FINAL-As-Built Baseline Monitoring Report
Seniard Creek Mitigation Site

Henderson County
French Broad River Basin
Cataloging Unit # 06010105

NCDMS Project No. 100017
NCDMS Contract No. 7189
DMS RFP No. 16-006991
USACE Action ID: SAW-2017-01571 **DWR#** 20171160
Data Collected: February – April 2021

Prepared for:

North Carolina Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh N C 27699-1652

Mitigation Services
ENVIRONMENTAL QUALITY

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Prepared for:

EW SOLUTIONS

37 Haywood Street, Suite 100
Asheville, NC 28801

Prepared by:

EQUINOX

balance through proper planning

37 Haywood Street, Suite 100
Asheville, NC 28801

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EQUINOX
balance through proper planning

June 3, 2021

Harry Tsomides,
Project Manager NCDEQ-DMS
5 Ravenscroft Dr., Suite 102
Asheville, NC 28801

Re: Draft As-Built Baseline Monitoring Report (Task 6)
Seniard Creek Mitigation Project,
Henderson County French Broad River CU 06010105
DMS Project ID No. 100017 / DEQ Contract #7189

Dear Harry,

Equinox has reviewed the list of DMS comments regarding the Draft As-Built Baseline Monitoring Report (Task 6) for the Seniard Creek Mitigation Project. This plan documents stream restoration, enhancement and preservation approaches aimed at delivering 3,645.949 Stream Mitigation Units (SMU).

Following are the original DMS comments and EWS responses in (*Red*) text.

> Please remove the credits table from the goals and objectives section and place it in a standalone section. Please provide the performance standards table from the mitigation plan in the performance standards section. Please provide the monitoring features table from the mitigation plan and red-line any changes, in the monitoring plan section.
>
> Please remove the goals/performance/results table. *Additional section created for project quantities and credits information. Performance standards table replaced and moved. Monitoring features table updated, replaced, and moved.*

> Please provide an explanation for each instance where the as built LF differ from the mitigation plan LF. Please provide a total sum for the as-built LF. *Added description of significant deviations in reach footages to Table 1.*

> When providing a secondary reference to the mitigation plan (e.eg, performance standards) please provide not just the calendar year but the mm/dd/year for the final

approved plan so the reader understands the exact version being referenced. *Specific references included in text and tables where applicable.*

The report states that "*Supplemental planting is proposed for all Enhancement II reaches. The remainder of the site will be planted per typical densities sufficient to ensure planted woody stem survival at the appropriate MY3 and MY7 densities."* Does this mean that planting is not yet complete? Or is this carryover verbiage from the mitigation planting plan? Please clarify in the document. *Text removed from the document. Planting was conducted in areas of low stem density within the Enhancement II reaches. This statement was referencing the potential need for supplemental planting following the initial round of invasive species removal.*

It looks as if part of Table 3 was duplicated - David Branch 1/2/3 are listed twice each. Please correct or clarify. *Replaced in text with the appropriate table.*

When listing the hydrologic unit codes, please include the leading "zero" as this is a code not a quantity. *Updated formatting within digital deliverables to reflect complete code. Inserted updated tables.*

Table 4 title says Harrell site. Please correct, and QAQC to make sure there are no other Harrell references. *Corrected in Report and Digital Deliverables.*

Planting dates and MY0 stream and veg assessment dates (and earthwork completion) should be month-day-year format since you are headed straight into MY1 monitoring. In addition please split out stream survey and veg assessment dates. You will need to wait a minimum of 180 days to collect any MY1 stream survey/veg data. *Dates updated to Month Day Year Format and table replaced in text.*

Bare Root and Live Stake Plantings	-	Feb - 2021
Baseline Monitoring Document (Year 0 Monitoring - Baseline)		
Stream Assessment	Apr - 2021	Apr - 2021
Vegetation Assessment		

Monitoring features map sheet key – could we possibly just label the stream reaches alongside the reaches, rather than have pointer lines everywhere? That would be preferable. If you have to keep the pointer lines please change the color from black to white or yellow as they are hard to read against all the other black lines. *Pointer lines removed and labels adjusted.*

Please include reach names on all of the monitoring features maps. These should also be re-named Current Conditions Plan View (CCPV) maps, and include the current monitoring year in the title block. *Map title changed and stream reach labels included on each sheet.*

Black willow and silky willow are listed in the veg tables as planted species and counted towards success. Were these live stakes? Live stakes should not be included in this table.

Two livestakes and four transplanted root balls were excluded from the counts. Tables updated accordingly.

The as built record drawings do not show any red lines. Was this a layer that wasn't turned on? Please highlight any deviations from the mitigation plan in red. In addition the designer record drawings did not include planting sheets. As a reminder:

- Monitoring features need not be shown as red lines on the record set since they appear on the as built survey
- The record drawing red lines appear should not be a copy-and-paste from the as- built survey showing widespread changes. This makes the record set very hard to distinguish minor variations within reason, from more significant changes such as stream extensions, structure type changes and upstream/downstream movements, and other variations that are useful to helping the reader determine field decisions that affected the project design and outcome more meaningfully. The record drawings should focus on any deviations from the design outside the range of tolerance for normal variation between design and as built condition; for example, red lines showing structure elevation changes of a few inches should be avoided.
- Record set should include planting plan deviations (shown as red lines) from Mitigation Plan sheets, and capture any omissions/ substitutions that were made; planting plan changes from mitigation plan to as built conditions should be listed and explained in the report.

No red lines were displayed on the as built record drawings due to there being no significant deviations (< 1%) in the as built from design. No omissions or substitutions of species were

made from the planting plan.

Digitals comments (previously sent via email):

- Please include the zero credit features that connect the creditable segments in the AS_Built_Centerline feature class. *Added Non-Creditable segments to the feature class.*

- Table 2 suggests that there are 5 continuous stage recorders, but 6 features were provided. Please update Table 2. *Table 2 Revised and Replaced as requested above. Red-line changes were indicated within the table.*

- The following stream segments do not intersect in the AS_Built_Centerline feature class, please review and address: *Non-Creditable lengths which form intersections were added in the As-Built centerline feature class.*

    1. Redmond Branch 1B and Sitton Creek 1. *Added*

    2. David Branch 1C and Sitton Creek 1. *Added*

- If available, please submit existing stream features. *Existing stream features data not available.*

Sincerely,

Danvey Walsh, Project Manager
Equinox Environmental
37 Haywood Street, Suite 100
Asheville, NC 28801

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1.0 PROJECT SUMMARY

1.1. Project Setting and Background

The Seniard Creek Mitigation Site (Seniard Mitigation Site) is located in the French Broad River Basin (CU 06010105). The Seniard Mitigation Site also lies within the North Fork Mills River Watershed (HUC 060101050403) which is identified as a Targeted Local Watershed (TLW) according to the 2009 French Broad River Basin Restoration Priorities (RBRP) Plan. Project work at the Seniard Site was completed in late February 2021 including construction and monitoring feature installation; bare root and live stake installation occurred in February 2021.

Historic land use at the Seniard Mitigation Site consisted of forestry and agricultural use for at least 65 years, according to historic aerial photos. Historic agricultural practices, relocation of the Seniard and Sitton Creeks had functionally removed the streams' connectivity with the floodplain. One poorly functioning culvert on Seniard Creek has degraded the ecological connectivity of the stream at the head of the Seniard Mitigation Site. The lack of deep-rooted vegetation and unstable channel characteristics have contributed to the degradation of the streambanks on both sides of the project. Ecological function has been restored to the existing streams, wetlands, and riparian corridor by returning the stream channels to a stable condition. The relocation of Seniard and Sitton Creeks to the historic floodplain has restored proper floodplain connectivity. The restoration of the upper Seniard Creek reach addressed a perched culvert by raising the bed elevation. In the mid and downstream reaches of Seniard Creek, the profile of the channel was raised, shifted, and proper channel dimensions were restored. The restoration of the upper Sitton Creek reach focused on realigning the channel, reestablishing dimension, and floodplain connectivity. Additional measures that promoted functional uplift included stabilizing and revegetating disturbed areas, restoring floodplain connectivity and wetland hydrology, reestablishing wooded riparian areas. These measures contribute to reduced downstream sediment and nutrient loads, as well as improving aquatic and terrestrial habitat.

This project is protected by an 11.68-acre conservation easement and is located approximately 3.7 miles northwest of Mills River, NC in Henderson County at 35.409056° N, -82.627667° W. The Seniard Mitigation Site is bounded by agricultural and residential properties.

1.2. Project Quantities and Credits

The Seniard Mitigation Site has restored, enhanced and preserved a total of 5,228 linear feet of stream. The project is expected to generate a total of 3,645.949 SMU. Refer to Table 1 for the project components and mitigation credit information and Figure 2 for the Project Asset Map.

Table 1. Seniard Creek Mitigation Site (100017) Project Mitigation Quantities and Credits.							
Component (Reach ID)	Mitgation Plan Footage (ft)	As-Built (ft)	Mitigation Category	Restoration Level	Mitigation Ration (X:1)	Mitigation Plan Credits	+Comments
Seniard Creek 1A	376	376.509	Cold	R	1:1	376.000	
*Seniard Creek 1B	1213	1198.706	Cold	R	1:1	1213.000	Confluence with Sitton farther upstream than design
*Seniard Creek 2	176	187.521	Cold	R	1:1	176.000	Confluence with Sitton farther upstream than design
*Sitton Creek 1	1095	1070.019	Cold	R	1:1	1095.000	Confluence with Seniard farther upstream than design
*Lee Branch	212	209.48	Cold	R	1:1	212.000	Reduced sinuosity compared to design
David Branch 1A	132	128.298	Cold	P	10:1	13.200	Restoration on David 1B begins upstream compared to design
David Branch 1B	296	296.779	Cold	R	1:1	296.000	
David Branch 1C	226	220.522	Cold	R	1:1	226.000	Longer Non-Creditable section for culvert outfall
Whitaker Branch	416	415.749	Cold	EII	8:1	52.000	
Redmond Branch 1A	1046	1046.569	Cold	EII	7:1	149.429	
Redmond Branch 1B	76	78.036	Cold	R	1:1	76.000	Shorter Non-Creditable section for culvert outfall

*Deviations in As-Built vs. Design footage relate directly to reduction in sinuosity when calculated using As-Built centerline derived from surveyed top of bank.

+ No redlines were displayed on the As-built record drawing due to no significant deviations from the design (<1%).

Project Credits

Restoration Level	Stream (ft)			Wetlands (ac)		
	Warm	Cool	Cold	Riparian	Non-Riparian	Coastal
Restoration			3670.000			
Re-establishment						
Rehabilitation						
Enhancement						
Enhancement I						
Enhancement II			201.429			
Creation						
Preservation			13.200			
Totals^	0	0	3884.629	0	0	0

Stream Credits						
Total Baseline Credit			3884.629			
Credit Loss in Required Buffer			-441.360			
Credit Gained for Additional Buffer			202.680			
Net Change in Credit from Buffers			-238.680			
Total Project Credits^			3645.949			

Overall Asset Summary	
Total Stream Credit	**3,645.949**
Total Wetland Credit	**0.000**

^These numbers are 2.701 SMUs less than the the corresponding numbers in the Project Assets (Table 18A) of the approved mitigation plan. This is the result of an error in the approved mitigation plan table. The credit sums in this table are correct.

Wetland Mitigation Category

CM Coastal Marsh
R Riparian
NR Non-Riparian

Restoration Level

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

Project Goals and Objectives

The project goals address stressors identified in the TLW and priority sub-watershed, as outline in the Final Mitigation Plan, and include:

- Provide a network of streams with natural, stable forms that support proper stream functions;
- Improve groundwater hydrology to support recovery of native riparian vegetation;
- Reduce sediment inputs from eroding stream banks to reduce fine sediment loads and percentage of fines in the bed-material load;
- Restore proper sediment transport to support channel stability and bedform diversity;
- Improve substrate quality to facilitate hyporheic flow and support aquatic communities;
- Improve quantity, quality, and diversity of habitats to support healthy aquatic communities;
- Reduce pollutant inputs to the project streams (fecal coliform, nitrogen, phosphorus) to restore a balance to proper nutrient cycles;

- Improve riparian vegetation community to provide temperature regulation of the stream, provide a future source of organic inputs, and aid in long-term channel bank stability;
- Restore areas of former riparian vegetative communities so that the hydrology and soils will support wetland vegetative communities and wildlife;
- Improve landscape connectivity that allows space for biotic and abiotic process and provides a source and sink for natural populations; and,
- Prevent the site from future impacts of development and agricultural uses.

The following objectives are proposed for accomplishing the above listed goals as outlined in the Final Mitigation Plan:

- Construct stream channels that will maintain proper dimension, pattern, and profile;
- Construct streams with proper bankfull to floodplain relationship;
- Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering;
- Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall stream profile neither aggrades nor degrades over time;
- Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes;
- Construct stable riffles that provide an improved diversity of bed material clast and a reduction in fines relative to existing conditions;
- Construct in-stream habitat features from native material to provide diversity of habitat;
- Provide a buffer from agricultural activates and row crops;
- Plant native tree species and understory species in the riparian zone;
- Reconstruct stream channels that are properly connected to the riparian areas;
- Re-grade topography to eliminate ditches and drainage features;
- Plant native wetland tree and shrub species; and,
- Establish a conservation easement that provides a minimum buffer from future activities in the adjacent watershed and ensure aquatic organism passage by correcting perched culverts or removing other barriers within the easement.

1.4. Monitoring Plan Components

Additions and deviations from the Final Mitigation Plan - Seniard Creek Mitigation Site (May 27, 2020) are listed in Table 2. Two (2) cross-sections were added to the approved monitoring features. The first was added in Seniard Reach 1A at the request of the Interagency Review Team (IRT). The second was added in Seniard Reach 2 to provide representation of both a pool and riffles within the reach. As a result of the addition of a riffle cross-section to Seniard Reach 1, an additional pebble count was added for a total of eight. Twelve (12) photo stations were established throughout the restoration site to provide visual representation of the project. An additional continuous stage recorder was added on David Branch Reach 1B. A third groundwater gage was added to the riparian wetlands along Sitton Creek. The Vegetation plot located on David Branch 1C was shifted downstream to allow for setup of a 5 X 20-meter plot due to constraints associated with the proposed location. Similar constraints were observed on Whitaker Branch where a 5 X 20-meter plot was substituted for the 10 X 10 proposed in the Approved Mitigation Plan. The vegetation plot on Redmond Branch 1A was relocated downstream to allow for the monitoring of planted stems in an area where augmented planting of bare root trees was conducted.

Table 2. Seniard Creek Mitigation Site (100017) Monitoring Plan Components				
Parameter	**Method**	**Quantity**	**Frequency**	**Notes**
Dimension	Riffle Cross Sections	Seniard Reach 1 (~~1~~ **2**) Seniard Reach 2 (1) Sitton Reach 1 (1) Lee Reach 1(1) David Reach 1 (1) Whitaker Reach 1 (1) Redmond Reach 1 (1)	Years 1, 2, 3, 5, & 7	Measured dimensions will be compared to reference dimensions to calculate bed- width index and max-depth index.
	Pool Cross Sections	Seniard Reach 1 (2) Seniard Reach 2 (**1**) Sitton Reach 1 (1) Lee Reach 1(1) David Reach 1 (1) Whitaker Reach 1 (1) Redmond Reach 1 (1)	Years 1, 2, 3, 5, & 7	Measured dimensions will be compared to reference dimensions to calculate bed- width index and max-depth index.
Pattern	Visual Inspection	None	Bi-annual	Bank pins will be installed only in areas of concern.
Profile	Visual Inspection	None	Bi-annual	Additional profile measurements may be required if problems are identified during the monitoring period.
Substrate	Pebble Counts	~~7~~ **8**	Years 1, 2, 3, 5, & 7	
Surface Water Hydrology	Continuous Stage Recorder Crest Gauge	~~5~~ **6** 2	Semi- annual	The device will be inspected on a semi-annual basis to document the occurrence of bankfull events on the project.
Groundwater Hydrology	Groundwater Gauge	~~2~~ **3**	Annual	Data will be downloaded on a monthly basis during the growing season.
Vegetation	Vegetation Plots	10	Annual	Vegetation monitoring will follow CVS protocol.
Fish Passage	Electrofishing surveys	1	Annual	Measurements and sampling methods will follow recommendations in the Standard Methods for Sampling North American Freshwater Fishes, 2009 and Fisheries Techniques 3rd Ed, 2012.
Exotic and Nuisance Vegetation	Visual	N/A	Semi- annual	Approximate locations of exotic and nuisance vegetation and the occurrence of beaver dams will be mapped.
Project Boundary	Visual	N/A	Semi- annual	Locations of vegetation damage, boundary encroachments, etc. will be mapped.

(**Red**) text indicates a deviation from the Final Mitigation Plan - Seniard Creek Mitigation Site (May 27, 2020).

1.5. Project Performance Standards

The stream restoration performance standards for the project will follow accepted and approved criteria in Table 3 and based on the Final Mitigation Plan - Seniard Creek Mitigation Site (May 27, 2020). Annual monitoring reports will follow the DMS Stream and Wetland Mitigation Plan Template and Guidance (October 2020). Performance criteria will be evaluated throughout the seven-year monitoring period.

Table 3. Seniard Creek Mitigation Site (100017) Performance Standards

Objective	Performance Standard	Monitoring Approach
Construct stream channels that will maintain proper dimension, pattern and profile.	□ Riffle section W/D ratios should remain within the range of the appropriate stream type. □ BHR should not exceed 1.2. BHR should not change more than 10% in any given monitoring interval. Changes that do occur should indicate a trend toward stability. □ Entrenchment Ratios should be ≥ 2.2 for C/E channels and ≥ 1.4 for B Channels. □ Document nearly continuous surface flow.	Survey of select cross sections and visual assessment. Continuous stage recorders for base flow.
Construct streams with proper bankfull to floodplain relationship.	Four bankfull events or greater, in separate years, will be documented during the monitoring period.	Crest gauges, continuous stage recorders, and debris lines.
Construct streams that provide naturally stable dimensions and stabilize constructed banks with appropriate bioengineering.	Channel banks should generally remain stable. Where bank migration does occur, it should not exceed 10% of the previous monitored bankfull width and 20% of the original design bankfull width.	Visual assessment and bank pin monitoring as necessary.
Construct streams that maintain an appropriate sediment transport balance with the sediment that is supplied by the watershed so that the overall stream profile neither aggrades nor degrades over time.	Profile adjustments should not indicate significant aggradation or degradation. BHR requirements as stated above.	Resurvey of longitudinal profile if visual assessment indicates potential instability.
Create and improve stream bedform diversity by constructing pools of varied depths and riffles of varied slopes.	Profile should maintain a diversity of depths expressed in riffle/pool forms.	Visual assessment
Construct stable riffles that provide an improved diversity of bed material clast and a reduction in fines relative to existing conditions.	Substrate material should progress towards or maintain coarser material in riffles and runs with finer material present in pools and glides.	Pebble count measurements at surveyed cross sections

Table 3. cont. Seniard Creek Mitigation Site (100017) Performance Standards		
Objective	**Performance Standard**	**Monitoring Approach**
Construct in-stream habitat features from native material to provide a diversity of habitats.	In-stream habitat structures should remain intact and functional.	Visual assessment
Provide improved fish passage through previous upstream impediments.	No standards have been set, but results should present trends in increased fish passage.	Electrofishing surveys
Provide a buffer from agricultural activities and row crops.	Record conservation easement prior to implementation.	Conservation Easement Compliance
Plant native climax tree species and understory species in the riparian zone.	At project initiation, a minimum of 680 stems/ac are to be planted. Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present, measuring 6ft at MY-5. Minimum of 210 stems/ac present, measuring 8ft at MY-7.	Vegetation plots
Reconstruct stream channels that are properly connected to the riparian areas.	Bankfull elevations and profile should be consistent with valley grade.	Visual assessment
Re-grade topography to eliminate ditches and drainage features.	Floodplain topography should no longer contain lateral ditches or drainage features.	Visual assessment
Plant native wetland tree and shrub species.	At project initiation, a minimum of 680 stems/ac are to be planted. Minimum of 320 stems/ac present at MY-3. Minimum of 260 stems/ac present, measuring 6ft at MY-5. Minimum of 210 stems/ac present, measuring 8ft at MY-7.	Vegetation plots
Establish a conservation easement that provides a minimum buffer from future activities in the adjacent watershed.	Record conservation easement prior to implementation.	Conservation Easement Compliance

1.6. Mitigation Components

The Seniard Mitigation Site is expected to generate 3,645.949 SMUs. These credits are based on the IRT approved Seniard Creek Mitigation Plan (May 27, 2020) of 3,648.650, minus 2.701 SMU due to a stream length calculation error discovered after mitigation plan approval, in which lengths were slightly over-calculated due to tributary lines tying into center lines rather than top-of-banks; this is now correct moving forward.

1.7. Restoration Type and Approach

Earthwork activities included excavation of the proposed channels, partial or complete backfilling of existing channels, and removal of spoil berms. Grading was designed to restore or mimic natural contours.

1.7.1. Stream Restoration

Seniard Creek Reach 1A

Reach 1A bed was lifted using a long boulder brush run to provide a stable pool and transitional area from the perched culvert invert. Additional grading of the bank along this long boulder brush run was designed to reduce shear stress at bankfull flows. The remainder of the Reach 1A utilized a series of boulder brush runs and brush runs to provide the essential roughness and stability for the reach.

Seniard Creek Reach 1B

Reach 1B was constructed using boulder brush runs and brush enhanced riffles. This reach will be raised to reconnect Reach 1 with the confluence of Sitton Creek and Seniard Creek Reach 2. Existing alder and willow clumps from this section will be transplanted throughout the site.

Seniard Creek Reach 2

Reach 2 was constructed to provide a transitional area between the confluence of Sitton Creek and Seniard Reach 1B. This area was constructed with both boulder brush runs and brush runs. Both banks were regraded to reduce additional shear on the banks in this bend and transition to the existing Seniard Creek channel.

Sitton Creek Reach 1

Reach 1 was constructed with a series of brush runs and boulder brush runs. Brush runs were reinforced with a cobble matrix to provide the essential roughness and stability for the reach.

Lee Branch Reach 1

Reach 1 was constructed using a headwater treatment, appropriate for small streams and steep slopes. The channel bed and banks were constructed of a harvested cobble/ brush matrix.

David Branch Reach 1A

Reach 1A is preservation only. No instream work was performed.

David Branch Reach 1B

Reach 1B was constructed by using a headwater treatment adjacent to a pre-existing pond. The pond dam was deconstructed, and the basin filled using hydric soils recovered on site. The channel bed and banks were constructed of a harvested cobble/brush matrix. The harvested cobble is of a sufficient size to resist the elevated shear stress and the brush provides roughness, which encourages stability in the higher-performance reach.

David Branch Reach 1C

Reach 1C was constructed using the same headwater treatment as Reach 1B. This reach is of lower energy and was aligned adjacent to existing wetlands.

Whitaker Branch Reach 1

Reach 1A is an Enhancement II reach. No instream work was performed.

Redmond Branch Reach 1A

Reach 1A is an Enhancement II reach. No instream work was performed.

Redmond Branch Reach 1B

Reach 1B is a transition zone from an existing corrugated metal pipe to Sitton Creek. Reach 1B was constructed with a series of brush runs to provide the necessary roughness and stability for this transition.

Existing woody vegetation was harvested and re-planted within the site where possible. The remainder of the site will be planted per typical densities sufficient to ensure planted woody stem survival at the appropriate MY3 and MY7 densities. Reach summaries and attributes can be found Table 4. Project timeline and contacts can be found in Table 5.

Table 4. Seniard Creek Mitigation Site Attribute Table				
Project Name		Seniard Creek Mitigation Site		
County		Henderson		
Project Area (acres)		11.68		
Project Coordinates (latitude and longitude decimal		35.409056° N, -82.627667° W		
Project Watershed Summary Information				
Physiographic Province		Blue Ridge Mountains		
River Basin		French Broad		
USGS Hydrologic Unit 8-digit	06010105	060101050403		
DWR Sub-basin		04-03-03		
Project Drainage Area (acres)		2310		
Project Drainage Area Percentage of Impervious Area		<1		
Land Use Classification		Cropland (Hayland)		
Reach Summary Information				
Parameters		**Seniard Reach 1A**	**Seniard Reach 1B**	**Seniard Reach 2**
Pre-project length (feet)		443	1272	422
Post-project (feet)		396	1274	176
Valley confinement (Confined, moderately confined,		Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)		826	858	1574
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial
NCDWR Water Quality Classification		WSII, TR, HQW	WSII, TR, HQW	WSII, TR, HQW
Dominant Stream Classification (existing)		G/F	G	G
Dominant Stream Classification (proposed)		B	B	B
Dominant Evolutionary class (Simon) if applicable		N/A	N/A	N/A
Wetland Summary Information				
Parameters		**Wetland 1**	**Wetland 2**	**Wetland 3**
Pre-project (acres)		N/A	N/A	N/A
Post-project (acres)		N/A	N/A	N/A
Wetland Type (non-riparian, riparian)		N/A	N/A	N/A
Mapped Soil Series		N/A	N/A	N/A
Soil Hydric Status		N/A	N/A	N/A
Regulatory Considerations				
Parameters		**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404		Yes	Yes	SAW-2017-01571
Water of the United States - Section 401		Yes	Yes	DWR # 17-1160
Endangered Species Act		Yes	Yes	04EN1000-2017-SLI-0139
Historic Preservation Act		Yes	Yes	ER 17-1172
Coastal Zone Management Act (CZMA or CAMA)		No	N/A	N/A
Essential Fisheries Habitat		No	N/A	N/A

Table 4 cont. Seniard Creek Mitigation Site Attribute Table				
Project Name		Seniard Creek Mitigation Site		
County		Henderson		
Project Area (acres)		11.68		
Project Coordinates (latitude and longitude decimal		35.409056° N, -82.627667° W		
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Physiographic Province		Blue Ridge Mountains		
River Basin		French Broad		
USGS Hydrologic Unit 8-digit	06010105	060101050403		
DWR Sub-basin		04-03-03		
Project Drainage Area (acres)		2310		
Project Drainage Area Percentage of Impervious Area		<1		
Land Use Classification		Cropland (Hayland)		
Reach Summary Information				
Parameters		**Sitton Creek Reach 1**	**Lee Branch Reach 1**	**Whitaker Branch Reach 1**
Pre-project length (feet)		1105	129	426
Post-project (feet)		1236	226	426
Valley confinement (Confined, moderately confined,		Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)		633	13	26
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial
NCDWR Water Quality Classification		WSII, TR, HQW	WSII, TR, HQW	WSII, TR, HQW
Dominant Stream Classification (existing)		G	G	B
Dominant Stream Classification (proposed)		B	B	B
Dominant Evolutionary class (Simon) if applicable		N/A	N/A	N/A
Wetland Summary Information				
Parameters		**Wetland 1**	**Wetland 2**	**Wetland 3**
Pre-project (acres)		N/A	N/A	N/A
Post-project (acres)		N/A	N/A	N/A
Wetland Type (non-riparian, riparian)		N/A	N/A	N/A
Mapped Soil Series		N/A	N/A	N/A
Soil Hydric Status		N/A	N/A	N/A
Regulatory Considerations				
Parameters		**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404		Yes	Yes	SAW-2017-01571
Water of the United States - Section 401		Yes	Yes	DWR # 17-1160
Endangered Species Act		Yes	Yes	04EN1000-2017-SLI-0139
Historic Preservation Act		Yes	Yes	ER 17-1172
Coastal Zone Management Act (CZMA or CAMA)		No	N/A	N/A
Essential Fisheries Habitat		No	N/A	N/A

Table 4 cont. Seniard Creek Mitigation Site Attribute Table				
Project Name		Seniard Creek Mitigation Site		
County		Henderson		
Project Area (acres)		11.68		
Project Coordinates (latitude and longitude decimal		35.409056° N, -82.627667° W		
Project Watershed Summary Information				
Physiographic Province		Blue Ridge Mountains		
River Basin		French Broad		
USGS Hydrologic Unit 8-digit	06010105	060101050403		
DWR Sub-basin		04-03-03		
Project Drainage Area (acres)		2310		
Project Drainage Area Percentage of Impervious Area		<1		
Land Use Classification		Cropland (Hayland)		
Reach Summary Information				
Parameters		**David Branch 1A**	**David Branch 1B**	**David Branch 1C**
Pre-project length (feet)		132	224	165
Post-project (feet)		132	335	273
Valley confinement (Confined, moderately confined,		Moderately Confined	Moderately Confined	Moderately Confined
Drainage area (acres)		6	6	26
Perennial, Intermittent, Ephemeral		Perennial	Perennial	Perennial
NCDWR Water Quality Classification		WSII, TR, HQW	WSII, TR, HQW	WSII, TR, HQW
Dominant Stream Classification (existing)		B	G	G
Dominant Stream Classification (proposed)		B	B	B
Dominant Evolutionary class (Simon) if applicable		N/A	N/A	N/A
Wetland Summary Information				
Parameters		**Wetland 1**	**Wetland 2**	**Wetland 3**
Pre-project (acres)		N/A	N/A	N/A
Post-project (acres)		N/A	N/A	N/A
Wetland Type (non-riparian, riparian)		N/A	N/A	N/A
Mapped Soil Series		N/A	N/A	N/A
Soil Hydric Status		N/A	N/A	N/A
Regulatory Considerations				
Parameters		**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404		Yes	Yes	SAW-2017-01571
Water of the United States - Section 401		Yes	Yes	DWR # 17-1160
Endangered Species Act		Yes	Yes	04EN1000-2017-SLI-0139
Historic Preservation Act		Yes	Yes	ER 17-1172
Coastal Zone Management Act (CZMA or CAMA)		No	N/A	N/A
Essential Fisheries Habitat		No	N/A	N/A

Table 4 cont. Seniard Creek Mitigation Site Attribute Table				
Project Name		Seniard Creek Mitigation Site		
County		Henderson		
Project Area (acres)		11.68		
Project Coordinates (latitude and longitude decimal		35.409056° N, -82.627667° W		
Project Watershed Summary Information				
Physiographic Province		Blue Ridge Mountains		
River Basin		French Broad		
USGS Hydrologic Unit 8-digit	06010105	060101050403		
DWR Sub-basin		04-03-03		
Project Drainage Area (acres)		2310		
Project Drainage Area Percentage of Impervious Area		<1		
Land Use Classification		Cropland (Hayland)		
Reach Summary Information				
Parameters		**Redmond Branch 1A**	**Redmond Branch 1B**	
Pre-project length (feet)		1066	40	
Post-project (feet)		1054	94	
Valley confinement (Confined, moderately confined,		Moderately Confined	Moderately Confined	
Drainage area (acres)		45	45	
Perennial, Intermittent, Ephemeral		Perennial	Perennial	
NCDWR Water Quality Classification		WSII, TR, HQW	WSII, TR, HQW	
Dominant Stream Classification (existing)		B	G	
Dominant Stream Classification (proposed)		N/A	B	
Dominant Evolutionary class (Simon) if applicable		N/A	N/A	
Wetland Summary Information				
Parameters		**Wetland 1**	**Wetland 2**	**Wetland 3**
Pre-project (acres)		N/A	N/A	N/A
Post-project (acres)		N/A	N/A	N/A
Wetland Type (non-riparian, riparian)		N/A	N/A	N/A
Mapped Soil Series		N/A	N/A	N/A
Soil Hydric Status		N/A	N/A	N/A
Regulatory Considerations				
Parameters		**Applicable?**	**Resolved?**	**Supporting Docs?**
Water of the United States - Section 404		Yes	Yes	SAW-2017-01571
Water of the United States - Section 401		Yes	Yes	DWR # 17-1160
Endangered Species Act		Yes	Yes	04EN1000-2017-SLI-0139
Historic Preservation Act		Yes	Yes	ER 17-1172
Coastal Zone Management Act (CZMA or CAMA)		No	N/A	N/A
Essential Fisheries Habitat		No	N/A	N/A

1.7.2. Wetlands

No wetlands credits were proposed for the Seniard Creek Mitigation Project. Functional uplift of existing wetlands and creation of new wetlands involved removal of any overburden material to expose the underlying hydric soils. Wetland hydrology was improved by raising stream bed elevations. Additional grading activities included harvesting usable topsoil material for re-use on portions of the re-graded floodplain, removal of spoil berms, and grading of off-channel depressional features to provide additional retention of surface water and increased habitat diversity. Reestablishment areas were planted with native vegetation. Rehabilitation of the existing wetlands involved stabilizing wetland hydrology and replanting.

1.7.3.Additional Site Considerations

Future Land Uses

Current residential and agricultural land uses are currently compatible with a conservation easement. Changes in this land use may require further steps to ensure the protection of the easement.

Nuisance Wildlife

Deer are commonly observed in and around the site. Some browse damage to the newly planted stems is likely. Similarly, beaver have not been observed within the site, but indications of beaver activity will be monitored throughout the life of the project.

1.7.4. Project Timeline and Contacts

Table 5. Project Activity and Timeline Seniard Creek Mitigation Site		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Mitigation Plan	Dec - 2019	May 27, 2020
Mitigation Plan Addendum	-	-
Final Design - Construction Plans	-	Dec - 2020
Construction	-	Dec 5, 2020
Temporary S&E Mix Applied	-	Dec 5, 2020
Permanent Seed Mix Applied	-	Dec 5, 2020
Bare Root and Live Stake Plantings	-	Feb 25, 2021
Baseline Monitoring Document (Year 0 Monitoring - Baseline)		May - 2021
Stream Assessment	April 2, 2021	-
Vegetation Assessment	March 30, 2021	-
Year 1 Monitoring	-	-

Table 5 cont. Project Contacts Seniard Mitigation Site	
Prime Contractor David Tuch (828) 253-6856	EW Solutions 37 Haywood Street, Suite 100 Asheville, NC 28801
Designer Grant Ginn (828) 449-1930	Stantec Consulting, Inc 56 College Street, Sute 201 Asheville NC, 28801
Construction Contractor Charles Baker (828) 668-5060	Baker Construction 1000 Bat Cave Rd, Old Fort NC 28762
Seeding Contractor Charles Baker (828) 668-5060	Baker Construction 1000 Bat Cave Rd, Old Fort NC 28762
Planting Contractor Owen Carson (828) 253-6856	Equinox Environmental 37 Haywood Street, Suite 100 Asheville, NC 28801
As-built Surveys Brad Kee (828) 575-9021	Kee Mapping 88 Central Ave Asheville, NC 28801
Seeding Mix Source (800) 873-3321	Ernst Conservation Seeds 8884 Mercer Pike Meadsville, PA 16335
Woody Stem Source Cole Williams (706) 483-3397	Native Forest Nursery 11306 Hwy 411 S Chatsworth, Ga 30705
Live Stakes Carla Scholl (919) 742-1200	Mellow Marsh Farms 1312 Woody Store Rd Siler City, NC 27344
Monitoring Performers (MY0)- 2021 Danvey Walsh (828) 253-6856 ext 201	Equinox Environmental 37 Haywood Street, Suite 100 Asheville, NC 28801

2.0 REFERENCES

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (http://cvs.bio.unc.edu/methods.htm).

Kee Mapping and Survey. March 2021. As-Built Survey of Seniard Creek Restoration Project. Prepared for EW Solutions.

NCDMS Stream and Wetland Mitigation Annual Monitoring Template (October 2020).

NCDMS Veg Table Production Tool, Version (1/12/2021).

Stantec Consulting, Inc. 2020. Final Mitigation Plan – Seniard Mitigation Site (May 27, 2020). Prepared for North Carolina Department of Environmental Quality, Division of Mitigation Services. DMS Project No. 100017.

3.0 PROJECT LOCATION AND ASSETS MAP

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EQUINOX

CCPV MY0
Sheet Key
Seniard Creek
Stream Restoration Site
Henderson Co., NC
April 2021

As-Built Centerline

Restoration Type
- Enhancement II
- Preservation
- Restoration
- NC

- Reach Breaks
- Utility Easement

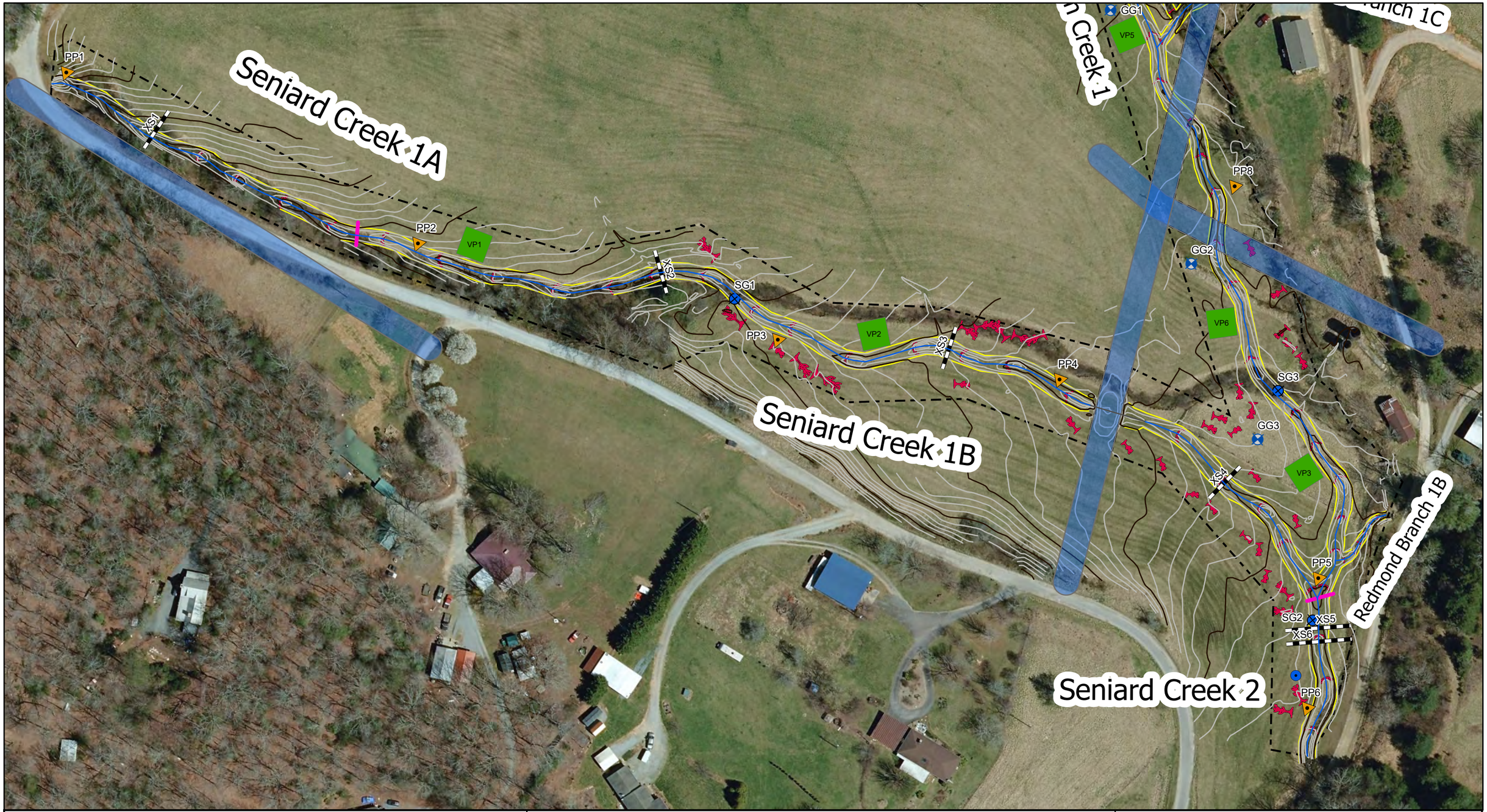
Top of Bank
- Top of Bank

- Conservation Easement

N

0 65 130 260 390 520 Feet

This map is not a survey and is not to be construed as such.



EQUINOX

CCPV MY0
Sheet 1
Seniard Creek Stream Restoration Site
Henderson Co., NC
April 2021

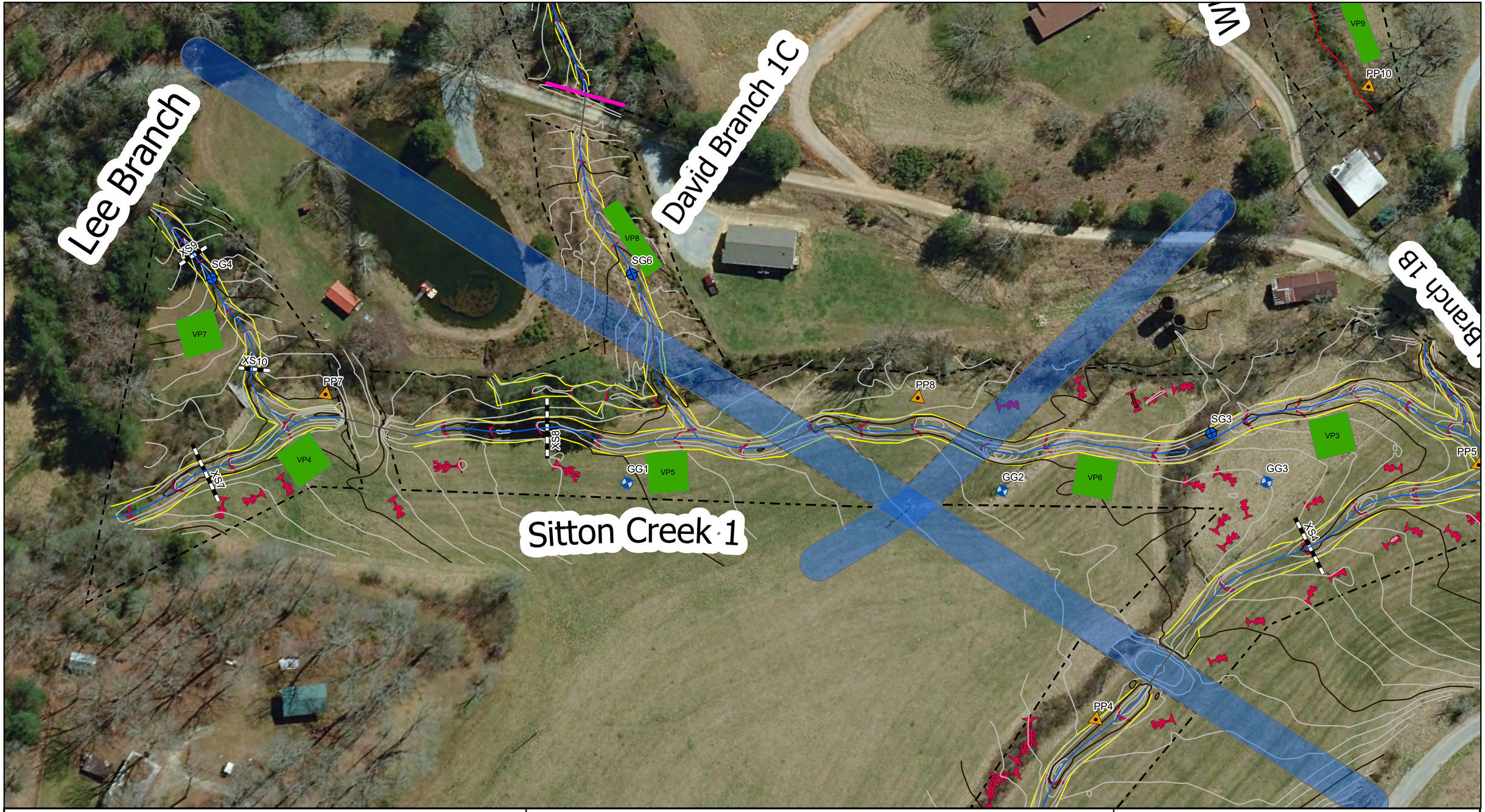
As-Built Centerline
Restoration Type
- Enhancement II
- Preservation
- Restoration
- NC

- Reach Breaks
- Utility Easement
- Photo Station
- Continuous Stage Recorder
- Groundwater Gauge
- Rain Gauge
- Cross Section
- Vegetation Plot
- Top of Bank
- Structures
- Conservation Easement

N

0 40 80 160 240 320 Feet

This map is not a survey and is not to be construed as such.



EQUINOX

CCPV MY0
Sheet 2
Seniard Creek Stream Restoration Site
Henderson Co., NC
April 2021

As-Built Centerline
Restoration Type
- Enhancement II
- Preservation
- Restoration
- NC

- Reach Breaks
- Utility Easement
- Photo Station
- Continuous Stage Recorder
- Groundwater Gauge

- Cross Section
- Vegetation Plot
- Top of Bank
- Structures
- Conservation Easement

N

0 25 50 100 150 200 Feet

This map is not a survey and is not to be construed as such.

EQUINOX

CCPV MY0
Sheet 3
Seniard Creek Stream Restoration Site
Henderson Co., NC
April 2021

As-Built Centerline
Restoration Type
- Enhancement II
- Preservation
- Restoration
- NC

- Reach Breaks
- Utility Easement
- Photo Station
- Continuous Stage Recorder
- Groundwater Gauge

- Cross Section
- Vegetation Plot
- Top of Bank
- Structures
- Conservation Easement

N

0 20 40 80 120 160 Feet

This map is not a survey and is not to be construed as such.

Whitaker Branch

Redmond Branch 1A

d Branch 1B

XS14

XS13

CG1

VP9

PP10

VP10

PP11

PP12

XS16

XS15

CG2

EQUINOX

CCPV MY0
Sheet 4
Seniard Creek Stream Restoration Site
Henderson Co., NC
April 2021

As-Built Centerline

Restoration Type

- Enhancement II
- Preservation
- Restoration

- NC
- Reach Breaks
- Utility Easement
- Photo Station
- Crest Gauge

- Cross Section
- Vegetation Plot
- Top of Bank
- Structures
- Conservation Easement

N

0 25 50 100 150 200 Feet

This map is not a survey and is not to be construed as such.

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Appendix A
Visual Assessment Data

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Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - Seniard Reach 1A - Restoration PII
Assessed Length 396 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	4	4			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - Seniard Reach 1B - Restoration PI
Assessed Length 1274 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	19	19			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	19	19			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	19	19			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	19	19			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	19	19			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment Seniard Mitigation Site - Seniard Reach 2 - Restoration PI Assessed Length 176 feet										
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number in As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**	**Number with Stabilizing Woody Vegetation**	**Footage with Stabilizing Woody Vegetation**	**Adjusted % for Stabilizing Woody Vegetation**
1. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	3	3			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	3	3			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	3	3			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment Seniard Mitigation Site - Sitton Reach 1 - Restoration PI Assessed Length 1236 feet										
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number in As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**	**Number with Stabilizing Woody Vegetation**	**Footage with Stabilizing Woody Vegetation**	**Adjusted % for Stabilizing Woody Vegetation**
1. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	22	22			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	22	22			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	22	22			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	22	22			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	22	22			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment Seniard Mitigation Site - Lee Reach 1 - Restoration PII Assessed Length 226 feet										
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number in As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**	**Number with Stabilizing Woody Vegetation**	**Footage with Stabilizing Woody Vegetation**	**Adjusted % for Stabilizing Woody Vegetation**
1. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	8	8			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment Seniard Mitigation Site - David Reach 1A - Preservation Assessed Length 132 feet										
Major Channel Category	**Channel Sub-Category**	**Metric**	**Number Stable, Performing as Intended**	**Total Number in As-built**	**Number of Unstable Segments**	**Amount of Unstable Footage**	**% Stable, Performing as Intended**	**Number with Stabilizing Woody Vegetation**	**Footage with Stabilizing Woody Vegetation**	**Adjusted % for Stabilizing Woody Vegetation**
1. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.					N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.					N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.					N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.					N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.					N/A			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - David Reach 1B - Restoration PI&II
Assessed Length 335 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	16	16			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	16	16			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	16	16			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	16	16			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	16	16			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - David Reach 1C - Restoration PI
Assessed Length 273 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	7	7			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	7	7			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	7	7			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	7	7			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	7	7			100%			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - Whitaker Reach 1 - Enhancement II
Assessed Length 426 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.					N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.					N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.					N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.					N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.					N/A			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - Redmond Reach 1A - Enhancement II
Assessed Length 1054 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	1. Scoured / Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.					N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.					N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.					N/A			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.					N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.					N/A			

N/A - Item does not apply.

Visual Stream Morphology Stability Assessment
Seniard Mitigation Site - Redmond Reach 1B - Restoration PI
Assessed Length 94 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bank	**1. Scoured / Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion.			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
2. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	6	6			100%			

N/A - Item does not apply.

Vegetation Condition Assessment Seniard Mitigation Site						
Planted Acreage: 7.4						
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Planted Acreage**
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	n/a	0	0	0.00%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres		0	0	0.00%
			Total	0	0	0.00%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	n/a	0	0	0.00%
			Cumulative Total	0	0	0.00%
Easement Acreage:	**11.8**					
Vegetation Category	**Definitions**	**Mapping Threshold**	**CCPV Depiction**	**Number of Polygons**	**Combined Acreage**	**% of Easement Acreage**
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale). High Density	1000 SF		0	0	0.00%
	Areas or points (if too small to render as polygons at map scale). Low Density	1000 SF		0	0	0.00%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	n/a	0	0	0.00%

n/a Item does not apply

Photo Point 1. Facing downstream

Photo Point 2. Facing downstream

Photo Point 2. Facing upstream

Photo Point 3. Facing downstream

Photo Point 3. Facing upstream

Photo Point 4. Facing downstream

Photo Point 4. Facing upstream.

Photo Point 5. Facing downstream

Photo Point 5. Facing upstream Seniard Creek

Photo Point 5. Facing upstream Sitton Creek and Redmond Br.

Photo Point 6. Facing downstream

Photo Point 6. Facing upstream

Photo Point 7. Facing upstream Lee Branch

Photo Point 7. Facing upstream Sitton Creek

Photo Point 8. Facing downstream

Photo Point 8. Facing upstream

Photo Point 9. Facing downstream

Photo Point 10. Facing downstream

Photo Point 10. Facing upstream

Photo Point 11. Facing downstream

Photo Point 12. Facing downstream

Photo Point 12. Facing upstream

Appendix B
Vegetation Plot Data

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https://ncdms.shinyapps.io/Veg_Table_Tool

Planted Acreage	7.4
Date of Initial Plant	2021-02-28
Date(s) of Supplemental Plant(s)	#N/A
Date(s) Mowing	#N/A
Date of Current Survey	2021-04-02
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	hazel alder	Tree	OBL	1	1	2	2	2	2	4	4	3	3					3	3			2	2
	Betula nigra	river birch	Tree	FACW	1	1	3	3			1	1			3	3			1	1			3	3
	Carpinus caroliniana	American hornbeam	Tree	FAC	1	1	3	3	3	3			3	3	1	1			2	2			1	1
	Cornus amomum	silky dogwood	Shrub	FACW											8	8			8	8			1	1
	Diospyros virginiana	common persimmon	Tree	FAC	1	1	1	1	1	1	1	1			2	2	3	3					1	1
	Hamamelis virginiana	American witchhazel	Tree	FACU	3	3	1	1					1	1							2	2		
	Ilex opaca	American holly	Tree	FACU							1	1	1	1							3	3		
	Ilex verticillata	common winterberry	Tree	FACW			1	1	1	1	3	3					1	1	1	1				
	Lindera benzoin	northern spicebush	Tree	FAC									1	1										
	Liriodendron tulipifera	tuliptree	Tree	FACU							1	1	1	1			4	4			1	1		
	Nyssa sylvatica	blackgum	Tree	FAC													2	2						
	other								1	1														
	Platanus occidentalis	American sycamore	Tree	FACW	5	5	1	1	2	2			1	1					1	1	1	1		
	Quercus rubra	northern red oak	Tree	FACU					1	1							1	1			2	2		
	Quercus sp.				1	1	1	1	3	3			1	1										
	Salix nigra	black willow	Tree	OBL	2	2	1	1	2	2	1	1	5	5									2	2
	Sambucus nigra	black elderberry	Tree	FAC							1	1												
Sum	Performance Standard				15	15	14	14	16	16	13	13	17	17	14	14	11	11	16	16	9	9	10	10
Post Mitigation Plan Species	Carya ovata	shagbark hickory	Tree	FACU													1	1						
	Carya tomentosa	mockernut hickory	Tree														2	2						
	Quercus imbricaria	shingle oak	Tree	FAC			2	2			1	1	1	1			2	2						
Sum	Proposed Standard				15	15	16	16	16	16	14	14	18	18	14	14	16	16	16	16	9	9	10	10
Mitigation Plan Performance Standard	Current Year Stem Count					15		14		16		13		17		14		11		16		9		10
	Stems/Acre					607		567		648		526		688		567		445		648		364		405
	Species Count					8		9		9		8		9		4		5		6		5		6
	Dominant Species Composition (%)					33		19		19		29		28		57		25		50		33		30
	Average Plot Height					1		1		1		1		1		1		1		1		1		1
	% Invasives					0		0		0		0		0		0		0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					15		16		16		14		18		14		16		16		9		10
	Stems/Acre					607		648		648		567		729		567		648		648		364		405
	Species Count					8		10		9		9		10		4		8		6		5		6
	Dominant Species Composition (%)					33		19		19		29		28		57		25		50		33		30
	Average Plot Height					1		1		1		1		1		1		1		1		1		1
	% 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.

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Vegetation Performance Standards Summary Table
Seniard Creek Mitigation Site MY0 (2021)

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607		8	0	567		10	0	648		9	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	526		9	0	688		10	0	567		4	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	445		8	0	648		6	0	364		5	0
	Veg Plot 10 F											
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives								
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	405		6	0								

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

Vegetation Plot Photos

Vegetation Monitoring Plot 1

Vegetation Monitoring Plot 2

Vegetation Monitoring Plot 3

Vegetation Monitoring Plot 4

Vegetation Monitoring Plot 5

Vegetation Monitoring Plot 6

Vegetation Monitoring Plot 7

Vegetation Monitoring Plot 8

Vegetation Monitoring Plot 9

Vegetation Monitoring Plot 10

Appendix C
Stream Geomorphology Data

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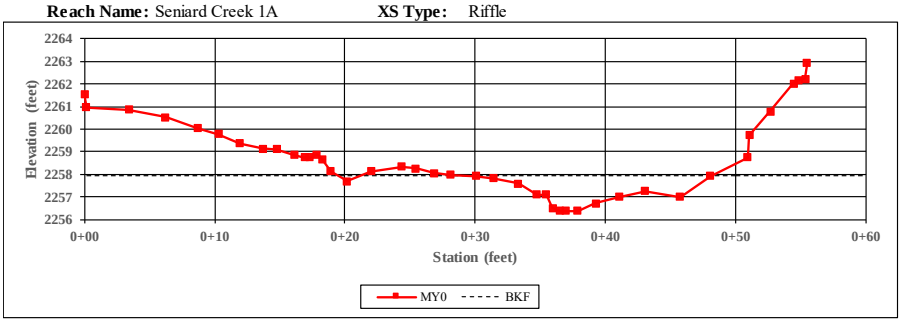
Project Name: Seniard **XS Number:** 1 **Station:** 100+32
Reach Name: Seniard Creek 1A **XS Type:** Riffle

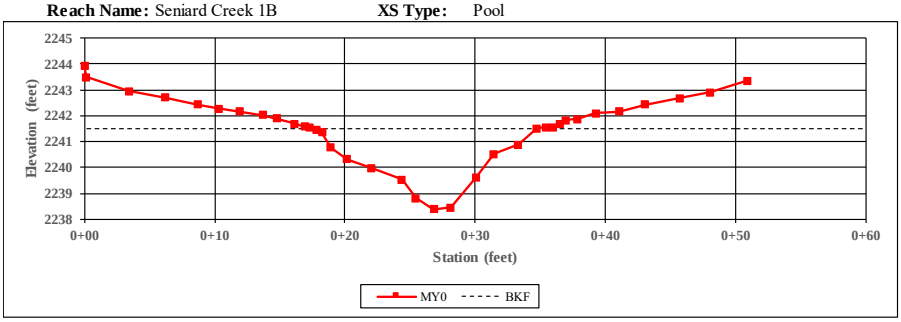


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	18.0	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.8	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.5	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	14.1	-	-	-	-	-	-	-
Width/Depth Ratio	22.9	-	-	-	-	-	-	-
Entrenchment Ratio	2.8	-	-	-	-	-	-	-
Bank Height Ratio	1.3	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 2 **Station:** 107+60
Reach Name: Seniard Creek 1B **XS Type:** Pool

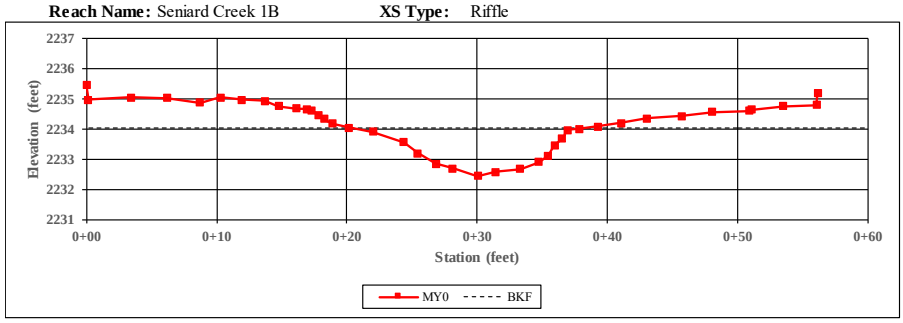


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	16.9	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.6	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	3.1	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	27.2	-	-	-	-	-	-	-
Width/Depth Ratio	10.5	-	-	-	-	-	-	-
Entrenchment Ratio	3.0	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 3 **Station:** 111+23
Reach Name: Seniard Creek 1B **XS Type:** Riffle

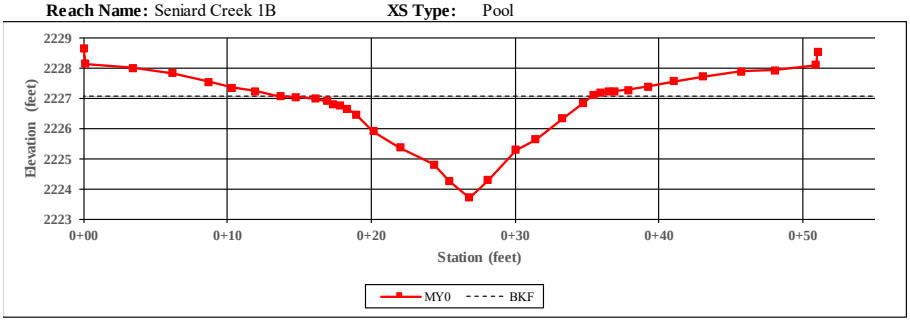


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	17.7	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.9	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.6	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	15.6	-	-	-	-	-	-	-
Width/Depth Ratio	20.1	-	-	-	-	-	-	-
Entrenchment Ratio	2.8	-	-	-	-	-	-	-
Bank Height Ratio	1.0	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 4 **Station:** 114+85
Reach Name: Seniard Creek 1B **XS Type:** Pool

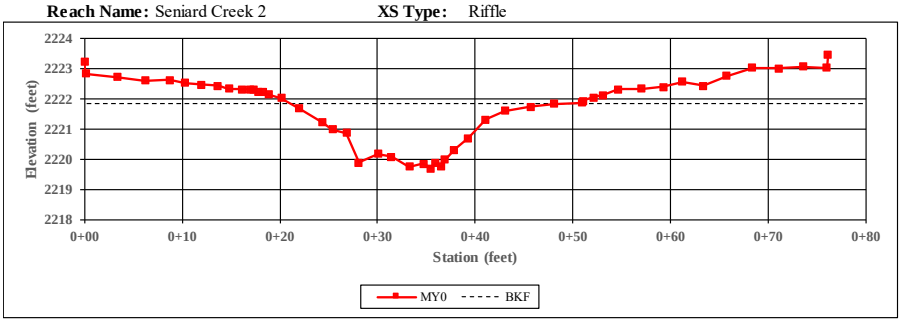


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	21.0	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.4	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	3.4	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	29.6	-	-	-	-	-	-	-
Width/Depth Ratio	14.9	-	-	-	-	-	-	-
Entrenchment Ratio	2.4	-	-	-	-	-	-	-
Bank Height Ratio	1.1	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 5 **Station:** 116+93
Reach Name: Seniard Creek 2 **XS Type:** Riffle

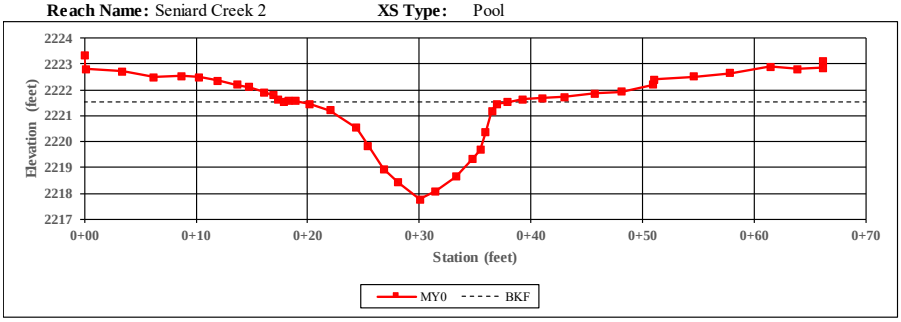


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	26.1	-	-	-	-	-	-	-
Floodprone Width (ft)	100.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.1	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.1	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	27.9	-	-	-	-	-	-	-
Width/Depth Ratio	24.4	-	-	-	-	-	-	-
Entrenchment Ratio	3.8	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 6 **Station:** 117+09
Reach Name: Seniard Creek 2 **XS Type:** Pool

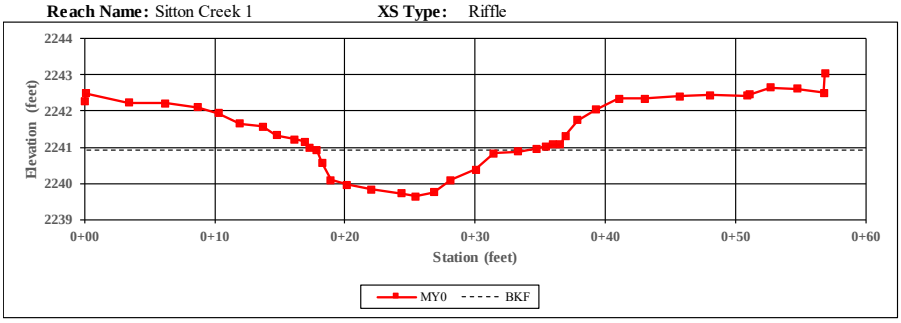


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	17.7	-	-	-	-	-	-	-
Floodprone Width (ft)	100.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.9	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	3.8	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	34.0	-	-	-	-	-	-	-
Width/Depth Ratio	9.2	-	-	-	-	-	-	-
Entrenchment Ratio	5.6	-	-	-	-	-	-	-
Bank Height Ratio	1.0	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 7 **Station:** 201+53
Reach Name: Sitton Creek 1 **XS Type:** Riffle

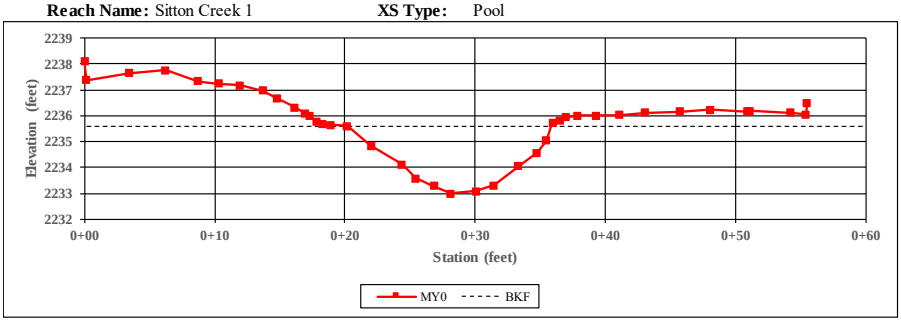


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	15.5	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.8	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.3	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	12.1	-	-	-	-	-	-	-
Width/Depth Ratio	19.8	-	-	-	-	-	-	-
Entrenchment Ratio	3.2	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 8 **Station:** 204+48
Reach Name: Sitton Creek 1 **XS Type:** Pool

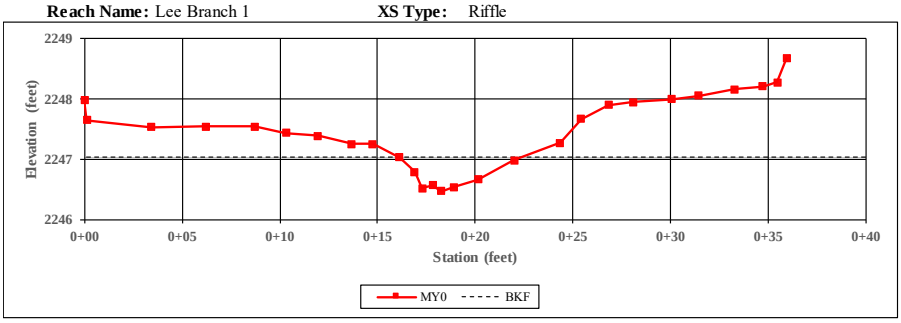


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	15.3	-	-	-	-	-	-	-
Floodprone Width (ft)	50.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	1.7	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	2.6	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	25.8	-	-	-	-	-	-	-
Width/Depth Ratio	9.1	-	-	-	-	-	-	-
Entrenchment Ratio	3.3	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 9 **Station:** 300+51
Reach Name: Lee Branch 1 **XS Type:** Riffle

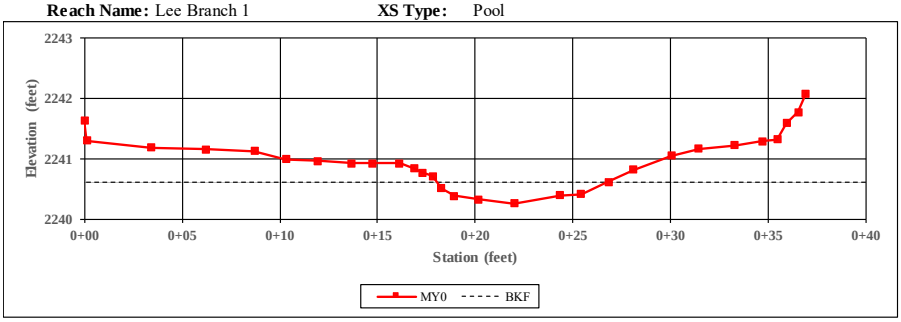


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	5.9	-	-	-	-	-	-	-
Floodprone Width (ft)	25.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.3	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.6	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	2.0	-	-	-	-	-	-	-
Width/Depth Ratio	17.4	-	-	-	-	-	-	-
Entrenchment Ratio	4.3	-	-	-	-	-	-	-
Bank Height Ratio	1.4	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 10 **Station:** 301+61
Reach Name: Lee Branch 1 **XS Type:** Pool

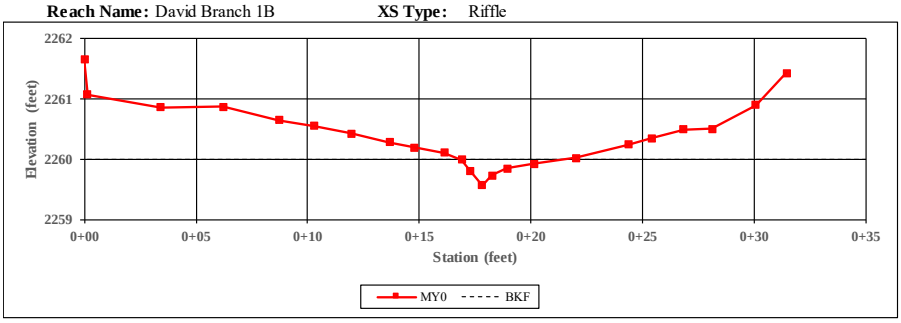


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	8.6	-	-	-	-	-	-	-
Floodprone Width (ft)	25.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.2	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.4	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	2.1	-	-	-	-	-	-	-
Width/Depth Ratio	35.6	-	-	-	-	-	-	-
Entrenchment Ratio	2.9	-	-	-	-	-	-	-
Bank Height Ratio	1.3	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 11 **Station:** 402+31
Reach Name: David Branch 1B **XS Type:** Riffle

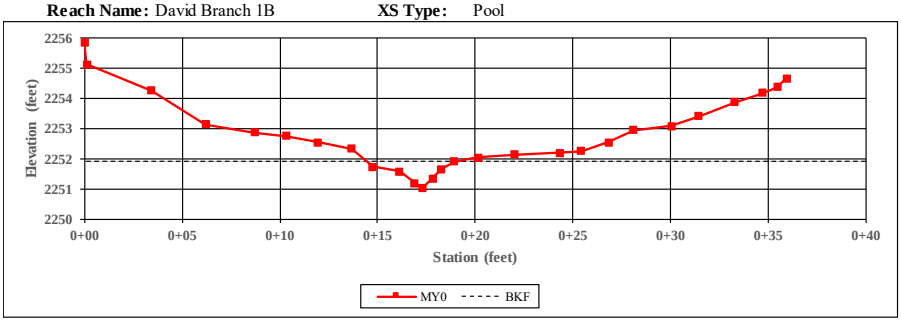


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	3.2	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.2	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.4	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	0.6	-	-	-	-	-	-	-
Width/Depth Ratio	17.5	-	-	-	-	-	-	-
Entrenchment Ratio	3.1	-	-	-	-	-	-	-
Bank Height Ratio	1.3	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 12 **Station:** 403+24
Reach Name: David Branch 1B **XS Type:** Pool

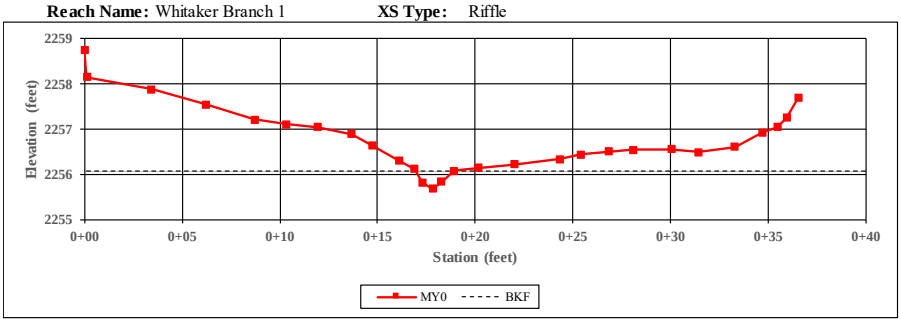


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	4.2	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.4	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.9	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	1.7	-	-	-	-	-	-	-
Width/Depth Ratio	10.2	-	-	-	-	-	-	-
Entrenchment Ratio	2.4	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 13 **Station:** 601+41
Reach Name: Whitaker Branch 1 **XS Type:** Riffle

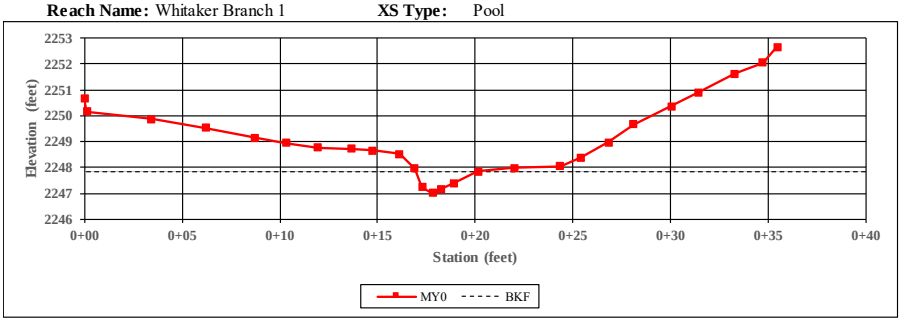


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	1.6	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.2	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.4	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	0.4	-	-	-	-	-	-	-
Width/Depth Ratio	6.7	-	-	-	-	-	-	-
Entrenchment Ratio	6.2	-	-	-	-	-	-	-
Bank Height Ratio	1.2	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 14 **Station:** 602+64
Reach Name: Whitaker Branch 1 **XS Type:** Pool

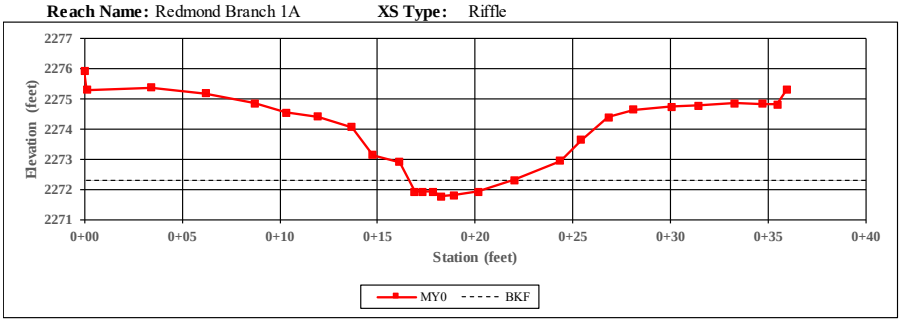


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	2.8	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.5	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.8	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	1.3	-	-	-	-	-	-	-
Width/Depth Ratio	6.1	-	-	-	-	-	-	-
Entrenchment Ratio	3.5	-	-	-	-	-	-	-
Bank Height Ratio	1.1	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 15 **Station:** 702+67
Reach Name: Redmond Branch 1A **XS Type:** Riffle

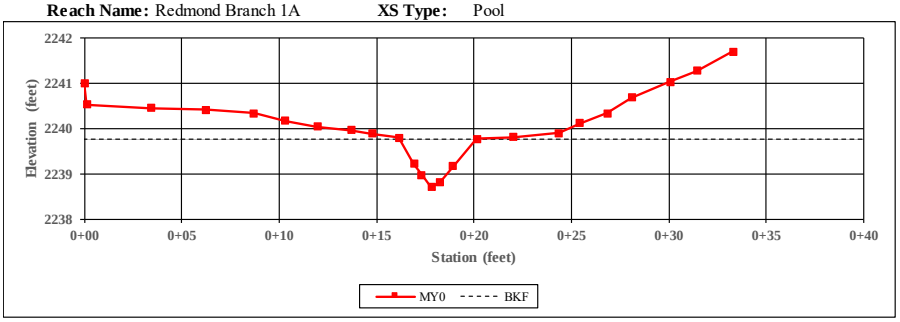


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	5.1	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.3	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	0.5		-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	1.8	-	-	-	-	-	-	-
Width/Depth Ratio	14.8	-	-	-	-	-	-	-
Entrenchment Ratio	2.0	-	-	-	-	-	-	-
Bank Height Ratio	1.6	-	-	-	-	-	-	-

Left Descending Bank

Right Descending Bank

Project Name: Seniard **XS Number:** 16 **Station:** 709+81
Reach Name: Redmond Branch 1A **XS Type:** Pool

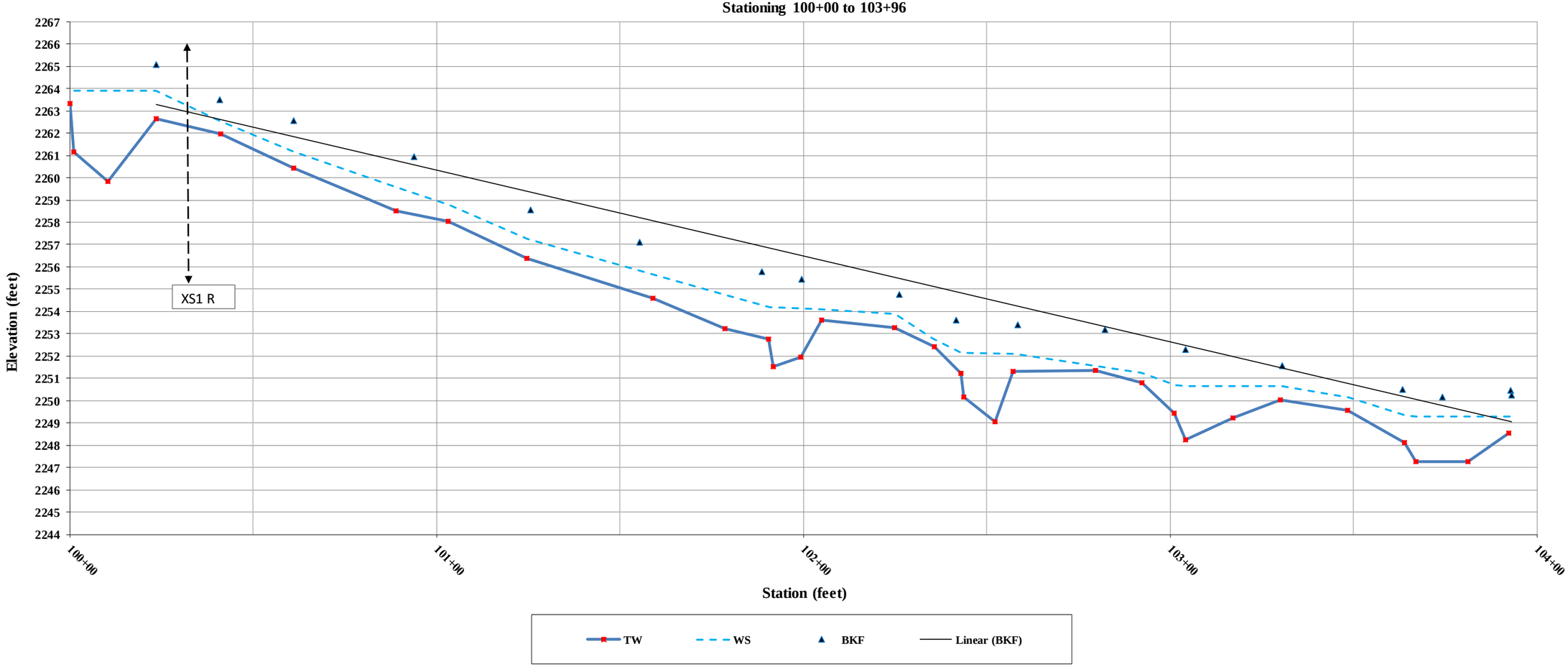


CHANNEL DIMENSIONS SUMMARY	MY0	MY1	MY2	MY3	MY4	MY5	MY6	MY7
Bankful Width (ft)	3.2	-	-	-	-	-	-	-
Floodprone Width (ft)	10.0	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.6	-	-	-	-	-	-	-
Bankfull Max Depth (ft)	1.1	-	-	-	-	-	-	-
Bankfull Cross-Sectional Area (ft^2)	2.1	-	-	-	-	-	-	-
Width/Depth Ratio	5.1	-	-	-	-	-	-	-
Entrenchment Ratio	3.1	-	-	-	-	-	-	-
Bank Height Ratio	1.0	-	-	-	-	-	-	-

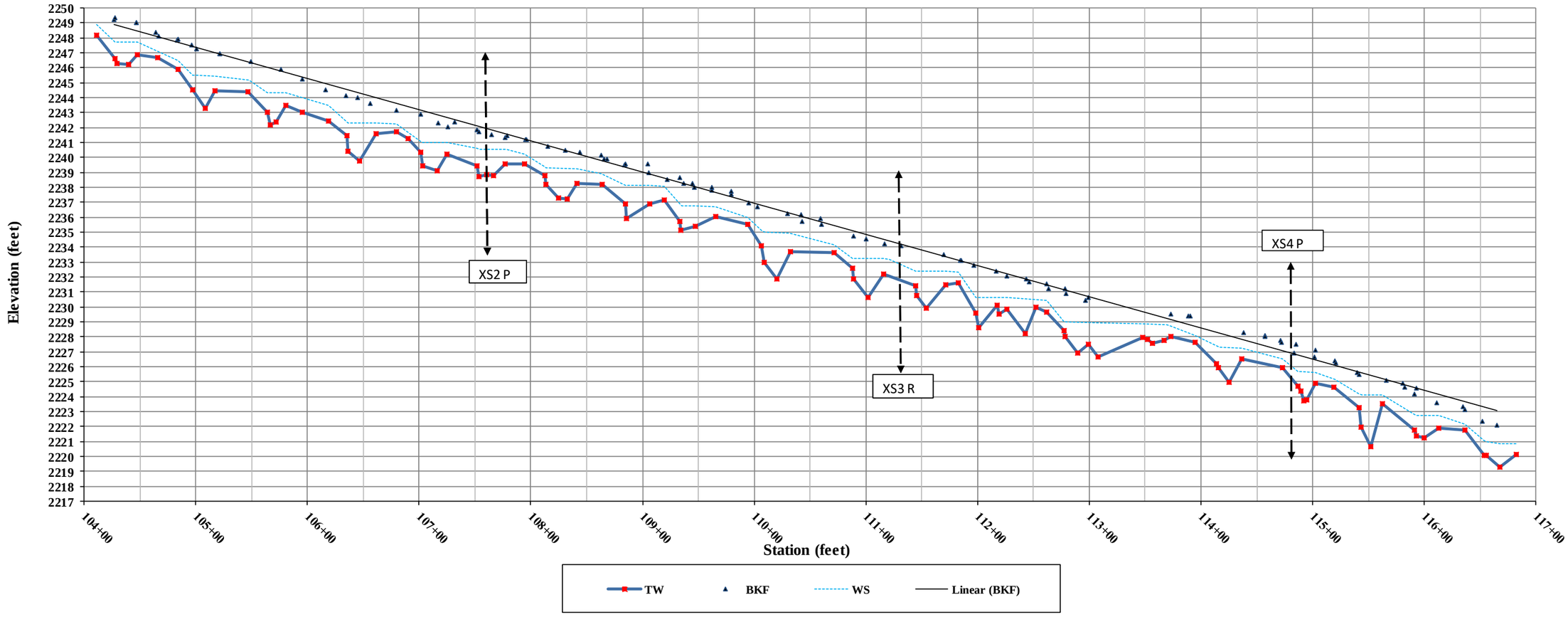
Left Descending Bank

Right Descending Bank

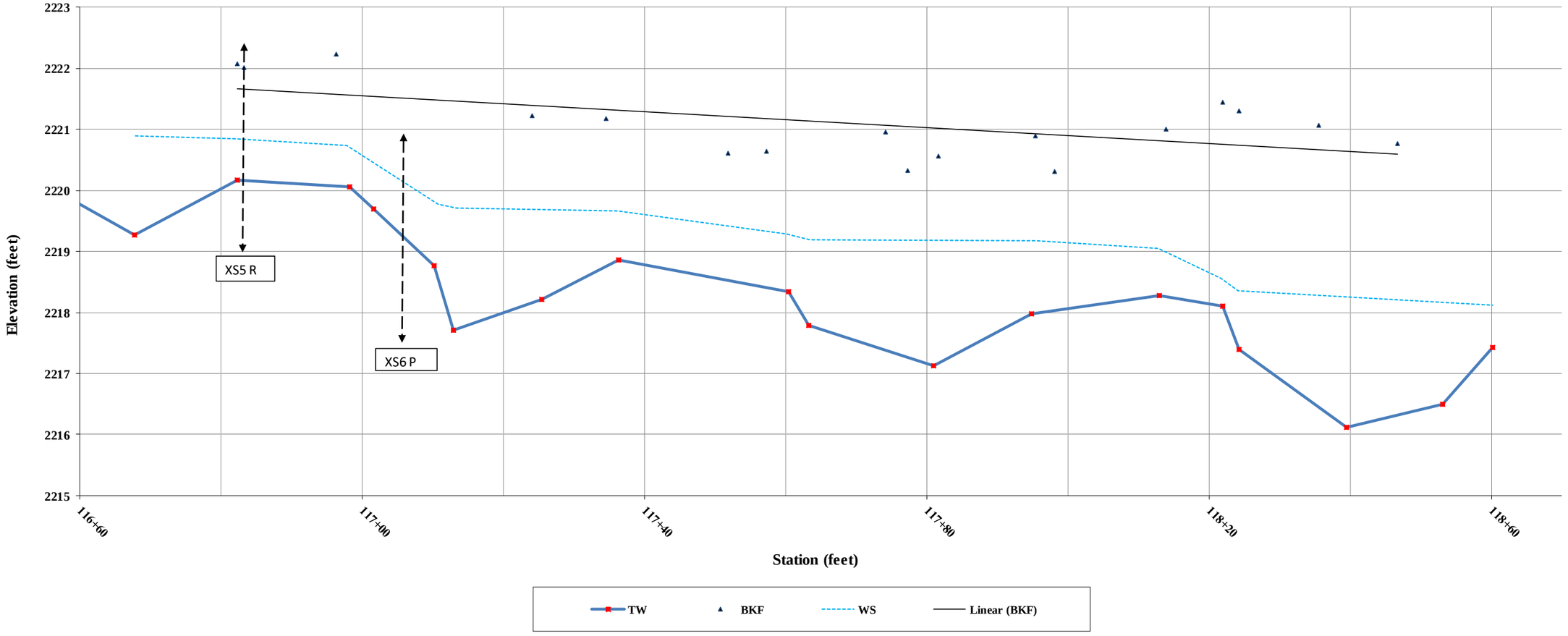
Seniard Creek Reach 1A - Longitudinal Profile
Stationing 100+00 to 103+96



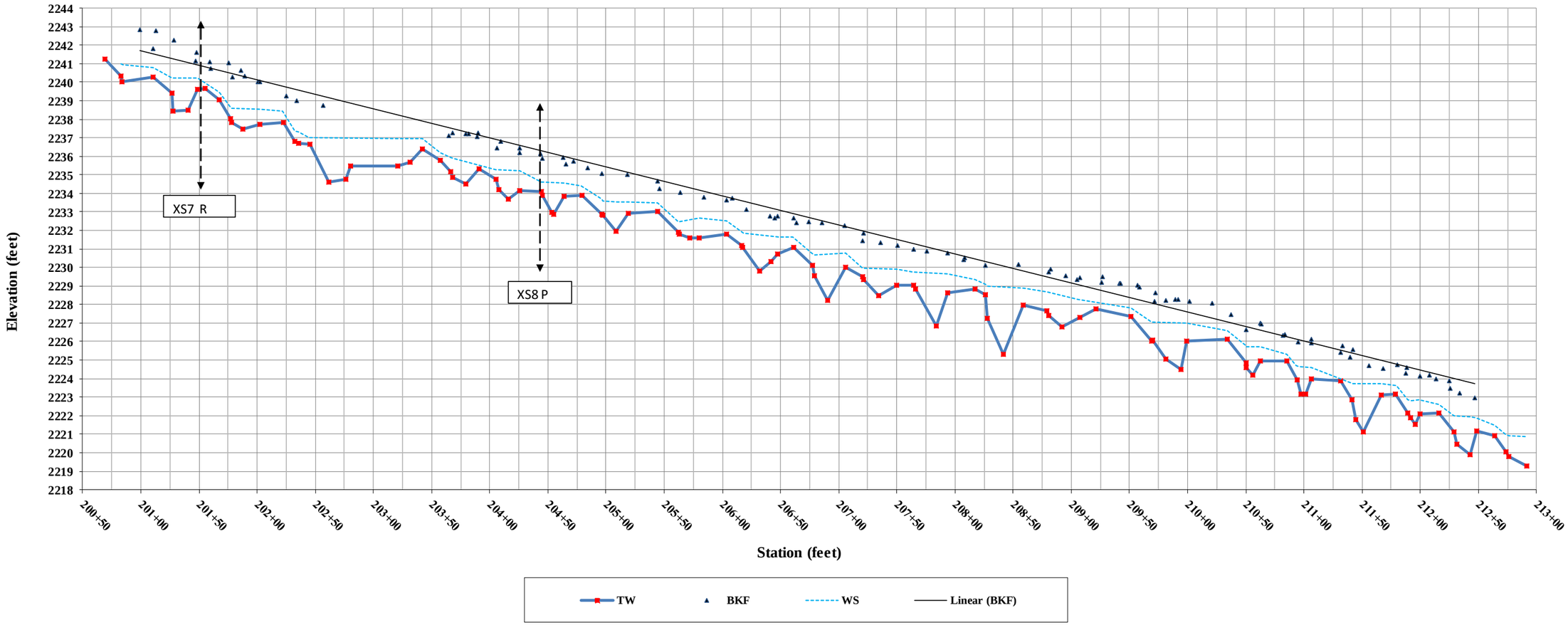
Seniard Creek Reach 1B - Longitudinal Profile
Stationing 103+96 to 116+70



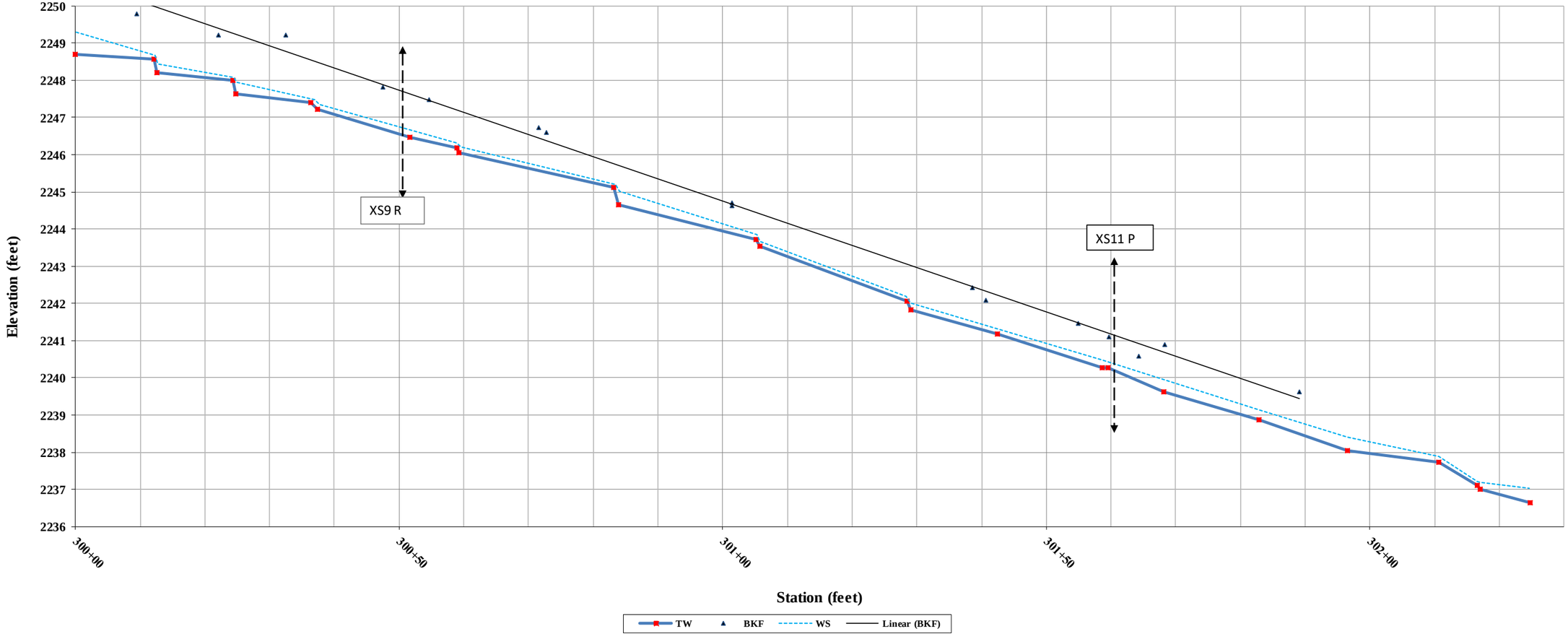
Seniard Creek Reach 2- Longitudinal Profile
Stationing 116+70 to 118+61



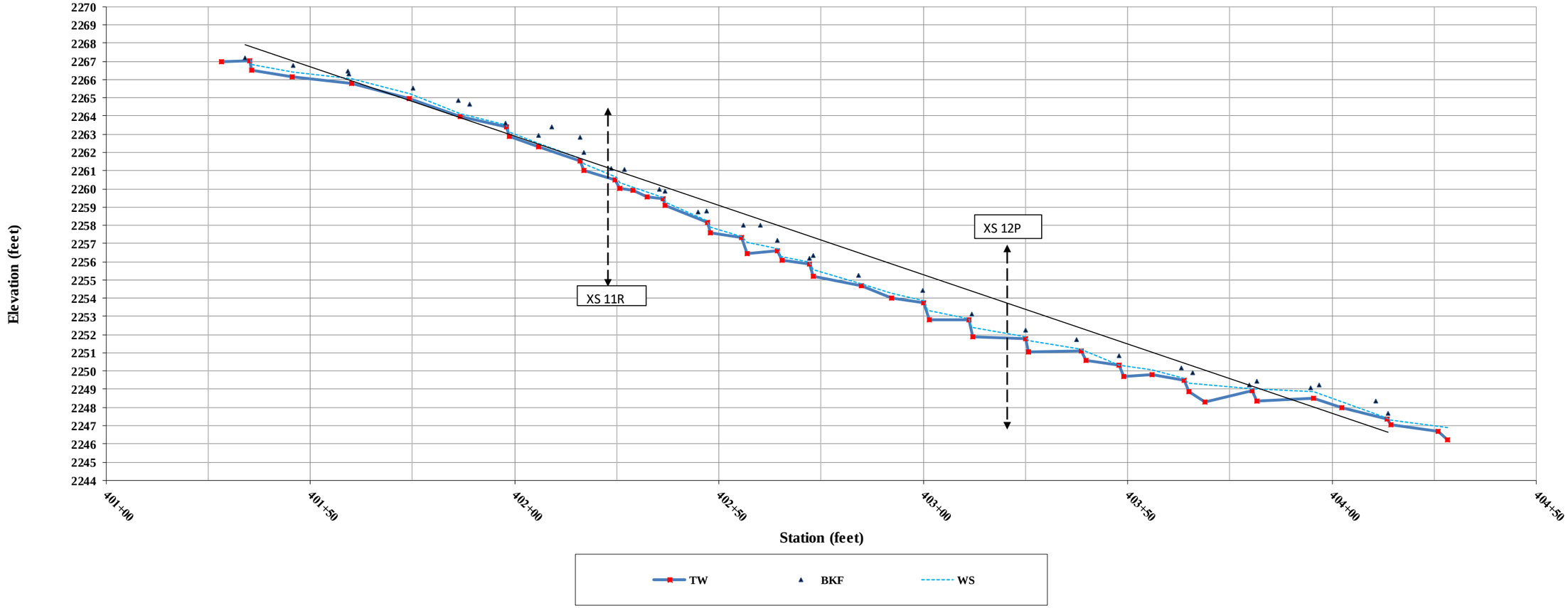
Sitton Creek Reach 1 - Longitudinal Profile
Stationing 200+55 to 212+91



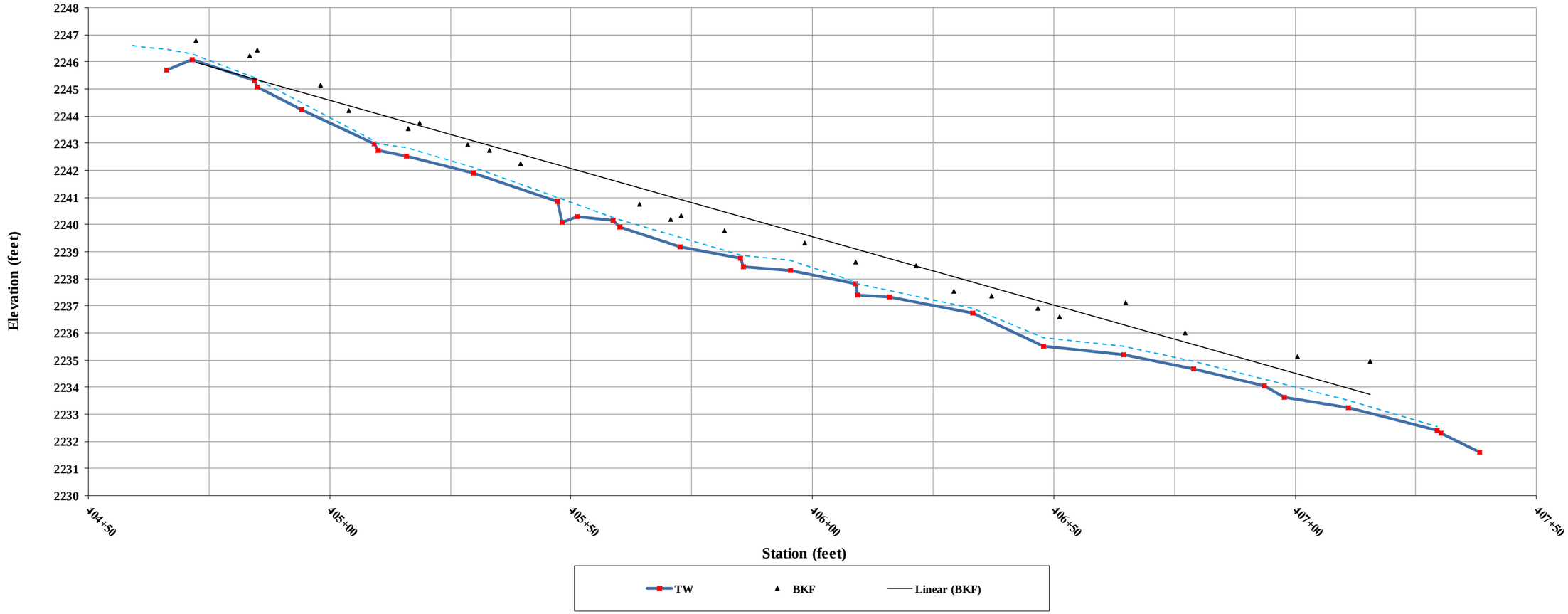
Lee Branch- Longitudinal Profile
Stationing 300+00 to 302+26



David Branch 1B - Longitudinal Profile
Stationing 401+32 to 404+28



David Branch 1C- Longitudinal Profile
Stationing 404+66 to 407+39



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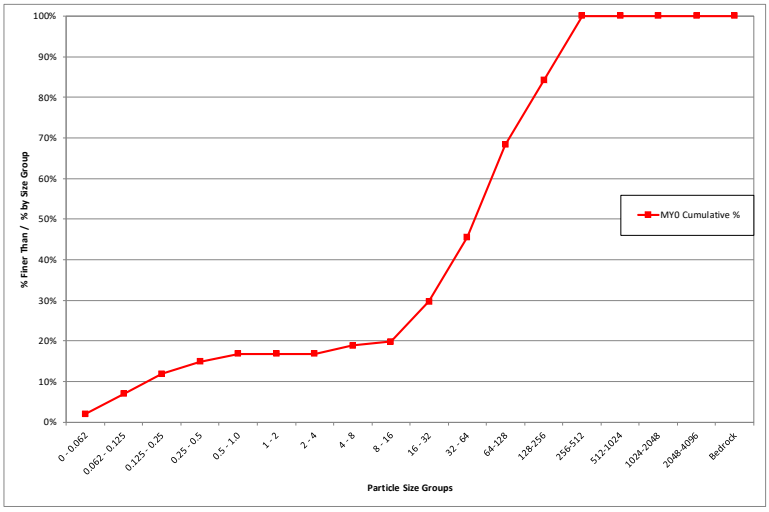
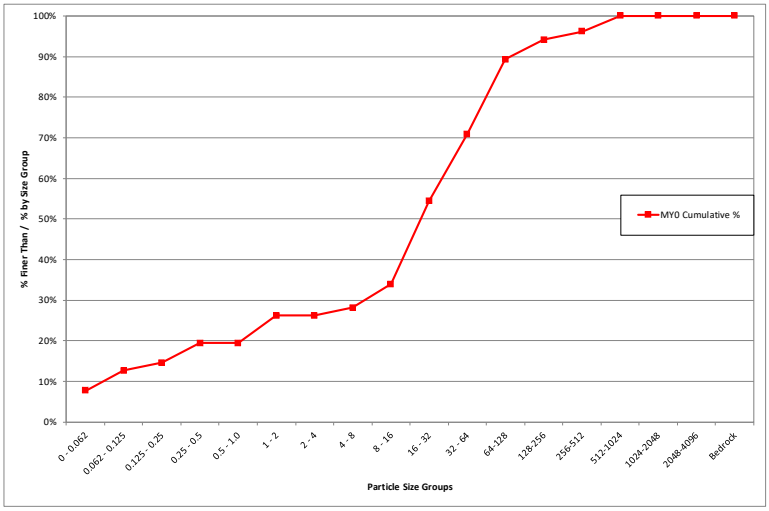
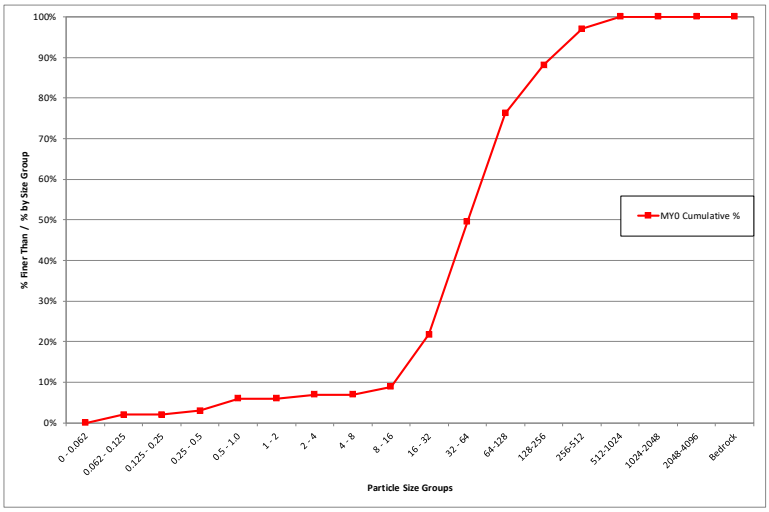
Seniard Creek			
Cross Section 1 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	2	2.0%	2%
0.062 - 0.125	5	5.0%	7%
0.125 - 0.25	5	5.0%	12%
0.25 - 0.5	3	3.0%	15%
0.5 - 1.0	2	2.0%	17%
1 - 2	0	0.0%	17%
2 - 4	0	0.0%	17%
4 - 8	2	2.0%	19%
8 - 16	1	1.0%	20%
16 - 32	10	9.9%	30%
32 - 64	16	15.8%	46%
64-128	23	22.8%	68%
128-256	16	15.8%	84%
256-512	16	15.8%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**101**	**100%**	**100%**
		Summary Data	
		D50	**75**
		D84	**250**
		D95	**410**



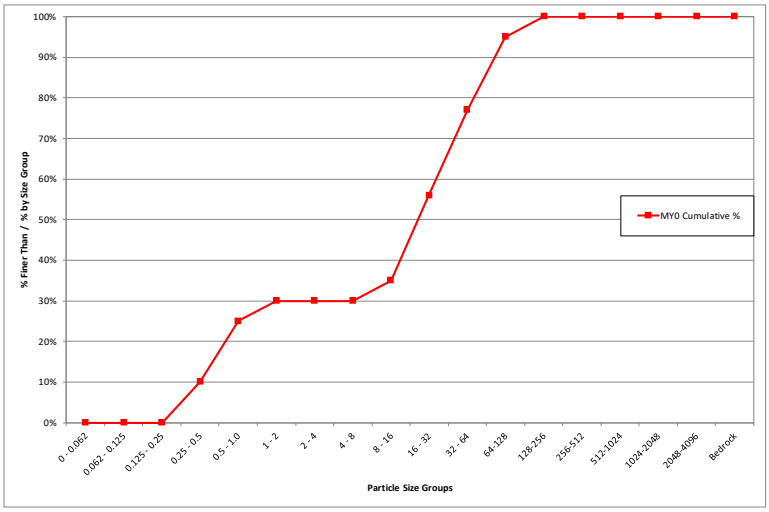
Seniard Creek			
Cross Section 3 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	8	7.8%	8%
0.062 - 0.125	5	4.9%	13%
0.125 - 0.25	2	1.9%	15%
0.25 - 0.5	5	4.9%	19%
0.5 - 1.0	0	0.0%	19%
1 - 2	7	6.8%	26%
2 - 4	0	0.0%	26%
4 - 8	2	1.9%	28%
8 - 16	6	5.8%	34%
16 - 32	21	20.4%	54%
32 - 64	17	16.5%	71%
64-128	19	18.4%	89%
128-256	5	4.9%	94%
256-512	2	1.9%	96%
512-1024	4	3.9%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**103**	**100%**	**100%**
		Summary Data	
		D50	**28**
		D84	**89**
		D95	**300**



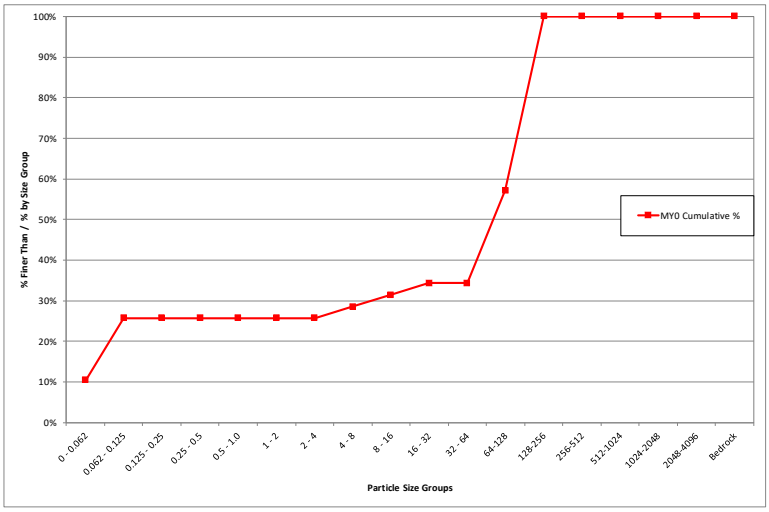
Seniard Creek			
Cross Section 5 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	0	0.0%	0%
0.062 - 0.125	2	2.0%	2%
0.125 - 0.25	0	0.0%	2%
0.25 - 0.5	1	1.0%	3%
0.5 - 1.0	3	3.0%	6%
1 - 2	0	0.0%	6%
2 - 4	1	1.0%	7%
4 - 8	0	0.0%	7%
8 - 16	2	2.0%	9%
16 - 32	13	12.9%	22%
32 - 64	28	27.7%	50%
64-128	27	26.7%	76%
128-256	12	11.9%	88%
256-512	9	8.9%	97%
512-1024	3	3.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**101**	**100%**	**100%**
		Summary Data	
		D50	**65**
		D84	**170**
		D95	**470**



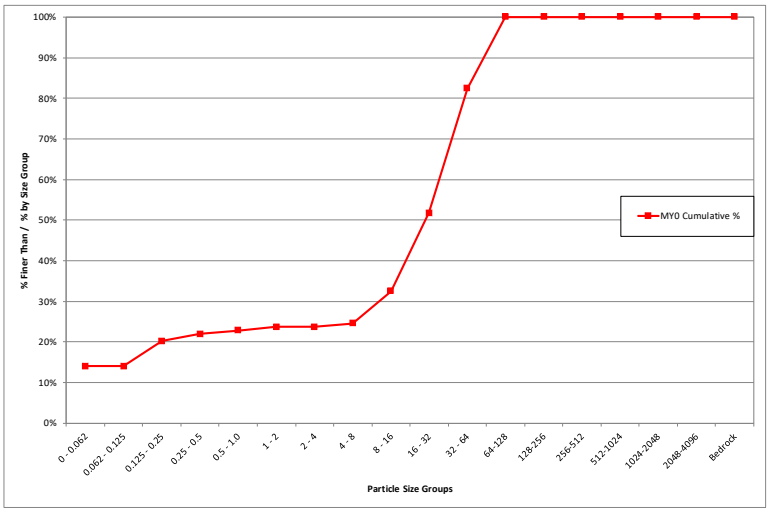
Seniard Creek			
Cross Section 7 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	0	0.0%	0%
0.062 - 0.125	0	0.0%	0%
0.125 - 0.25	0	0.0%	0%
0.25 - 0.5	10	10.0%	10%
0.5 - 1.0	15	15.0%	25%
1 - 2	5	5.0%	30%
2 - 4	0	0.0%	30%
4 - 8	0	0.0%	30%
8 - 16	5	5.0%	35%
16 - 32	21	21.0%	56%
32 - 64	21	21.0%	77%
64-128	18	18.0%	95%
128-256	5	5.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**100**	**100%**	**100%**
		Summary Data	
		D50	**28**
		D84	**77**
		D95	**130**



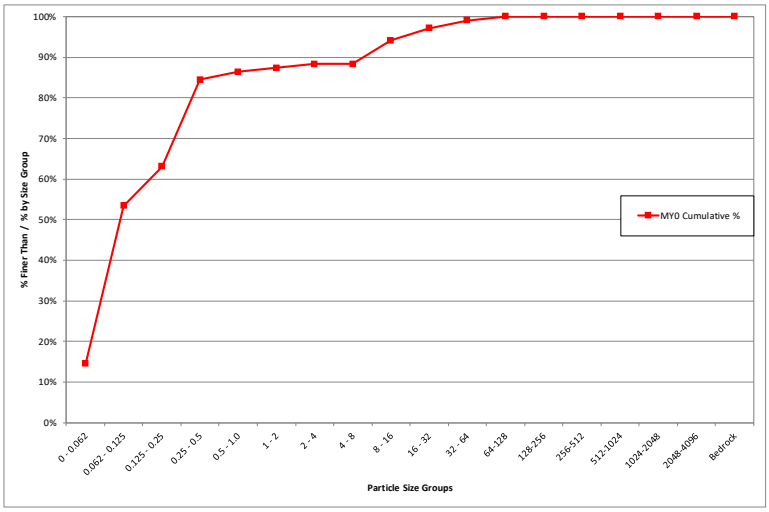
Seniard Creek			
Cross Section 9 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	11	10.5%	10%
0.062 - 0.125	16	15.2%	26%
0.125 - 0.25	0	0.0%	26%
0.25 - 0.5	0	0.0%	26%
0.5 - 1.0	0	0.0%	26%
1 - 2	0	0.0%	26%
2 - 4	0	0.0%	26%
4 - 8	3	2.9%	29%
8 - 16	3	2.9%	31%
16 - 32	3	2.9%	34%
32 - 64	0	0.0%	34%
64-128	24	22.9%	57%
128-256	45	42.9%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**105**	**100%**	**100%**
		Summary Data	
		D50	**100**
		D84	**160**
		D95	**180**



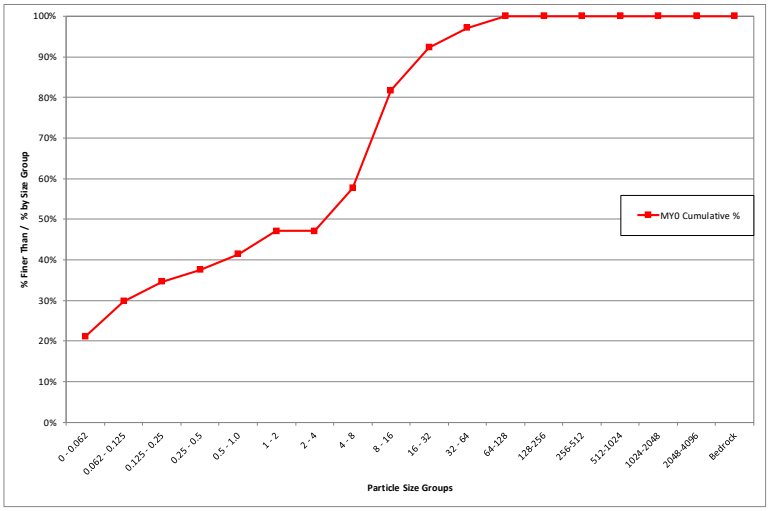
Seniard Creek			
Cross Section 11 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	16	14.0%	14%
0.062 - 0.125	0	0.0%	14%
0.125 - 0.25	7	6.1%	20%
0.25 - 0.5	2	1.8%	22%
0.5 - 1.0	1	0.9%	23%
1 - 2	1	0.9%	24%
2 - 4	0	0.0%	24%
4 - 8	1	0.9%	25%
8 - 16	9	7.9%	32%
16 - 32	22	19.3%	52%
32 - 64	35	30.7%	82%
64-128	20	17.5%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**114**	**100%**	**100%**
		Summary Data	
		D50	**30**
		D84	**66**
		D95	**82**



Seniard Creek			
Cross Section 13 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	15	14.6%	15%
0.062 - 0.125	40	38.8%	53%
0.125 - 0.25	10	9.7%	63%
0.25 - 0.5	22	21.4%	84%
0.5 - 1.0	2	1.9%	86%
1 - 2	1	1.0%	87%
2 - 4	1	1.0%	88%
4 - 8	0	0.0%	88%
8 - 16	6	5.8%	94%
16 - 32	3	2.9%	97%
32 - 64	2	1.9%	99%
64-128	1	1.0%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**103**	**100%**	**100%**
		Summary Data	
		D50	**0.12**
		D84	**0.49**
		D95	**18**



Seniard Creek			
Cross Section 15 - Riffle			
Monitoring Year - 2021; MY0			
Bed Surface Material Particle Size Class (mm)	Number	% Individual	% Cumulative
0 - 0.062	22	21.2%	21%
0.062 - 0.125	9	8.7%	30%
0.125 - 0.25	5	4.8%	35%
0.25 - 0.5	3	2.9%	38%
0.5 - 1.0	4	3.8%	41%
1 - 2	6	5.8%	47%
2 - 4	0	0.0%	47%
4 - 8	11	10.6%	58%
8 - 16	25	24.0%	82%
16 - 32	11	10.6%	92%
32 - 64	5	4.8%	97%
64-128	3	2.9%	100%
128-256	0	0.0%	100%
256-512	0	0.0%	100%
512-1024	0	0.0%	100%
1024-2048	0	0.0%	100%
2048-4096	0	0.0%	100%
Bedrock	0	0.0%	100%
Total	**104**	**100%**	**100%**
		Summary Data	
		D50	**6**
		D84	**18**
		D95	**39**



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Baseline Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
Seniard Mitigation Site

	Cross Section 1 (Riffle) Seniard Creek Reach 1A								Cross Section 2 (Riffle) Seniard Creek Reach 1B								Cross Section 3 (Riffle) Seniard Creek Reach 1B								Cross Section 4 (Pool) Seniard Creek Reach 1B							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2257.9								2241.5								2234.1								2227.1							
Low Bank Height Elevation (datum) Used	2258.3								2242.1								2234.1								2227.2							
Bankfull Width (ft)	18.0								16.9								17.7								21.0							
Floodprone Width (ft)	50.0								50.0								50.0								50.0							
Bankfull Mean Depth (ft)	0.8								1.6								0.9								1.4							
Bankfull Max Depth (ft)	1.5								3.1								1.6								3.4							
Bankfull Cross Sectional Area (ft^2)	14.1								27.2								15.6								29.6							
Bankfull Width/Depth Ratio	22.9								10.5								20.1								14.9							
Bankfull Entrenchment Ratio	2.8								3.0								2.8								2.4							
Bankfull Bank Height Ratio	1.3								1.2								1.0								1.1							
Low Top of Bank Depth (ft)	1.9								3.7								1.6								3.5							

	Cross Section 5 (Riffle) Seniard Reach 2								Cross Section 6 (Pool) Seniard Reach 2								Cross Section 7 (Riffle) Sitton Reach 1								Cross Section 8 (Pool) Sitton Reach 1							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2221.8								2221.5								2240.9								2235.6							
Low Bank Height Elevation (datum) Used	2222.3								2221.7								2241.2								2236.0							
Bankfull Width (ft)	26.1								17.7								15.5								15.3							
Floodprone Width (ft)	100.0								100.0								50.0								50.0							
Bankfull Mean Depth (ft)	1.1								1.9								0.8								1.7							
Bankfull Max Depth (ft)	2.1								3.8								1.3								2.6							
Bankfull Cross Sectional Area (ft^2)	27.9								34.0								12.1								25.8							
Bankfull Width/Depth Ratio	24.4								9.2								19.8								9.1							
Bankfull Entrenchment Ratio	3.8								5.6								3.2								3.3							
Bankfull Bank Height Ratio	1.2								1.0								1.2								1.2							
Low Top of Bank Depth (ft)	2.6								3.9								1.6								3.0							

	Cross Section 9 (Riffle) Lee Branch Reach 1								Cross Section 10 (Pool) Lee Branch Reach 1								Cross Section 11 (Riffle) David Branch Reach 1B								Cross Section 12 (Pool) David Branch Reach 1B							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2247.0								2240.6								2260.0								2251.9							
Low Bank Height Elevation (datum) Used	2247.3								2240.7								2260.1								2252.1							
Bankfull Width (ft)	5.9								8.6								3.2								4.2							
Floodprone Width (ft)	25.0								25.0								10.0								10.0							
Bankfull Mean Depth (ft)	0.3								0.2								0.2								0.4							
Bankfull Max Depth (ft)	0.6								0.4								0.4								0.9							
Bankfull Cross Sectional Area (ft^2)	2.0								2.1								0.6								1.7							
Bankfull Width/Depth Ratio	17.4								35.6								17.5								10.2							
Bankfull Entrenchment Ratio	4.3								2.9								3.1								2.4							
Bankfull Bank Height Ratio	1.4								1.3								1.3								1.2							
Low Top of Bank Depth (ft)	0.8								0.5								0.5								1.0							

	Cross Section 13 (Riffle) Whitaker Branch Reach 1								Cross Section 14 (Pool) Whitaker Branch Reach 1								Cross Section 15 (Riffle) Redmond Branch Reach 1								Cross Section 16 (Pool) Redmond Branch Reach 1							
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
Record Elevation (datum) Used	2256.1								2247.8								2272.3								2239.8							
Low Bank Height Elevation (datum) Used	2256.1								2248.0								2272.6								2239.8							
Bankfull Width (ft)	1.6								2.8								5.1								3.2							
Floodprone Width (ft)	10.0								10.0								10.0								10.0							
Bankfull Mean Depth (ft)	0.2								0.5								0.3								0.6							
Bankfull Max Depth (ft)	0.4								0.8								0.5								1.1							
Bankfull Cross Sectional Area (ft^2)	0.4								1.3								1.8								2.1							
Bankfull Width/Depth Ratio	6.7								6.1								14.8								5.1							
Bankfull Entrenchment Ratio	6.2								3.5								2.0								3.1							
Bankfull Bank Height Ratio	1.2								1.1								1.6								1.0							
Low Top of Bank Depth (ft)	0.5								0.9								0.8								1.1							

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Baseline Stream Data Summary Seniard Creek - Seniard Creek Reach 1A							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	10.7	-	-	13	-	17.4	18.0
Floodprone Width (ft)	-	-	-	-	-	-	50.0
Bankfull Mean Depth (ft)	0.8	-	-	1.2	-	1.1	0.8
Bankfull Max Depth (ft)	-	-	-	-	-	1.4	1.5
Bankfull Cross Sectional Area (ft^2)	8.3	-	-	15.3	-	18.3	14.1
Width/Depth Ratio	11.1	-	-	13.8	-	16.5	22.9
Entrenchment Ratio	1.1	-	-	1.3	-	1.4	2.8
Bank Height Ratio	-	-	-	-	-	-	1.3
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	G/F					B	B
Bankfull Discharge (cfs)	68					-	-
Sinuosity (ft)	1.03					0.01	1.03
Water Surface Slope (Channel) (ft/ft)	0.04					0.025	0.040
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seniard Creek - Seniard Creek Reach 1B							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	8.0	-	-	11.4	-	17.6	15.9
Floodprone Width (ft)	-	-	-	-	-	-	50.0
Bankfull Mean Depth (ft)	1.0	-	-	1.3	-	1.1	1.0
Bankfull Max Depth (ft)	-	-	-	-	-	1.4	1.6
Bankfull Cross Sectional Area (ft^2)	8.7	-	-	13.7	-	18.7	15.3
Width/Depth Ratio	6.0	-	-	9.8	-	16.6	16.4
Entrenchment Ratio	1.0	-	-	1.8	-	1.4	3.2
Bank Height Ratio	-	-	-	-	-	-	1.0
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	G					B	B
Bankfull Discharge (cfs)	70					-	-
Sinuosity (ft)	1.08					1.00	1.07
Water Surface Slope (Channel) (ft/ft)	0.022					0.02	0.021
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Seniard Creek Reach 2							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	10.0	-	-	10.2	-	22.5	26.1
Floodprone Width (ft)	-	-	-	-	-	-	100.0
Bankfull Mean Depth (ft)	1.0	-	-	1.3	-	1.3	1.1
Bankfull Max Depth (ft)	-	-	-	-	-	1.6	2.1
Bankfull Cross Sectional Area (ft^2)	10.6	-	-	13.1	-	28.2	27.9
Width/Depth Ratio	7.6	-	-	9.8	-	17.9	24.4
Entrenchment Ratio	1.4	-	-	1.6	-	1.1	3.8
Bank Height Ratio	-	-	-	-	-	-	1.2
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	G					B	B
Bankfull Discharge (cfs)	113					-	-
Sinuosity (ft)	1.13					1.03	1.03
Water Surface Slope (Channel) (ft/ft)	0.017					0.013	0.014
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Sitton Creek Reach							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	6.4	-	-	11.4	2	15.6	15.5
Floodprone Width (ft)	11	-	-	21	2	-	50.0
Bankfull Mean Depth (ft)	0.8	-	-	1.1	2	1.0	0.8
Bankfull Max Depth (ft)	0.7	-	-	1.2	2	1.3	1.3
Bankfull Cross Sectional Area (ft^2)	7.2	-	-	8.9	2	15.3	12.1
Width/Depth Ratio	5.7	-	-	14.6	2	16.0	19.8
Entrenchment Ratio	1.7	-	-	1.8	2	2.0	3.2
Bank Height Ratio	3.6	-	-	5.9	2	-	1.2
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	G					B	B
Bankfull Discharge (cfs)	55					-	-
Sinuosity (ft)	1.09					1.06	1.07
Water Surface Slope (Channel) (ft/ft)	0.018					0.015	0.016
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Lee Branch Reach							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	1.8	-	-	1.8	-	7.8	5.9
Floodprone Width (ft)	-	-	-	-	-	-	25.0
Bankfull Mean Depth (ft)	0.8	-	-	0.8	-	0.3	0.3
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	0.6
Bankfull Cross Sectional Area (ft^2)	1.3	-	-	1.3	-	2.4	2.0
Width/Depth Ratio	2.5	-	-	2.5	-	25.8	17.4
Entrenchment Ratio	1.8	-	-	1.8	-	1.5	4.3
Bank Height Ratio	-	-	-	-	-	-	1.4
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	G					B	B
Bankfull Discharge (cfs)	3					-	-
Sinuosity (ft)	1.04					1.06	1.07
Water Surface Slope (Channel) (ft/ft)	0.048					0.029	0.056
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - David Branch Reach 1A							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	-	-	-	-	-	7.8	-
Floodprone Width (ft)	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	-	-	-	-	-	0.3	-
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	-
Bankfull Cross Sectional Area (ft^2)	-	-	-	-	-	2.4	-
Width/Depth Ratio	-	-	-	-	-	25.8	-
Entrenchment Ratio	-	-	-	-	-	1.9	-
Bank Height Ratio	-	-	-	-	-	-	-
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	-					B	-
Bankfull Discharge (cfs)	-					-	-
Sinuosity (ft)	-					1.08	1.08
Water Surface Slope (Channel) (ft/ft)	-					0.135	-
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - David Branch Reach 1B							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	6	-	-	8.4	-	7.8	3.2
Floodprone Width (ft)	-	-	-	-	-	-	10.0
Bankfull Mean Depth (ft)	0.5	-	-	0.6	-	0.3	0.2
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	0.4
Bankfull Cross Sectional Area (ft^2)	2.9	-	-	4.7	-	2.4	0.6
Width/Depth Ratio	12.6	-	-	15.2	-	25.8	17.5
Entrenchment Ratio	1.8	-	-	2.0	-	1.9	3.1
Bank Height Ratio	-	-	-	-	-	-	1.3
Max part size (mm) mobilized at bankfull						-	-
Rosgen Classification			G			B	B
Bankfull Discharge (cfs)			1			-	-
Sinuosity (ft)			1.04			1.03	1.02
Water Surface Slope (Channel) (ft/ft)			0.05			0.07	0.08
Other			-			-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - David Branch Reach 1C							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	7.8	-	-	7.8	-	7.8	-
Floodprone Width (ft)	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	0.3	-	-	0.3	-	0.3	-
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	-
Bankfull Cross Sectional Area (ft^2)	2.6	-	-	2.6	-	2.4	-
Width/Depth Ratio	23.3	-	-	23.3	-	25.8	-
Entrenchment Ratio	1.3	-	-	1.3	-	1.9	-
Bank Height Ratio	-	-	-	-	-	-	-
Max part size (mm) mobilized at bankfull						-	-
Rosgen Classification			G			B	B
Bankfull Discharge (cfs)			4			-	-
Sinuosity (ft)			1.03			1.1	1.05
Water Surface Slope (Channel) (ft/ft)			0.058			0.051	0.052
Other			-			-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Whitaker Branch Reach 1A							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	-	-	-	-	-	7.8	1.6
Floodprone Width (ft)	-	-	-	-	-	-	10.0
Bankfull Mean Depth (ft)	-	-	-	-	-	0.3	0.2
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	0.4
Bankfull Cross Sectional Area (ft^2)	-	-	-	-	-	2.4	0.4
Width/Depth Ratio	-	-	-	-	-	25.8	6.7
Entrenchment Ratio	-	-	-	-	-	1.5	6.2
Bank Height Ratio	-	-	-	-	-	-	1.2
Max part size (mm) mobilized at bankfull						-	-
Rosgen Classification			-			B	B
Bankfull Discharge (cfs)			-			-	-
Sinuosity (ft)			-			1.0	1.05
Water Surface Slope (Channel) (ft/ft)			-			0.082	
Other			-			-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Redmond Branch Reach 1A							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	-	-	-	-	-	7.8	5.1
Floodprone Width (ft)	-	-	-	-	-	-	10.0
Bankfull Mean Depth (ft)	-	-	-	-	-	0.3	0.3
Bankfull Max Depth (ft)	-	-	-	-	-	0.5	0.5
Bankfull Cross Sectional Area (ft^2)	-	-	-	-	-	2.4	1.8
Width/Depth Ratio	-	-	-	-	-	25.8	14.8
Entrenchment Ratio	-	-	-	-	-	2.6	2.0
Bank Height Ratio	-	-	-	-	-	-	1.6
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	-					B	B
Bankfull Discharge (cfs)	-					-	-
Sinuosity (ft)	-					1.2	1.2
Water Surface Slope (Channel) (ft/ft)	-					0.05	
Other	-					-	-

" - " denotes information is either not available or not applicable

Baseline Stream Data Summary Seinard Creek - Redmond Branch Reach 1B							
Parameter	**Pre-Existing Condition (if applicable)**					**Design**	**Monitoring**
Riffle Only	Min	Mean	Med	Max	n		
Bankfull Width (ft)	-	-	-	-	-	6.8	-
Floodprone Width (ft)	-	-	-	-	-	-	-
Bankfull Mean Depth (ft)	-	-	-	-	-	0.5	-
Bankfull Max Depth (ft)	-	-	-	-	-	0.8	-
Bankfull Cross Sectional Area (ft^2)	-	-	-	-	-	3.6	-
Width/Depth Ratio	-	-	-	-	-	12.8	-
Entrenchment Ratio	-	-	-	-	-	2.9	-
Bank Height Ratio	-	-	-	-	-	-	-
Max part size (mm) mobilized at bankfull	-					-	-
Rosgen Classification	-					B	-
Bankfull Discharge (cfs)	-					-	-
Sinuosity (ft)	-					1.06	1.08
Water Surface Slope (Channel) (ft/ft)	-					0.05	0.040
Other	-					-	-

" - " denotes information is either not available or not applicable

Appendix D
Hydrologic Data

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Appendix E
Other Data

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NC DMS PROJECT #100017

EW SOLUTIONS, LLC

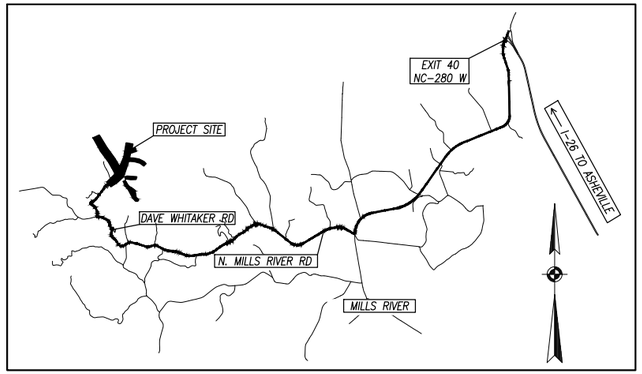
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
NC	172621103	AB-1	17

	FINAL PLANS	5/22/20	CME
1	SHEETS 1, EC-1, EC-2A	5/29/20	CME
2	SHEETS 1, 2, 3, 4, 6-11, 14-16, P-1, P-2, EC-1, EC-2, EC-4	7/14/20	CME
3	SHEETS 1, EC-1, EC-4	8/10/20	CME
	AS - BUILT PLANS - RECORD SET	4/02/21	CME
1	SHEETS 1, 1A, 4-14, P-1, P-2	5/17/21	CME
NUM.	DESCRIPTION	DATE	APPROVED

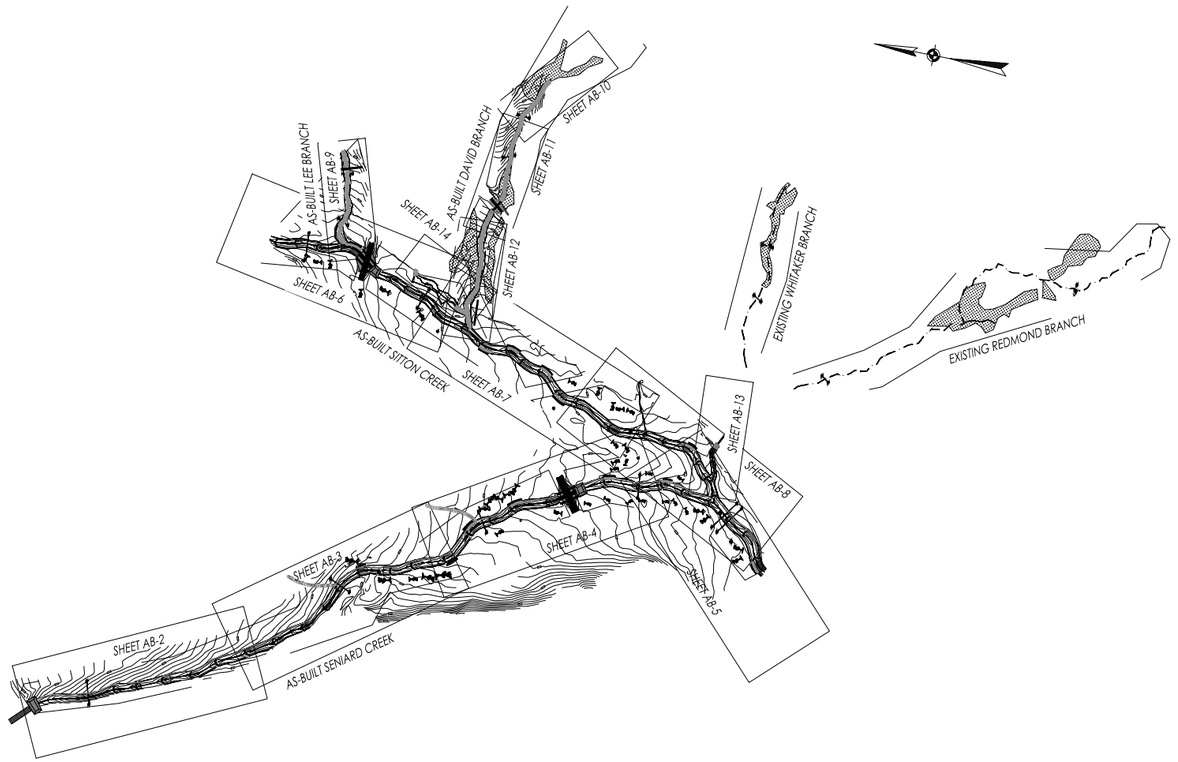
REVISIONS

SENIARD CREEK MITIGATION PROJECT

SENIARD CREEK
HENDERSON COUNTY, NORTH CAROLINA



VICINITY MAP
NOT TO SCALE



SHEET INDEX

NO SIGNIFICANT DEVIATIONS FROM DESIGN
AS-BUILT PLANS

GRAPHIC SCALES (SCALE IN FEET)

20 0 20 60
PLAN & HORIZONTAL PROFILE - SHEETS 4-10

10 0 10 30
PLAN & HORIZONTAL PROFILE - SHEETS 11-16

2 0 2 6
VERTICAL PROFILE - SHEETS 4-10

1 0 1 3
VERTICAL PROFILE - SHEETS 11-16

30 0 100 300
PLAN - SHEET 1A AND P-2

PROJECT LENGTHS

AS-BUILT RESTORATION:

SENIARD CREEK	= 1,783 FT
SITTON CREEK	= 1,079 FT
DAVID BRANCH	= 524 FT
LEE BRANCH	= 215 FT
REDMOND BRANCH	= 83 FT

AS-BUILT ENHANCEMENT:

WHITAKER BRANCH	= 426 FT
REDMOND BRANCH	= 1,054 FT

AS-BUILT PRESERVATION:

DAVID BRANCH	= 132 FT
TOTAL LENGTH	= 5,265 FT

Prepared by:

Stantec

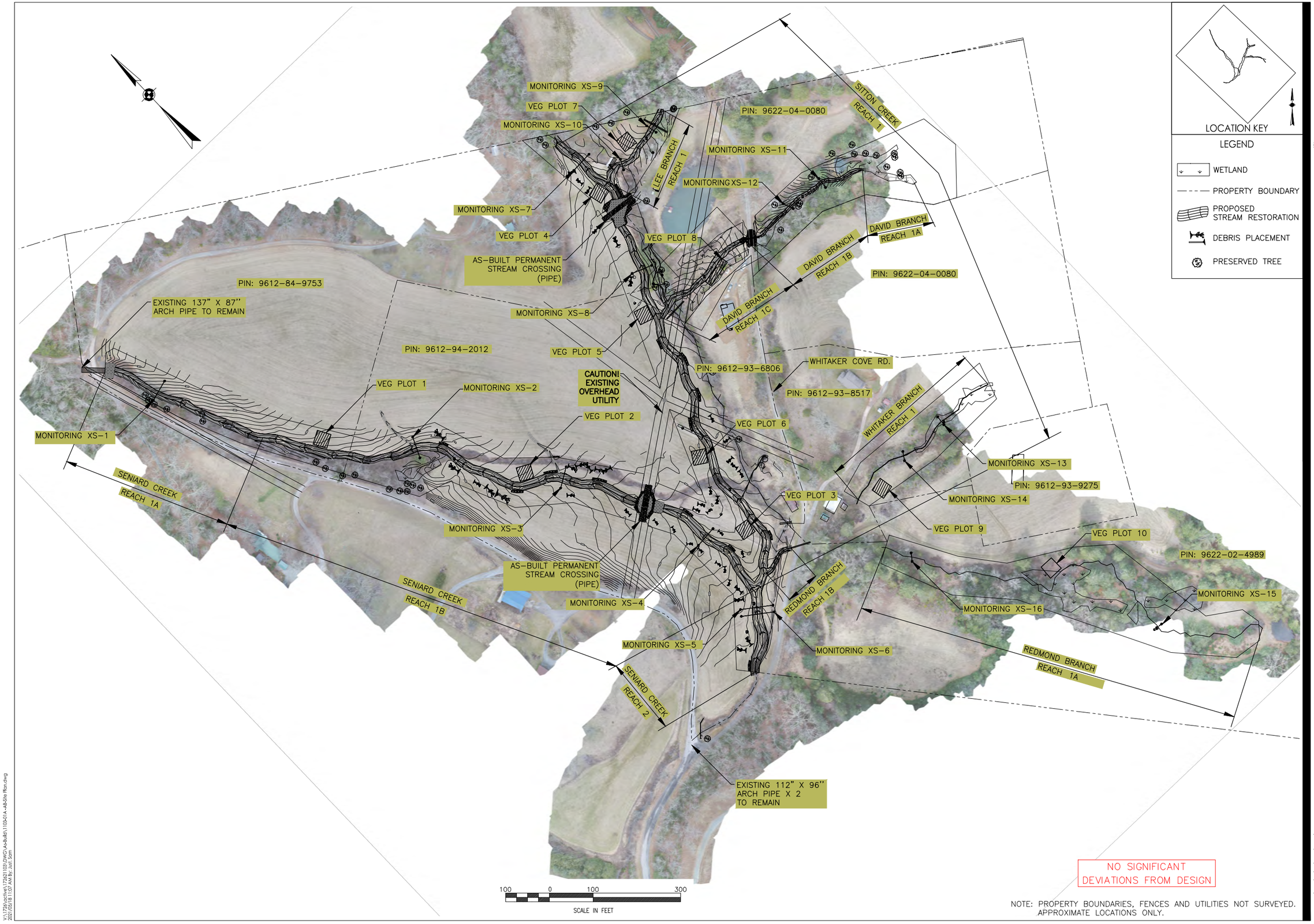
Stantec Consulting Services Inc.
56 College Street, Suite 201
Asheville, North Carolina 28801
www.stantec.com

NORTH CAROLINA PROFESSIONAL SEAL 038505 ENGINEER CHRISTOPHER M. SNIDER
5/26/21
PROJECT ENGINEER

Prepared for:

NC DMS

HARRY TSOMIDES
PROJECT MANAGER



LOCATION KEY

LEGEND

- WETLAND
- PROPERTY BOUNDARY
- PROPOSED STREAM RESTORATION
- DEBRIS PLACEMENT
- PRESERVED TREE

NO SIGNIFICANT DEVIATIONS FROM DESIGN

NOTE: PROPERTY BOUNDARIES, FENCES AND UTILITIES NOT SURVEYED. APPROXIMATE LOCATIONS ONLY.

Stantec
56 COLLEGE STREET, SUITE 201
ASHEVILLE, NC 28801
www.stantec.com

Issued	By	Appd.	YY.MM.DD
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17
Revision	By	Appd.	YY.MM.DD

Client/Project
EW SOLUTIONS
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NORTH CAROLINA
Title
SITE PLAN - AS-BUILT

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGEL
5/26/21

Project Number: 172621103

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Revision 0
Sheet AB-1A

V:\172\active\172621103\DWG\As-Built\1103-01 A-AB-Site Plan.dwg
2021/05/18 11:07 AM By: Justi Som

REACH 1A

101+00

102+00

103+00

REACH 1A REACH 1B

CHANNEL & STRUCTURE DIMENSIONS CHANGE

104+00

EXISTING
137" x 87" ARCH PIPE
TO REMAIN
INV IN: 2265.50'
INV OUT: 2263.29'

AS-BUILT RIPRAP
OUTLET PROTECTION

MONITORING XS-1

CONSERVATION
EASEMENT BOUNDARY

AS-BUILT SENIARD CREEK

2270
2265
2260
2255
2250

MATCH LINE STA 105+00

CAUTION
EXISTING UTILITY
POLE AND GUY WIRE

DAVE WHITAKER RD.

EXISTING 18" CMP
TO REMAIN

BOULDER BRUSH RUN
STA 101+88.8 EL 2253.12

BOULDER BRUSH RUN
STA 102+41.3 EL 2251.14

EXISTING UTILITY
EASEMENT

BOULDER BRUSH RUN
STA 102+98.9 EL 2249.23

CAUTION!
EXISTING
OVERHEAD
UTILITY

BRUSH RUN - LARGE
STA 103+58.9 EL 2248.10

BOULDER BRUSH RUN
STA 104+26.4 EL 2246.48

BOULDER BRUSH RUN
STA 104+96.0 EL 2244.59

NO SIGNIFICANT
DEVIATIONS FROM DESIGN

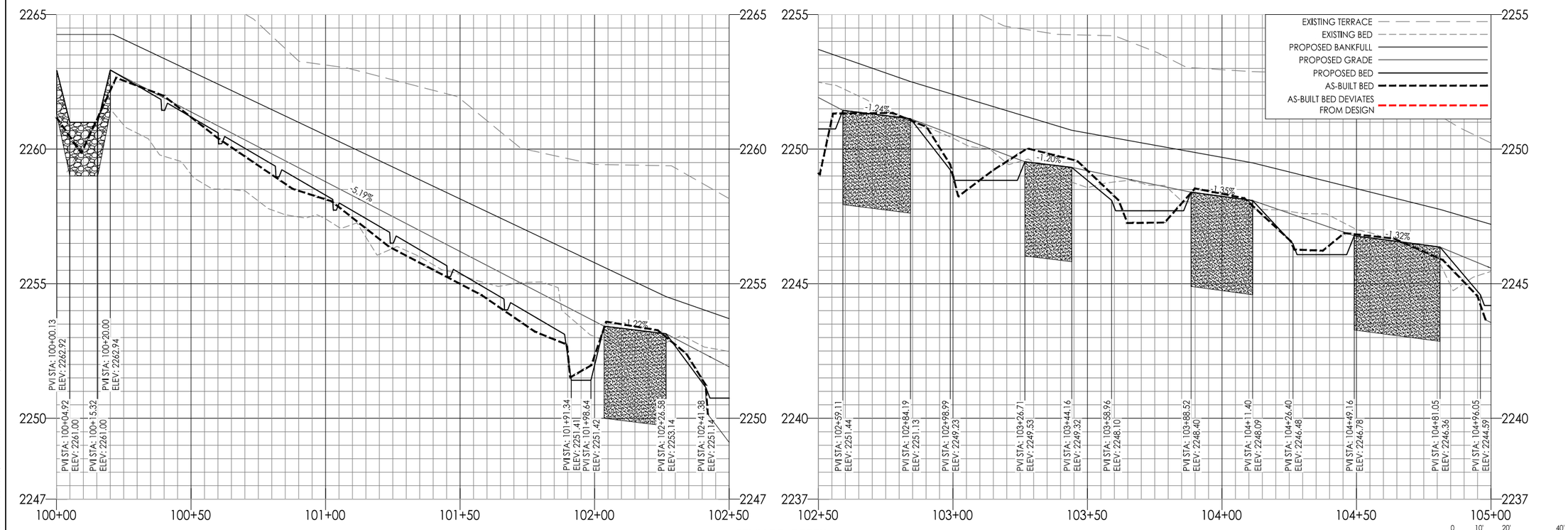
LOCATION KEY

LEGEND

- PROPOSED STREAM RESTORATION
- PROPOSED RIPRAP
- PROPOSED BRUSH ENHANCED RIFFLE
- EXISTING WETLAND

AS-BUILT LEGEND

- TOP OF BANK
- TOP OF BANK DEVIATIONS
- THALWEG
- THALWEG DEVIATIONS
- PRESERVED TREE
- DEBRIS PLACEMENT
- BRUSH TOE
- BOULDER BRUSH RUN
- BRUSH RUN – LARGE



SENIARD CREEK

1"=20' 0 10' 20' 40'

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Issued	By	Appd.	YY.MM.DD
Revision	CME	CME	20.07.14
REV-2 - UNEWEIGHT AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.18

Client/Project
EW SOLUTIONS, LLC

SENIARD CREEK MITIGATION SITE

HENDERSON COUNTY, NC

Title
SENIARD CREEK - PLAN & PROFILE - AS-BUILT
STA 100+00 - 105+00

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M ENGE
5/26/21

Project Number: 172621103

File Name: 1103-04-AB-Seniard PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No.

Revision	Sheet
2	AB-2

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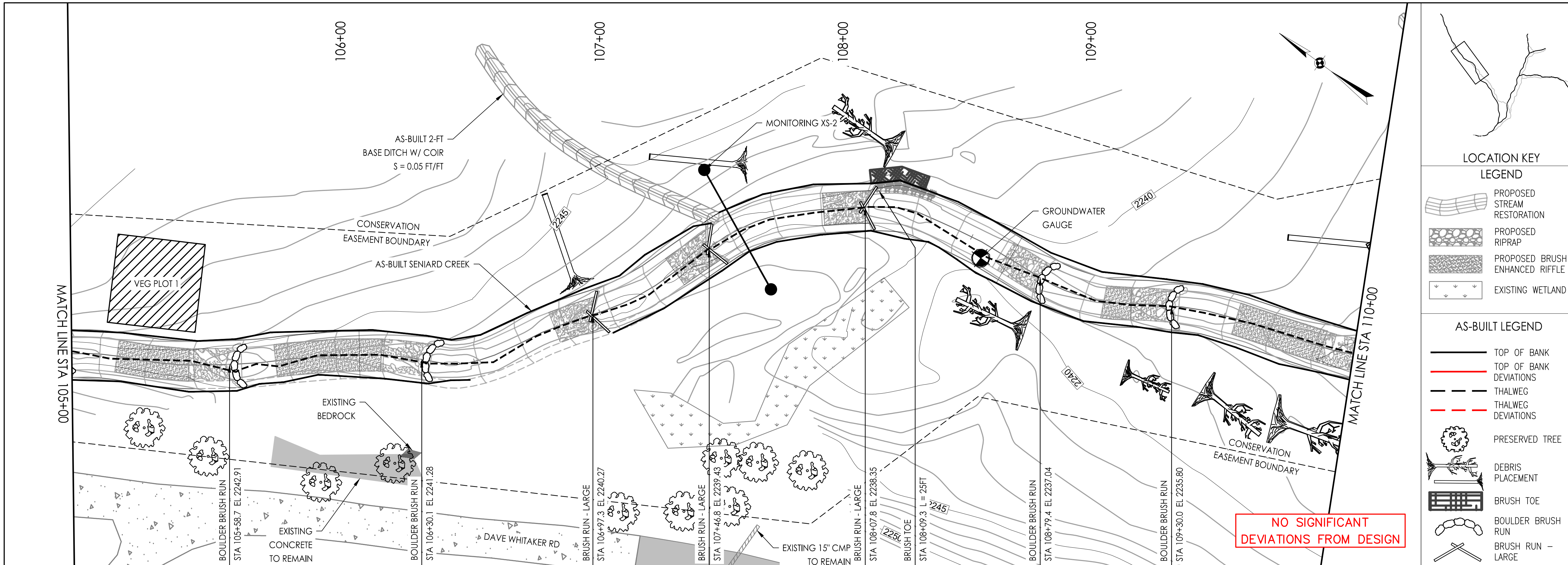

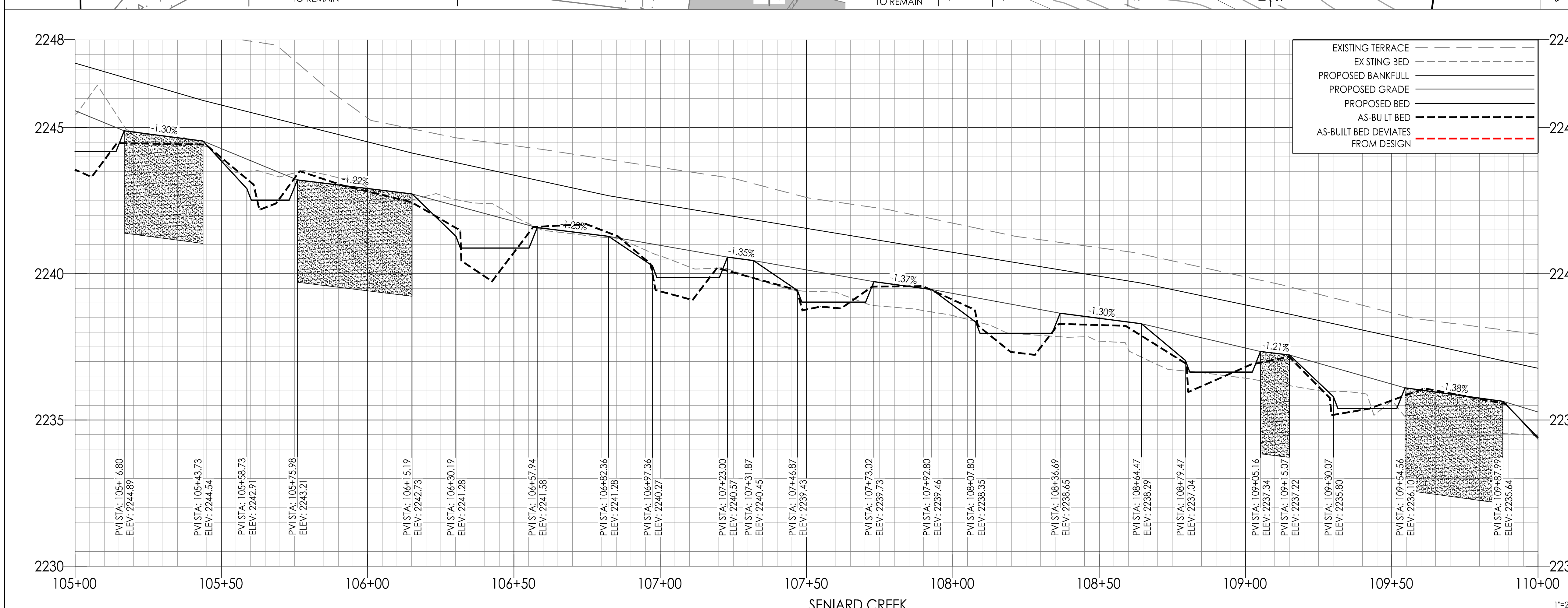

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Revision	By	Appd.	YY.MM.DD
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

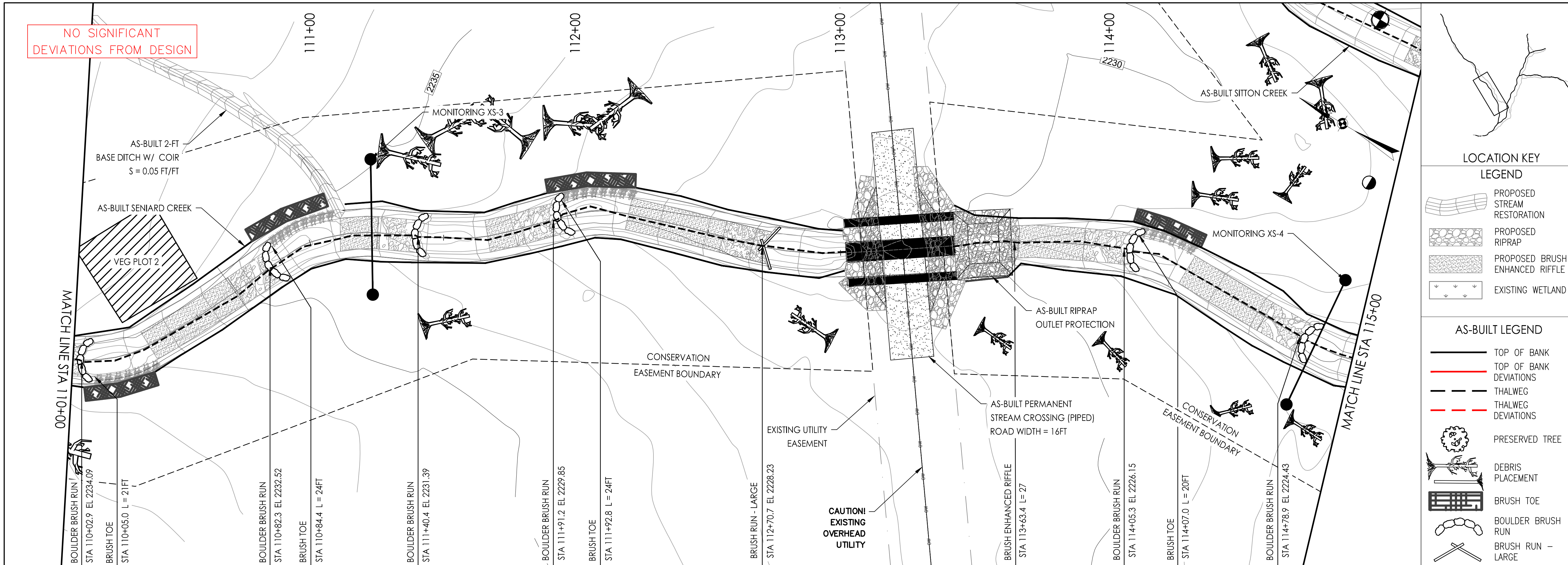
Title
SENIARD CREEK - PLAN & PROFILE - AS-BUILT
STA 105+00 - 110+00

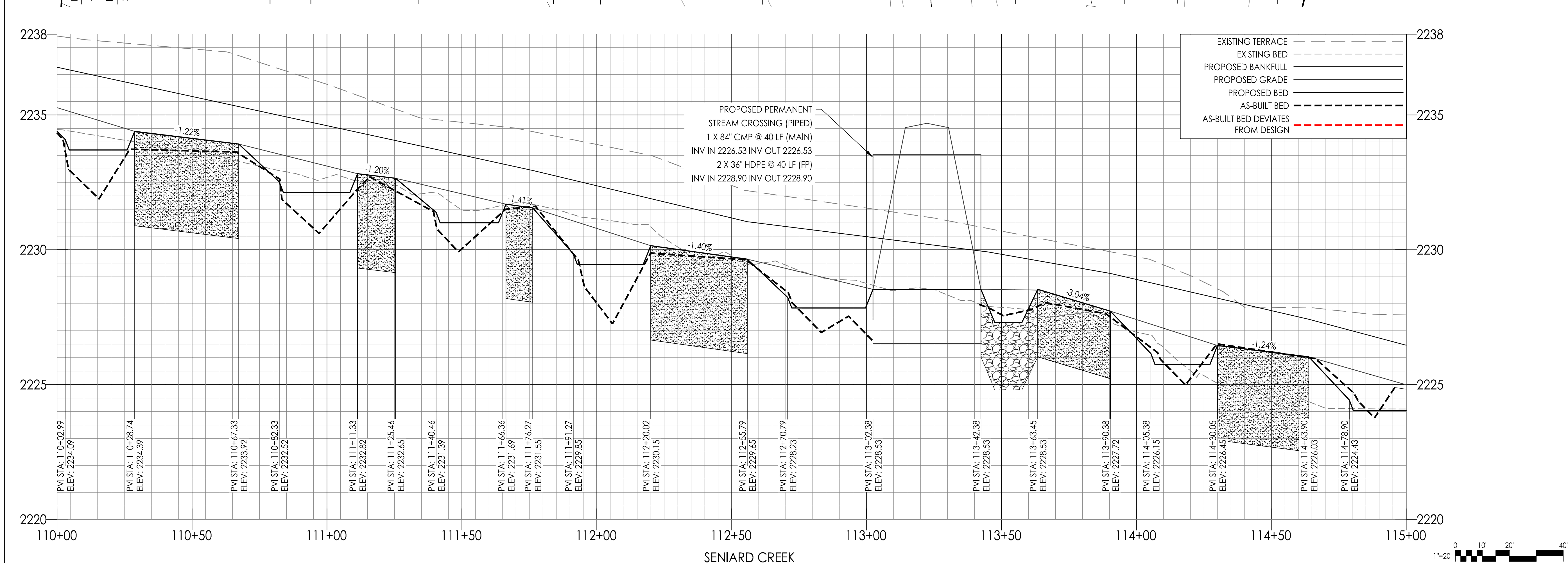
Permit-Seal

Project Number: 172621103
File Name: 1103-04-AB-Seniard PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No.
Revision 0
Sheet AB-3





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Revision	By	Appd.	YY.MM.DD
REV-2 - PIPED CROSSING	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued	By	Appd.	YY.MM.DD

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

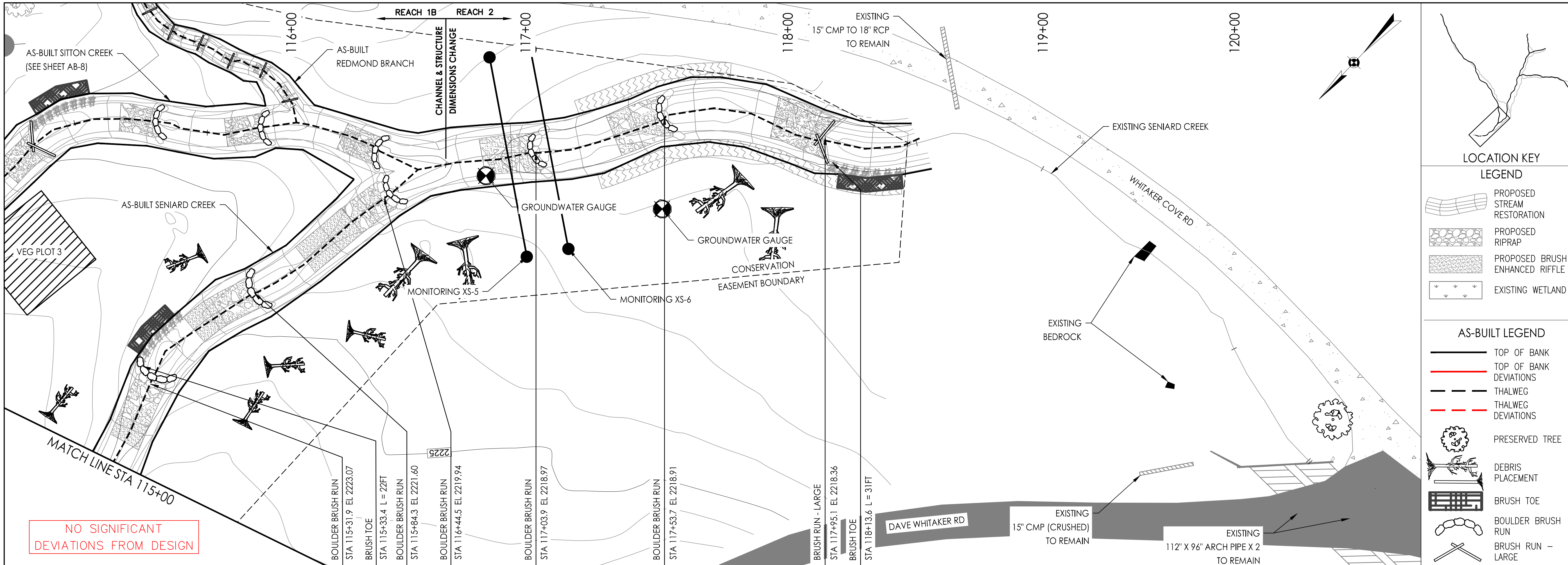
Title
SENIARD CREEK - PLAN & PROFILE - AS-BUILT
STA 110+00 - 115+00

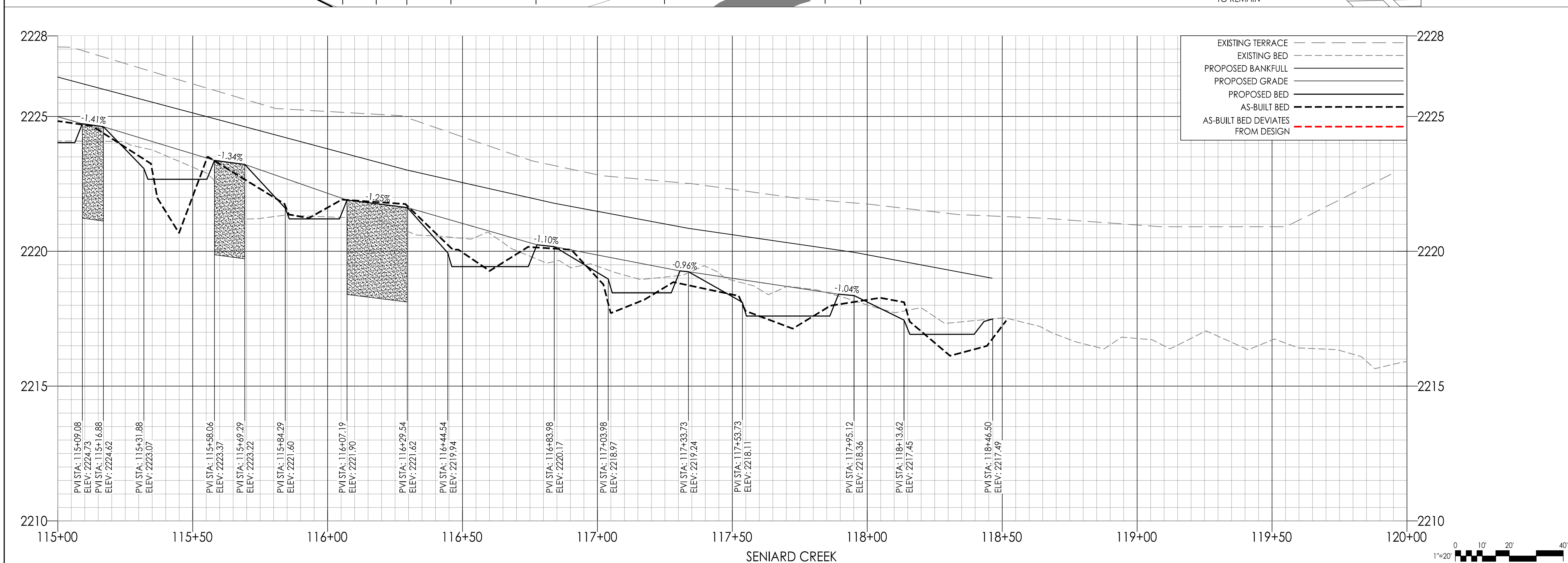
Permit-Seal
NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE
5/26/21

Project Number: 172621103
File Name: 1103-04-AB-Seniard PLANPRO.dwg

Dwn.	Chkd.	Dsgn.	YY.MM.DD
CEG	SGG	CME	21.03.31

Drawing No.
Revision 2
Sheet AB-4





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Revision	By	Appd.	YY.MM.DD
REV-2 - BRENCH PROTECTION	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued | By | Appd. | YY.MM.DD

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
SENIARD CREEK - PLAN & PROFILE - AS-BUILT
STA 115+00 - 120+00

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE 5/26/21

Project Number: 172621103

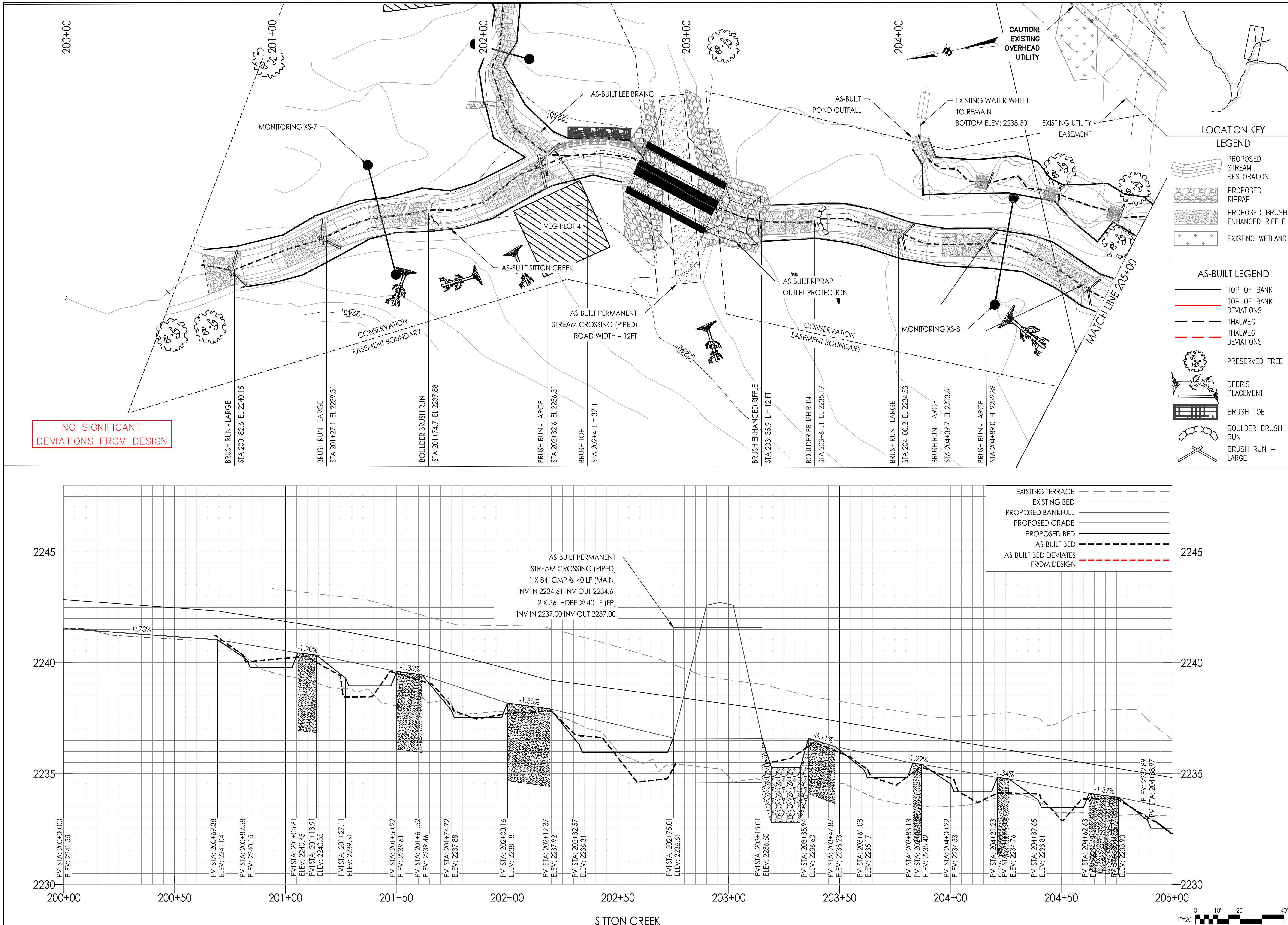
File Name: 1103-04-AB-Seniard PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No.

Revision 2

Sheet AB-5



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Revision	By	Appd.	YY.MM.DD
REV-2 - PIPED CROSSING	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
SITTON CREEK - PLAN & PROFILE - AS-BUILT
STA 200+00 - 205+00

Permit-Seal

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038595 CHRISTOPHER M. ENGLE 5/26/21

Project Number: 172621103
File Name: PLANPRO-REV.dwg

Dwn.	Chkd.	Dsgn.	YY.MM.DD
CEG	SGG	CME	21.03.31

Drawing No.
Revision 2
Sheet AB-6

NO SIGNIFICANT DEVIATIONS FROM DESIGN

206+00 207+00 208+00 209+00

MATCH LINE 205+00

MATCH LINE 210+00

AS-BUILT POND OUTFALL

AS-BUILT GROUNDWATER CURTAIN

AS-BUILT DAVID BRANCH

AS-BUILT SITTON CREEK

CONSERVATION EASEMENT BOUNDARY

CONSERVATION EASEMENT BOUNDARY

CONSERVATION EASEMENT BOUNDARY

2235

2230

VEG PLOT 5

VEG PLOT 6

CAUTION! EXISTING OVERHEAD UTILITY

EXISTING UTILITY POLE TO REMAIN

EXISTING UTILITY EASEMENT

BRUSH RUN - LARGE STA 205+57.7 EL. 2231.78

BRUSH RUN - LARGE STA 206+12.1 EL. 2230.81

BRUSH TOE STA 206+13.7 L = 23FT

BRUSH RUN - LARGE STA 206+70.9 EL. 2229.93

BRUSH TOE STA 206+72.4 L = 20FT

BRUSH RUN - LARGE STA 207+12.9 EL. 2229.42

BRUSH RUN - LARGE STA 207+56.4 EL. 2228.93

BRUSH TOE STA 207+58.0 L = 22FT

BRUSH RUN - LARGE STA 208+18.3 EL. 2228.24

BRUSH TOE STA 208+19.8 L = 23FT

BRUSH RUN - LARGE STA 208+71.6 EL. 2227.78

BRUSH RUN - LARGE STA 209+63.4 EL. 2225.97

LOCATION KEY

LEGEND

- PROPOSED STREAM RESTORATION
- PROPOSED RIPRAP
- PROPOSED BRUSH ENHANCED RIFFLE
- EXISTING WETLAND

AS-BUILT LEGEND

- TOP OF BANK
- TOP OF BANK DEVIATIONS
- THALWEG
- THALWEG DEVIATIONS
- PRESERVED TREE
- DEBRIS PLACEMENT
- BRUSH TOE
- BOULDER BRUSH RUN
- BRUSH RUN – LARGE

EXISTING TERRACE
EXISTING BED
PROPOSED BANKFULL
PROPOSED GRADE
PROPOSED BED
AS-BUILT BED
AS-BUILT BED DEVIATES FROM DESIGN

-1.27% -1.34% -1.23% -1.36% -1.29% -1.18% -1.26% -1.33%

2235 2230 2225 2220

PVI STA: 205+12.10 ELEV: 2233.19
PVI STA: 205+44.47 ELEV: 2232.78
PVI STA: 205+57.67 ELEV: 2231.78
PVI STA: 205+82.48 ELEV: 2232.08
PVI STA: 205+98.92 ELEV: 2231.86
PVI STA: 206+12.12 ELEV: 2230.81
PVI STA: 206+38.95 ELEV: 2231.11
PVI STA: 206+57.69 ELEV: 2230.88
PVI STA: 206+70.89 ELEV: 2229.93
PVI STA: 206+95.32 ELEV: 2230.17
PVI STA: 206+99.72 ELEV: 2230.17
PVI STA: 207+12.92 ELEV: 2229.42
PVI STA: 207+37.06 ELEV: 2229.72
PVI STA: 207+43.25 ELEV: 2229.64
PVI STA: 207+56.45 ELEV: 2228.93
PVI STA: 207+82.31 ELEV: 2229.23
PVI STA: 208+05.11 ELEV: 2228.96
PVI STA: 208+18.31 ELEV: 2228.24
PVI STA: 208+45.71 ELEV: 2228.54
PVI STA: 208+58.41 ELEV: 2228.38
PVI STA: 208+71.61 ELEV: 2227.78
PVI STA: 208+97.37 ELEV: 2228.08
PVI STA: 209+50.19 ELEV: 2227.38
PVI STA: 209+63.39 ELEV: 2225.97
PVI STA: 209+92.09 ELEV: 2226.27

205+00 205+50 206+00 206+50 207+00 207+50 208+00 208+50 209+00 209+50 210+00

SITTON CREEK

1"=20' 0 10' 20' 40'

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Revision	By	Appd.	YY.MM.DD
REV-2 - LEGEND	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17
Issued	CME	CME	21.03.31

Client/Project
EW SOLUTIONS, LLC

SENIARD CREEK MITIGATION SITE

HENDERSON COUNTY, NC

Title
SITTON CREEK - PLAN & PROFILE - AS-BUILT
205+00 - 210+00

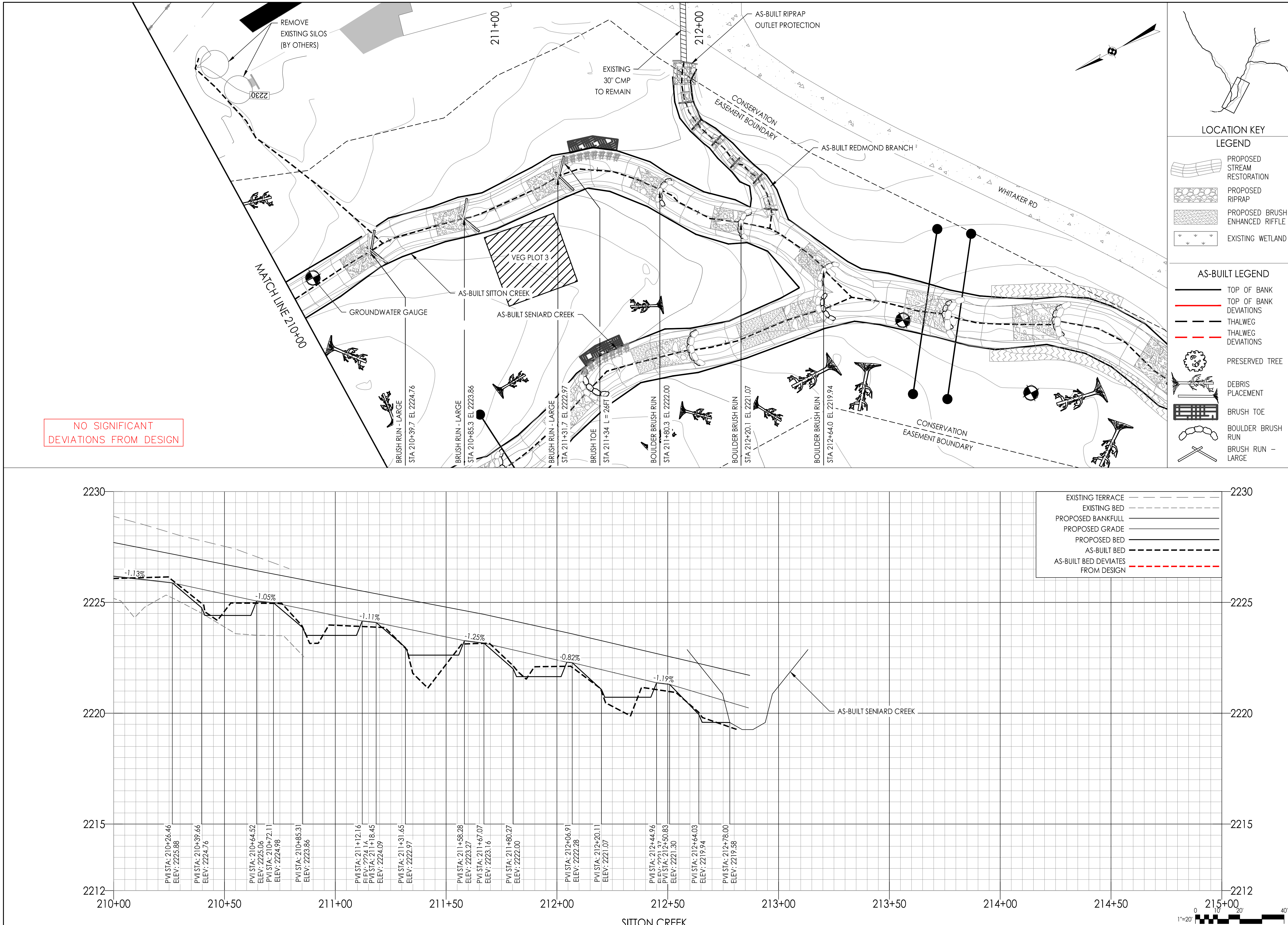
Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE 12/26/21

Project Number: 172621103
110505-AB-Sitton
File Name: PLANPRO-REV.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No.
Revision 2
Sheet AB-7



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Revision	By	Appd.	YY.MM.DD
REV-2 - LABELS	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
SITTON CREEK - PLAN & PROFILE - AS-BUILT
STA 210+00 - 215+00

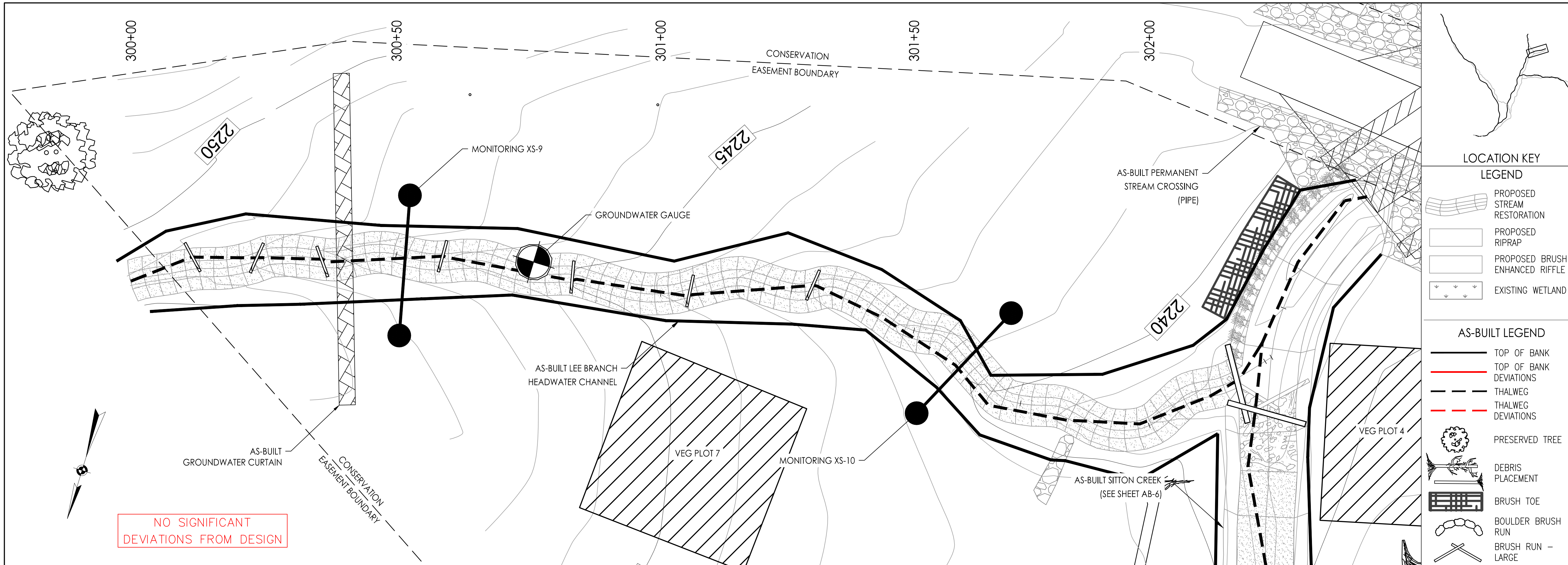
Permit-Seal

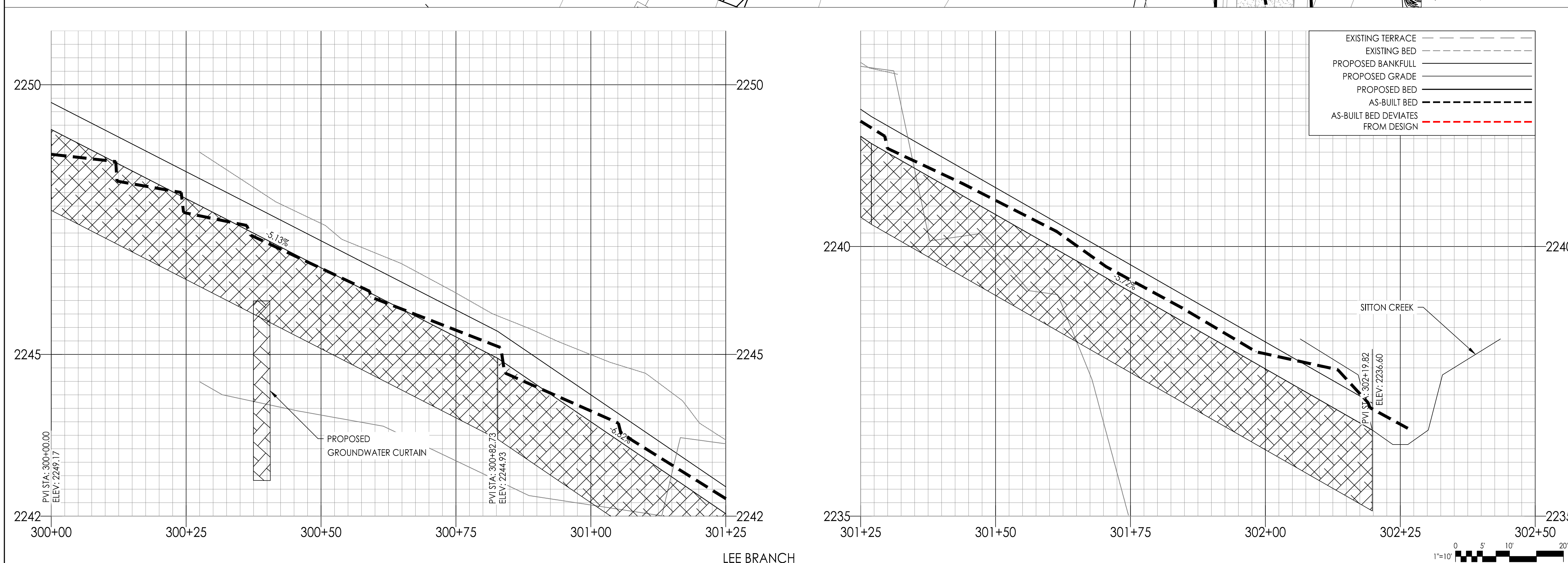
NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE
5/26/21

Project Number: 172621103
File Name: PLANPRO-REV.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No.
Revision 2
Sheet AB-8





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Revision	By	Appd.	YY.MM.DD
REV-2 - LABELS	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued	By	Appd.	YY.MM.DD
20.07.14	CME		

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
LEE BRANCH - PLAN & PROFILE - AS-BUILT
STA 300+00 -302+50

Permit-Seal
NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE 5/26/21

Project Number: 172621103
File Name: 1103-06-AB-Lee PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. LEE - (1)
Revision 2
Sheet AB-9

400+00
400+50
401+00
401+50
402+00
CONSERVATION EASEMENT BOUNDARY
REACH 1A
REACH 1B
CHANNEL & STRUCTURE DIMENSIONS CHANGE
MONITORING XS-11
MATCH LINE STA 402+50
EXISTING DAVID BRANCH
AS-BUILT DAVID BRANCH HEADWATER CHANNEL
2265
CONSERVATION EASEMENT BOUNDARY
NO SIGNIFICANT DEVIATIONS FROM DESIGN

LOCATION KEY

LEGEND
- PROPOSED STREAM RESTORATION
- PROPOSED RIPRAP
- PROPOSED BRUSH ENHANCED RIFFLE
- EXISTING WETLAND

AS-BUILT LEGEND
- TOP OF BANK
- TOP OF BANK DEVIATIONS
- THALWEG
- THALWEG DEVIATIONS
- PRESERVED TREE
- DEBRIS PLACEMENT
- BRUSH TOE
- BOULDER BRUSH RUN
- BRUSH RUN – LARGE

EXISTING TERRACE
EXISTING BED
PROPOSED BANKFULL
PROPOSED GRADE
PROPOSED BED
AS-BUILT BED
AS-BUILT BED DEVIATES FROM DESIGN

-5.59%
-10.12%
PVI STA: 401+31.50
ELEV: 2266.95
PVI STA: 401+95.00
ELEV: 2263.40

2274 2272 2270 2268 2266 2264 2262 2260 2258 2256 2254 2252 2250 2248 2246 2244 2242 2240 2238 2236 2234 2232 2230 2228 2226 2224 2222 2220 2218 2216 2214 2212 2210 2208 2206 2204 2202 2200 2198 2196 2194 2192 2190 2188 2186 2184 2182 2180 2178 2176 2174 2172 2170 2168 2166 2164 2162 2160 2158 2156 2154 2152 2150 2148 2146 2144 2142 2140 2138 2136 2134 2132 2130 2128 2126 2124 2122 2120 2118 2116 2114 2112 2110 2108 2106 2104 2102 2100 2098 2096 2094 2092 2090 2088 2086 2084 2082 2080 2078 2076 2074 2072 2070 2068 2066 2064 2062 2060 2058 2056 2054 2052 2050 2048 2046 2044 2042 2040 2038 2036 2034 2032 2030 2028 2026 2024 2022 2020 2018 2016 2014 2012 2010 2008 2006 2004 2002 2000 1998 1996 1994 1992 1990 1988 1986 1984 1982 1980 1978 1976 1974 1972 1970 1968 1966 1964 1962 1960 1958 1956 1954 1952 1950 1948 1946 1944 1942 1940 1938 1936 1934 1932 1930 1928 1926 1924 1922 1920 1918 1916 1914 1912 1910 1908 1906 1904 1902 1900 1898 1896 1894 1892 1890 1888 1886 1884 1882 1880 1878 1876 1874 1872 1870 1868 1866 1864 1862 1860 1858 1856 1854 1852 1850 1848 1846 1844 1842 1840 1838 1836 1834 1832 1830 1828 1826 1824 1822 1820 1818 1816 1814 1812 1810 1808 1806 1804 1802 1800 1798 1796 1794 1792 1790 1788 1786 1784 1782 1780 1778 1776 1774 1772 1770 1768 1766 1764 1762 1760 1758 1756 1754 1752 1750 1748 1746 1744 1742 1740 1738 1736 1734 1732 1730 1728 1726 1724 1722 1720 1718 1716 1714 1712 1710 1708 1706 1704 1702 1700 1698 1696 1694 1692 1690 1688 1686 1684 1682 1680 1678 1676 1674 1672 1670 1668 1666 1664 1662 1660 1658 1656 1654 1652 1650 1648 1646 1644 1642 1640 1638 1636 1634 1632 1630 1628 1626 1624 1622 1620 1618 1616 1614 1612 1610 1608 1606 1604 1602 1600 1598 1596 1594 1592 1590 1588 1586 1584 1582 1580 1578 1576 1574 1572 1570 1568 1566 1564 1562 1560 1558 1556 1554 1552 1550 1548 1546 1544 1542 1540 1538 1536 1534 1532 1530 1528 1526 1524 1522 1520 1518 1516 1514 1512 1510 1508 1506 1504 1502 1500 1498 1496 1494 1492 1490 1488 1486 1484 1482 1480 1478 1476 1474 1472 1470 1468 1466 1464 1462 1460 1458 1456 1454 1452 1450 1448 1446 1444 1442 1440 1438 1436 1434 1432 1430 1428 1426 1424 1422 1420 1418 1416 1414 1412 1410 1408 1406 1404 1402 1400 1398 1396 1394 1392 1390 1388 1386 1384 1382 1380 1378 1376 1374 1372 1370 1368 1366 1364 1362 1360 1358 1356 1354 1352 1350 1348 1346 1344 1342 1340 1338 1336 1334 1332 1330 1328 1326 1324 1322 1320 1318 1316 1314 1312 1310 1308 1306 1304 1302 1300 1298 1296 1294 1292 1290 1288 1286 1284 1282 1280 1278 1276 1274 1272 1270 1268 1266 1264 1262 1260 1258 1256 1254 1252 1250 1248 1246 1244 1242 1240 1238 1236 1234 1232 1230 1228 1226 1224 1222 1220 1218 1216 1214 1212 1210 1208 1206 1204 1202 1200 1198 1196 1194 1192 1190 1188 1186 1184 1182 1180 1178 1176 1174 1172 1170 1168 1166 1164 1162 1160 1158 1156 1154 1152 1150 1148 1146 1144 1142 1140 1138 1136 1134 1132 1130 1128 1126 1124 1122 1120 1118 1116 1114 1112 1110 1108 1106 1104 1102 1100 1098 1096 1094 1092 1090 1088 1086 1084 1082 1080 1078 1076 1074 1072 1070 1068 1066 1064 1062 1060 1058 1056 1054 1052 1050 1048 1046 1044 1042 1040 1038 1036 1034 1032 1030 1028 1026 1024 1022 1020 1018 1016 1014 1012 1010 1008 1006 1004 1002 1000 998 996 994 992 990 988 986 984 982 980 978 976 974 972 970 968 966 964 962 960 958 956 954 952 950 948 946 944 942 940 938 936 934 932 930 928 926 924 922 920 918 916 914 912 910 908 906 904 902 900 898 896 894 892 890 888 886 884 882 880 878 876 874 872 870 868 866 864 862 860 858 856 854 852 850 848 846 844 842 840 838 836 834 832 830 828 826 824 822 820 818 816 814 812 810 808 806 804 802 800 798 796 794 792 790 788 786 784 782 780 778 776 774 772 770 768 766 764 762 760 758 756 754 752 750 748 746 744 742 740 738 736 734 732 730 728 726 724 722 720 718 716 714 712 710 708 706 704 702 700 698 696 694 692 690 688 686 684 682 680 678 676 674 672 670 668 666 664 662 660 658 656 654 652 650 648 646 644 642 640 638 636 634 632 630 628 626 624 622 620 618 616 614 612 610 608 606 604 602 600 598 596 594 592 590 588 586 584 582 580 578 576 574 572 570 568 566 564 562 560 558 556 554 552 550 548 546 544 542 540 538 536 534 532 530 528 526 524 522 520 518 516 514 512 510 508 506 504 502 500 498 496 494 492 490 488 486 484 482 480 478 476 474 472 470 468 466 464 462 460 458 456 454 452 450 448 446 444 442 440 438 436 434 432 430 428 426 424 422 420 418 416 414 412 410 408 406 404 402 400 398 396 394 392 390 388 386 384 382 380 378 376 374 372 370 368 366 364 362 360 358 356 354 352 350 348 346 344 342 340 338 336 334 332 330 328 326 324 322 320 318 316 314 312 310 308 306 304 302 300 298 296 294 292 290 288 286 284 282 280 278 276 274 272 270 268 266 264 262 260 258 256 254 252 250 248 246 244 242 240 238 236 234 232 230 228 226 224 222 220 218 216 214 212 210 208 206 204 202 200 198 196 194 192 190 188 186 184 182 180 178 176 174 172 170 168 166 164 162 160 158 156 154 152 150 148 146 144 142 140 138 136 134 132 130 128 126 124 122 120 118 116 114 112 110 108 106 104 102 100 98 96 94 92 90 88 86 84 82 80 78 76 74 72 70 68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0

400+00 400+25 400+50 400+75 401+00 401+25 401+50 401+75 402+00 402+25 402+50

DAVID BRANCH

1"=10' 0 5' 10' 20'

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Issued	Revision	By	Appd.	YY.MM.DD
AS-BUILT REV-1 - NO DEVIATIONS NOTE		CME	CME	21.05.17

Client/Project
EW SOLUTIONS, LLC

SENIARD CREEK MITIGATION SITE

HENDERSON COUNTY, NC

Title
DAVID BRANCH - PLAN & PROFILE - AS-BUILT
STA 400+00 - 402+50

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M ENGLE
5/26/21

Project Number: 1726211103

File Name: 1103-07-AB-David PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. DAVID - (1)

Revision	Sheet
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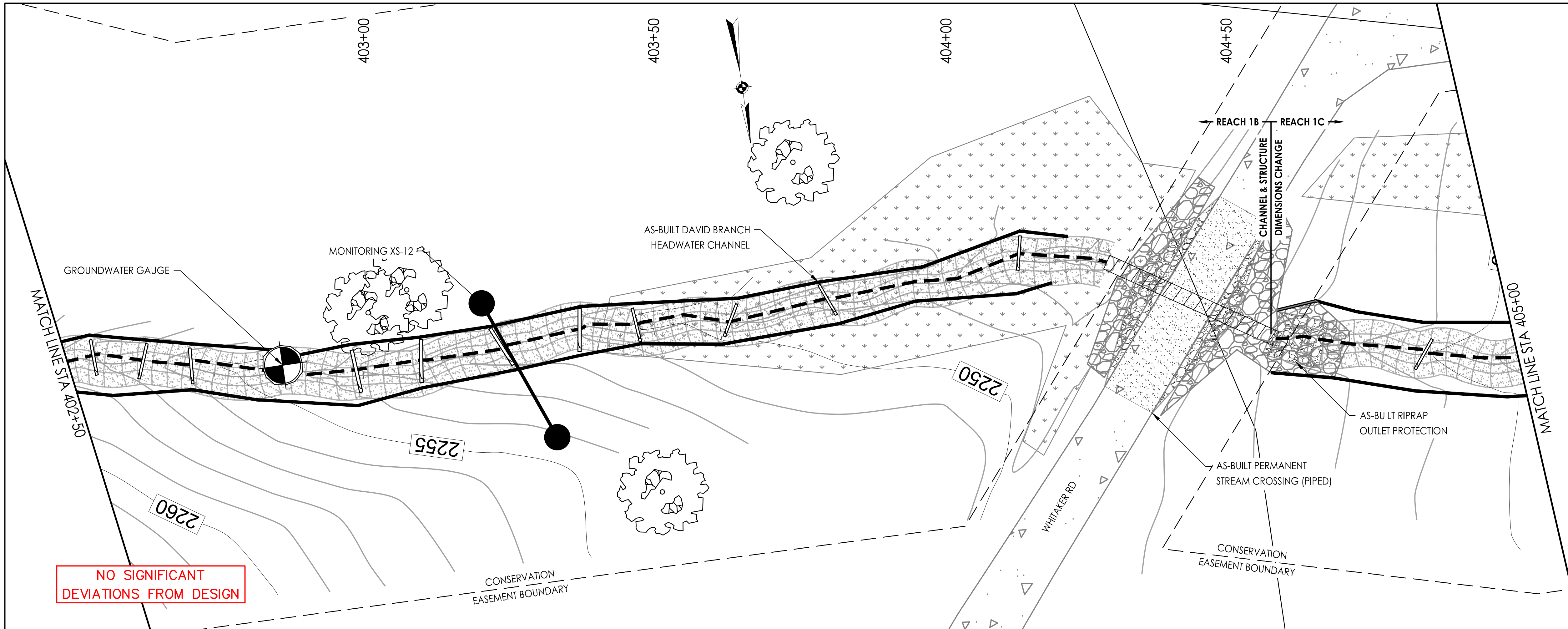
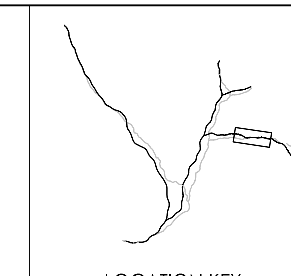


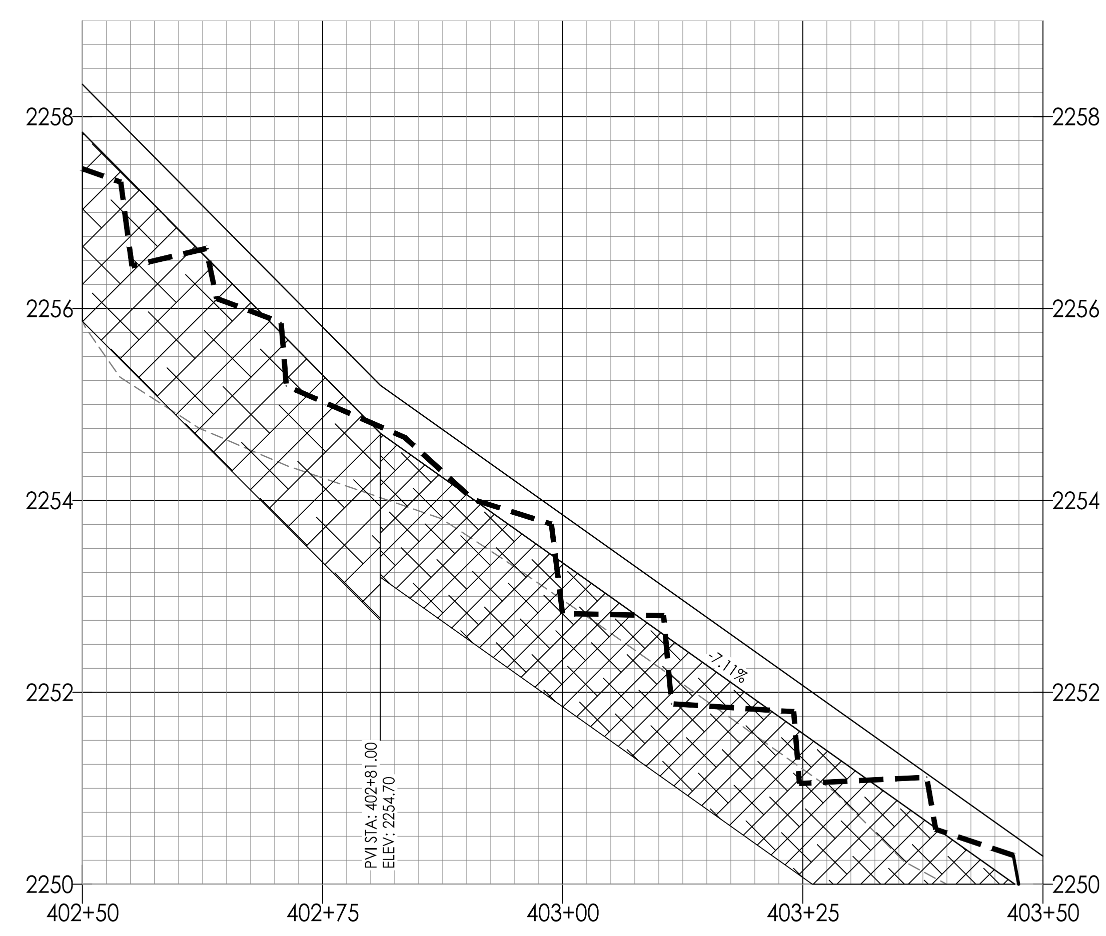


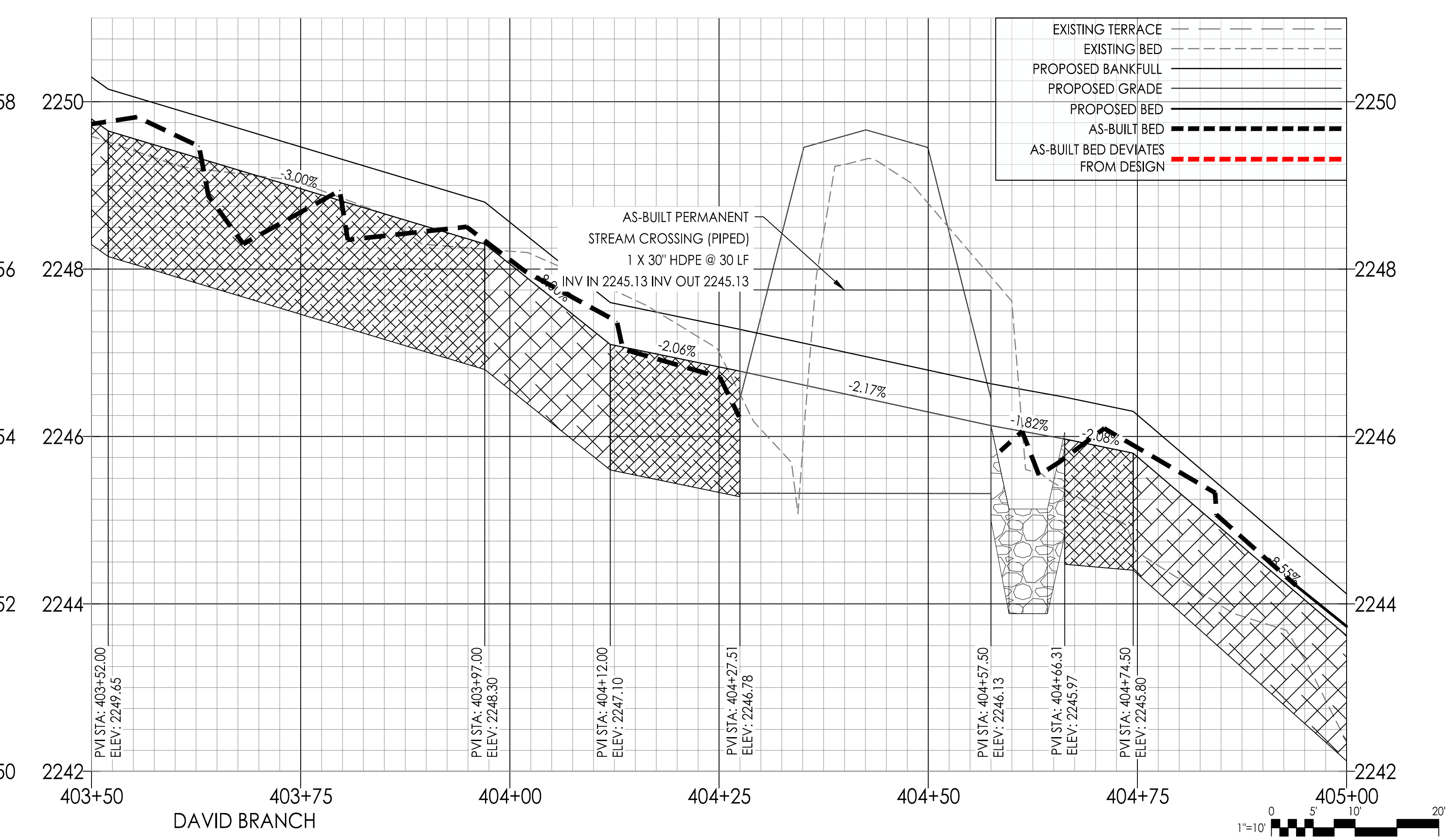
LEGEND

- PROPOSED STREAM RESTORATION
- PROPOSED RIPRAP
- PROPOSED BRUSH ENHANCED RIFFLE
- EXISTING WETLAND

AS-BUILT LEGEND

- TOP OF BANK
- TOP OF BANK DEVIATIONS
- THALWEG
- THALWEG DEVIATIONS
- PRESERVED TREE
- DEBRIS PLACEMENT
- BRUSH TOE
- BOULDER BRUSH RUN
- BRUSH RUN – LARGE





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Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
DAVID BRANCH - PLAN & PROFILE - AS-BUILT
STA 402+50 - 405+00

Permit-Seal

SEAL 038595 — NORTH CAROLINA PROFESSIONAL ENGINEER — CHRISTOPHER M. ENGLE — 5/26/21

Project Number: 172621103
File Name: 1103-07-AB-David PLANPRO.dwg

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Drawing No. DAVID - (2)

Revision	Sheet
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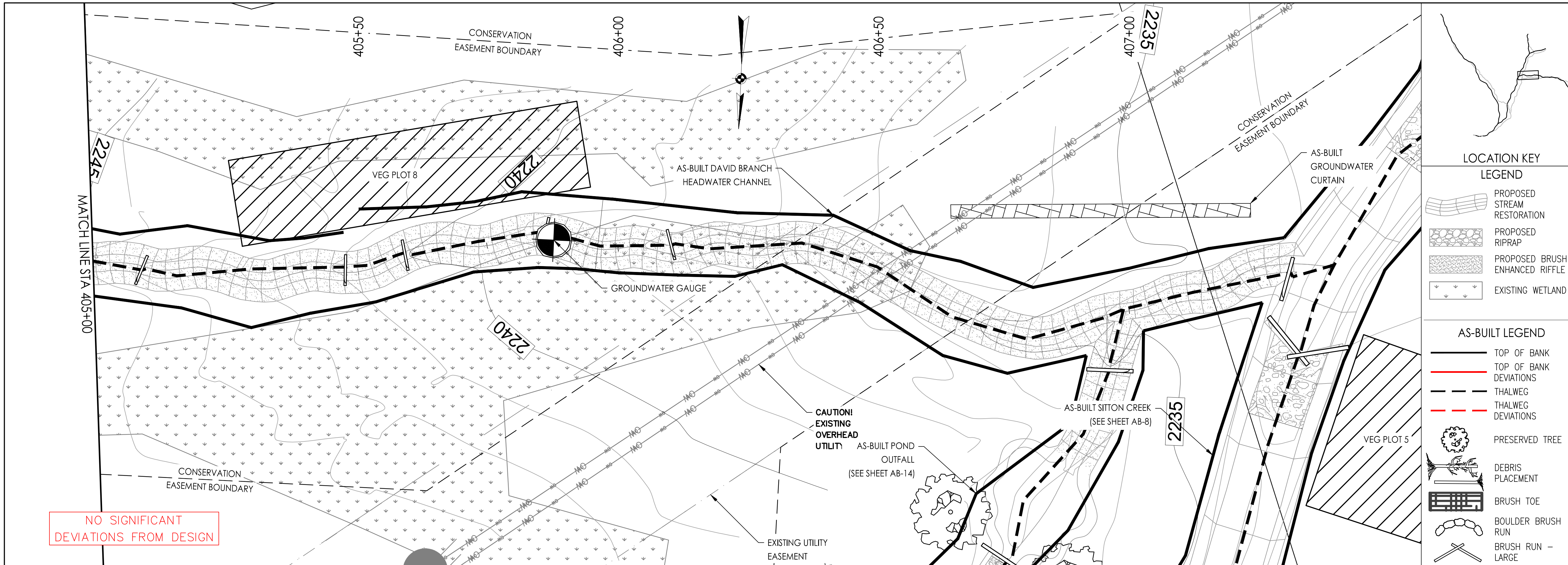

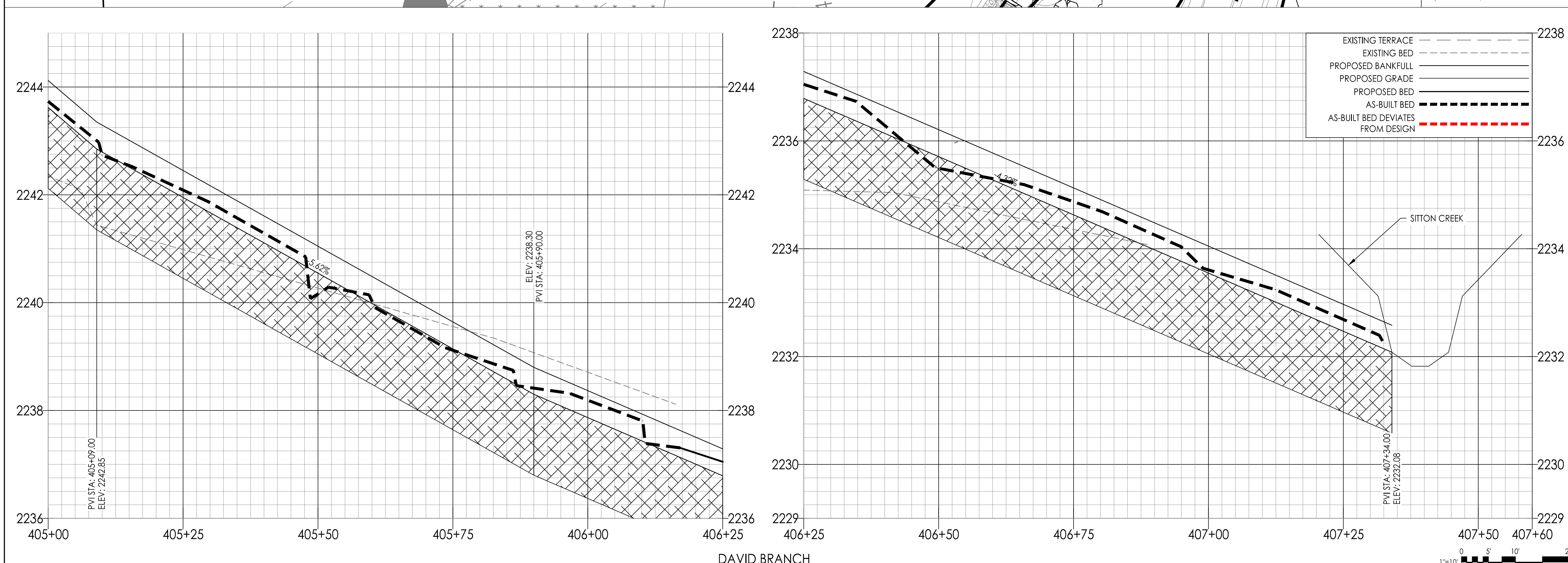

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Revision	By	Appd.	YY.MM.DD
REV-2 - LABELS	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

Issued	By	Appd.	YY.MM.DD

Client/Project
EW SOLUTIONS, LLC

SENIARD CREEK MITIGATION SITE

HENDERSON COUNTY, NC

Title
DAVID BRANCH - PLAN & PROFILE - AS-BUILT
STA 405+00 - 407+50

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE
5/26/21

Project Number: 172621103

File Name: 1103-07-AB-David PLANPRO.dwg

CEG	SGG	CME	21.03.31
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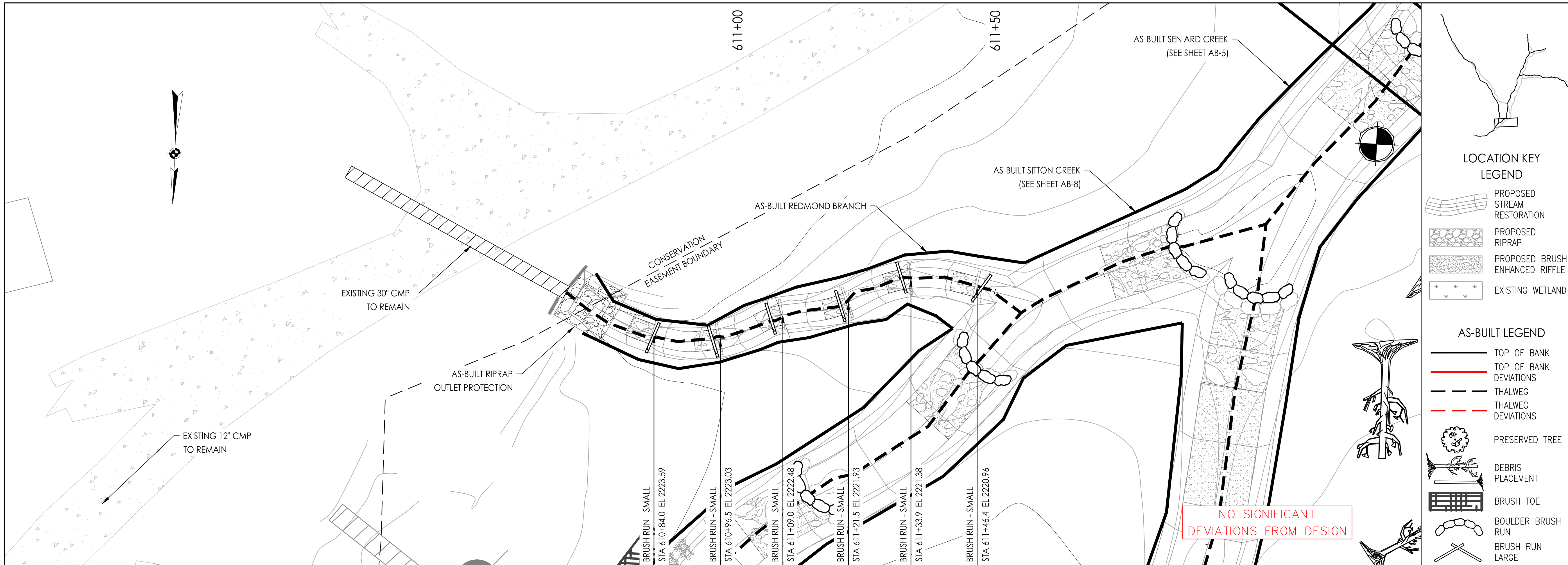
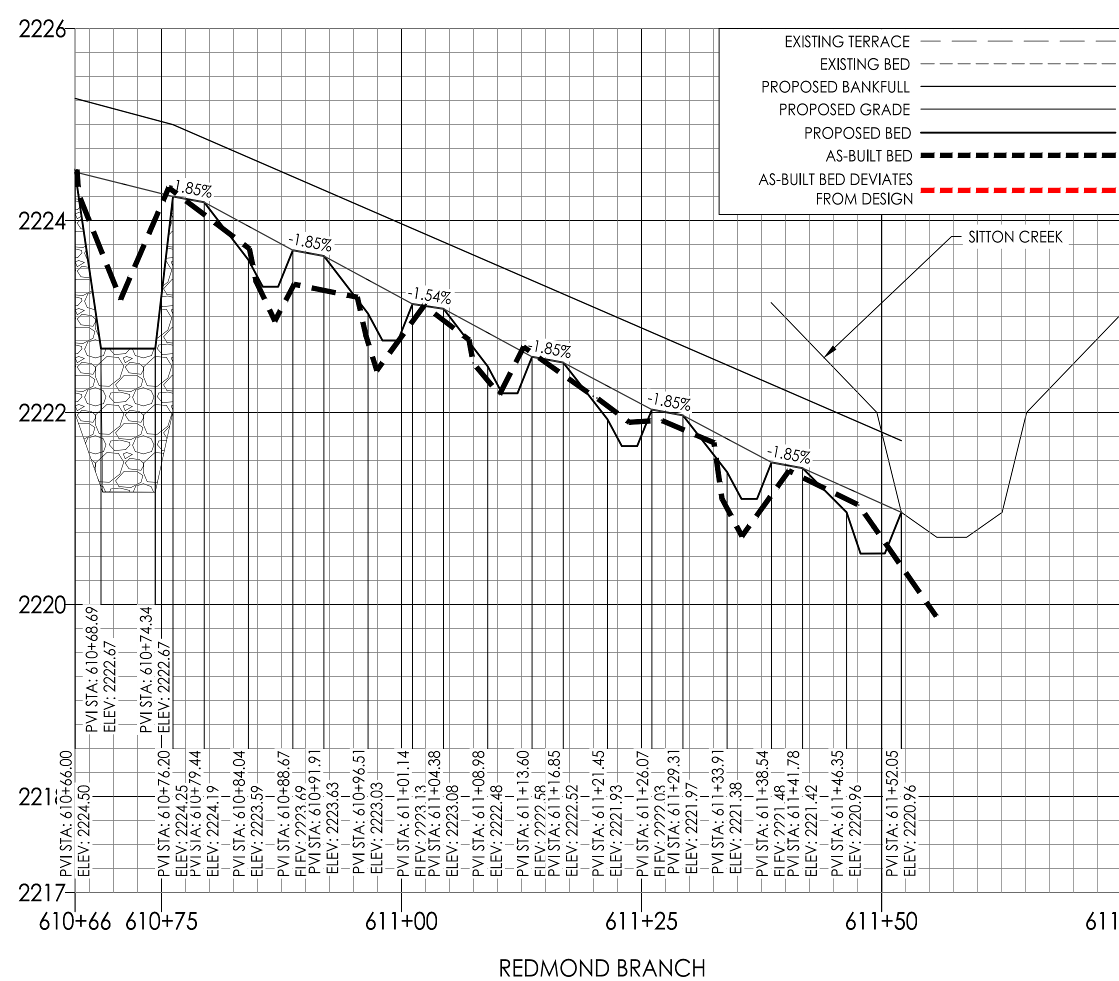
Drawing No. DAVID - (3)

Revision 2

Sheet AB-12





1"=10' 0 5' 10' 20'

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Revision	By	Appd.	YY.MM.DD
REV-2 - OUTLET PROTECT AND LABELS	CME	CME	20.07.14
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17

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Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
REDMOND BRANCH - PLAN & PROFILE - AS-BUILT
STA 405+00 - 407+50

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE 5/26/21

Project Number: 172621103
File Name: 1103-07-AB-David PLANPRO.dwg

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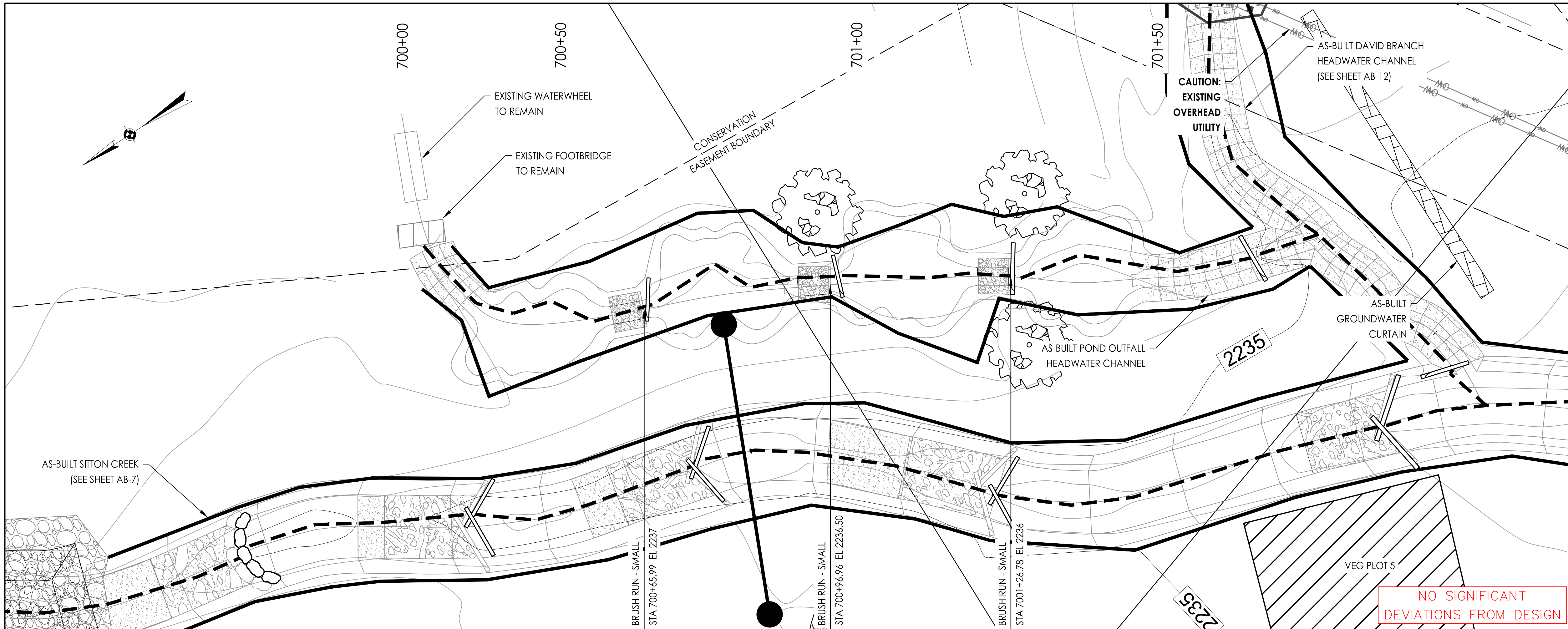
Drawing No. REDMOND (1)
Revision 2
Sheet AB-13



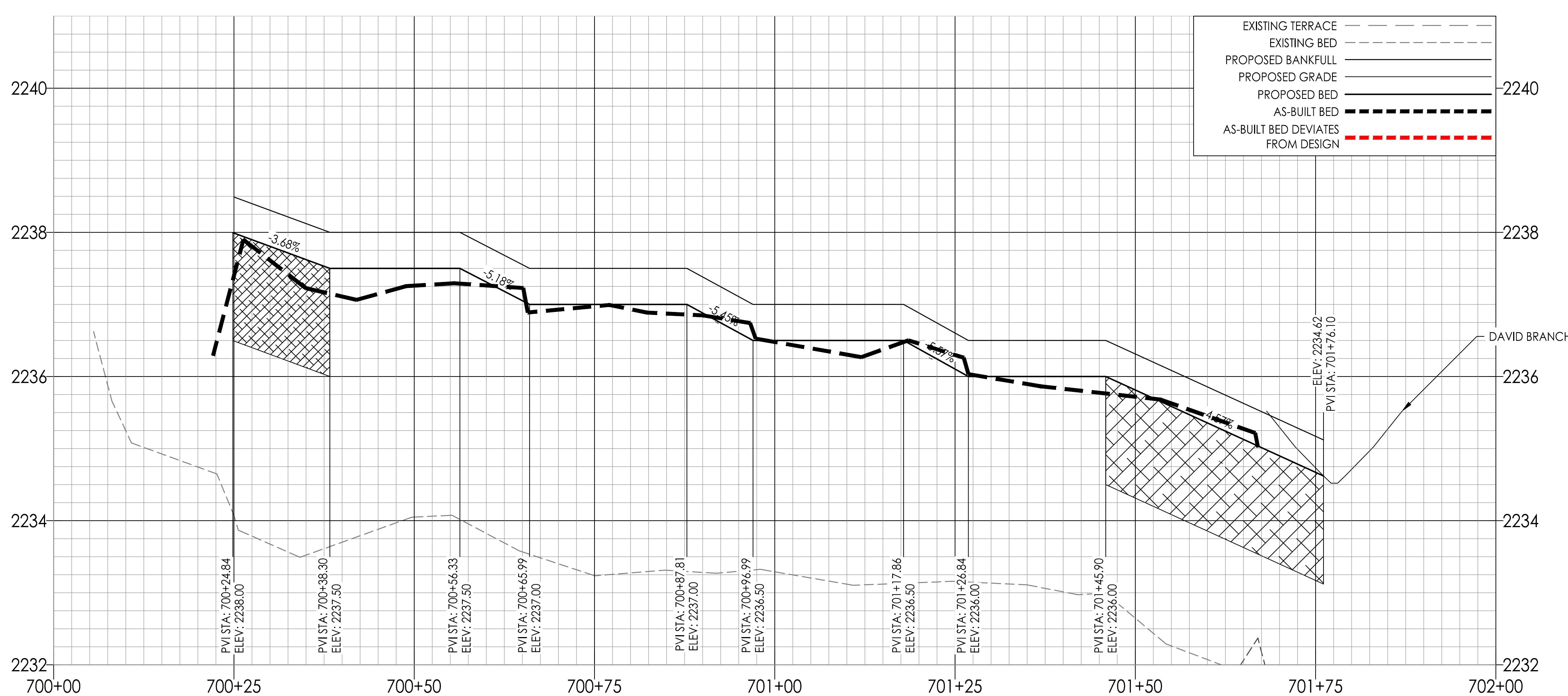
LOCATION KEY

LEGEND

- PROPOSED STREAM RESTORATION
- PROPOSED RIPRAP
- PROPOSED BRUSH ENHANCED RIFFLE
- EXISTING WETLAND

AS-BUILT LEGEND

- TOP OF BANK
- TOP OF BANK DEVIATIONS
- THALWEG
- THALWEG DEVIATIONS
- PRESERVED TREE
- DEBRIS PLACEMENT
- BRUSH TOE
- BOULDER BRUSH RUN
- BRUSH RUN – LARGE



POND OUTFALL

1"=10' 0 5' 10' 20'

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Revision	By	Appd.	YY.MM.DD
AS-BUILT REV-1 - NO DEVIATIONS NOTE	CME	CME	21.05.17
REV-2 - LABELS	CME	CME	20.07.14

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Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

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DAVID BRANCH - PLAN & PROFILE
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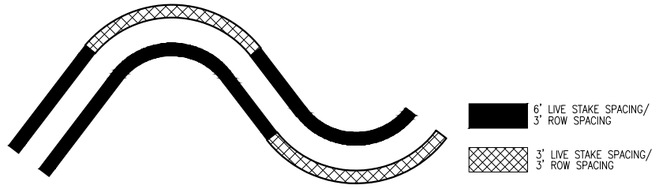
Permit-Seal
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038595 CHRISTOPHER M. ENGLE 5/26/21

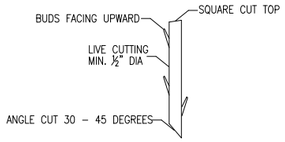
Project Number: 172621103
File Name: 1103-07-AB-David PLANPRO.dwg

CEG	SGG	CME	21.03.31
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. POND OUTFALL
Revision 2 Sheet AB-14



PLAN VIEW



LIVE STAKE DETAIL

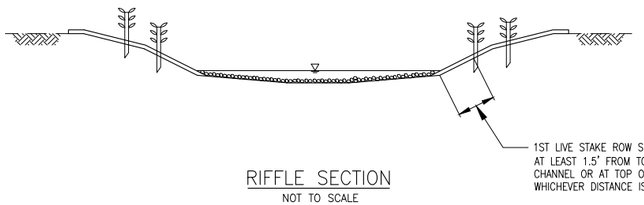
NUMBER OF LIVE STAKE ROWS			
CHANNEL DEPTH (FT)	INSIDE OF BEND	TANGENT	OUTSIDE OF BEND
0 – 1.5	1	1	2
1.5 – 2.5	2	2	3
2.5 – 3.5	3	3	4

PLANTING NOTES:

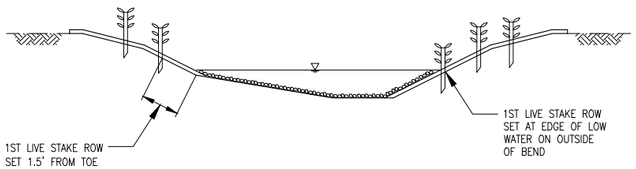
TEMPORARY AND PERMANENT SEED
1. ALL DISTURBED AREAS WILL BE STABILIZED USING MULCH AND TEMPORARY SEED TO PROVIDE ADEQUATE GROUND COVER AND CONDITION THE SOIL.
2. MULCH MUST BE ADDED TO ACHIEVE 95% COVERAGE (ROUGHLY 4 TONS/ACRE FOR WHEAT STRAW)
3. A FERTILITY SOIL TEST SHALL BE USED TO DETERMINE FERTILIZER AMOUNTS OR, IF NO SOIL TEST IS AVAILABLE, A STANDARD MIXTURE SHALL BE APPLIED OF 2 TONS OF LIME PER ACRE AND 700–1000 LBS OF 10–10–10 FERTILIZER PER ACRE.

BARE ROOT PLANTINGS
1. PLANT BARE ROOT SHRUBS AND TREES IN AREAS AS INDICATED ON THE PLANS.
2. PROVIDE 8 FT OF SPACING BETWEEN INSTALLED PLANTS YIELDING A DENSITY OF 680 STEMS/AC, DIVIDED EQUALLY BETWEEN AVAILABLE SPECIES.
3. LOOSEN COMPACTED SOIL AND PLANT IN HOLES FORMED WITH A MATTOCK, DIBBLE BAR OR EQUAL.
4. PROVIDE PLANTING HOLE SUFFICIENT IN SIZE AND DEPTH TO PREVENT CROWDING OF ROOTS.
5. ROOTS SHALL BE KEPT MOIST DURING TRANSPORTATION, DISTRIBUTION, AND INSTALLATION.
6. PLANTS SHALL BE HEELED–IN INTO MOIST SOIL IF NOT PROMPTLY PLANTED AFTER DELIVERY TO THE PROJECT SITE.

LIVE STAKES:
1. STAKES SHOULD BE SPACED ACCORDING TO PLAN VIEW DETAIL AND DIVIDED EQUALLY BETWEEN THE AVAILABLE SPECIES.
2. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
3. STAKES THAT ARE SPLIT SHALL NOT BE INSTALLED.
4. STAKES SHALL BE INSTALLED ORTHOGONAL TO THE BANK AND WITH BUDS POINTING UPWARDS.
5. STAKES SHALL BE ½ TO 2 INCHES IN DIAMETER AND 2 TO 3 FEET IN LENGTH.
6. AFTER INSTALLATION, THE TOP PORTION OF STAKES SHALL BE PRUNED WITH A SQUARE CUT LEAVING NO LESS THAN 3 INCHES AND NO MORE THAN 6 INCHES ABOVE THE GROUND.



RIFFLE SECTION
NOT TO SCALE



POOL SECTION
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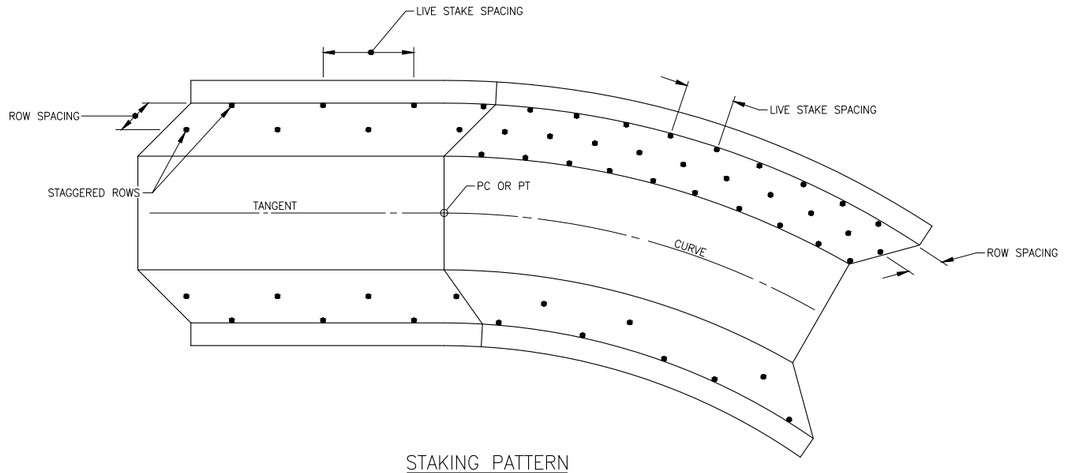

STAKING PATTERN
NOT TO SCALE

RIPARIAN & WETLAND PLANTINGS - BY STREAM

	Senlard Creek			Sitton Creek			Lee Branch		
	RIPARIAN AREA = 3.07 AC	WETLAND AREA = 0.04 AC	Setting RIP - RIPARIAN WET - WETLAND	RIPARIAN AREA = 0.79 AC	WETLAND AREA = 1.07 AC	Setting RIP - RIPARIAN WET - WETLAND	RIPARIAN AREA = 0.45 AC	WETLAND AREA = 0.0 AC	Setting RIP - RIPARIAN WET - WETLAND
	COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME	
TREES	River Birch	*Betula nigra*	RIP	River Birch	*Betula nigra*	RIP	Serviceberry	*Amelanchier arborea*	RIP
	Tulip poplar	*Liriodendron tulipifera*	RIP	Tulip poplar	*Liriodendron tulipifera*	RIP	Northern Red Oak	*Quercus rubra*	RIP
	Black Tupelo	*Nyssa sylvatica*	RIP	Black Tupelo	*Nyssa sylvatica*	RIP	American Beech	*Fagus grandifolia*	RIP
	Black Willow	*Salix nigra*	RIP / WET	American Holly	*Ilex opaca*	RIP	Black Tupelo	*Nyssa sylvatica*	RIP
	Green Ash	*Fraxinus pennsylvanica*	RIP / WET	Black Willow	*Salix nigra*	RIP / WET	American Holly	*Ilex opaca*	RIP
	American Sycamore	*Platanus occidentalis*	RIP / WET	American Sycamore	*Platanus occidentalis*	RIP / WET	American Hornbeam	*Carpinus caroliniana*	RIP
SHRUBS	Smooth Alder	*Alnus serrulata*	WET	Smooth Alder	*Alnus serrulata*	WET	American Witch-Hazel	*Hamamelis virginiana*	RIP
	Red Chokeberry	*Aronia arbutifolia*	WET	Red Chokeberry	*Aronia arbutifolia*	WET	Highbush Blueberry	*Vaccinium corymbosum*	RIP
	Winterberry	*Ilex verticillata*	WET	Winterberry	*Ilex verticillata*	WET	Sweet Pepperbush	*Clethra alnifolia*	RIP
	Black Elderberry	*Sambucus canadensis*	WET	Black Elderberry	*Sambucus canadensis*	WET	Smooth Alder	*Alnus serrulata*	WET
							Winterberry	*Ilex verticillata*	WET
							Black Elderberry	*Sambucus canadensis*	WET
							Red Chokeberry	*Aronia arbutifolia*	WET
LIVE STAKES	Silky dogwood	*Cornus amomum*		Silky dogwood	*Cornus amomum*		Silky dogwood	*Cornus amomum*	
	Elderberry	*Sambucus canadensis*		Elderberry	*Sambucus canadensis*		Elderberry	*Sambucus canadensis*	
	Black Willow	*Salix nigra*		Black Willow	*Salix nigra*				

RIPARIAN & WETLAND PLANTINGS - BY STREAM

	David Branch			Whitaker Branch			Redmond Branch		
	RIPARIAN AREA = 1.42 AC	WETLAND AREA = 0.39 AC	Setting RIP - RIPARIAN WET - WETLAND	RIPARIAN AREA = 0.76 AC	WETLAND AREA = 0.11 AC	Setting RIP - RIPARIAN WET - WETLAND	RIPARIAN AREA = 2.16 AC	WETLAND AREA = 0.35 AC	Setting RIP - RIPARIAN WET - WETLAND
	COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME		COMMON NAME	SCIENTIFIC NAME	
TREES	Serviceberry	*Amelanchier arborea*	RIP	Serviceberry	*Amelanchier arborea*	RIP	Serviceberry	*Amelanchier arborea*	RIP
	Northern Red Oak	*Quercus rubra*	RIP	Northern Red Oak	*Quercus rubra*	RIP	Northern Red Oak	*Quercus rubra*	RIP
	Sassafras	*Sassafras albidum*	RIP	Sassafras	*Sassafras albidum*	RIP	Sassafras	*Sassafras albidum*	RIP
	Sourwood	*Oxydendrum arboreum*	RIP	Sourwood	*Oxydendrum arboreum*	RIP	Sourwood	*Oxydendrum arboreum*	RIP
	American Holly	*Ilex opaca*	RIP	American Holly	*Ilex opaca*	RIP	American Holly	*Ilex opaca*	RIP
	American Hornbeam	*Carpinus caroliniana*	RIP	American Hornbeam	*Carpinus caroliniana*	RIP	American Hornbeam	*Carpinus caroliniana*	RIP
SHRUBS	American Witch-Hazel	*Hamamelis virginiana*	RIP	American Witch-Hazel	*Hamamelis virginiana*	RIP	American Witch-Hazel	*Hamamelis virginiana*	RIP
	Highbush Blueberry	*Vaccinium corymbosum*	RIP	Highbush Blueberry	*Vaccinium corymbosum*	RIP	Highbush Blueberry	*Vaccinium corymbosum*	RIP
	Sweet Pepperbush	*Clethra alnifolia*	RIP	Sweet Pepperbush	*Clethra alnifolia*	RIP	Sweet Pepperbush	*Clethra alnifolia*	RIP
	Smooth Alder	*Alnus serrulata*	WET	Smooth Alder	*Alnus serrulata*	WET	Smooth Alder	*Alnus serrulata*	WET
	Winterberry	*Ilex verticillata*	WET	Winterberry	*Ilex verticillata*	WET	Winterberry	*Ilex verticillata*	WET
	Black Elderberry	*Sambucus canadensis*	WET	Black Elderberry	*Sambucus canadensis*	WET	Black Elderberry	*Sambucus canadensis*	WET
	Red Chokeberry	*Aronia arbutifolia*	WET	Red Chokeberry	*Aronia arbutifolia*	WET	Red Chokeberry	*Aronia arbutifolia*	WET
				Smooth Witherod	*Viburnum nudum*	WET	Smooth Witherod	*Viburnum nudum*	WET
LIVE STAKES	Silky dogwood	*Cornus amomum*		Silky dogwood	*Cornus amomum*		Silky dogwood	*Cornus amomum*	
	Elderberry	*Sambucus canadensis*		Elderberry	*Sambucus canadensis*		Elderberry	*Sambucus canadensis*	

NOTE: PLANT SPECIES TO BE INSTALLED SHALL BE DEPENDENT ON SPECIES AVAILABILITY. CONTRACTOR MAY MODIFY COMPOSITION AS APPROVED BY ENGINEER.

NO SIGNIFICANT DEVIATIONS FROM DESIGN

PERMANENT RIPARIAN MIX		
Riparian Buffer Mix (Mellow Marsh Farm)		
COMMON NAME	SCIENTIFIC NAME	% MIX
Autumn bentgrass	*Agrostis perennans*	15
Big bluestem	*Andropogon gerardii*	10
Lanceleaf coreopsis	*Coreopsis lanceolata*	5
Virginia wildrye	*Elymus virginicus*	20
Soft rush	*Juncus effusus*	5
Switchgrass	*Panicum virgatum*	15
Black-eyed susan	*Rudbeckia hirta*	5
Little bluestem	*Schizachyrium scoparium*	5
Indian grass	*Sorghastrum nutans*	5
Eastern gamagrass	*Tripsacum dactyloides*	5
Recommended application rate: 30-35 lbs per acre		

PERMANENT WETLAND MIX		
Wetland Seed Mix (Mellow Marsh)		
COMMON NAME	SCIENTIFIC NAME	% MIX
Showy tickseed sunflower	*Bidens aristosa*	7
Fox sedge	*Carex vulpinoidea*	12
Deer tongue	*Dichanthelium clandestinum*	8
River bank wildrye	*Elymus riparius*	26
Soft rush	*Juncus effusus* NC Ecotype	4
Smooth panicgrass	*Panicum dichotomiflorum*	14
Redtop panicgrass	*Panicum rigidulum*	8
Switchgrass	*Panicum virgatum*	23
Pennsylvania smartweed	*Polygonum pensylvanicum*	3
Eastern bur reed	*Sparganium americanum*	2
Recommended application rate: 30-35 lbs per acre		

NOTE: PERMANENT WETLAND MIX SHALL BE APPLIED TO ALL EXISTING AND PROPOSED WETLAND AREAS. PERMANENT RIPARIAN MIX SHALL BE APPLIED TO ALL OTHER AREAS INSIDE CONSERVATION EASEMENT.

COMMON NAME	SCIENTIFIC NAME	SEEDING DENSITY (lbs/acre)	SEEDING DATES
Temporary Seeding			
Partridge Pea	*Chamaecrista fasciculata*	9	MAR 15 - OCT 15
Daikon Radish	*Raphanus sativus var. longipinnatus*	9	MAR 15 - OCT 15
Browntop Millet	*Echinochloa esculenta*	9	MAR 15 - OCT 15
Buckwheat	*Fagopyram esculentum*	10	MAR 15 - OCT 15
Cereal Rye	*Secale cereal*	26	OCT 15 - MAR 16

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Revision	By	Appd.	YY.MM.DD
REV 2 - PLANTING TABLES	CME	CME	20.07.14

Client/Project
EW SOLUTIONS, LLC
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NC

Title
PLANTING DETAILS - AS-BUILT

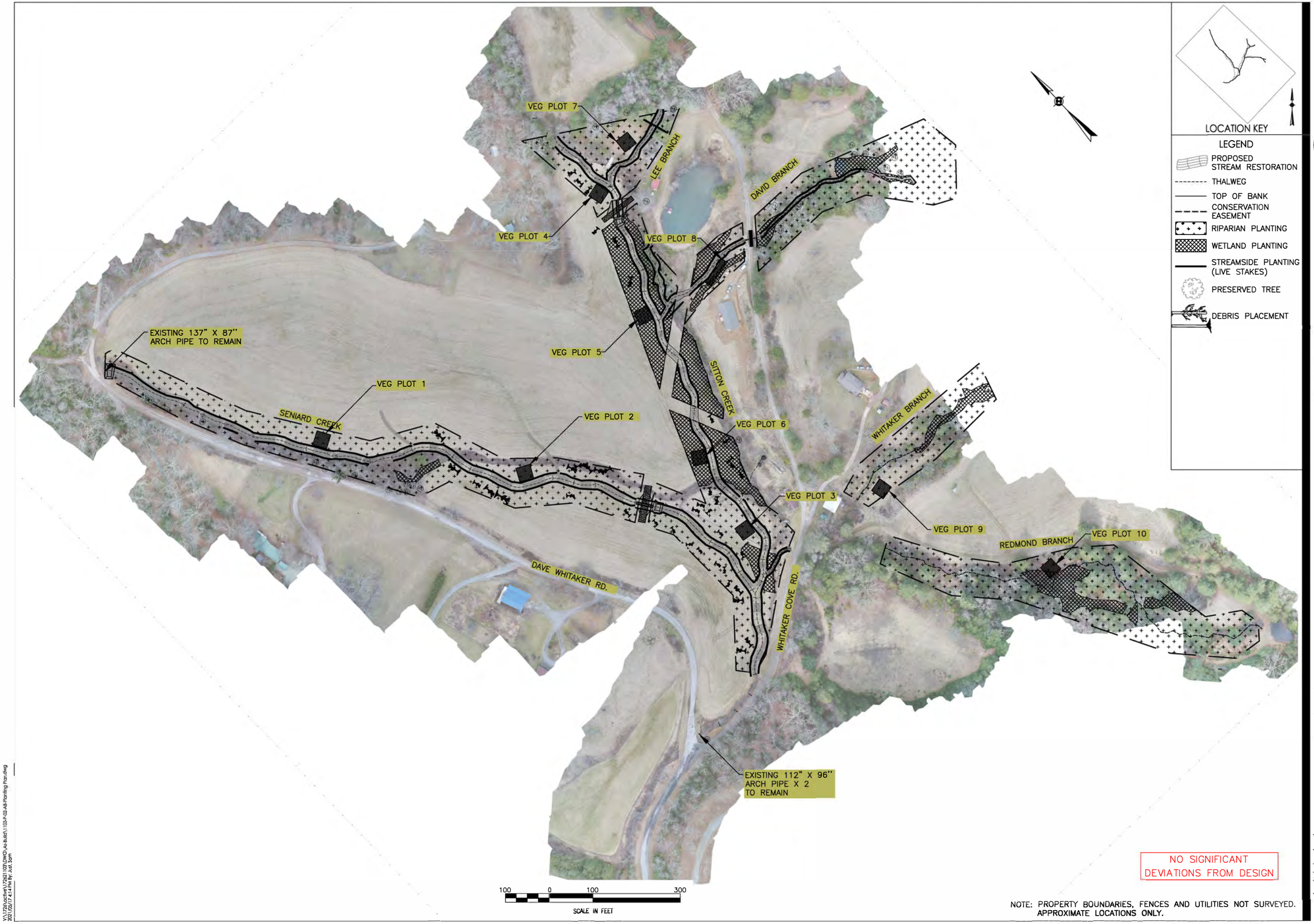
Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE
5/26/21

Project Number: 172621103

CEG	SGG	CME	21.05.17
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Revision 0
Sheet AB - P-1



LOCATION KEY

LEGEND

- PROPOSED STREAM RESTORATION
- THALWEG
- TOP OF BANK
- CONSERVATION EASEMENT
- RIPARIAN PLANTING
- WETLAND PLANTING
- STREAMSIDE PLANTING (LIVE STAKES)
- PRESERVED TREE
- DEBRIS PLACEMENT

NO SIGNIFICANT DEVIATIONS FROM DESIGN

NOTE: PROPERTY BOUNDARIES, FENCES AND UTILITIES NOT SURVEYED. APPROXIMATE LOCATIONS ONLY.

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Revision	By	Appd.	YY.MM.DD
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Client/Project
EW SOLUTIONS
SENIARD CREEK MITIGATION SITE
HENDERSON COUNTY, NORTH CAROLINA

Title
PLANTING PLAN - AS-BUILT

Permit-Seal

NORTH CAROLINA PROFESSIONAL SEAL 038595 ENGINEER CHRISTOPHER M. ENGLE

Project Number: 172621103

CEG	SGG	CME	21.05.17
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Revision 0
Sheet AB - P-2

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