Year 4 Monitoring Report
Final

RES Randleman Group A
Riparian Buffer Mitigation Project

DMS Project # 100046 (Contract # 7427)
DWR Project # 2018-1330
RFP #16-007242

Randolph County, North Carolina
Cape Fear River Basin HUC 03030003

Data Collection: September/October 2022

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January 26, 2023

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RE: Randleman Group A, Project ID #100046, DMS Contract #7427

Listed below are comments provided by DMS on January 17, 2023, regarding the Randleman Group A Sites: Year 4 Monitoring Report and RES' responses.

Comments:
1. Cover Sheet: Please add the data collection dates to the report cover.
Data collection dates have been added to the report cover.

2. Section 5 Year 4 (MY4) Monitoring Performance: Please indicate how the invasives have responded to the treatment during the course of the project. Is the privet mostly small resprouts that will be sprayed or were mature specimens observed?
The response to the invasive treatment throughout the Projects has been successful, many instances of observed specimens were small resprouts with a few isolated occurrences of larger specimens.

3. Section 5 Year 4 (MY4) Monitoring Performance: Thank you for summarizing stability at the stream crossings. Please add discussion of the stream stability in other sections where grading work was conducted for each section of the project.
Section 5 was updated to reflect that the grading work at Sunbeam on Reach ZF1 is also stable.

4. Section 5 Year 4 (MY4) Monitoring Performance: Was additional easement marking added where the encroachment occurred?
Yes, additional easement signage and horse tape was installed to prevent future encroachment in these areas. This language has been included in the monitoring report.

5. Table 7s: How are you counting volunteer stems (sweetgum and red maple in particular)? DMS recommends only counting those that are greater than 1 foot tall, since many of the shorter ones will not survive due to competition. Are there any areas where you anticipate needing to thin these species?
Volunteer stems are only counted towards the volunteer stem total if they are greater than one foot tall. RES does not anticipate to thin areas with volunteer sweet gum and red maple due to the success of the planted species within fixed vegetation plots.

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1 PROJECT SUMMARY

1.1 Project Overview

Environmental Banc & Exchange, LLC (EBX), a wholly-owned subsidiary of Resource Environmental Solutions (RES), is pleased to provide this Monitoring Report for the RES Randleman Group A Riparian Buffer Mitigation Project (Project) as a full-delivery buffer mitigation project for the Division of Mitigation Services (DMS) (DMS #100046). The RES Randleman Group A includes three sites: Pequod, Schmid Creek, and Sunbeam. These sites provide riparian buffer mitigation credits for unavoidable impacts due to development within the Randleman Lake Watershed of the Cape Fear River Basin, United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC – 03030003). The Mitigation Plan was approved in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 and the Randleman Lake Water Supply Watershed Buffer Rule 15A NCAC 02B .0250.

The Project provides significant functional uplift to the watershed and assists DMS with achieving its mitigation goals in the Randleman Lake Watershed. The Project provides up to 1,671,826.349 ft² (38.38acres) of riparian buffer mitigation assets. These are derived from restoration, enhancement, and preservation of riparian buffers in the Randleman Lake Watershed.

Site	Riparian Buffer Credits
Pequod	812,085.766 ft² (18.64 ac)
Schmid Creek	273,737.545 ft² (6.28 ac)
Sunbeam	586,003.039 ft² (13.45 ac)
Total	**1,671,826.349 ft² (38.38 ac)**

The conservation easement of the three sites combined totals approximately 50 acres. Primary land use within the watershed is largely residential, agricultural, commercial, and forested. The goal of the Project is to restore, enhance and preserve ecological function to the existing stream and riparian buffer by establishing appropriate plant communities while minimizing temporal and land disturbing impacts. Buffer improvements and the removal of livestock, helps to filter runoff from agricultural fields, thereby reducing nutrient and sediment loads to Project channels and the overall watershed. Restoration, enhancement, and preservation of the Randleman Lake riparian buffer (as defined in 15A NCAC 02B .0250) results in a reduction of the water quality stressors affecting the Project: livestock access and a lack of riparian buffer. Immediate water quality benefits and pollutant removal within the vicinity of the Project include the exclusion of livestock access to streams and reduction in nutrient loads from agricultural land-uses. This Project is consistent with the management strategy for maintaining and protecting riparian areas in the Randleman Lake watershed.

1.2 Monitoring Protocol and Project Success Criteria

Annual vegetation monitoring and visual assessments are to be conducted annually throughout the five-year monitoring period. Riparian buffer vegetation monitoring for all three sites is based on the "Carolina Vegetation Survey-Ecosystem Enhancement Program Protocol for Recording Vegetation: Level 1-2 Plot Sampling Only Version 4.2". Monitoring plots are to be installed a minimum of 100 meters squared in size and cover at least two percent of the planted mitigation area. These plots are to be randomly placed throughout the planted riparian buffer mitigation area and be representative of the riparian buffer restoration and enhancement areas where applicable (i.e. when enhancement credit is being generated from supplemental planting under 15A NCAC 02B .0295 (n)). The following data is to be recorded for all trees in the plots: species, height, planting date (or volunteer), and grid location. All stems in plots are to be

flagged with flagging tape. The Pequod Site has 17 monitoring plots (16 designated to restoration, one designated to enhancement), the Schmid Creek Site has eight monitoring plots, and the Sunbeam Site has 12 monitoring plots.

Photos are to be taken from all photo points each monitoring year and provided in the annual reports. Visual inspections and photos are to be taken to ensure that enhancement areas are being maintained and compliant. The measure of vegetative success for the Project Sites is the survival of at least four native hardwood tree species, where no one species is greater than 50 percent of the established stems, established at a density of at least 260 planted trees per acre at the end of Year 5. Native volunteer species may be included to meet the performance standards as determined by NC Division of Water Resources (DWR).

A visual assessment of the conservation easement is also to be performed each year to confirm:

- Fencing is in good condition throughout the site (if applicable);
- no cattle access within the conservation easement area;
- no encroachment has occurred;
- no invasive species in areas were invasive species were treated,
- diffuse flow is being maintained in the conservation easement areas; and
- there has not been any cutting, clearing, filling, grading, or similar activities that would negatively affect the functioning of the buffer.

Component/ Feature	Monitoring	Maintenance through project close-out
Vegetation	Annual vegetation monitoring	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing.
Invasive and Nuisance Vegetation	Visual Assessment	Invasive and noxious species shall be monitored and treated so that none become dominant or alter the desired community structure of the site. Locations of invasive and nuisance vegetation will be mapped.
Site Boundary	Visual Assessment	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries will be marked with signs identifying the property as a mitigation site and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring, and staking/signage maintenance will continue in perpetuity as a stewardship activity.
Road Crossing	Visual Assessment	Road crossings within the site may be maintained only as allowed by conservation easement or existing easement, deed restrictions, rights of way, or corridor agreements. Crossings in easement breaks are the responsibility of the landowner to maintain.
Livestock Fencing (if applicable)	Visual Assessment	Livestock fencing is placed outside the easement limits. Maintenance of fencing is the responsibility of the landowner.

2 PEQUOD SITE

2.1 Project Location and Description

The Pequod Site is within the Randleman Lake Watershed of the Cape Fear River Basin within the 8-digit Hydrologic Unit Code (HUC) 03030003, 14-digit HUC 03030003010060 and DWR Subbasin Number 03-06-08.

The Pequod Site is located in Randolph County approximately five miles northwest of Archdale, North Carolina (**Figure 1a**). To access the Site head South on Main Street from I-85 and turn immediately left on Aldridge Road, after about a half mile turn right onto Huff Road, in about 0.4 miles the Site is on the left. The coordinates are 35.9107 °N and -79.9381 °W.

The easement, approximately 22.14 acres in size, is comprised of three sections, separated by two crossings, one of which is co-located with a gas easement. There is also an existing sanitary sewer easement within the Site area. The Pequod Site is composed of six stream channels: BF1, BF2, BF3, BF4, BF5, and BF6. BF1 flows directly into Muddy Creek approximately one mile downstream of the site. Reaches BF2, BF3, and BF5 drain to BF1. Reach BF6 drains to Reach BF2 and Reach BF4 drains to reach BF3. BF1 is a perennial unnamed tributary that is the primary feature onsite and has a drainage area of approximately 2,295 acres. The channel runs through pasture from the northern property boundary to the south before entering a culvert under Huff Road. BF1 is approximately 1,047 linear feet. A sanitary sewer easement runs parallel to this channel along the right bank. BF1 exhibits portions of bank instability and erosion from continued cattle access and the lack of a riparian buffer. BF2 is a perennial tributary that flows into BF1. This channel runs from the west to east for approximately 1,455 linear feet. BF2 has a drainage area of approximately 34 acres. BF3 is a perennial tributary that flows from northeast to southwest across the Site property and empties into BF1. A sanitary sewer easement runs parallel to this channel along the left bank. BF3 is approximately 1,463 linear feet and has a drainage area of approximately 65 acres. BF4 is an ephemeral tributary that runs through pasture from the northern property boundary to the south before draining to reach BF3. BF4 is approximately 233 linear feet and has a drainage area of approximately 11 acres. BF5 is a perennial tributary that originates at the southern property boundary before flowing north to its confluence with BF1. BF5 is approximately 328 linear feet and has a drainage area of approximately 10 acres. Reach BF6 is an intermittent stream that originates just downstream of a farm pond and drains to the north to its confluence with Reach BF2 just upstream of an existing gas easement. BF6 is approximately 418 linear feet and has a drainage area of approximately 11 acres. Stream identifications were verified by the DWR site visit on March 26, 2018.

2.2 Project Components

This Site generates approximately 767,201.823 ft^2 (17.61 acres) of riparian buffer restoration credits on existing non-forested pasture and 44,883.943 ft^2 (1.03 acres) of buffer enhancement credits. The riparian buffer restoration and enhancement adjacent to the ephemeral Reach B4 comprises 1.32 acres (57,464 ft^2) which is in compliance with 15A NCAC 02B .0295 (o)(7) in that it is only 6.5 percent of the total area of buffer mitigation, which is less than 25 percent of the total area of buffer mitigation (20.45 total acres) that is allowed. The riparian buffer mitigation credits generated will service Randleman Lake buffer impacts within the USGS 8-digit HUC 03030003 of the Cape Fear River Basin. The total mitigation credits that the RES Randleman Group A - Pequod Site will generate are summarized in **Table 1a**.

2.3 Riparian Restoration and Enhancement Approach

Since this Site was mostly non-forested pasture, per 15A NCAC 02B .0295 (n), buffer restoration activities occurred in the majority of the Site with a few patches of enhancement. Along the upstream left bank of BF3, the densely populated cluster of tree-of-heaven was removed, and the area was replanted with hardwoods. Large individual tree-of-heaven trees were cut down and smaller trees or saplings had herbicide applied to the foliage. A rigorous invasive management plan for these areas is to be followed during the following monitoring years. There is a fixed vegetation monitoring plot located in this area so that any re-sprouts can be identified and treated.

Some additional restoration activities were conducted along BF2 to address the observed trash, pipes and culverts found in the streams and a side gully with no flow that enters the stream. These activities included upgrading the crossing, removing an old box culvert, removing other debris within the buffer, and bank stabilization and grading where banks were compromised. Other restoration activities included the removal of the small non-subject pond above reach BF6. The pond was drained, filled, and planted.

A sanitary sewer easement runs parallel to reaches BF3 and BF1 and crosses reaches BF1, BF2, and BF5. The sewer easement along the left bank of BF3 is located outside of Zone 1 and in full compliance with 15A NCAC 02B .0295 (l)(4)(A-C), and therefore was included in the buffer restoration activities. Pursuant to 15A NCAC 02B .0295 (l) (4), sewer easements in Zone 2 may be suitable for buffer mitigation credit if: the applicant or mitigation provider restores or enhances the forested buffer in Zone 1 adjacent to the sewer easement, the sewer easement is maintained in a condition that meets the vegetative requirements of the collection system permit, and diffuse flow is provided across the entire buffer width. As part of the restoration approach, all of these criteria were met. Due to bank instability and erosion there are sections of the sewer easement along the left bank of BF1 that are now within Zone 1, along with the section of the sewer easement that crosses BF1, BF2, and BF5. These 0.1 acres are not viable for buffer credit.

Enhancement occurred in the limited forested areas within the Site, found in small patches along BF1, BF3, BF4, and BF5, in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 (n). These areas include supplemental planting. Enhancement also occurs in BF3 per 15A NCAC 02B .0295 (n) where there are currently clumps of densely populated early-successional (two to four year) sweetgum saplings combined with invasives. The enhancement activities included thinning the sweetgums to the extent necessary, treating the invasives and planting hardwood stems to add diversity to the riparian buffer. There was also a small area along BF1 that was considered enhancement after further site evaluation conducted by RES on December 4th, 2018. After further discussions with DWR, it was agreed upon that these areas could be used for enhancement under 15A NCAC 02B .0295 (n) with supplemental planting.

Reach BF4 was classified as an ephemeral stream (per Buffer Viability) and, therefore, the restoration and enhancement of this channel do not comprise more than 25 percent of the total area of buffer mitigation per 15A NCAC 02B .0295 (o)(7). In response to comments from DWR, RES conducted vegetation transect surveys on December 4th, 2018, to ensure that this area was indeed eligible for restoration credit. It was determined that the areas that were already enhancement should remain as enhancement, at the confluence of BF3 and BF4, and the other areas that were determined to be restoration should remain as restoration.

2.4 Construction and As-Built Conditions

Revegetation of the site included treating invasive species and planting native hardwood bare root trees. Prior to planting, RES prepped the site by spraying and ripping the easement as well as thinning sweetgum in enhancement areas. The planting of bare root trees occurred in April 2019. Deviations from the initial planting plan were due to bare root availability. A list of the planted species can be found in **Table 5a**. The other construction work included removing debris, an old culvert, and a farm pond as well as improving a crossing. This work was also completed in April 2019. The conservation easement is marked every 150-

200 feet with NCDEQ Stewardship Program signs attached to either fences or t-posts. There was no easement change between the final mitigation plan and as-built, however there was a change in credits. This change was a result of an error in the buffer zones submitted with the mitigation plan. The result was an increase in 750 ft² (0.02 ac).

3 SCHMID CREEK SITE

3.1 Project Location and Description

The Schmid Creek Site is located in the Randleman Lake Watershed of the Cape Fear River Basin within the 8-digit Hydrologic Unit Code (HUC) 03030003, 14-digit HUC 03030003010060 and DWR Subbasin Number 03-06-08.

The Site is located in Randolph County approximately five miles northwest of Randleman, North Carolina (**Figure 1b**). To access the Site head West on Cedar Square Road from I-74 and turn right on Davis Country Road, after about a mile turn right onto Gilbert Davis Drive, in about 0.4 miles the Site is on the left. The coordinates of the Site are 35.8726 °N and -79.8726 °W.

The conservation easement totals approximately 9.99 acres. The majority of the Site was grazed, non-forested pasture. The riparian buffer was devoid of trees or shrubs and cattle were allowed access within the existing channels

The easement is comprised of two sections, separated by one farm access crossing. The Schmid Creek Site is comprised of one stream channel, SC1, which begins downstream of a pond and then flows from northeast to the southwest eventually draining directly into Randleman Lake approximately 1,500 feet downstream of the site. SC1 is an intermittent unnamed tributary that is the primary drainage feature onsite and has a drainage area of approximately 57 acres. This channel begins downstream of an existing culvert at the eastern property boundary and runs through active pasture before passing through two more culverts on the property. SC1 is approximately 1,022 linear feet. This channel is mostly stable throughout, however, it does exhibit some areas of active erosion from cattle access. There is one linear wetland onsite that drains directly to SC1. DWR Stream Identification Forms were completed and verified by DWR during a site visit on April 12, 2017.

3.2 Project Components

This Site generates approximately 273,737.545 ft^2 (6.28 acres) of riparian buffer restoration credits on existing non-forested pasture. The riparian buffer mitigation credits generated will service Randleman Lake buffer impacts within the USGS 8-digit HUC 0303003 of the Cape Fear River Basin. The total mitigation credits that the RES Randleman Group A – Schmid Creek Mitigation Site generates are summarized in **Table 1b**.

3.3 Riparian Restoration Approach

Since this Site was all non-forested pasture, per 15A NCAC 02B .0295 (n), buffer restoration activities included planting throughout the entire Site. Some additional restoration activities included the removal of debris found within the Site and updating the farm crossing culvert. Specifically, the debris removal included the removal of a drain tile and culvert at the most upstream section of the Reach SC1 and removal of a culvert and earthen berm at the downstream section of Reach SC1. The crossing was improved with properly sized and embedded corrugated pipe, and embankment stabilization to facilitate future landowner access to both sides of the property. These areas were stabilized with coir matting, permanent and temporary seeding, and live stakes after culvert removal.

3.4 Construction and As-Built Conditions

Revegetation of the site included planting native hardwood bare root trees. Prior to planting, RES prepped the site by spraying and ripping the easement. The planting of bare root trees occurred in April 2019. Deviations from the initial planting plan were due to bare root availability. A list of the planted species can be found in **Table 5b**. The other construction work included removing debris (culverts, drain tile, and earthen berm) as well as improving a crossing. This work was also completed in April 2019. The conservation easement is marked every 150-200 feet with NCDEQ Stewardship Program signs attached to either fences or t-posts. There was no easement or credit change between the final mitigation plan and as-built.

4 SUNBEAM SITE

4.1 Project Location and Description

The Sunbeam Site is within the Randleman Lake Watershed of the Cape Fear River Basin within the 8-digit Hydrologic Unit Code (HUC) 03030003, 14-digit HUC 03030003010060 and DWR Subbasin Number 03-06-08.

The Site is located in Randolph County approximately six miles southeast of Archdale, North Carolina. The easement is located on both sides of Interstate Highway 74. To access the Site from Interstate Highway 85 travel south on US 311 (toward Asheboro), then take exit 79 for Cedar Square Road, then turn right. Travel on Cedar Square Road for approximately a quarter of a mile, then turn left onto SR 1009. Travel on SR 1009 for approximately one and a quarter mile, and the Site will be on the right. The coordinates are 35.8631 °N and -79.8911 °W.

The Sunbeam Site easement, approximately 18.4 acres in size, is made up of four sections, separated by two farm access crossings and a highway, and is comprised of four stream reaches: ZF1, ZF2, ZF3, and ZF4 (**Figure 1c**). ZF1 flows directly into Randleman Lake approximately 5,500 linear feet downstream of the Site. Both ZF2 and ZF3 flow into ZF1 near the downstream end of the Site. ZF1 is a perennial unnamed tributary that is the primary drainage feature onsite and has a drainage area of approximately 540 acres. This channel runs through pasture from the western property corner to the east side of the Site before entering a culvert under I-74. ZF1 is approximately 1,614 linear feet. This channel is mostly stable throughout, however, it did exhibit portions of vertical banks and erosion from cattle. There is also a ditch that discharges into ZF1. The ditch was graded out and a diffuse flow structure was built on the easement boundary to ensure that diffuse flow of runoff is maintained within the riparian buffer. ZF2 is an intermittent to perennial tributary that begins downstream of a farm pond, roughly 260 linear feet off the Site property and then flows into ZF1. This channel runs from the south to north for approximately 1,530 linear feet. ZF2 has a drainage area of approximately 55 acres. This stream channel is stable and exhibits bedrock features at the downstream end. The stream channel was bound by active cattle pasture on the right bank and agriculture hay fields on the left bank. There is currently an existing fence line along the stream channel of ZF2 to prevent cattle from crossing into the left bank riparian buffer. ZF3 is an intermittent to perennial tributary that flows from northwest to southeast across the Site property and empties into ZF1. ZF3 has a drainage area of approximately 98 acres. ZF3 exhibits multiple segments of bedrock providing grade control and streambed stability. This stable tributary lies within a valley bottom and is bound by active cattle pasture. The channel is approximately 1,224 linear feet. ZF4 is an intermittent tributary located on the Site east of Interstate 74. This channel runs from north to south for approximately 529 linear feet before draining to ZF1 downstream of the Site. The drainage area is approximately 16 acres. This stable channel is bound by a mature forest on the left bank and hay field on the right. Stream identifications were verified by the DWR site visit on March 26, 2018.

4.2 Project Components

This Site generates approximately 577,098.433 ft^2 (13.25 acres) of riparian buffer restoration credits on existing non-forested pasture, 3,311.971 ft^2 (0.08 acres) of buffer enhancement credits via cattle exclusion, and 5,592.634 ft^2 (0.13 acres) of riparian buffer preservation credits on subject streams. Due to the removal of a small section of the easement, a very small piece of the buffer along ZF1 now has a buffer that is less than 30 feet but greater than 20 feet and therefore only receives 75 percent of the credit in that area. The riparian buffer mitigation credits generated, service Randleman Lake buffer impacts within the USGS 8-digit HUC 03030003 of the Cape Fear River Basin. The total mitigation credits that the RES Randleman Group A – Sunbeam Site generates are summarized in **Table 1c.**

4.3 Riparian Restoration, Enhancement, and Preservation Approach

Since a majority of the Sunbeam Site was non-forested actively grazed pasture, per 15A NCAC 02B .0295 (n), buffer restoration activities occurred throughout the Site. Some additional restoration activities included minor bank stabilization and grading where needed based on compromised banks and where erosional rills and gullies were observed. Minimal grading and benching was performed to stabilize the confluence of ZF1 and ZF3, and to provide spot stabilization along ZF1. Stabilizing these areas provide functional uplift to the stream system by stopping the mass bank wasting that is currently a problem and by reducing instream sediment loads. In order to maintain diffuse flow in the riparian buffer, the ditch that drains to ZF1 was graded out and a diffuse flow structure was built along the boundary of the easement. Another restoration activity was the upgrading of the existing crossing This crossing is necessary for property access and is fenced to prevent cattle access. The crossing was constructed such that farm equipment has access and to prevent future degradation. These areas were stabilized with coir matting, permanent and temporary seeding, and live stakes after culvert removal.

Enhancement occurred in the very limited forested areas within the Site, found in small patches along ZF1, where grazing occurred adjacent to the stream in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 (o)(6). All livestock were removed from the easement and the fence was installed to exclude access to riparian areas and their associated streams.

Buffer preservation was performed along Reach ZF4 in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 (o)(5). The current land use in this area is mature hardwood in the forested area on the left bank of ZF4. Preservation activities consist of permanently protecting the buffer from cutting, clearing, filling, grading, and similar activities that would affect the functioning of the buffer through a conservation easement that has clearly visible easement markers and signs.

4.4 Construction and As-Built Conditions

Revegetation of the site included planting native hardwood bare root trees. Prior to planting, RES prepped the site by spraying and ripping the easement. The planting of bare root trees occurred in April 2019. Deviations from the initial planting plan were due to bare root availability. A list of the planted species can be found in **Table 5c**. The other construction work included bank stabilization and spot treatments on ZF1 and improving the crossing on ZF1. The crossing on ZF1 was originally planned to be a culvert crossing but due to the bedrock in the proposed area, the crossing was installed as a ford. Additionally, a rill entering the easement at the top of ZF1 was graded and planted. This work was also completed in April 2019. A Buffer Impacts Authorization was approved in January 2019 for the temporary impacts in Zone 1 from the bank stabilization work on ZF1 (**As-Built Report**). The conservation easement is marked every 150-200 feet with NCDEQ Stewardship Program signs attached to either fences or t-posts. Fences were installed in the western portion of the site where livestock is present. There was no easement or credit change between the final mitigation plan and as-built.

5 YEAR 4 (MY4) MONITORING PERFORMANCE

The RES Randleman Group A Year 4 Monitoring activities were completed in October 2022. All Year 4 Monitoring data is present below and in the appendices. The Site is on track to meeting interim success criteria.

Monitoring of the 37 permanent vegetation plots was completed during September/October 2022. Vegetation tables are in **Appendix B** and associated photos are in **Appendix C**. At Pequod, 17 of 17 plots are exceeding the interim success criteria of 260 planted stems per acre. Planted stem densities ranged from 364 to 971 planted stems per acre with a mean of 629 planted stems per acre across all plots. The average planted stem height was 5.8 feet. At Schmid Creek, 8 of 8 plots are exceeding the interim success criteria and the planted stem densities range from 446 to 1,052 with a mean of 774 stems per acre across all plots. The average planted stem height was 3.8 feet. And 12 of 12 plots at Sunbeam are exceeding the interim success criteria and the planted stem densities range from 445 to 850 with a mean of 644 stems per acre across all plots. The average planted stem height was 8.2 feet. A total of 16 tree species were documented within the plots. Volunteer species were more abundant across the sites in MY4.

Visual assessment of vegetation outside of the monitoring plots indicates that the herbaceous vegetation is becoming well established throughout all three Sites. Invasives at Sunbeam consisted of an area of Chinese privet along the banks of ZF1 and a few areas of sparsely scattered Bradford pear. Invasives at Pequod consisted of a few areas of sparsely scattered Bradford pear. Recently observed areas of invasive species are illustrated on the MY4 CCPV Figures and will be treated throughout the remainder of the monitoring period.

Agricultural encroachment was observed at Pequod in June 2022. The encroachment area was planted with corn and is approximately 0.12 acres. The encroachment area was replanted on December 6, 2022 with 40 three-gallon trees that included Sycamore, Water oak, Northern red oak, and River birch species. Also, driving paths to the adjacent sewer easement were observed within the conservation easement during MY4. RES contacted the City of Archdale and met with them onsite to determine appropriate paths to access the sewer easement. RES cleared two paths outside of the conservation easement that allows access the sewer easement. Additional easement signage and horse tape was installed to prevent future encroachment in these areas. This instance of encroachment will no longer be an issue.

The upgraded crossing on Pequod is stable. The culvert removals and crossing upgrade on Schmid Creek are stable. Crossing improvement and brush-toe bank stabilization at Sunbeam are stable. The grading work that was completed on Reach ZF1 in 2019 is also stable.

6 REFERENCES

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NC Environmental Management Commission. 2014. Rule 15A NCAC 02B.0295 - Mitigation Program Requirements for the Protection and Maintenance of Riparian Buffers.

Resource Environmental Solutions, LLC (2019). Randleman Group A – As-Built Baseline Monitoring Report.

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Appendix A

Project Background Tables and Site Maps

Table 1a. Pequod Mitigation Site Buffer Project Areas and Assets

RIPARIAN BUFFER (15A NCAC 02B.0295)

Location	Jurisdictional Streams	Restoration Type	Reach ID/Component	Buffer Width (ft)	Creditable Area (acreage)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)	Riparian Buffer Credits (acreage)	Convertible to Nutrient Offset (Yes or No)	If Converted to Nutrient Offset: Nutrient Offset: N (lbs)	If Converted to Nutrient Offset: Nutrient Offset: P (lbs)
Rural	Subject	Restoration	BF1	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	3.35	145,905		100%	1.00000	145,904.931	3.35	No	0.000	0.000
				101-200	0.24	10,237		33%	3.00000	3,378.107	0.08	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.05	2,032		100%	2.00000	1,016.084	0.02	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
Rural	Subject	Restoration	BF2	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	5.49	239,201		100%	1.00000	239,200.774	5.49	No	0.000	0.000
				101-200	0.18	7,966		33%	3.00000	2,628.839	0.06	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.00	0		100%	2.00000	0.000	0.00	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
Rural	Subject	Restoration	BF3	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	4.88	212,393		100%	1.00000	212,392.571	4.88	No	0.000	0.000
				101-200	0.99	43,258		33%	3.00000	14,275.279	0.33	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.64	27,860		100%	2.00000	13,930.039	0.32	No	0.000	0.000
				101-200	0.00			33%	6.00000	0.000	0.00	No	0.000	0.000
Rural	Subject	Restoration	BF5	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	1.11	48,185		100%	1.00000	48,185.441	1.11	No	0.000	0.000
				101-200	0.04	1,850		33%	3.00000	610.359	0.01	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.08	3,362		100%	2.00000	1,681.11	0.04	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
Rural	Subject	Restoration	BF6	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	1.85	80,603		100%	1.00000	80,602.565	1.85	No	0.000	0.000
				101-200	0.24	10,290		33%	3.00000	3,395.723	0.08	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.00	0		100%	2.00000	0.000	0.00	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
				SUBTOTALS	**19.13**	**833,142**				**767,201.823**	**17.61**		**0.000**	**0.000**

			ELIGIBLE PRESERVATION AREA								
Location	**Jurisdictional Streams**	**Restoration Type**	**Reach ID/Component**	**Buffer Width (ft)**		**Creditable Area (sf)***	**Initial Credit Ratio (x:1)**	**% Full Credit**	**Final Credit Ratio (x:1)**	**Riparian Buffer Credits (BMU)**	**Riparian Buffer Credits (acreage)**
Rural	Subject	Preservation		20-29			10	75%	13.33333	0.000	0.00
				30-100				100%	10.00000	0.000	0.00
				101-200				33%	30.00000	0.000	0.00
	Nonsubject			20-29			5	75%	6.66667	0.000	0.00
				30-100				100%	5.00000	0.000	0.00
				101-200				33%	15.00000	0.000	0.00
				SUBTOTALS		**0**				**0.000**	**0.000**

**Area eligible for preservation may be no more than 25% of total area, where total area is back-calculated with the equation R+E/0.75.*

**All buffers eligible for credit must be at minimum 20' wide*

**When preservation areas exceed the total eligible preservation area, select the areas with the best credit ratios as the creditable areas.*

			ELIGIBLE EPHEMERAL AREA*		**6.38**	**277,714**					
Location	**Jurisdictional Streams**	**Restoration Type**	**Reach ID/Component**	**Buffer Width (ft)**	**Creditable Area (acreage)***	**Creditable Area (sf)***	**Initial Credit Ratio (x:1)**	**% Full Credit**	**Final Credit Ratio (x:1)**	**Riparian Buffer Credits (BMU)**	**Riparian Buffer Credits (acreage)**
Rural	Ephemeral	Restoration	BF4	20-29	0.00	0	1	75%	1.33333	0.000	0.00
				30-100	0.87	37,838		100%	1.00000	37,838.047	0.87
				101-200	0.37	16,278		33%	3.00000	5,371.771	0.12
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00
				30-100	0.08	3,348		100%	2.00000	1674.124	0.04
				101-200	0.00	0		33%	6.00000	0.000	0.00
				SUBTOTALS	**1.32**	**57,464**				**44,883.943**	**1.03**
				TOTALS	**20.45**	**890,606**				**812,085.766**	**18.64**

** The area of the mitigation site on ephemeral channels shall comprise no more than 25 percent of the total area of buffer mitigation. Total area is back-calculated with the equation R+E/0.75.*

Regulatory direction for Riparian Buffer in this table follows NCAC rule 15A NCAC 02B .0295, effective November 1, 2015.
Regulatory direction for Nutrient Offset in this table follows Nutrient Offsets Payments Rule 15A NCAC 02B. 0240, amended effective September 1, 2010 and
DWR – 1998. Methodology and Calculations for determining Nutrient Reductions associated with Riparian Buffer Establishment.
N.O. calculation based on effectiveness in 30 years, with 146.40 lb/ac P; and 2,273.02 lb/ac N. The N credit ratio used is 19.16325 sf per pound. The P credit ratio used is 297.54098 sf per pound.

Table 2a. Project Activity and Reporting History
Pequod Site

Elapsed Time Since grading complete: **NA**
Elapsed Time Since planting complete: **3 year 6 months**
Number of reporting Years[1]: **4**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	NA	Mar-19
Final Design – Construction Plans	NA	NA
Stream Construction	NA	NA
Site Planting	NA	Apr-19
As-built (Year 0 Monitoring – baseline)	Apr-19	May-19
Year 1 Monitoring	Oct-19	Nov-19
Invasive Species Treatment	NA	Aug-20
Year 2 Monitoring	Oct-20	Nov-20
Year 3 Monitoring	Oct-21	Oct-21
Invasive Species Treatment	NA	Nov-21
Year 4 Monitoring	Oct-22	Oct-22
Year 5 Monitoring		

1 = The number of reports or data points produced excluding the baseline

Table 3a. Project Contacts Table Pequod Site	
Planting Contractor	H&J Forestry
Planting contractor POC	Matt Hitch
Nursery Stock Suppliers	Claridge Nursery 1-(888) 628-7337
Monitoring Performers	RES / 3600 Glenwood Ave, Suite 100, Raleigh, NC 27612
Vegetation Monitoring POC	Ryan Medric (919) 741-6268

Table 4a. Project Background Information			
Project Name	Pequod		
County	Randolph		
Project Area (acres)	22.14		
Project Coordinates (latitude and longitude)	Latitude: 35.9107 N Longitude: -79.9381 W		
Planted Acreage (Acres of Woody Stems Planted)	19.6		
Project Watershed Summary Information			
Physiographic Province	Southern Outer Piedmont		
River Basin	Cape Fear		
USGS Hydrologic Unit 8-digit	03030003	USGS Hydrologic Unit 14-digit	03030003010060
DWR Sub-basin	03-06-08		
Project Drainage Area (Acres)	2,295		
CGIA Land Use Classification	Forest; Agricultural; Residential		

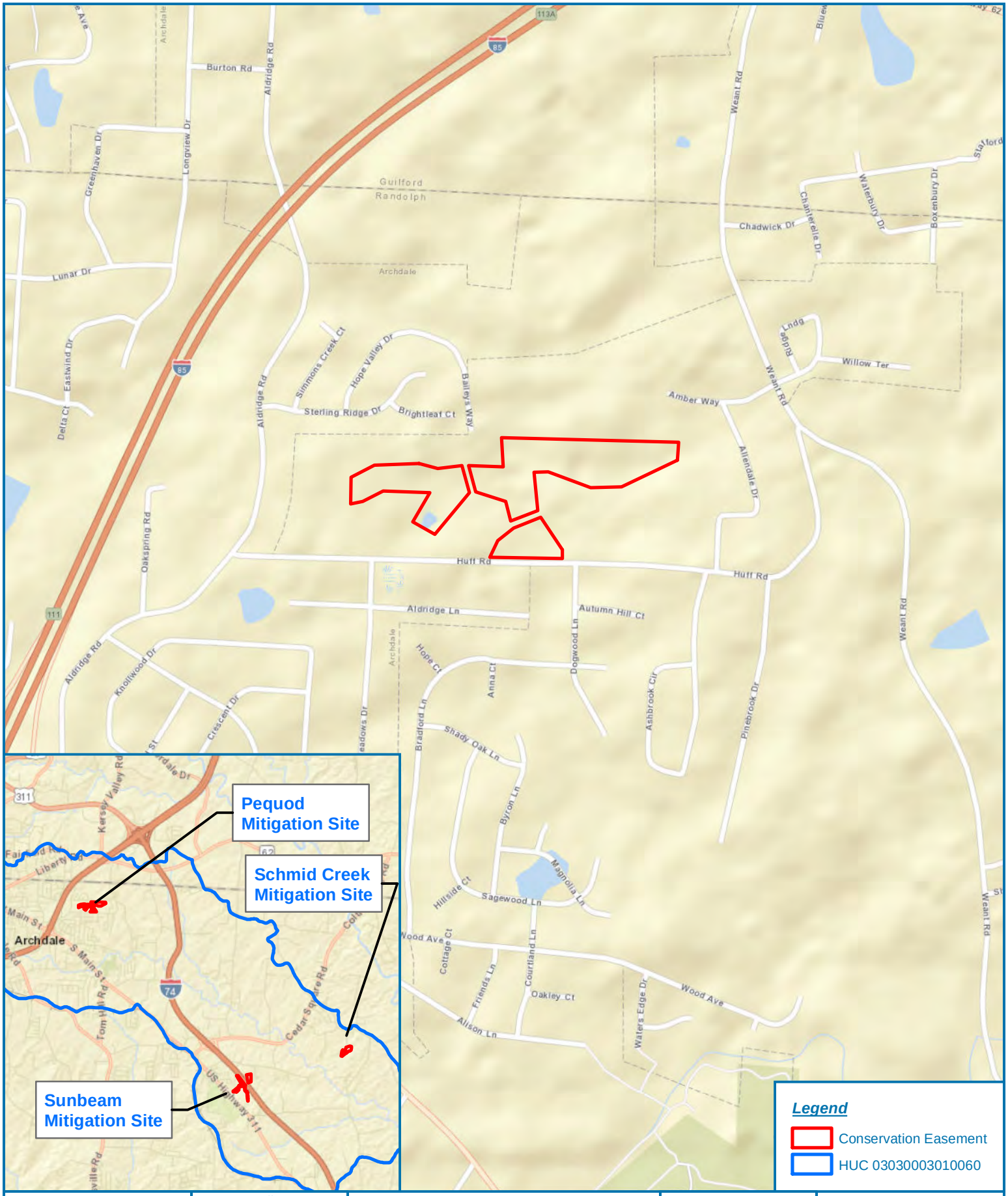


Figure 1a - Site Location Map

RES Randleman Group A - Pequod Mitigation Site

Randolph County, North Carolina

Date:	5/3/2019
Drawn by:	RTM
Checked by:	BPB
	1 inch = 1,000 feet

0 150 300
Feet

Figure 2a. Current Conditions Plan View

RES Randleman Group A - Pequod Mitigation Site (MY4 2022)

Randolph County, North Carolina

Date: 10/27/2022
Drawn by: RTM
Checked by: BPB
1 inch = 300 feet

res

Table 1b. Schmid Creek Mitigation Site Buffer Project Areas and Assets

RIPARIAN BUFFER (15A NCAC 02B.0295)

Location	Jurisdictional Streams	Restoration Type	Reach ID/Component	Buffer Width (ft)	Creditable Area (acres)*	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)	Riparian Buffer Credits (acres)	Convertible to Nutrient Offset (Yes or No)	If Converted to Nutrient Offset: Nutrient Offset: N (lbs)	If Converted to Nutrient Offset: Nutrient Offset: P (lbs)
Rural	Subject	Restoration	SC1	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	4.80	209,182		100%	1.00000	209,182.414	4.80	No	0.000	0.000
				101-200	4.49	195,622		33%	3.00000	64,555.131	1.48	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.00	0		100%	2.00000	0.000	0.00	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
			SUBTOTALS		**9.29**	**404,804**				**273,737.545**	**6.28**		**0.000**	**0.000**

			ELIGIBLE PRESERVATION AREA			**134,935**					
Location	**Jurisdictional Streams**	**Restoration Type**	**Reach ID/Component**	**Buffer Width (ft)**		**Creditable Area (sf)***	**Initial Credit Ratio (x:1)**	**% Full Credit**	**Final Credit Ratio (x:1)**	**Riparian Buffer Credits (BMU)**	**Riparian Buffer Credits (acres)**
Rural	Subject	Preservation		20-29		0	10	75%	13.33333	0.000	0.00
				30-100		0		100%	10.00000	0.000	0.00
				101-200		0		33%	30.00000	0.000	0.00
	Nonsubject			20-29		0	5	75%	6.66667	0.000	0.00
				30-100		0		100%	5.00000	0.000	0.00
				101-200		0		33%	15.00000	0.000	0.00
Urban	Subject or Nonsubject			20-29		0	3	75%	4.00000	0.000	0.00
				30-100		0		100%	3.00000	0.000	0.00
				101-200		0		33%	9.00000	0.000	0.00
			SUBTOTALS			**0**				**0.000**	**0.00**
			TOTALS		**9.29**	**404,804**				**273,737.545**	**6.28**

**Area eligible for preservation may be no more than 25% of total area, where total area is back-calculated with the equation R+E/0.75.*

**All buffers eligible for credit must be at minimum 20' wide*

**When preservation areas exceed the total eligible preservation area, select the areas with the best credit ratios as the creditable areas.*

FILLIBLE CELLS, leave blank if N/A

Regulatory direction for Riparian Buffer in this table follows NCAC rule 15A NCAC 02B .0295, effective November 1, 2015.
Regulatory direction for Nutrient Offset in this table follows Nutrient Offsets Payments Rule 15A NCAC 02B. 0240, amended effective September 1, 2010 and
DWR – 1998. Methodology and Calculations for determining Nutrient Reductions associated with Riparian Buffer Establishment.
N.O. calculation based on effectiveness in 30 years, with 146.40 lb/ac P; and 2,273.02 lb/ac N. The N credit ratio used is 19.16325 sf per pound. The P credit ratio used is 297.54098 sf per pound.

Table 2b. Project Activity and Reporting History
Schmid Creek Site

Elapsed Time Since grading complete: **NA**
Elapsed Time Since planting complete: **3 year 6 months**
Number of reporting Years[1]: **4**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	NA	Mar-19
Final Design – Construction Plans	NA	NA
Stream Construction	NA	NA
Site Planting	NA	Apr-19
As-built (Year 0 Monitoring – baseline)	Apr-19	May-19
Year 1 Monitoring	Oct-19	Jan-20
Livestake Planting	NA	Mar-20
Year 2 Monitoring	Oct-20	Oct-20
Invasive Species Treatment	NA	Oct-21
Year 3 Monitoring	Oct-21	Oct-21
Year 4 Monitoring	Sep-22	Oct-22
Year 5 Monitoring		

1 = The number of reports or data points produced excluding the baseline

Table 3b. Project Contacts Table Schmid Creek Mitigation Site	
Planting Contractor	H&J Forestry
Planting contractor POC	Matt Hitch
Nursery Stock Suppliers	Arborgen / 2011 Broadbank Court, Ridgeville, SC 29472
Monitoring Performers	RES / 3600 Glenwood Ave, Suite 100, Raleigh, NC 27612
Vegetation Monitoring POC	Ryan Medric (919) 741-6268

Table 4b. Project Background Information			
Project Name	Schmid Creek		
County	Randolph		
Project Area (acres)	9.99		
Project Coordinates (latitude and longitude)	Latitude: 35.8726 N Longitude: -79.8726 W		
Planted Acreage (Acres of Woody Stems Planted)	9.3		
Project Watershed Summary Information			
Physiographic Province	Southern Outer Piedmont		
River Basin	Cape Fear		
USGS Hydrologic Unit 8-digit	03030003	USGS Hydrologic Unit 14-digit	03030003010060
DWR Sub-basin	03-06-08		
Project Drainage Area (Acres)	57		
CGIA Land Use Classification	Forest; Agricultural; Residential		

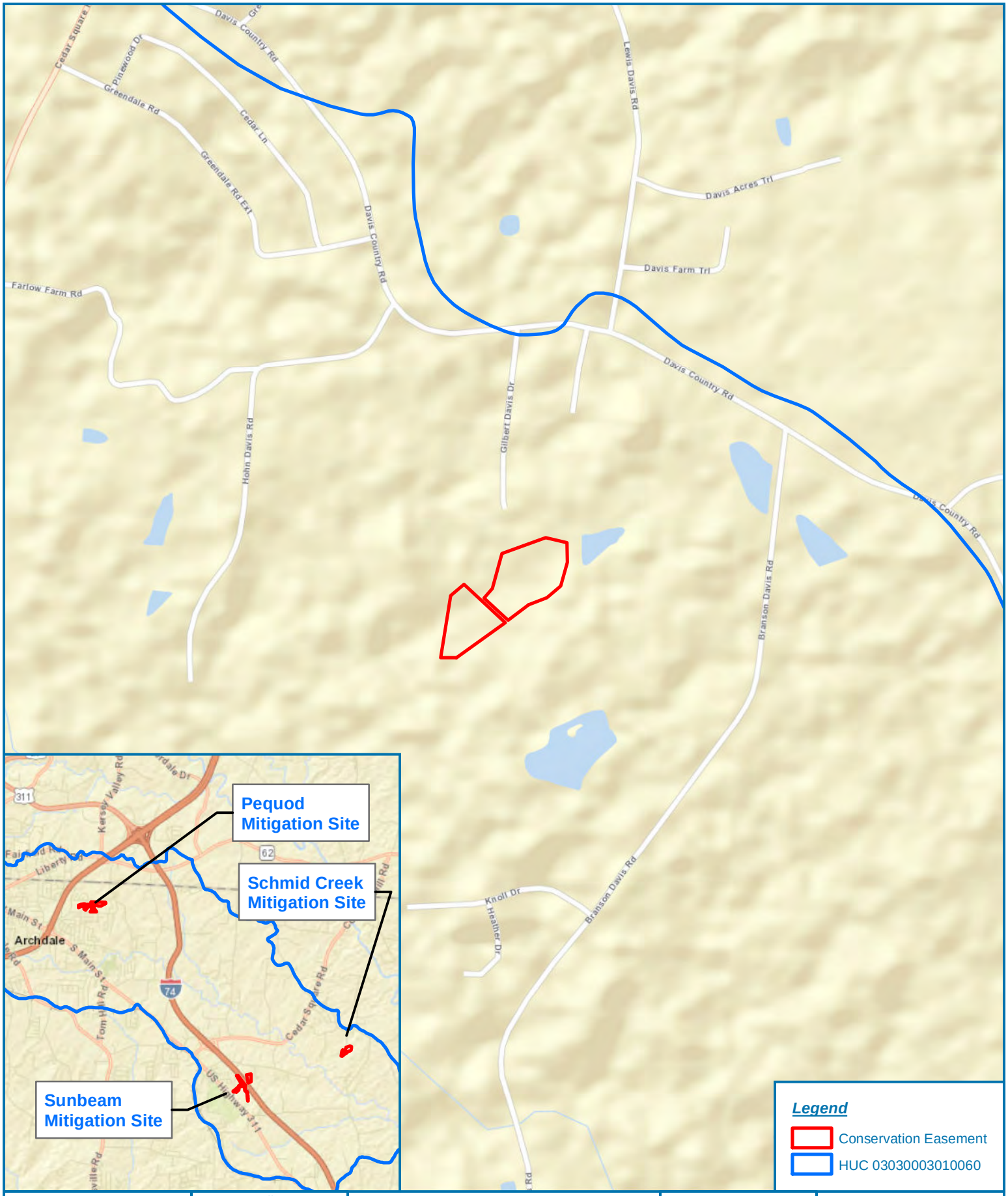
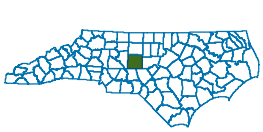


Figure 1b - Site Location Map

RES Randleman Group A - Schmid Creek Mitigation Site

Randolph County, North Carolina

Date:	5/3/2019
Drawn by:	RTM
Checked by:	BPB
	1 inch = 1,000 feet



N
W E
S
0 100 200
Feet

Figure 2b - Current Conditions Plan View

RES Randleman Group A - Schmid Creek Mitigation Site (MY4 2022)

Randolph County, North Carolina

Date: 10/27/2022

Drawn by: RTM

Checked by: BPB

1 inch = 200 feet

res

Document Path: R:\Respective\projects\100913_Randleman_Group_A\Monitoring\MY4\Schmid\Figure 2b - CCPV MY4 - Schmid.mxd

Table 1c. Sunbeam Mitigation Site Buffer Project Areas and Assets

RIPARIAN BUFFER (15A NCAC 02B.0295)

Location	Jurisdictional Streams	Restoration Type	Reach ID / Component	Buffer Width (ft)	Creditable Area (acreage)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)	Riparian Buffer Credits (acreage)	Convertible to Nutrient Offset (Yes or No)	If Converted to Nutrient Offset: Nutrient Offset: N (lbs)	If Converted to Nutrient Offset: Nutrient Offset: P (lbs)
Rural	Subject	Restoration	ZF1	20-29	0.06	2,527	1	75%	1.33333	1,894.930	0.04	No	0.000	0.000
				30-100	4.16	181,155		100%	1.00000	181,155.058	4.16	No	0.000	0.000
				101-200	0.24	10,467		33%	3.00000	3,453.974	0.08	No	0.000	0.000
		Enhancement		20-29	0.00	0	2	75%	2.66667	0.000	0.00	No	0.000	0.000
				30-100	0.15	6,624		100%	2.00000	3,311.971	0.08	No	0.000	0.000
				101-200	0.00	0		33%	6.00000	0.000	0.00	No	0.000	0.000
		Restoration	ZF2	20-29	0.00	0	1	75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	2.20	95,766		100%	1.00000	95,766.014	2.20	No	0.000	0.000
				101-200	0.00	0		33%	3.00000	0.000	0.00	No	0.000	0.000
			ZF3	20-29	0.00	0		75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	4.16	181,232		100%	1.00000	181,231.846	4.16	No	0.000	0.000
				101-200	0.20	8,617		33%	3.00000	2,843.463	0.07	No	0.000	0.000
			ZF4	20-29	0.00	0		75%	1.33333	0.000	0.00	No	0.000	0.000
				30-100	1.93	83,983		100%	1.00000	83,983.325	1.93	No	0.000	0.000
				101-200	1.86	81,121		33%	3.00000	26,769.823	0.61	No	0.000	0.000
				SUBTOTALS	**14.96**	**651,491**				**580,410.404**	**13.32**		**0.000**	**0.000**
				ELIGIBLE PRESERVATION AREA	**4.99**	**217,164**								

Location	Jurisdictional Streams	Restoration Type	Reach ID / Component	Buffer Width (ft)	Creditable Area (acreage)	Creditable Area (sf)*	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)	Riparian Buffer Credits (acreage)
Rural	Subject	Preservation	ZF4	20-29	0.00	0	10	75%	13.33333	0.000	0.00
				30-100	1.01	44,063		100%	10.00000	4406.342	0.10
				101-200	0.83	35,948		33%	30.00000	1186.293	0.03
				SUBTOTALS	**1.84**	**80,012**				**5,592.634**	**0.13**
				TOTALS	**16.79**	**731,502**				**586,003.039**	**13.45**

**Area eligible for preservation may be no more than 25% of total area, where total area is back-calculated with the equation R+E/0.75.*

**All buffers eligible for credit must be at minimum 20' wide*

**When preservation areas exceed the total eligible preservation area, select the areas with the best credit ratios as the creditable areas.*

FILLIBLE CELLS, leave blank if N/A

Regulatory direction for Riparian Buffer in this table follows NCAC rule 15A NCAC 02B .0295, effective November 1, 2015.
Regulatory direction for Nutrient Offset in this table follows Nutrient Offsets Payments Rule 15A NCAC 02B. 0240, amended effective September 1, 2010 and
DWR – 1998. Methodology and Calculations for determining Nutrient Reductions associated with Riparian Buffer Establishment.
N.O. calculation based on effectiveness in 30 years, with 146.40 lb/ac P; and 2,273.02 lb/ac N. The N credit ratio used is 19.16325 sf per pound. The P credit ratio used is 297.54098 sf per pound.

Table 2c. Project Activity and Reporting History
Sunbeam Site

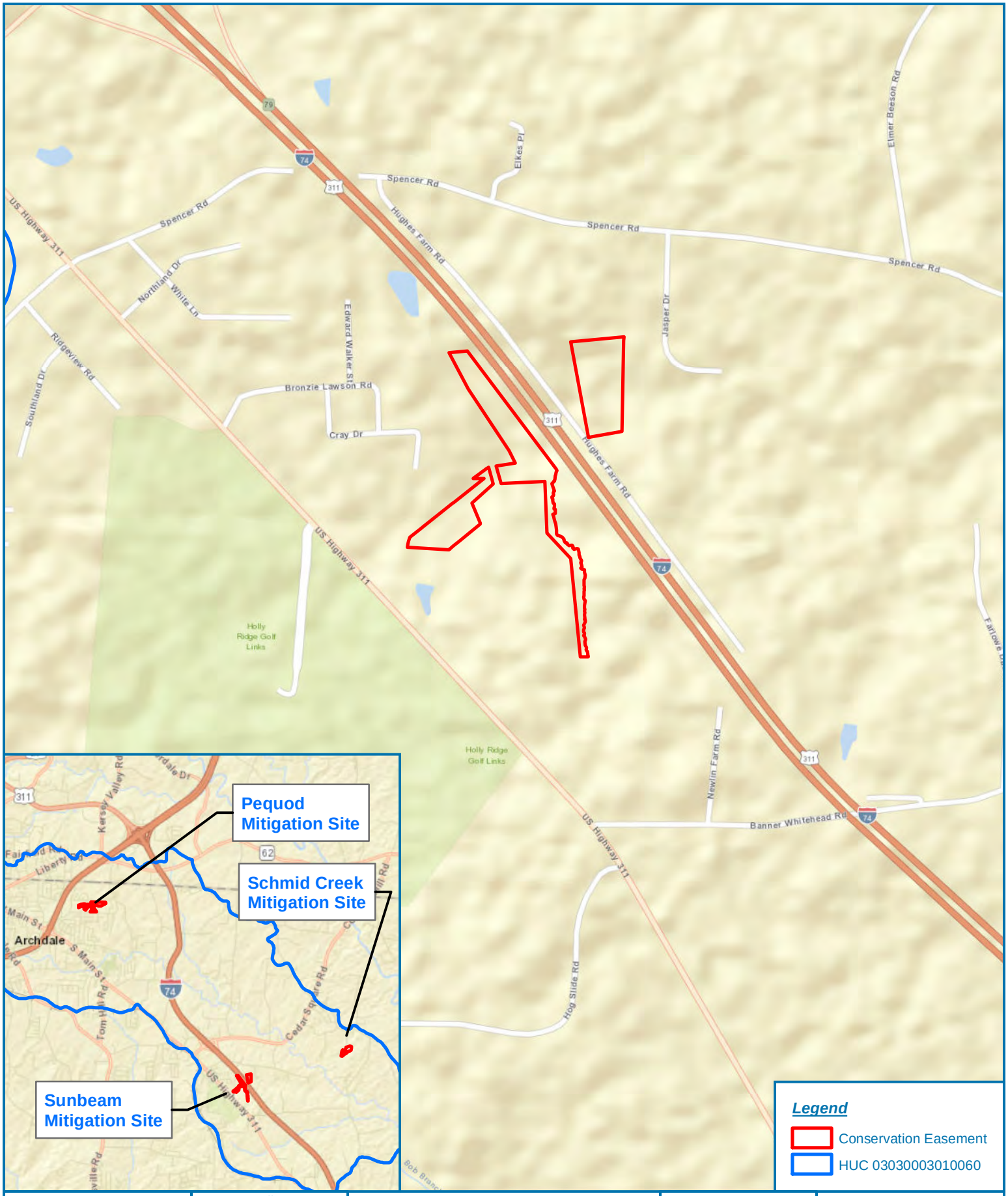
Elapsed Time Since grading complete: **NA**
Elapsed Time Since planting complete: **3 year 6 months**
Number of reporting Years[1]: **4**

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	NA	Mar-19
Final Design – Construction Plans	NA	NA
Stream Construction	NA	NA
Site Planting	NA	Apr-19
As-built (Year 0 Monitoring – baseline)	Apr-19	May-19
Year 1 Monitoring	Oct-19	Jan-20
Invasive Species Treatment	NA	Aug-20
Year 2 Monitoring	Oct-20	Nov-20
Livestake Planting	NA	Mar-21
Year 3 Monitoring	Oct-21	Oct-21
Year 4 Monitoring	Sep-22	Oct-22
Year 5 Monitoring		

1 = The number of reports or data points produced excluding the baseline

Table 3c. Project Contacts Table Sunbeam Site	
Planting Contractor	H&J Forestry
Planting contractor POC	Matt Hitch
Nursery Stock Suppliers	Arborgen / 2011 Broadbank Court, Ridgeville, SC 29472
Monitoring Performers	RES / 3600 Glenwood Ave, Suite 100, Raleigh, NC 27612
Vegetation Monitoring POC	Ryan Medric (919) 741-6268

Table 4c. Project Background Information			
Project Name	Sunbeam		
County	Randolph		
Project Area (acres)	18.46		
Project Coordinates (latitude and longitude)	Latitude: 35.8726 N Longitude: -79.8726 W		
Planted Acreage (Acres of Woody Stems Planted)	14.8		
Project Watershed Summary Information			
Physiographic Province	Southern Outer Piedmont		
River Basin	Cape Fear		
USGS Hydrologic Unit 8-digit	03030003	USGS Hydrologic Unit 14-digit	03030003010060
DWR Sub-basin	03-06-08		
Project Drainage Area (Acres)	540		
CGIA Land Use Classification	Forest; Agricultural; Residential		



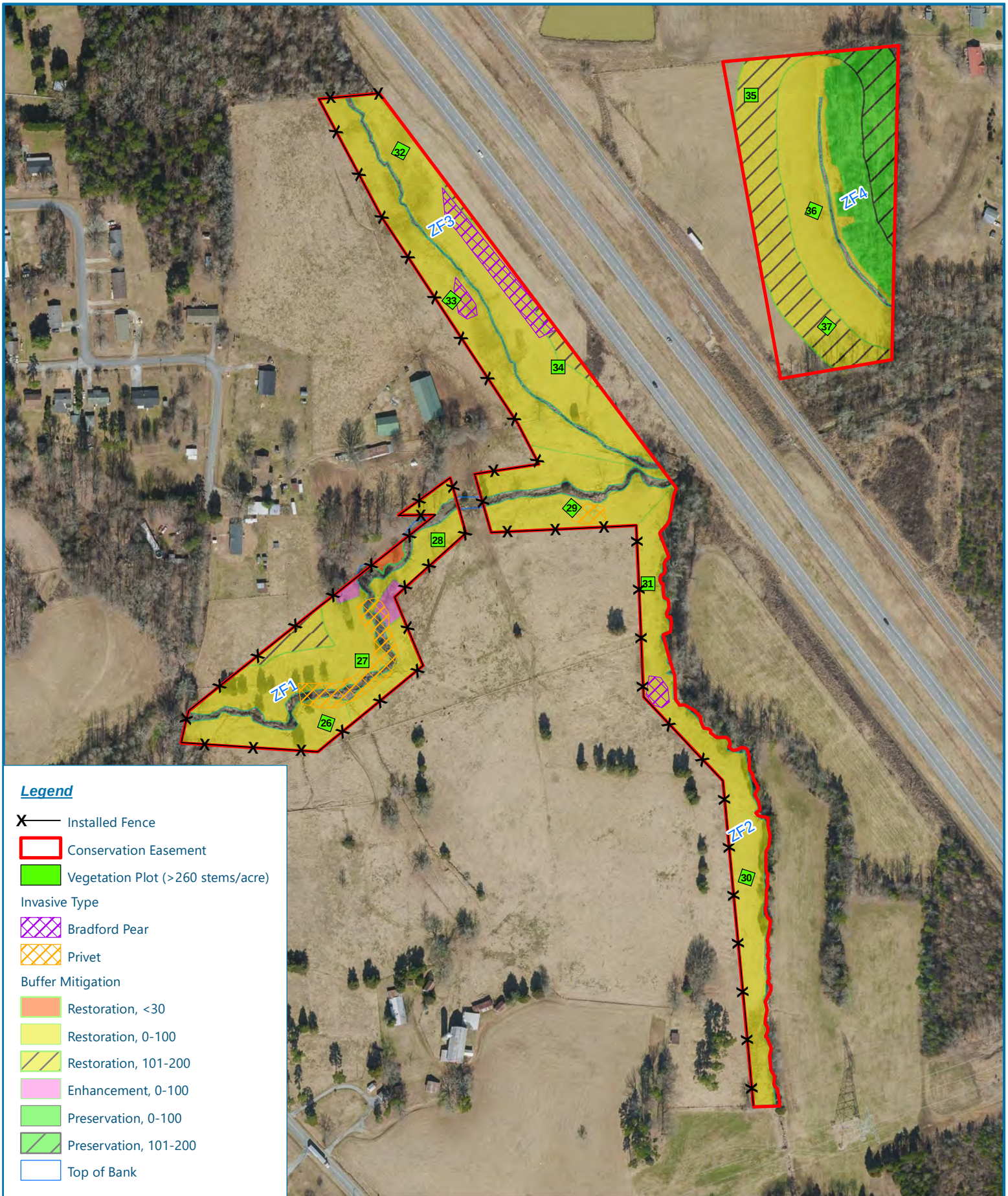
0 500 1,000
Feet

Figure 1c - Site Location Map

RES Randleman Group A - Sunbeam Mitigation Site

Randolph County, North Carolina

Date: 5/3/2019
Drawn by: RTM
Checked by: BPB
1 inch = 1,000 feet



Legend

- Installed Fence
- Conservation Easement
- Vegetation Plot (>260 stems/acre)

Invasive Type

- Bradford Pear
- Privet

Buffer Mitigation

- Restoration, <30
- Restoration, 0-100
- Restoration, 101-200
- Enhancement, 0-100
- Preservation, 0-100
- Preservation, 101-200
- Top of Bank

0 150 300

Feet

Figure 2c - Current Conditions Plan View

RES Randleman Group A - Sunbeam Mitigation Site (MY4 2022)

Randolph County, North Carolina

Date: 10/27/2022

Drawn by: RTM

Checked by: BPB

1 inch = 300 feet

res

Appendix B

Vegetation Assessment Data

Table 5a. Pequod Planted Species Summary

Common Name	Scientific Name	Total Stems Planted
Sycamore	*Platanus occidentalis*	3,800
Water Oak	*Quercus nigra*	3,800
Tuliptree	*Liriodendron tulipifera*	2,400
Willow Oak	*Quercus phellos*	2,000
White Oak	*Quercus alba*	1,800
Northern Red Oak	*Quercus rubra*	1,800
River Birch	*Betula nigra*	1,400
Green Ash	*Fraxinus pennsylvanica*	1,200
	Total	18,200

Table 6a. Pequod Vegetation Plot Mitigation Success Summary (MY4)

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
1	567	283	850	Yes	7.7
2	728	1416	2145	Yes	6.4
3	567	1781	2347	Yes	7.9
4	728	2145	2873	Yes	7.9
5	526	81	607	Yes	4.7
6	971	40	1012	Yes	7.9
7	647	526	1174	Yes	5.3
8	486	1052	1538	Yes	5.3
9	769	1416	2185	Yes	5.5
10	526	364	890	Yes	4.3
11	364	2064	2428	Yes	6.1
12	526	728	1255	Yes	5.7
13	607	2388	2995	Yes	5.3
14	809	324	1133	Yes	5.4
15	567	2752	3318	Yes	6.1
16	607	809	1416	Yes	4.6
17	688	81	769	Yes	3.7
Project Avg	**629**	**1074**	**1702**	**Yes**	**5.8**

Table 7a. Pequod Stem Count Total and Planted by Plot Species (MY4)

Pequod			Current Plot Data (MY4 2022)																																		
			100046-01-0001			100046-01-0002			100046-01-0003			100046-01-0004			100046-01-0005			100046-01-0006			100046-01-0007			100046-01-0008			100046-01-0009			100046-01-0010			100046-01-0011		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																																			1
Acer rubrum	red maple	Tree									14															14												
Betula nigra	river birch	Tree							1	1	1	2	2	2													1	1	1									
Carya	hickory	Tree																																				
Carya ovata	shagbark hickory	Tree																								2												
Diospyros virginiana	common persimmon	Tree																								3												
Fraxinus pennsylvanica	green ash	Tree				1	1	7			1			1	1	1	1	3	3	3	2	2	2				1	1	14	1	1	1	2	2	7			
Juglans nigra	black walnut	Tree			1															1						1												
Liquidambar styraciflua	sweetgum	Tree			6			29			27			51			1						13			6			22			7			45		
Liriodendron tulipifera	tuliptree	Tree				2	2	2				3	3	3										1	1	1	1	1	1	1	1	1						
Platanus occidentalis	American sycamore	Tree	11	11	11	1	1	1	10	10	10	2	2	2	3	3	3	8	8	8	4	4	4				5	5	5	2	2	2	2	2	2			
Prunus serotina	black cherry	Tree																													1						
Quercus	oak	Tree																																				
Quercus alba	white oak	Tree										1	1	1										3	3	3												
Quercus nigra	water oak	Tree	1	1	1	1	1	1				2	2	2	1	1	1	1	1	1	1	1	1				2	2	2	2	2	2						
Quercus phellos	willow oak	Tree	2	2	2	8	8	8	3	3	3	5	5	5	4	4	4	12	12	12	7	7	7	5	5	5	6	6	6	2	2	2	2	2	2			
Quercus rubra	northern red oak	Tree				5	5	5				3	3	3	4	4	4				2	2	2	3	3	3	3	3	3	5	5	5	3	3	3			
Ulmus americana	American elm	Tree									2			1			1															1						
		Stem count	14	14	21	18	18	53	14	14	58	18	18	71	13	13	15	24	24	25	16	16	29	12	12	38	19	19	54	13	13	22	9	9	60			
		size (ares)	1			1			1			1			1			1			1			1			1			1			1					
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02					
		Species count	3	3	5	6	6	7	3	3	7	7	7	10	5	5	7	4	4	5	5	5	6	4	4	9	7	7	8	6	6	9	4	4	6			
		Stems per ACRE	567	567	850	728	728	2145	567	567	2347	728	728	2873	526	526	607	971	971	1012	648	648	1174	486	486	1538	769	769	2185	526	526	890	364	364	2428			

Pequod			Current Plot Data (MY4 2022)																		Annual Means																	
			100046-01-0012			100046-01-0013			100046-01-0014			100046-01-0015			100046-01-0016			100046-01-0017			MY4 (2022)			MY3 (2021)			MY2 (2020)			MY1 (2019)			MY0 (2019)					
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Acer negundo	boxelder	Tree																					1															
Acer rubrum	red maple	Tree																					28			9			15			7					
Betula nigra	river birch	Tree																1	1	1	5	5	5	5	5	5	6	6	6	3	3	3	3	3	3			
Carya	hickory	Tree																											2			7					
Carya ovata	shagbark hickory	Tree									1												3														
Diospyros virginiana	common persimmon	Tree															1			1			5			5											
Fraxinus pennsylvanica	green ash	Tree	4	4	4	2	2	2				1	1	12							18	18	55	19	19	74	19	19	90	22	22	86	24	24	100			
Juglans nigra	black walnut	Tree									1						2						6			6			8								
Liquidambar styraciflua	sweetgum	Tree			18			57			5			57			17						361			234			330			558			76		
Liriodendron tulipifera	tuliptree	Tree	3	3	3	1	1	1							1	1	1				13	13	13	14	14	16	16	16	16	25	25	30	34	34	34			
Platanus occidentalis	American sycamore	Tree	3	3	3	4	4	4	3	3	3	7	7	7							65	65	65	66	66	66	64	64	64	69	69	69	79	79	79			
Prunus serotina	black cherry	Tree						2															3			2						3					
Quercus	oak	Tree																									3	3	3	10	10	10	124	124	124			
Quercus alba	white oak	Tree				3	3	3							5	5	5	6	6	7	18	18	19	20	20	20	18	18	18	23	23	23	1	1	1			
Quercus nigra	water oak	Tree	1	1	1	1	1	1	1	1	1										14	14	14	12	12	12	11	11	11	17	17	17	28	28	28			
Quercus phellos	willow oak	Tree	1	1	1	3	3	3	11	11	11	4	4	4	7	7	7	3	3	3	85	85	85	91	91	91	90	90	90	100	100	102	89	89	89			
Quercus rubra	northern red oak	Tree	1	1	1	1	1	1	5	5	6	2	2	2	2	2	2	7	7	7	46	46	47	46	46	46	43	43	43	50	50	52	19	19	19			
Ulmus americana	American elm	Tree																					5									2					
		Stem count	13	13	31	15	15	74	20	20	28	14	14	82	15	15	35	17	17	19	264	264	715	273	273	586	270	270	696	319	319	969	401	401	553			
		size (ares)	1			1			1			1			1			1			17			17			17			17			17					
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.42			0.42			0.42			0.42			0.42					
		Species count	6	6	7	7	7	9	4	4	7	4	4	5	4	4	7	4	4	5	8	8	16	8	8	13	9	9	13	9	9	14	9	9	10			
		Stems per ACRE	526	526	1255	607	607	2995	809	809	1133	567	567	3318	607	607	1416	688	688	769	629	629	1702	650	650	1395	643	643	1657	760	760	2307	955	955	1316			

Table 5b. Schmid Creek Planted Species Summary

Common Name	Scientific Name	Total Stems Planted
Water Oak	*Quercus nigra*	2,700
Sycamore	*Platanus occidentalis*	2,800
Tuliptree	*Liriodendron tulipifera*	1,600
Willow Oak	*Quercus phellos*	1,500
White Oak	*Quercus alba*	1,500
Northern Red Oak	*Quercus rubra*	1,200
River Birch	*Betula nigra*	1,000
Green Ash	*Fraxinus pennsylvanica*	800
	Total	13,100

Table 6b. Schmid Creek Vegetation Plot Mitigation Success Summary (MY4)

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
18	607	0	607	Yes	3.1
19	810	40	850	Yes	4.7
20	729	121	850	Yes	4.2
21	810	0	810	Yes	4.8
22	446	0	446	Yes	3.7
23	1052	121	1174	Yes	2.9
24	891	40	931	Yes	3.9
25	850	2023	2873	Yes	3.1
Project Avg	774	**293**	**1067**	**Yes**	**3.8**

Table 7b. Schmid Creek Stem Count Total and Planted by Plot Species (MY4)

Schmid Creek			Current Plot Data (MY4 2022)																								
			100046-01-0018			100046-01-0019			100046-01-0020			100046-01-0021			100046-01-0022			100046-01-0023			100046-01-0024			100046-01-0025		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	River Birch, Red Birch	Tree				1	1	1	4	4	4	6	6	6				2	2	2						
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree				4	4	5			3	2	2	2	1	1	1	2	2	5	3	3	3	2	2	52
Liriodendron tulipifera	Tulip Poplar	Tree	2	2	2	1	1	1							1	1	1	1	1	1	1	1	1	1	1	1
Platanus occidentalis	Sycamore, Plane-tree	Tree	3	3	3	3	3	3	7	7	7	1	1	1	2	2	2	6	6	6	4	4	4	1	1	1
Quercus	Oak	Shrub Tree																								
Quercus alba	White Oak	Tree	5	5	5	4	4	4				5	5	5				3	3	3			1	3	3	3
Quercus nigra	Water Oak, Paddle Oak	Tree				1	1	1	1	1	1				2	2	2									
Quercus phellos	Willow Oak	Tree	2	2	2	2	2	2	4	4	4	4	4	4	5	5	5	11	11	11	9	9	9	4	4	4
Quercus rubra	Northern Red Oak	Tree	3	3	3	4	4	4	2	2	2	2	2	2				1	1	1	5	5	5	10	10	10
		Stem count	15	15	15	20	20	21	18	18	21	20	20	20	11	11	11	26	26	29	22	22	23	21	21	71
		size (ares)	1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	5	8	8	8	5	5	6	6	6	6	5	5	5	7	7	7	5	5	6	6	6	6
		Stems per ACRE	607	607	607	810	810	850	729	729	850	810	810	810	446	446	446	1052	1052	1174	891	891	931	850	850	2873

Schmid Creek			Annual Means														
			MY4 (2022)			MY3 (2021)			MY2 (2020)			MY1 (2019)			MY0 (2019)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	River Birch, Red Birch	Tree	13	13	13	15	15	15	15	15	15	16	16	16	29	29	29
Fraxinus pennsylvanica	Green Ash, Red Ash	Tree	14	14	71	14	14	81	13	13	44	14	14	24	14	14	14
Liriodendron tulipifera	Tulip Poplar	Tree	7	7	7	8	8	8	9	9	9	24	24	24	36	36	36
Platanus occidentalis	Sycamore, Plane-tree	Tree	27	27	27	28	28	28	30	30	30	30	30	30	45	45	45
Quercus	Oak	Shrub Tree													38	38	38
Quercus alba	White Oak	Tree	20	20	21	20	20	20	20	20	20	23	23	23	2	2	2
Quercus nigra	Water Oak, Paddle Oak	Tree	4	4	4	4	4	4	4	4	4	4	4	4	8	8	8
Quercus phellos	Willow Oak	Tree	41	41	41	41	41	41	41	41	41	44	44	44	29	29	29
Quercus rubra	Northern Red Oak	Tree	27	27	27	25	25	25	26	26	26	26	26	26	12	12	12
		Stem count	153	153	211	155	155	222	158	158	189	181	181	191	213	213	213
		size (ares)	8			8			8			8			8		
		size (ACRES)	0.20			0.20			0.20			0.20			0.20		
		Species count	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9
		Stems per ACRE	774	774	1067	784	784	1123	799	799	956	916	916	966	1077	1077	1077

Table 5c. Sunbeam Planted Species Summary

Common Name	Scientific Name	Total Stems Planted
Water Oak	*Quercus nigra*	2,100
Sycamore	*Platanus occidentalis*	1,900
Tuliptree	*Liriodendron tulipifera*	1,000
Willow Oak	*Quercus phellos*	1,000
White Oak	*Quercus alba*	800
Northern Red Oak	*Quercus rubra*	800
River Birch	*Betula nigra*	600
Green Ash	*Fraxinus pennsylvanica*	600
	Total	8,800

Table 6c. Sunbeam Vegetation Plot Mitigation Success Summary (MY4)

Plot #	Planted Stems/Acre	Volunteer Stems/Acre	Total Stems/Acre	Success Criteria Met?	Average Planted Stem Height (ft)
26	607	121	728	Yes	9.3
27	445	121	567	Yes	14.1
28	769	121	890	Yes	12.7
29	567	243	809	Yes	7.7
30	809	81	890	Yes	9.6
31	688	283	971	Yes	9.5
32	526	405	931	Yes	10.9
33	850	81	931	Yes	7.1
34	688	283	971	Yes	7.1
35	405	0	405	Yes	2.8
36	567	1214	1781	Yes	5.7
37	809	405	1214	Yes	2.5
Project Avg	**644**	**280**	**924**	**Yes**	**8.2**

Table 7c. Sunbeam Stem Count Total and Planted by Plot Species (MY4)

Sunbeam			Current Plot Data (MY4 2022)																											
			100046-01-0026			100046-01-0027			100046-01-0028			100046-01-0029			100046-01-0030			100046-01-0031			100046-01-0032			100046-01-0033			100046-01-0034		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree																								2				
Betula nigra	river birch	Tree							4	4	4	4	4	4	1	1	1							2	2	2				
Diospyros virginiana	common persimmon	Tree												3			1			1			2						4	
Fraxinus pennsylvanica	green ash	Tree	9	9	11	6	6	7	3	3	3	4	4	4				2	2	2				3	3	3				
Hamamelis virginiana	American witchhazel	Tree																												
Juglans nigra	black walnut	Tree															1			6										
Liquidambar styraciflua	sweetgum	Tree																					8							3
Liriodendron tulipifera	tuliptree	Tree	1	1	1										3	3	3				1	1	1				1	1	1	
Platanus occidentalis	American sycamore	Tree	1	1	1	3	3	3	5	5	5	1	1	1	6	6	6	5	5	5	6	6	6	1	1	1	4	4	4	
Quercus	oak	Tree																												
Quercus alba	white oak	Tree																						7	7	7				
Quercus nigra	water oak	Tree							3	3	3	3	3	3	6	6	6	2	2	2	3	3	3	2	2	2	3	3	3	
Quercus phellos	willow oak	Tree	4	4	4	2	2	2	3	3	4	2	2	2	1	1	1	8	8	8	3	3	3	2	2	2	4	4	4	
Quercus rubra	northern red oak	Tree							1	1	1				3	3	3							4	4	4	5	5	5	
Rhus	sumac	shrub																												
Ulmus alata	winged elm	Tree												3																
Ulmus americana	American elm	Tree			1			2			2																			
Stem count			15	15	18	11	11	14	19	19	22	14	14	20	20	20	22	17	17	24	13	13	23	21	21	23	17	17	24	
size (ares)			1			1			1			1			1			1			1			1			1			
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			
Species count			4	4	5	3	3	4	6	6	7	5	5	7	6	6	8	4	4	6	4	4	6	7	7	8	5	5	7	
Stems per ACRE			607	607	728	445	445	567	769	769	890	567	567	809	809	809	890	688	688	971	526	526	931	850	850	931	688	688	971	

Sunbeam			Current Plot Data (MY4 2022)									Annual Means																		
			100046-01-0035			100046-01-0036			100046-01-0037			MY4 (2022)			MY3 (2021)			MY2 (2020)			MY1 (2019)			MY0 (2019)					
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T			
Acer rubrum	red maple	Tree												2																
Betula nigra	river birch	Tree										11	11	11	14	14	14	17	17	21	18	18	18	18	18	18				
Diospyros virginiana	common persimmon	Tree												11			14													
Fraxinus pennsylvanica	green ash	Tree	1	1	1	1	1	1	2	2	2	31	31	34	30	30	37	33	33	43	32	32	34	36	36	36				
Hamamelis virginiana	American witchhazel	Tree																					2							
Juglans nigra	black walnut	Tree												7						4										
Liquidambar styraciflua	sweetgum	Tree						30			10			51			29			5			7							
Liriodendron tulipifera	tuliptree	Tree										6	6	6	6	6	6	8	8	8	15	15	15	22	22	22				
Platanus occidentalis	American sycamore	Tree	3	3	3	5	5	5	1	1	1	41	41	41	45	45	45	45	45	45	47	47	47	51	51	51				
Quercus	oak	Tree																			7	7	7	52	52	52				
Quercus alba	white oak	Tree							6	6	6	13	13	13	13	13	13	18	18	18	19	19	19	19	19	19				
Quercus nigra	water oak	Tree	2	2	2	5	5	5	1	1	1	30	30	30	27	27	27	37	37	37	42	42	42	30	30	30				
Quercus phellos	willow oak	Tree	2	2	2	3	3	3	8	8	8	42	42	43	45	45	45	46	46	46	39	39	39	26	26	26				
Quercus rubra	northern red oak	Tree	2	2	2				2	2	2	17	17	17	18	18	21	22	22	22	20	20	20	25	25	25				
Rhus	sumac	shrub															2													
Ulmus alata	winged elm	Tree												3																
Ulmus americana	American elm	Tree												5						3										
Stem count			10	10	10	14	14	44	20	20	30	191	191	274	198	198	253	226	226	252	239	239	250	279	279	279				
size (ares)			1			1			1			12			12			12			12			12						
size (ACRES)			0.02			0.02			0.02			0.30			0.30			0.30			0.30			0.30						
Species count			5	5	5	4	4	5	6	6	7	8	8	14	8	8	11	8	8	11	9	9	11	9	9	9				
Stems per ACRE			405	405	405	567	567	1781	809	809	1214	644	644	924	668	668	853	762	762	850	806	806	843	941	941	941				

Appendix C

Vegetation Monitoring Plot Photos

Pequod Vegetation Monitoring Plot Photos

Vegetation Plot 1 (10/4/22)

Vegetation Plot 2 (10/4/22)

Vegetation Plot 3 (10/4/22)

Vegetation Plot 4 (10/4/22)

Vegetation Plot 5 (10/4/22)

Vegetation Plot 6 (10/4/22)

Pequod Vegetation Monitoring Plot Photos

Vegetation Plot 7 (10/4/22)

Vegetation Plot 8 (10/4/22)

Vegetation Plot 9 (10/4/22)

Vegetation Plot 10 (10/4/22)

Vegetation Plot 11 (10/4/22)

Vegetation Plot 12 (10/4/22)

Pequod Vegetation Monitoring Plot Photos

Vegetation Plot 13 (10/4/22)

Vegetation Plot 14 (10/4/22)

Vegetation Plot 15 (10/4/22)

Vegetation Plot 16 (10/4/22)

Vegetation Plot 17 (10/4/22)

Schmid Creek Vegetation Monitoring Plot Photos

Vegetation Plot 18 (9/29/2022)

Vegetation Plot 19 (9/29/2022)

Vegetation Plot 20 (9/29/2022)

Vegetation Plot 21 (9/29/2022)

Vegetation Plot 22 (9/29/2022)

Vegetation Plot 23 (9/29/2022)

Schmid Creek Vegetation Monitoring Plot Photos

Vegetation Plot 24 (9/29/2022)

Vegetation Plot 25 (9/29/2022)

Sunbeam Vegetation Monitoring Plot Photos

Vegetation Plot 26 (9/28/2022)

Vegetation Plot 27 (9/28/2022)

Vegetation Plot 28 (9/28/2022)

Vegetation Plot 29 (9/28/2022)

Vegetation Plot 30 (9/28/2022)

Vegetation Plot 31 (9/28/2022)

Sunbeam Vegetation Monitoring Plot Photos

Vegetation Plot 32 (9/28/2022)

Vegetation Plot 33 (9/28/2022)

Vegetation Plot 34 (9/28/2022)

Vegetation Plot 35 (9/28/2022)

Vegetation Plot 36 (9/28/2022)

Vegetation Plot 37 (9/28/2022)