NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES



As-built Baseline Monitoring Report Format, Data Requirements, and Content Guidance <u>February 2014</u>

Purpose and Preamble

The overall purpose of this document is to standardize the minimum content and format requirements of the As-built Baseline Monitoring Report, which marks the completion of the construction phase for EEP projects and the transition to the monitoring phase. Some of the content herein will simply be carried forward from the Mitigation Plan. While this document is intended to provide some level of standardization to support document review and data automation for EEP, it should not inhibit the inclusion of information that the mitigation services provider feels is essential given factors or occurrences unique to a given project.

1.0 Document Functions

The Baseline Monitoring Report is a key document and marks the technical transition from design/construction phase to the monitoring phase and serves several functions:

- 1.1 It details the post construction project structure in terms of the restoration components/assets
- 1.2 Provides a concise synopsis of the project and site background inclusive of construction
- 1.3 Compares the As-built baseline condition to the design specifications.
- 1.4 Documents a post-construction baseline to which the annual monitoring data can be compared and trends characterized.

2.0 Baseline Monitoring Document Content and Format

2.1 General

- 2.1.1 Please include standard footers. The footer should include the document type (e.g. Baseline, MY1 etc.) for the subject project (name/number), pagination and whether the document is a draft.
- 2.1.2 Data must have units assigned whether in figures, tables or text. Figures shall include the date of any data collection (day/month/year).
- 2.1.3 The number of data points (n) must be specified where ranges or means are provided.
- 2.1.4 The report should be printed double sided on 8.5" x 11". Maps can be printed 11" x 17" if needed for legibility.

- 2.1.5 Standard fonts at appropriate sizes that maximize legibility/readability such as Times New Roman, Arial, or Calibri etc. are preferred. Footnotes can go as low as a 9 font size.
- 2.1.6 All photos need to be in color, of adequate quality, and arranged in sequence. Please set cameras for date stamping of photos.
- 2.1.7 These companion documents and files are linked to this document and are on the <u>EEP portal</u>

Stream and Wetland Monitoring Guidelines – February 2014 Annual Monitoring and Closeout Reporting – February 2014 Format, Data Requirements, and Content Guidance for Digital Drawings. Monitoring Baseline and Annual Monitoring Excel Tables – Feb 2014

2.2 <u>Title Page</u>

- 2.2.1 Document Title "As-built Baseline Monitoring Report"
- 2.2.2 Draft or Final
- 2.2.3 Site name
- 2.2.4 EEP Site ID Number
- 2.2.5 Contract number
- 2.2.6 USACE Action ID number and DWR Project Number
- 2.2.7 SCO Number (if applicable)
- 2.2.8 County
- 2.2.9 Data collection period, Submission date
- 2.2.10 Project photo
- 2.2.11 Submitted to/prepared for: NCDENR-EEP address and logos
- 2.2.12 Performer/Provider company logos
- 2.3 <u>Table of Contents</u> Provide a Table of Contents to include appendices.

2.4 Project Summary

Attempt to limit the project summary to no more than 2 pages not including 2.4.8. Please include the following:

- 2.4.1 Bulleted goals as per the approved Mitigation Plan.
- 2.4.2 Project Success Criteria
- 2.4.3 A brief description of the project setting, background and pre-construction conditions with reference to the appropriate tables and figures that apply (i.e. Fig 1-vicinity map; Table 4 project component attributes table; etc.)
- 2.4.4 A description of the mitigation components (e.g. stream, buffer, wetlands, or forms of alternative mitigation etc. please reference Table 1; Fig 2)
- 2.4.5 A brief description of the design/approach and the expected functional improvements that the project will provide in keeping with the goals.
- 2.4.5 Basic information regarding the timeframe for the completion of the design and construction and weather there were any delays sufficient to alter the mitigation credit release schedule. Please reference the Project History Table (i.e. Table 2).
- 2.4.6 Deviations of significance between the construction plans and the As-built condition. This might include deviations in the constructed channel morphology that may be capable of affecting channel performance or significant changes in species planted.
- 2.4.7 A concise statement regarding any issues or mitigating factors, which may have arisen during or the period immediately after construction. (e.g. impoundment changes, extreme precipitation trends or events, beaver activity etc.), which may require consideration or attention.

- 2.4.8 A <u>Vicinity Map</u>: (Figure 1– This figure can be eliminated if all of the relevant information can be incorporated into the CCPV) to include a text box inset with detailed directions relaying how to get to the site. Road names/numbers and place-names should be clearly labeled on the vicinity map. The map should minimally include the following:
 - 2.4.8.1 Figure number and title
 - 2.4.8.2 North arrow
 - 2.4.8.3 Scale
 - 2.4.8.4 Appropriate plan footer info minimally including:
 - EEP logo Project name/number

NC County

- 2.4.8.5 Labeled stream layer with the project extent overlain or bolded.
- 2.4.8.6 Easement.
- 2.4.8.7 Typical project access point
- 2.4.8.8 Incorporate reference site(s) used if they are close enough to permit a reasonable map scale for locating the project.
- 2.5 <u>Methods and References</u> Please provide a short description of methods used and/or cite methodological references.

3.0 Appendices

The tables below with the (EXCEL) designation indicate that MS Excel will be the submission file format and that EXCEL template versions of those tables are available on the EEP website accompanying this guidance document. Text in blue italics below represents data that is to be submitted exclusively as digital files as part of the final annual digital submission. Exhibits for the reports elements listed below in this outline can be found in the Appendices at the end of this document.

- **3.1** Appendix A: Background Tables Tables 1-4 are carried forward from the Mitigation Plan and updated. (See Guidance, Exhibit Figures and Tables in Appendix A)
 - Table 1: Project Mitigation Components (EXCEL)
 - Table 2: Project Activity and Reporting History (EXCEL)
 - Table 3: Project Contacts Table (EXCEL)
 - Table 4: Project Attribute Table (EXCEL)
- **3.2** Appendix B: Visual Assessment Data This appendix will house the CCPV, visual assessment tables and photo points to include: (See Guidance and Exhibit Figures in Appendix B)

Figure 2: Current Condition Plan View (CCPV)Photos:(Stream Station Photos)Photos:(Vegetation Plot Photos)

Note: It is not anticipated that the As-built condition will include areas of concern with any regularity. Therefore the CCPV will just typically include the project features including the monitoring features. However, in the event issues do arise soon after construction, please document with photos for e-submission and map any areas of concern on the CCPV.

3.3 Appendix C: Vegetation Plot Data (See Exhibit Tables in Appendix C of this Guidance)

Table: Baseline Vegetation – As-Built Stem Counts (EXCEL)

3.4 Appendix D: Stream Survey and Geomorphology Data (See Exhibits in Appendix D of this Guidance)

Figure: Baseline Cross-Sections *e-Tables Raw cross-section survey data spreadsheets* (EXCEL - Exhibit)

Figure: Baseline Longitudinal profiles with annual overlays *e-Tables Raw longitudinal profile survey data spreadsheets* (EXCEL - Exhibit)

Figure: Pebble count plots with annual overlays (EXCEL) *e-Tables Raw pebble count data spreadsheets*Table: Baseline Stream Data Summary (EXCEL)

Table: Cross-Section Morphology Data Table (EXCEL)
Table: Stream Reach Morphology Data Table (EXCEL)

3.5 Appendix E: As-built Plan Sheets (See Format and Content Guidance in Appendix E Below)

4.0 Report and Digital Data Submission Formats

- 4.1 Initially, 1 hardcopy of the draft report needs to be submitted to the designated EEP reviewer along with the <u>complete digital submission</u> outlined below. Upon completion of the review, please submit 2 hardcopies of the revision and the revised PDF. The report PDF should be compressed to the maximum extent possible without compromising legibility. The PDF should be completely searchable and selectable, have no security settings and should be checked for general printer driver compatibility.
- 4.2 Create a master folder to house all e-files using the following naming convention: Project Name_EEPProjectNumber_MYX_200X
 Jumping Run(UT)_187_MY1_2009 (The calendar year should be for the calendar year of primary data collection, <u>not the report submission year</u>. Please use MY0 for baseline documents.
- 4.3 Please include a subfolder of the Stream Geomorphology folder to house any of the following related to the project design effort that wasn't submitted in association with the Mitigation Plan:
 - 4.3.1 Raw data tables and plots for cross sections and longitudinal profiles
 - 4.3.2 Any RiverMorph Files
 - 4.3.3 Any stream gauge hydrographs (USGS proxy or site transducer) and raw data files.
 - 4.3.4 Any modeling files (e.g. HEC-RAS)
- 4.4 Please include any raw precipitation and wetland hydrology data/plots in a subfolder of the Wetland Folder from the pre-construction phase not submitted during the Mitigation Plan submittal.

- 4.5 <u>Permits</u>: Please provide PDFs of any permits or associated correspondence acquired during design development that wasn't submitted during the Mitigation Plan development.
- 4.6 Under a subfolder named "Report" include:

A full PDF of the entire document formatted in keeping with item 4.1 (use the naming convention of the master folder).

4.7 Under a second subfolder named "Support Files" create five subfolders (for projects that apply) and structure as follows:



APPENDIX A Project Information Tables

Tables 1 - 4

		Ta	able 1.	Project P	Com Project	ponents a t Name/N	nd Mit umber	tigati ·	on Credits			
				Mi	tigation	n Credit Su	mmatio	ns				
	Stream	an Wetla	nd	Non-riparian Wetland			Buffer	Nitrogen Nutrient Offset		Phosphorous Nutrient Offset		
Overall Credit												
	I				Proj	ect Compo	nents	I				
Project Component -or- Reach ID	Stationing	Ex Foo Ac	isting tage or reage	Restor Footag Acrea	ation ge or age	Restoratior Level	Restor O Rest E	ration r Equiv.	Mitigation Ratio	Mitigation Credits		Notes
				Le	ngth ar	nd Area Su	mmatio	ns				
Restoration Level	Stre (linear	am feet)		Riparian (ac	Wetlar eres)	etland Non-riparian Wetland (acres)			Buffer (square feet)			Upland (acres)
			R	liverine	No Rive	on- erine	(4010)	57				
Restoration												
Enhancement												
Enhancement I												
Enhancement II												
Creation												
Preservation												
High Quality Preservation												
					B	MP Elemer	its					
Element	Locatio	on	Pur	pose/Fun	ction				Not	tes		
BMP Elements BR = Bioretention Cell; Level Spreader; NI = Na	SF = Sand Filter atural Infiltration	; SW = S Area; FF	tormwater = Foreste	Wetland; W d Buffer	VDP = W	et Detention P	ond; DDP	= Dry I	Detention Pond; FS	S = Filter Strip; S =	= Gras	sed Swale; LS =

Table 2. Project Activity and Reporting History Project Name/Number (XYZ)								
Activity, Deliverable, or Milestone	Data Collection Complete	Completion or Delivery						
Project Institution								
Mitigation Plan	June 2001	Dec 2001						
Permits Issued								
Final Design – Construction Plans	NA	May 2002						
Construction	NA	July 2002						
Temporary S&E mix applied to entire project area	NA	Aug 2002						
Permanent seed mix applied to reach/segments 1& 2	NA	Aug 2002						
Containerized and B&B plantings for reach/segments 1&2	NA	Sep 2002						
Baseline Monitoring Document (Year 0 Monitoring – baseline)	Oct 2002	Dec 2002						
Year 1 monitoring	Nov 2003	Jan 2004						
Year 2 Monitoring	Sep 2004	Feb 2005						
Structural maintenance (bench expansion, vane) Reach 1	NA	July 2005						
Year 3 Monitoring	Dec 2005	March 2006						
Supplemental planting of containerized material reach/segment 1	NA							
Year 4 Monitoring								
Etc								

Bolded items represent those events or deliverables that are variable. Non-bolded items represent events that are standard components over the course of a typical project. These are obviously not the extent of potential relevant project activities, but are just provided for example as part of this exhibit.

Table 3. Project Contact Table									
Project Name/Number (XYZ)									
Designer	Firm Information / Address								
Primary project design POC	POC name and phone								
Construction Contractor	Firm Information / Address								
Construction contractor POC	POC name and phone								
Planting Contractor	Firm Information / Address								
Planting contractor POC	POC name and phone								
Seeding Contractor	Company Information / Address								
Planting contractor point of contact	POC name and phone								
Seed Mix Sources	Company and Contact Phone								
Nursery Stock Suppliers	Company and Contact Phone								
Monitoring Performers	Firm Information / Address								
Stream Monitoring POC	POC name and phone								
Vegetation Monitoring POC	POC name and phone								
Wetland Monitoring POC	POC name and phone								

Table 4. Project Baseline Information and Attributes

Project Info	ormation			
Project Name				
County				
Project Area (acres)				
Project Coordinates (latitude and longitude)				
Project Watershed Summary Information				
Physiographic Province				
River Basin				
USGS Hydrologic Unit 8-digit	USGS Hydrologic	Unit 14-digit		
DWQ Sub-basin				
Project Drainage Area (acres)				
Project Drainage Area Percentage of Impervious Area				
CGIA Land Use Classification				
Reach Summary Information				
Parameters	Reach 1	Reac	h 2	Reach 3
Length of reach (linear feet)				
Valley classification				
Drainage area (acres)				
NCDWQ stream identification score				
NCDWQ Water Quality Classification				
Morphological Description (stream type)				
Design Rosgen Stream Type				
Evolutionary trend				
Design Approach (P1, P2, P3, E, etc.)				
Underlying mapped soils				
Drainage class				
Soil Hydric status				
Slope				
EEMA classification				
Native vegetation community				
Percent composition of exotic invasive vegetation				
Wetland Summary Information		I		
Paramatana	Wetlend 4	Wetley.	10	Wetland 2
Parameters	wetland	wetian	a 2	wetland 3
Motiond Type (non-riperion-riperion rivering or riperion pen rivering)				
Menned Seil Series				
Proinage class				
Soil Hudria Statua				
Native vegetation community				
Percent composition of exotic invasive vegetation				
Regulatory Cor	nsiderations		-	
Regulation	Applicable?	Resolved?	Suppo	rting Documentation
Waters of the United States - Section 404				
vvalers of the United States – Section 401				
Enuangered Species Act				
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)				
Essential Fisheries Habitat				

APPENDIX B

Visual Assessment Exhibits and Guidance

Figure 2 Current Condition Plan View (CCPV)

<u>Elements of Current Condition Plan View (CCPV)</u> – Typically, during the As-built baseline phase the current condition plan view (CCPV) serves primarily as the asset map given that the project is newly constructed. In concert with Table 1 it describes the project in its entirety, delineating the project components (mitigation features). During monitoring it additionally provides performance ratings for certain monitoring features. It is to include any areas of concern for vegetation (e.g. low density areas, invasive species populations, and vegetation plot success/failure), stream (e.g. bank erosion, structure performance) and wetland project elements (e.g. symbology for gauge success/failure).

Content to consider for the CCPV is listed below. Items in red italics are those that are most likely to be symbolized with performance ratings. If the project scale does not allow for clarity of the project features on a single plan sheet, the CCPV should include an overview as a coversheet with sheet breaks. but depending upon the complexity, it has been observed that a single sheet depicting more than ~ 4000 valley feet can make legibility challenging. Please indicate the date and source for any data layers that are updated with some frequency, such as aerial photography. Any features <u>created</u> in digital drawings (CAD, Microstation, or ArcGIS etc.) shall comply with the shape types and attribute naming conventions following the EEP digital drawings guidance found at the link below.

Format, Data Requirements, and Content Guidance For Digital Drawings Submitted to EEP"

The exhibit plan views below are provided because they had many useful characteristics, many of the attribute categories, and the clarity sought by EEP for this data product. However, the elements depicted, their symbology and the legend items should not be taken as a verbatim template for reproduction. The provider should look to the exhibits for a general understanding of the elements, layouts, scale and clarity that EEP has found useful, but make certain that the map addresses the list below and the guidance that exists in the visual survey summary tables in this Appendix.

- 1. General Items
 - Figure number and title
 - North arrow
 - Scale
 - Stationing
 - Proper legend and iconic representation of all applicable features
 - Appropriate plan footer info minimally including:
 - Map producer/logo; EEP logo; Project name/number; County; Date of production.
 - Date for aerials or any other layers for which timeframe is important
 - Cover sheet with match lines assuming project scale necessitates
 - Topography (Include only if it does not obscure data)
 - Aerials (Recent, high quality aerial while maintaining legibility/clarity of data)
 - Labeled Roads relevant to scale to assist in orientation

- 2. <u>Boundary or Hydrologic Features</u> Clear delineation with pattern and/or color of these boundary features:
 - Underlay silhouette or lightly shaded representation of pre-existing channel
 - *Top of Bank (sections may be annotated for stability see section 4 of this list)*
 - Bankfull (If meaningfully different than TOB)
 - Centerline with stationing
 - *Easement boundary (sections may be annotated related to encroachment)*
 - Fencing (sections may be annotated related to fence failures)
 - Reach breaks and ID's
 - Existing tree/woods line (if proximal)
 - Ditching (filled and unfilled)
 - Wetland Features/Tracts
 - Planting zones (assuming there are multiple zones and they have importance to interpretation of other performance data such as vegetation plots)
- 3. Relevant structures and utilities (Those in red represent infrastructure items that might have been part of the project or items that could be impacted by the project and are therefore elements which may require some annotation related to issues or performance.)
 - Bridges
 - Crossings
 - BMPs
 - Buildings
 - Utilities
- 4. Monitoring and Performance Features: (all monitoring features e.g. XS, gauges etc. require GPS points). See EEP Monitoring Template for additional guidance on bed and bank stability ratings should these issues arise at baseline.
 - Stream Structures (e.g. Wads, Boulders Vanes, Deflectors, Constructed Riffles, Plugs)
 - Monitoring cross sections
 - Bank pin locations
 - Bank stability See mapping guidance in visual assessment tables in this Appendix.
 - Bed stability items See mapping guidance in visual assessment tables in this Appendix.
 - Photo stations with vectors
 - Vegetation plots Color code for meeting vegetation success criteria and annotate with total/planted stem count e.g. 456/385
 - Gauges Color code for meeting hydro criteria
 - Areas of poor vegetation performance (low cover or woody stem densities)
 - Areas of invasives populations
 - Inundation or Backwater Zones
 - Beaver Dams (with approximate timeframes of impoundment if known)
 - Encroachment areas

Vegetative Problem Areas (Raw Data for Electronic Delivery Only)									
Feature Category	Station # / Range	Probable Cause	Photo #						
Bare Bank	$\begin{array}{r} 00+50-01+50\\\hline 15+75-16+00\\\hline 30+25-31+25\end{array}$	Storm-water from roadway Sandy soil not suitable for species Failing upstream structure	VPA1						
Bare Bench	21+00 25+00 30+50	Seed washed away by severe stormPoor/exposed subsoil materialPoor/exposed subsoil material	VPA2						
Bare Flood Plain	See VPA Plan View See Plan View See Plan View	Soil deposition from nearby construction Unknown Possibly due to compaction	VPA3						
Invasive/Exotic Populations	See Plan View See Plan View Throughout	Eleagnus: encroachment from outside Euonymus: persisting after treatment Microstegium: upstream seed source	VPA4 VPA5 VPA6						

Stream Problem Areas (electronic submission only) Project Name/Number (XYZ)								
Feature Issue	Station numbers	Suspected Cause	Photo number					
Aggradation/Bar Formation	00+50		CDI					
	15+75		SPI					
Bank scour	21+00		SD3					
	25+00		512					
Engineered structures – back or arm scour	00+75		CD2					
	10+50		515					
Etc.								

Photo Guidance

All photos should be in color, of adequate quality/resolution, and arranged in sequence (i.e. top of project or reach to the lower end). The following provides guidance for photography and formatting:

- Repeat photos for the current year for vegetation plots and stream photos stations should be placed adjacent to the earliest post-construction photo available from the same location, vantage point and leaf condition/season.
- Low-contrast light is best—overcast days or morning/evening light.
- Scene should include horizon if possible to provide perspective.
- Close-up photos should have something to reference scale such as a person, rod, or even a clipboard.
- Please use the digital date stamp feature and ensure that it is correct.
- Photo file names should include ID, complete date, and note about perspective. For example: JumpingRun_124_MY1_2010_7Aug_XS2_Upsteam.jpg
- Vegetation photo point photos should be taken while tape is strung from plot corners and X-section photos should be taken while tape is strung between section endpins.

APPENDIX C Vegetation Plot Data

		1113 (0				y i lot w		
								1
	Common						AB Mean	
	Name	Туре	Plot ID-X	Plot ID-X	Plot ID-X	Plot ID-X		
Alnus serrulata								
Aronia arbutifolia								
Baccharis halimifolia								
Betula nigra								
Cornus amomum								
Diospyros virginiana								
Nyssa sylvatica								
Pinus taeda								
Quercus laurifolia								
Quercus michauxii								
Quercus phellos								
Salix nigra								
Sambucus canadensis								
Morella cerifera								
Hamamelis virginiana								
Liriodendron tulipifera								
Unknown								
	Plot area (acres)							
	Speci	ies count						
	Ste	m Count						
	Stems	per Acre	ļ					
Type = Shrub or Tree								
P = Planted								

Please provide a tabular summarization of densities measured from the sampled plots after installation. <u>EEP requires the use of the CVS</u> data entry tool to facilitate centralized storage of these data and the automated production of tables such as the one above. This tool is to be utilized even if the CVS plot and sampling protocol is not utilized.

AS-built Baseline Monitoring Report – Feb 2014

APPENDIX D

Stream Geomorphology Survey Guidance and Data Formats

Installing and Marking Monitoring Features

Monitoring features will need to be installed and marked that support the following:

- Safety
- Long-term measurement (permanence)
- Ease of relocation (marking)
- Ease of identification (labeling)

No wooden material is to be used in the establishment of monitoring features. Rebar, or steel conduit will be cemented in place at the baseline phase. If this was not performed, the monitoring firm that inherited the project must <u>minimally</u> use rebar or steel conduit (2 foot lengths) driven into the ground with some means to provide ease of relocation (e.g. fiberglass flags, PVC Pipe etc.). The latter should only be excluded if risks of vandalism are high. Rebar or conduit should extend from the ground 4-6 inches and affixed with a cap for safety considerations and assisting in relocation. Burying a 2.5 or 3 inch diameter piece of PVC pipe with a threaded cap to surround the rebar/conduit is another mechanism to support all 4 of the bulleted elements above. The PVC will eventually get brittle over time, but it will provide the stated needs and added protections even over monitoring periods that extend well beyond the 7-year timeframe.

This is required for cross-sections, fixed vegetation plot corners GPS points will be collected for each pin as per standard practice from prior guidance. Cross-section pins should be placed far enough from the channel to capture floodplain topography (e.g., terraces or berms etc.) and capture the top and ground level of the pin.

Collecting and Plotting Cross-section Data

Survey

- 1. At a minimum, the features listed in the raw data table exhibit below from Harrelson et. al. (1994) need to be annotated in the survey. The shot density overall should be sufficient to provide the necessary detail for monitoring purposes and should capture additional inflection points of significance. Levees, berms, and terrace features on the floodplain should be captured. If it is perceived that low shot resolution compared to prior measurements significantly impacts trends in calculated values, the service provider will be asked to resurvey at a higher resolution.
- 2. The repeat cross-section surveys will use a set elevation (datum) established at baseline that represents the best estimator of bankfull at that time. Monitoring personnel should <u>not</u> attempt to make a "bankfull call" year to year and make that the basis for the cross-section calculations. Record the datum used for each year in table to confirm or document any changes should they become necessary. If cross-sections need to be reset or either pin was disturbed, this needs to be documented in the narrative and noted on the plot for that year.

<u>Plots</u>

An exhibit of a cross-section plot that contains the needed elements can be found below. It is a combination of examples from multiple sources. The following includes lists formatting requirements and the items that must be included.

- 1. Include official project name, number, reach ID, X-section ID, channel unit (riffle/pool), and station location. These can be added in the chart "title".
- 2. Include MY and complete survey date in the plot legend.
- 3. Format X and Y-axis scales to include entire extent of surveyed data.
- 4. Include a photo with orientation (e.g. upstream/downstream)
- 5. All lines should be solid.
- 6. Plot the baseline bankfull monitoring datum used in the calculation
- 7. Do NOT use "smoothed line" function in Excel.
- 8. Depict all individual data point symbology for at least current year.
- Do not plot with more than ~ 3X vertical exaggeration. The plot below was rendered in "landscape". Standard 8½ by 11" in landscape will be the typical page layout for this plot.
- 10. Indicate in an inset if either pin or the entire cross-section was ever disturbed or reset in its history and indicate when this occurred.

Collecting and Plotting Long Pro Data

(Typically only required during the As-built Baseline)

- 1. The data series to be shot and plotted are depicted below in the exhibit long pro plot and the exhibit table for the associated raw data. The data needs to be formatted so that grade control structures and other series can be readily extracted and plotted separately.
- 2. Items 1, 2, 5, 7, 8 listed under the plotting guidance for cross-sections directly above apply here.
- 3. Annotate shots on engineered structures (sills) to allow for plotting as a separate series and include as a distinct legend entry. The thalweg series should also include the sill survey points, but need not be symbolized separately. The thalweg elevation relative to any structure sill needs to be clearly representative of what is on the ground.
- 4. Also include the locations of other features of note such as X-sections, beaver dams, bedrock nickpoints, headcuts, etc.
- 5. Avoid excess vertical exaggeration. The longitudinal plot was rendered in "landscape" for large-format (ledger) paper at about 20X vertical exaggeration.
- 6. For steeper streams avoid plotting too much longitudinal footage on a single plot. Plots with 4 and 5 foot vertical intervals on the Y-axis can sometimes make it difficult to discern vertical differences which may exist between overlays (if repeat survey becomes necessary). Limiting the vertical interval to 2 feet or less will generally avoid this.

Collecting and Plotting Substrate Data

- 1. The collection of substrate data at the baseline should be driven by the goals and objectives of the project and ultimately determined by the provider/designer
- 2. The exhibit for particle distribution data below provides the relevant plot information.

Requi	red Fields	for Cross-Sectio	on Raw Data	ables						
Proj	ject Name:	Jumping Run	Mon Year:	MY0	Survey Date:	12/1/2009	Benchmark	ID:	BM1	
	EEP ID:	199	Reach:	UT1	Channel Unit:	Riffle		Northing:	826368.09	
			XS-ID:	XS-2				Easting:	2031001.52	
								Elevation:	203.34	
									(0) (10)	
Chat			Flowetion	Station (Distance			Features Req	uiring Annotatio	on (Shot ID)*	Ten left nin
Snot	Northing	Facting	Elevation (Feet)	Station/Distance	ShotID	Natao	1			Top left pin
#	Northing	Easing	(reel)	(reel)		Notes	2			
1	826368.09	2031001.52	202.54	0.00			3		ILB	Top leπ bank
2	826368.09	2031001.52	202.74	25.60	BLP		4		BKF	Bankfull Indicator
3	826368.09	2031001.52	202.94	25.60			5		BLB	Bottom leit bank
4	826368.09	2031001.52	203.14	25.60			0			Leit edge water
5	826368.09	2031001.52	203.34	25.60	ПО		1			Diabt edge water
0	826907.68	2030544.74	202.94	28.70	ILB		8		REW	Right edge water
/	827174.30	2030198.19	202.64	29.40			9		BRB	Bottom right bank
8	827174.30	2030198.19	202.84	29.40			10			Top right bank
10	027174.30	2030196.19	202.44	29.40			10			Top right pin
10	020140.52	2031117.55	201.94	30.20			Other feetures	are encotated ar		TOP IIght pin
10	020140.52	2031117.55	201.44	30.20			discretion of m	are annotated of		
12	926104.04	2031117.55	200.94	30.20			discretion of h	ionitoning personi		
1/	827174.30	2030108.10	201.44	29.40			* Those JD's are	hasad on those i	aubliched in l	Jarrolcon
15	826070 12	2030130.19	200.94	20.40	DEW/		Rawlins and Po	tvondy (1994) an	d are the rea	uired annotations
16	826070.12	2031104.60	200.04	30.22	TRB		riannio, and r o	() on a j (100 i) an	a are are req	
17	826368.09	2031001 52	201.94	25.60						
18	826368.09	2031001.52	202.34	25.00						
19	826103.49	2031106.40	202.94	30.22	BRP					
20	826150 18	2031106.24	203.94	30.22	TRP					

These raw data exhibits are for tables that are to be part of the electronic submission only

					<u>Benchmark</u>						
	Project Name:	Jumping Run	Mon Year:	MY0	ID:	BM1					
	EEP ID:	199	Reach:	UT1	Northing:	826368.09					
	Survey Date:	12/1/2009			Easting:	2031001.52					
					Elevation:	203.34			ID	- Types i	n red italics will also require Bed Subtype annotation
Shot			St	ation/Distan	Shot	Bed	Benchmark		1	BM	Benchmark
#	Northing	Easting	Elevation	(Feet)	ID	Subtype	ID	Notes	2	HI	Height of instrument
101	826368.09	2031001.52	299.42	10.00	THW	HRIF	BM-1		3	FS	Foresight
102	826907.68	2030544.74	300.99	10.00	WS	HRIF	BM-1		4	BS	Backsight
103	827174.30	2030198.19	300.68	10.00	TLB	HRIF	BM-1		5	TP	Turning point
104	826148.52	2031117.55	301.37	20.00	THW	TRIF	BM-1		6	TER	Terrace - Typically not captured as part of LP
105	826104.04	2031116.53	301.50	20.00	WS	TRIF	BM-1		7	FP	Floodplain - General Floodplain shot
106	826070.12	2031115.39	301.53	20.00	TLB	TRIF	BM-1		8	TLB	Top left bank
107	826070.21	2031104.60	301.07	22.00	SILL		BM-1		9	TRB	Top right bank
108	826103.49	2031106.40	301.41	35.00	THW	HPOOL	BM-1		10	BKF	Bankful indicator - If meaningfully different than bank
109	826150.18	2031106.24	301.17	35.00	WS	HPOOL	BM-1		11	WS	Water Surface Shot
110	826146.23	2031092.09	300.76	35.00	TRB	HPOOL	BM-1		12	THW	Thalweg
111	826108.63	2031091.23	300.44	42.00	THW	POOLM	BM-1		13	BRK	Bedrock Nickpoint
112	826069.83	2031090.45	300.49	42.00	WS	POOLM	BM-1		14	BAR	Bar
113	826070.03	2031080.87	300.46	55.00	THW	TPOOL	BM-1		15	SILL	Grade Control Sill
114	826074.01	2031088.69	292.67	55.00	WS	TPOOL	BM-1		16	VARM	Vane arm
115	826090.01	2031080.95	292.65	55.00	TRB	TPOOL	BM-1		17	BD	Beaver dam
116	826105.82	2031072.93	292.81	150.00	THW	HRIF	BM-1			Bed Su	btypes
117	826126.48	2031063.35	292.85	160.00	WS	HRIF	BM-1		1	HRIF	Head of riffle
118	826150.50	2031053.14	292.87	170.00	TLB	HRIF	BM-1		2	TRIF	Tail of riffle
119	826164.00	2031044.16	292.58	180.00	SILL		BM-1		3	HPOOL	Head of pool
120	826150.50	2031053.14	292.87	190.00	VARM		BM-1		4	TPOOL	Tail of pool
121	826164.00	2031044.16	292.58	200.00	BAR		BM-1		5	POOLN	Pool max depth

Cross-section Plot Exhibit

River Basin:	Neuse
Watershed:	Bold Run, MY-01
XS ID	XS - 2, Pool, 17+25
Drainage Area (sq mi):	1.6
Date:	9/7/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	278.3
4.1	278.3
5.7	277.8
8.3	276.7
10.6	276.5
15.3	276.4
17.9	276.4
22.6	274.2
23.3	273.8
24.4	273.7
24.7	273.5
25.4	273.3
76 8	772 2

SUMMARY DATA	
Bankfull Elevation:	276.4
Bankfull Cross-Sectional Area:	29.3
Bankfull Width:	19.0
Flood Prone Area Elevation:	279.5
Flood Prone Width:	>65
Max Depth at Bankfull:	3.1
Mean Depth at Bankfull:	1.5
W / D Ratio:	12.3
Entrenchment Ratio:	>3.4
Bank Height Ratio:	0.9





AS-built Baseline Monitoring Report – Feb 2014



Boulder Boulde	Cross-S Feature Material silt/clay ery fine sand fine sand nedium sand coarse sand ry coarse sand ery fine gravel fine gravel nedium gravel nedium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	Section: 3 re: Riffle Size (mm) 0.062 0.125 0.250 0.50 1.00 2.0 4.0 5.7 8.0 11.3 16.0 22.3 32.0 45 64 90	Total # 18 2 0 28 29	2009 Item % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	Cum % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%
Description I Silt/Clay V Sand I Sand I Ve Ve Ve Ve Gravel I M I Cobble I Boulder S I S	Feature Material silt/clay ery fine sand fine sand nedium sand coarse sand ry coarse sand ry coarse sand fine gravel fine gravel nedium gravel nedium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble redium cobble	Size (mm) 0.062 0.125 0.250 0.50 1.00 2.0 4.0 5.7 8.0 11.3 16.0 22.3 32.0 45 64 90	Total # 18 2 0 10 28 29	2009 Item % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	Cum % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%
Description Silt/Clay V Sand I Ve Ve Ve Ve Ve Gravel m Cobble Seconder Second	Material silt/clay ery fine sand fine sand nedium sand coarse sand ry coarse sand ry coarse sand ery fine gravel fine gravel fine gravel nedium gravel nedium gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	Size (mm) 0.062 0.125 0.250 0.50 1.00 2.0 4.0 5.7 8.0 11.3 16.0 22.3 32.0 45 64 90	Total # 18 2 0 28 29	2009 Item % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	Cum % 18% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%
Description Silt/Clay Sand I Ve Seconde Mathematical Seconde Ve Seconde Seconde <th>silt/clay ery fine sand fine sand medium sand coarse sand ry coarse sand ry coarse sand ery fine gravel fine gravel fine gravel medium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble</th> <th>Size (mm) 0.062 0.125 0.250 0.50 1.00 2.0 4.0 5.7 8.0 11.3 16.0 22.3 32.0 45 64 90</th> <th>Iotal # 18 2 0 10 28 29</th> <th>Item % 18% 2% 0%</th> <th>Cum % 18% 2% 0%</th>	silt/clay ery fine sand fine sand medium sand coarse sand ry coarse sand ry coarse sand ery fine gravel fine gravel fine gravel medium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble	Size (mm) 0.062 0.125 0.250 0.50 1.00 2.0 4.0 5.7 8.0 11.3 16.0 22.3 32.0 45 64 90	Iotal # 18 2 0 10 28 29	Item % 18% 2% 0%	Cum % 18% 2% 0%
Sint/Clay v Sand n Ve ve Ve ve Gravel n Gravel n Cobble s Boulder s S n	silt/clay ery fine sand fine sand nedium sand coarse sand ry coarse sand ry coarse sand ery fine gravel fine gravel fine gravel nedium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	$\begin{array}{c} 0.062 \\ 0.125 \\ 0.250 \\ 0.50 \\ 1.00 \\ 2.0 \\ 4.0 \\ 5.7 \\ 8.0 \\ 11.3 \\ 16.0 \\ 22.3 \\ 32.0 \\ 45 \\ 64 \\ 90 \\ 1220 \end{array}$	$ \begin{array}{c} 18\\ 2\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 10\\ 28\\ 29\\ \end{array} $	18% 2% 0%	18% 2% 0%
Sand r Sand r ve ve	fine sand fine sand medium sand coarse sand ry coarse sand ry coarse sand ry fine gravel fine gravel fine gravel medium gravel course gravel y coarse gravel y coarse gravel small cobble redium cobble	$\begin{array}{c} 0.125\\ 0.250\\ 0.50\\ 1.00\\ 2.0\\ 4.0\\ 5.7\\ 8.0\\ 11.3\\ 16.0\\ 22.3\\ 32.0\\ 45\\ 64\\ 90\\ 1120\\ \end{array}$	$ \begin{array}{c c} 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 28%	2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 28%
Sand T Ve Ve Ve Cobble Cobble Sand T Ve Ve Cobble S S S S S S S S S S S S S S S S S S	nedium sand nedium sand coarse sand ry coarse sand ery fine gravel fine gravel fine gravel nedium gravel nedium gravel course gravel y coarse gravel y coarse gravel small cobble nedium cobble	$\begin{array}{c} 0.250\\ 0.50\\ 1.00\\ 2.0\\ 4.0\\ 5.7\\ 8.0\\ 11.3\\ 16.0\\ 22.3\\ 32.0\\ 45\\ 64\\ 90\\ 1120\\ \end{array}$	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$	0% 0%	0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 28%
Sand r ve ve Gravel m Gravel m Cobble 8 Boulder 8 Smoother 1	nedium sand coarse sand ry coarse sand ery fine gravel fine gravel nedium gravel nedium gravel course gravel y coarse gravel y coarse gravel small cobble redium cobble	$ \begin{array}{r} 0.50\\ 1.00\\ 2.0\\ 4.0\\ 5.7\\ 8.0\\ 11.3\\ 16.0\\ 22.3\\ 32.0\\ 45\\ 64\\ 90\\ 1220 \end{array} $	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 10 \\ 28 \\ 29 \\ \end{array} $	0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 28%
ve ve ve ve m m c c ver ver ver ver ver ver ver ver s m s Boulder n n	coarse sand ry coarse sand ery fine gravel fine gravel fine gravel nedium gravel nedium gravel course gravel y coarse gravel y coarse gravel small cobble nedium cobble	$ \begin{array}{r} 1.00\\ 2.0\\ 4.0\\ 5.7\\ 8.0\\ 11.3\\ 16.0\\ 22.3\\ 32.0\\ 45\\ 64\\ 90\\ 120 \end{array} $	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 10 \\ 28 \\ 29 \\ \end{array} $	0% 0% 0% 0% 0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 0% 0% 0% 0% 10% 28%
ve Ve Ve Imm Imm <tr< td=""><td>ry coarse sand ery fine gravel fine gravel dedium gravel edium gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble</td><td>$\begin{array}{r} 2.0 \\ 4.0 \\ 5.7 \\ 8.0 \\ 11.3 \\ 16.0 \\ 22.3 \\ 32.0 \\ 45 \\ 64 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 9$</td><td>$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 10 \\ 28 \\ 29 \\ \end{array}$</td><td>0% 0% 0% 0% 0% 0% 0% 10% 28%</td><td>0% 0% 0% 0% 0% 0% 0% 10% 28%</td></tr<>	ry coarse sand ery fine gravel fine gravel dedium gravel edium gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	$ \begin{array}{r} 2.0 \\ 4.0 \\ 5.7 \\ 8.0 \\ 11.3 \\ 16.0 \\ 22.3 \\ 32.0 \\ 45 \\ 64 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 120 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 90 \\ 9$	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 10 \\ 28 \\ 29 \\ \end{array} $	0% 0% 0% 0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 0% 0% 0% 10% 28%
Gravel m Gravel m Cobble m Boulder s s	ry fine gravel fine gravel fine gravel edium gravel edium gravel course gravel y coarse gravel y coarse gravel y coarse gravel small cobble edium cobble	$ \begin{array}{r} 4.0 \\ 5.7 \\ 8.0 \\ 11.3 \\ 16.0 \\ 22.3 \\ 32.0 \\ 45 \\ 64 \\ 90 \\ 120 \\ \end{array} $	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 10 \\ 28 \\ 29 \\ \end{array} $	0% 0% 0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 0% 0% 10% 28%
Gravel m Gravel m Cobble 8 Boulder 8 5	fine gravel fine gravel nedium gravel course gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	5.7 8.0 11.3 16.0 22.3 32.0 45 64 90	0 0 0 0 0 0 10 28 29	0% 0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 0% 10% 28%
Gravel m Gravel m Cobble 8 Boulder 8 Boulder 1	fine gravel edium gravel eourse gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	8.0 11.3 16.0 22.3 32.0 45 64 90	0 0 0 0 10 28 29	0% 0% 0% 0% 10% 28%	0% 0% 0% 0% 10% 28%
Gravel m Gravel m Cobble 8 Boulder 8 1	edium gravel edium gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	$ \begin{array}{r} 11.3 \\ 16.0 \\ 22.3 \\ 32.0 \\ 45 \\ 64 \\ 90 \\ 120 \\ \end{array} $	0 0 0 10 28 29	0% 0% 0% 10% 28%	0% 0% 0% 10% 28%
Gravel m Gravel m Cobble m Cobble s Boulder s m S	edium gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	16.0 22.3 32.0 45 64 90	0 0 10 28 29	0% 0% 10% 28%	0% 0% 0% 10% 28%
Cobble Boulder Cobble Boulder Cobble C	course gravel course gravel y coarse gravel y coarse gravel small cobble edium cobble	22.3 32.0 45 64 90	0 0 10 28 29	0% 0% 10% 28%	tem % Cum % 18% 18% 2% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 28% 28% 29% 29% 12% 12% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 100% 100%
Cobble Boulder Cobble Co	y coarse gravel y coarse gravel y coarse gravel small cobble edium cobble	32.0 45 64 90	0 10 28 29	Item % Cum % 18% 18% 2% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 10% 10% 10% 12% 12% 12% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	
Cobble second se	y coarse gravel y coarse gravel small cobble edium cobble	al Size (mm) Total # Item % Cum % 0.062 18 18% 18% and 0.125 2 2% 2% d 0.250 0 0% 0% and 0.50 0 0% 0% and 1.00 0 0% 0% nd 1.00 0 0% 0% nd 1.00 0 0% 0% and 2.0 0 0% 0% sand 2.0 0 0% 0% cavel 4.0 0 0% 0% el 8.0 0 0% 0% avel 11.3 0 0% 0% wel 32.0 0 0% 0% gravel 64 28 28% 28% ble 90 29 29% 29% bble 128 12 12% 1	10% 28%		
Cobble m Cobble s Boulder s mo	y coarse gravel small cobble edium cobble				
Cobble m ver Boulder s	small cobble edium cobble	90	29	2004	200/
Cobble m ver Boulder s mo	edium cobble	100	2)	29%	29%
Boulder		128	12	12%	12%
Boulder	large cobble	180	1	1%	1%
Boulder s	ry large cobble	256	0	0%	0%
Boulder mo	mall boulder	362	0	0%	0%
	mall boulder	512	0	0%	0%
1	edium boulder	1024	0	0%	0%
1	arge boulder	2048	0	0%	0%
Bedrock	bedrock	40096	0	0%	0%
TOTAL % of whole	count		100	100%	100%
Summary Data					
D50	58.57				
D05	ð/.31 115.32				
	115.55	I			



					Proj	ect Na	me/Nu	umber	(XYZ)	- Seg	ment/l	Reach	: XYZ	, (4500	feet)										
Parameter	Gauge ²	Reg	ional C	urve		Pre-	Existin	g Cond	lition			Refere	ence Re	each(es	s) Data			Desigr			Мо	nitorin	g Base	line	
imension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	
Bankfull Width (ft)																									1
Floodprone Width (ft)																									
Bankfull Mean Depth (ft)																									
¹ Bankfull Max Depth (ft)																									
Bankfull Cross Sectional Area (ft ²)																									
Width/Depth Ratio																									
Entrenchment Ratio																									
¹ Bank Height Ratio																									
rofile					-	T	T		-	1				T			T	-		-		T	1	ī	
Riffle Length (ft)																									\bot
Riffle Slope (ft/ft)																									\bot
Pool Length (ft)																									╞
Pool Max depth (ft)																									\bot
Pool Spacing (ft)																									L
attern			1		1	T	T	1	1	1	•			T				•		1	•	T	1	1	
Channel Beltwidth (ft)																									
Radius of Curvature (ft)																									
Rc:Bankfull width (ft/ft)																									
Meander Wavelength (ft)																									
Meander Width Ratio																									
ransport parameters					-						-						-								
Reach Shear Stress (competency) lb/f ²																									
Max part size (mm) mobilized at bankfull																									
Stream Power (transport capacity) W/m ²																									
dditional Reach Parameters					•															•					
Rosgen Classification																									_
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)																									
Valley length (ft)																									
Channel Thalweg length (ft)											1														
Sinuosity (ft)											1														
Water Surface Slope (Channel) (ft/ft)											1														
BF slope (ft/ft)											1														
³ Bankfull Floodplain Area (acres)											1														
⁴ % of Reach with Eroding Banks											1														
Channel Stability or Habitat Metric											Ī														
Biological or Other											1														
						1	1			1															

			Pro	ject Na	me/Nun	nber (X	YZ) - 9	Segm	ent/Re	ach:	XYZ (4500	eet)							
Parameter	Pr	e-Exis	ting (Conditi	on		Refe	rence	Reac	h(es)	Data				Des	ign				As
¹ Ri% / Ru% / P% / G% / S%	1						<u> </u>								- T	T	—			
¹ SC% / Sa% / G% / C% / B% / Be%																				
¹ d16 / d35 / d50 / d84 / d95 / di ^p / di ^{sp} (mm)																				
² Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																				
³ Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																				
Shaded cells indicate that these will typically not be filled in.																				
1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = ma	ax pave, dis	sp = max s	subpave																	
2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide	e the perce	entage of I	the total r	reach foota	ge in each cl	lass in the ta	able. This	s will result	t from the r	measure	d cross-	sections a	s well as v	isual estim	ates					
3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the	e total reac	h footage	in each	class in the	table. This w	vill result fro	m the mea	asured cr	oss-sectio	ons as we	ell as the	longitudin	al profile			_				
Eastnates 2.2 These alasses are leasily built around the Desgan elessification and haz	ard ranking	brooke b		diuctod cliv	abtly to make	for opcior o	ccianmor	at to como	what coor	rorbing	based or	vicual or	timatas in	the field o	uch that m		nt of overv		ERwould	not ho nr
The intent here is to provide the reader/consumer of design and monitoring information with a		pral sense	of the ex	tent of hyd		inment in th		isting and	the rehab	nilitated	states as	wellasco	mnarisons	to the ref	erence dis	tributions	It of every	segmention		notbene
ER and BHR have been addressed in prior submissions as a subsample (cross- sections as p	art of the de	esign surv	ey), how	ever, these	subsamples	have often	focused	entirely or	n facilitatin	g desigr	n without	providing	a thoroug	n pre-con	strution dis	tribution o	f these par	ameters, lea	ving the re	eader/co
the reach. This means that the distributions for these parameters should include data from bo	th the cros	s-section	surveys	and the lon	gitudinal prof	file and in th	ne case o	f ER, visua	alestimate	s. Fore	xample, t	he typical	longitudir	al profile p	ermits san	npling of th	ne BHR at ri	ffles beyond	those sul	oject to c
a more complete sample distribution for these parameters, thereby providing the distribution/o	overage n	ecessary	to provid	le meaningf	ulcompariso	ns.														

		С	ross S	ection	1 (Riff	le)			C	ross S	ection	2 (Riff	le)	/	Г	Cr	oss Se	ection	3 (Riff	le)	/		С	ross S	Sectio
used on fixed baseline bankfull elevation ¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY
Record elevation (datum) used																									
Bankfull Width (ft)																									
Floodprone Width (ft)																									
Bankfull Mean Depth (ft)																									
Bankfull Max Depth (ft)																									
Bankfull Cross Sectional Area (ft ²)																									
Bankfull Width/Depth Ratio																									
Bankfull Entrenchment Ratio																									
Bankfull Bank Height Ratio																									
Cross Sectional Area between end pins (ft ²)																									
d50 (mm)																									
		C	ross S	ection	6 (Riff	le)			С	ross S	ection	7 (Poo	ol)			Cr	ross Se	ection	8 (Riff	le)			Cr	oss S	ecti
sed on fixed baseline bankfull elevation ¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	M
Record elevation (datum) used																									
Bankfull Width (ft)																									
Floodprone Width (ft)																									
Bankfull Mean Depth (ft)																									
Bankfull Max Depth (ft)																									
Bankfull Cross Sectional Area (ft ²)																									
Bankfull Width/Depth Ratio																									
Bankfull Entrenchment Ratio																									
Bankfull Bank Height Ratio																									
Cross Sectional Area between end pins (ft ²)																									

								_
uilt/Ba	seline)						
sary.								
ner with a s	sample th	nat is weig	hted hea	avily on the	e stable se	ections of		
sections	and there	efore car	be read	ily integrat	ed and pr	ovide		

			Cr	oss Se	ection	5 (Riff	le)	
MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
a)			Cr	oss Se	ection	10 (Po	ol)	
MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+

												Exh	ibit T	able	11b.	Mon	itorin	g Da	ta - S	trean	n Rea	ach D	Data S	umn	nary											
							-					F	rojec	ct Na	me/N	umbe	er (XY	Z) - S	egme	ent/R	each	h: XY2	Z (450	0 fee	et)						r					
rameter		_	Bas	seline		_		_	N	IY-1	_	_			Μ	Y-2	_			_	MY	/- 3	_			_	MY	(- 4	_			_	M	(- 5	_	_
nension and Substrate - Riffle only	Min	Mean	Med	Max	SD	⁴ n	Min	Mea	n Med	Max	C SD ⁴	n	Min	Mea	n Med	Max	SD^4	n	Min	Mean	Med	Max	SD^4	n	Min	Mean	Med	Max	SD^4	n	Min	Mean	Med	Max	SD^4	n
Bankfull Width (ft)																																				
Floodprone Width (ft)																																				
Bankfull Mean Depth (ft)																																				
¹ Bankfull Max Depth (ft)																																				
Bankfull Cross Sectional Area (ft ²)							_																													
Width/Depth Ratio							_																													
Entrenchment Ratio													_																							
¹ Bank Height Ratio																																				
ofile	-		-	-	-			-		-		-																								
Riffle Length (ft)																																				
Riffle Slope (ft/ft)																																				
Pool Length (ft)																																				
Pool Max depth (ft)																																				
Pool Spacing (ft)																																				
ttern																																				
Channel Beltwidth (ft)																																				
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Water Surface Slope (Channel) (ft/ft)																																				
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³ Ri% / Ru% / P% / G% / S%							_								_	<u> </u>	<u> </u>					<u> </u>							<u> </u>		L		<u> </u>			
³ SC% / Sa% / G% / C% / B% / Be%							_								_	<u> </u>	<u> </u>					<u> </u>							<u> </u>		<u> </u>		<u> </u>			_
³ d16 / d35 / d50 / d84 / d95 /													_				<u> </u>											<u> </u>	<u> </u>		L					
² % of Reach with Eroding Banks							_																													
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A of Reach with Eroding Banks Channel Stability or Habitat Metric Biological or Other aded cells indicate that these will typically not The distributions for these parameters can in Proportion of reach exhibiting banks that are	be fille clude in eroding	d in. formatio	on from	both the	e cross urvey fr	s-section om visua	al asses	s and th	e longitu able	idinal p	rofile.																									

APPENDIX E As-Built Plan Drawings

As-built/Record Drawings Guidance for EEP Projects

The as-built/record drawings combine the relevant design construction sheets, as-built survey and mark-ups. For design-bid-build projects (DBB), the as-built is submitted by the primary contractor to the designer and must bear a PLS seal. The mark-up drawings identify deviations between design and construction and must bear the designer's P.E. seal. It is EEPs intention that designers submit a single drawing that will service SCO record drawing needs and EEP As-built needs.

The as-built/record drawings support the following needs:

- 1. EEP Design and Construction Unit Review: Design Construction Unit assessment and verification that the project was built according to grade within the specified tolerances.
- 2. Provides an As-built baseline drawing to support monitoring needs.

Format:

Please review the PDF document entitled "Format, Data Requirements, and Content Guidance For Digital Drawings Submitted to EEP". Submission of electronic drawings in compliance with these formatting specifications will be critical to the utility of these drawing files to EEP. The main objective is that the features in the table in the linked document can be distinguished and readily extracted in Arc-GIS. The document does not specify symbology, just the features of interest, their preferred shape type (line, point or polygon) and some coding in the underlying digital table.

Sheet 1 or Title Sheet: Overall site plan cover sheet with sheet segmentation

- A. Name of project
- B. County
- C. Plan Type: (As-built/Record drawing each sheet)
- D. EEP ID Number
- E. SCO ID Number (Where applicable)
- F. Contract Number
- G. Project Plan Overview with sheet segmentation
- H. Stationing and ID of project stream reaches (and on all sheets that apply)
- I. Wetland project tract numbers/ID (and on all sheets that apply)
- J. Accurate, recorded conservation easement (and on all sheets that apply)
- K. Limits of disturbance (and on all sheets that apply)
- L. Latitude and Longitude at upstream start of the project (STA 0+00)
- M. Vicinity inset map
- N. Scale and North Arrow (each relevant sheet)
- O. Index of sheets
- P. Firm name and project manager contact information
- Q. P.E. seal with date and initials on title page and every page, except the surveyed As-builts (Sheets 5A, 5B, etc.), which are submitted by the contractor. The As-built sheets submitted by the contractor must bear PLS seal with date and initials.

Sheet 2:

- A. Legend and Symbols
- B. Abbreviations
- C. Any special notes on changes (e.g., dropping reaches, bedrock encountered, etc.)

Sheet 3, "Key sheet":

Topographic Contours intervals should be at a 1 foot maximum

Sheet 4A, 4B, etc.: As-built Sheet Series

- A. As-built plan view survey results for features surveyed in accordance with the Special Provisions in the Project Manual. The contractor's PLS seal must be included on this sheet.
- B. As-built cross-sections and profile views. The contractor's PLS seal must be included on this sheet
- C. Monitoring features should have been surveyed in and included in Sheet Series 4

Sheets 5A, 5B, etc: As-built / Design Comparison Sheet Series

- A. Plan view showing both the design layer and as-built layer (Sheet 5). Both layers must be distinguished by making the design layer a background feature (black) and as-built as foreground in red to identify deviations with callout annotations as needed.
- B. Profile view and cross-section overlays of both design and As-built.

Note:

<u>Profile</u> – A geomorphologically relevant survey of the projects entire channel length is to be performed as part of the As-built baseline. This has been performed on some projects in the past without adequate resolution or without reliable capture of certain features, diminishing the surveys utility as a monitoring baseline. The surveyor or survey oversight personnel must possess the knowledge necessary to conduct the survey to facilitate the extraction of meaningful distributions for the variables in the morphology tables in Appendix D. The thalweg, TOB, bankfull, and water surface need to be surveyed at head of riffles, pools, pool max depth, glide, run, structures, etc.