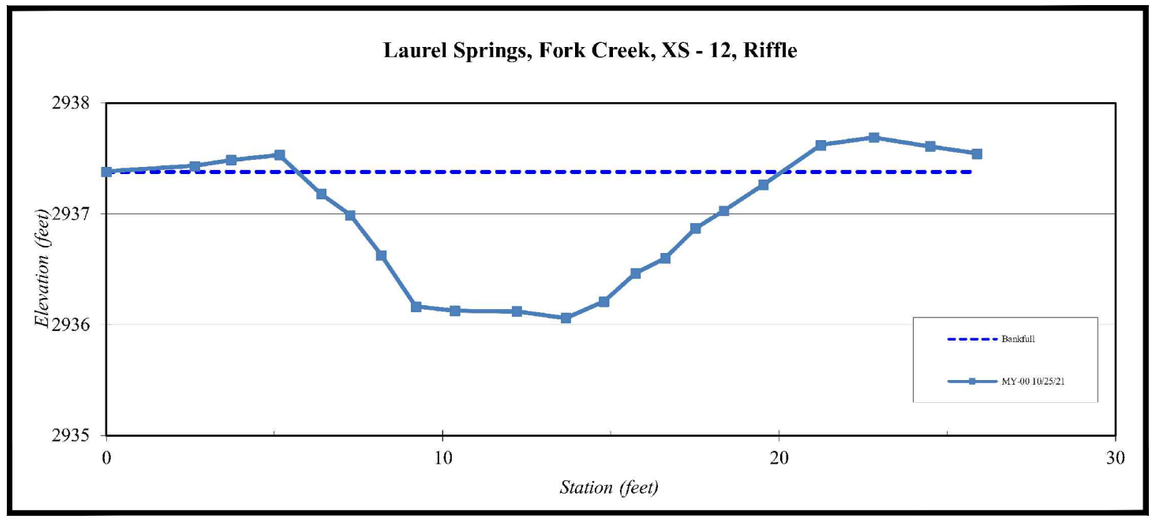
CROSS SECTIONS 5-8

C8.01









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AS-BUILT SURVEY DRAWINGS

AVERY COUNTY, NORTH CAROLINA

PLAN INFORMATION

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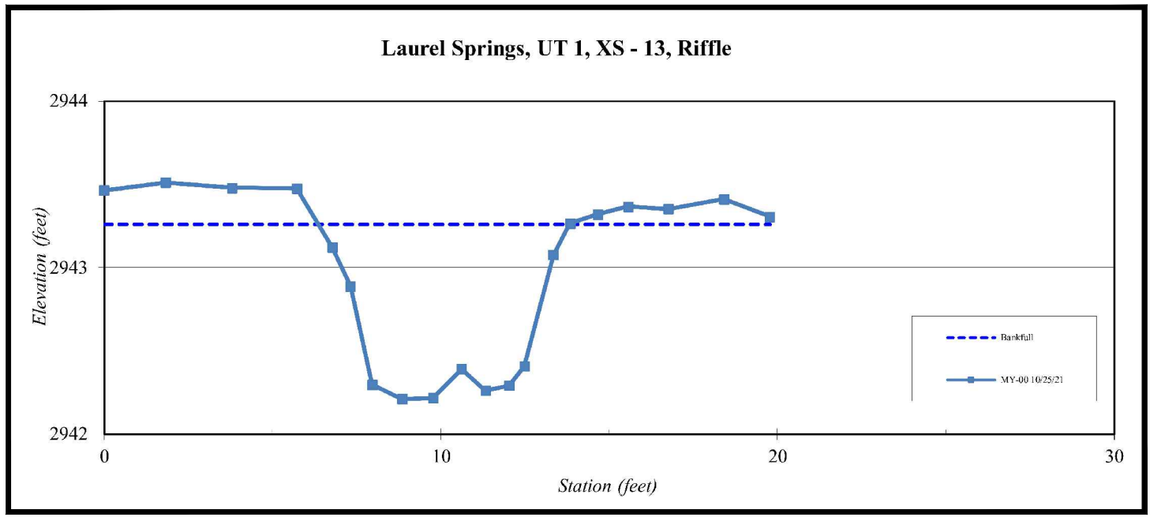
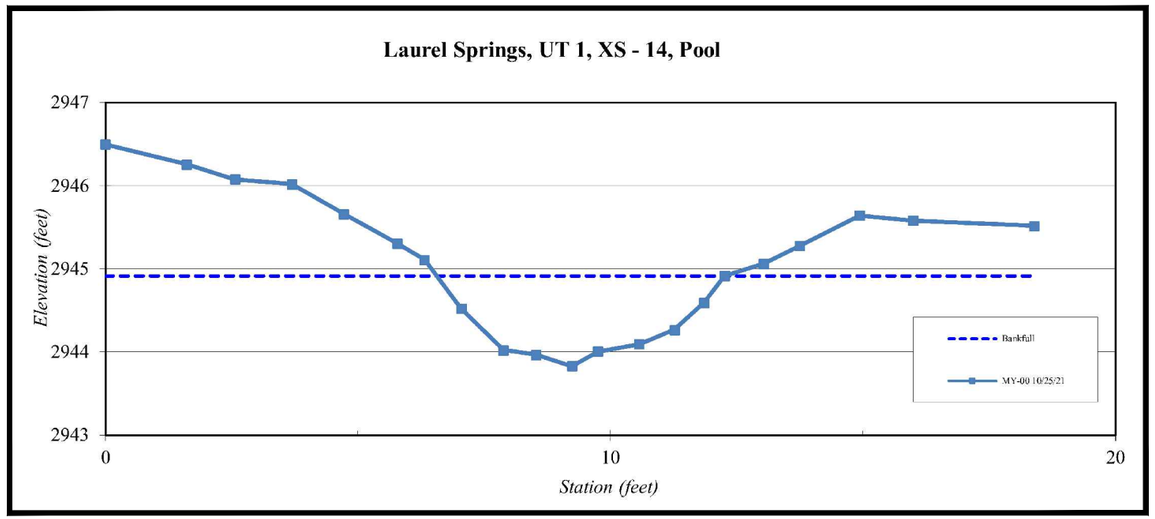
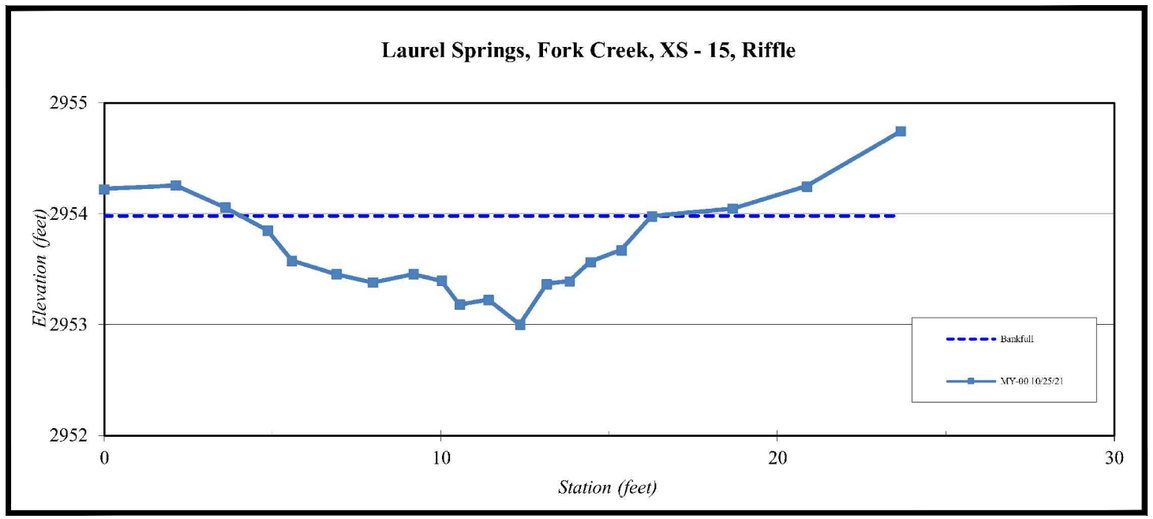
FILENAME	AXI19000-ABS-XS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	N.T.S.
DATE	10.19.2022

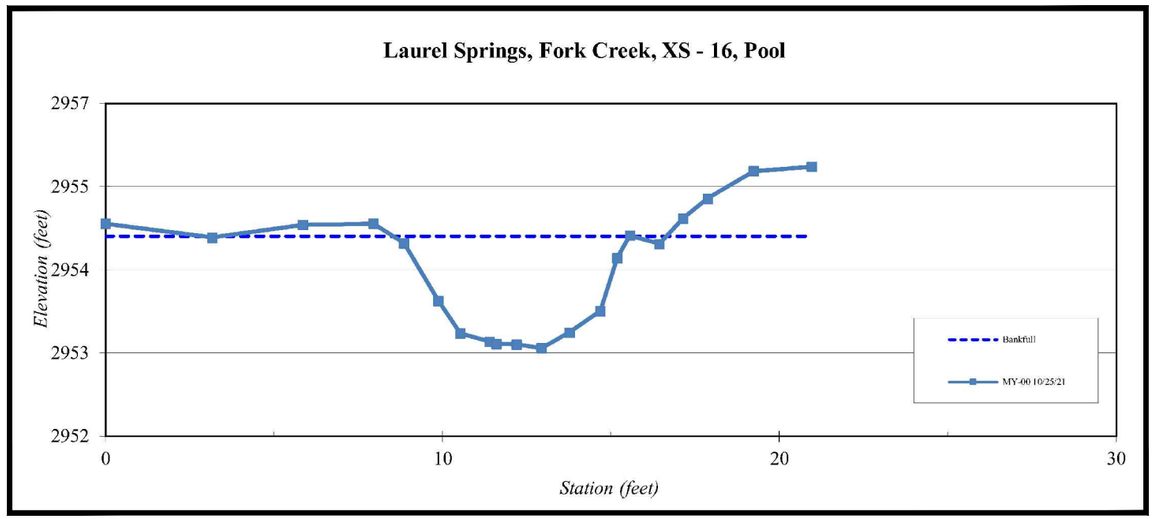
CROSS SECTIONS 9-12

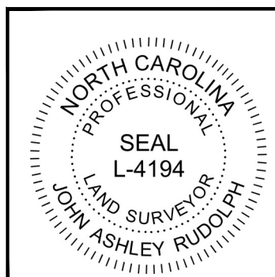
C8.02











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PLAN INFORMATION	
PROJECT NO.	AXI-19000
FILENAME	AXI19000-ABS-XS
CHECKED BY	RAS
DRAWN BY	CHJ
SCALE	N.T.S.
DATE	10.19.2022

CROSS SECTIONS 13-16

C8.03