Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects within Tennessee

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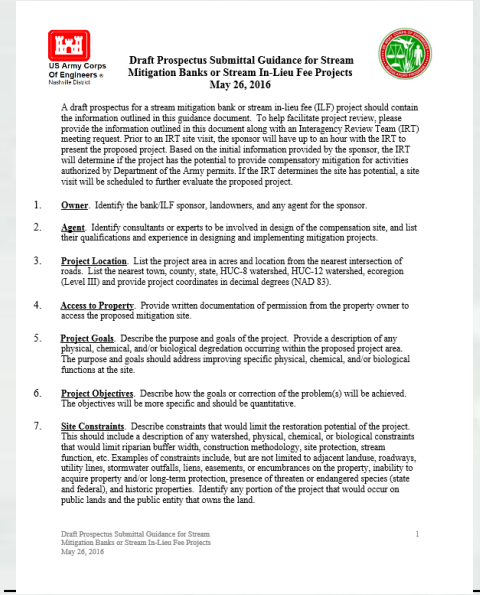
US Army Corps of Engineers
BUILDING STRONG®

Regulatory Initiatives

- Development of Mitigation Guidance Documents
  - Draft Prospectus Guidance for Stream Mitigation Banks or ILF Projects
  - Draft Prospectus Guidance for Wetland Mitigation Banks or ILF Projects
  - Permittee-Responsible Mitigation Guidance
  - Prospectus Checklist for Stream and Wetland Mitigation Banks or ILF Projects
  - Long-Term Management Guidance
  - Performance Standards and Monitoring for Stream and Wetland Compensatory Mitigation
  - Mitigation Banking Instrument Template
- Purpose: To provide clear expectations to the public and a consistent and more efficient review that is rooted in sound science and is compliant with all applicable laws

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- <u>Applicable to Bank and ILF Projects</u>
- Draft Prospectus Submittal Procedures:
  - ► Submit draft prospectus information and request a meeting with the IRT
  - ► Based on the information provided, the IRT will determine if the project has potential
  - ► If the site has potential, a site visit will be scheduled
  - ► IRT will provide written comments following the site visit

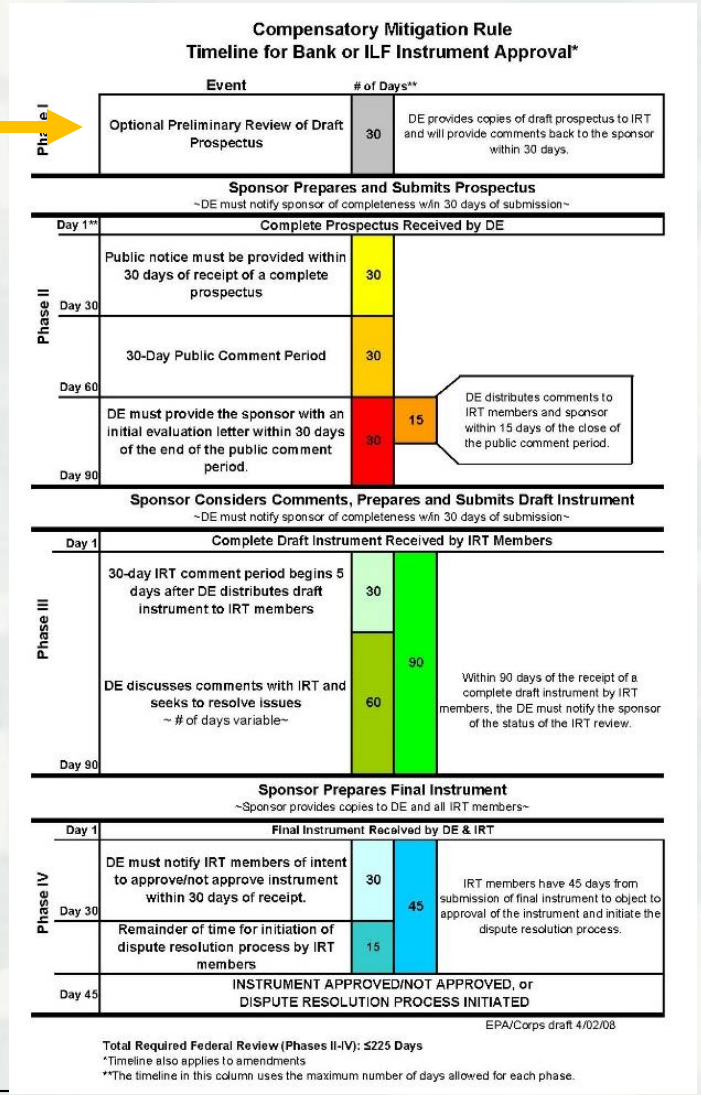


US Army Corps Of Engineers
Nashville District

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects
May 26, 2016

A draft prospectus for a stream mitigation bank or stream in-lieu fee (ILF) project should contain the information outlined in this guidance document. To help facilitate project review, please provide the information outlined in this document along with an Interagency Review Team (IRT) meeting request. Prior to an IRT site visit, the sponsor will have up to an hour with the IRT to present the proposed project. Based on the initial information provided by the sponsor, the IRT will determine if the project has the potential to provide compensatory mitigation for activities authorized by Department of the Army permits. If the IRT determines the site has potential, a site visit will be scheduled to further evaluate the proposed project.

1. **Owner**. Identify the bank/ILF sponsor, landowners, and any agent for the sponsor.
2. **Agent**. Identify consultants or experts to be involved in design of the compensation site, and list their qualifications and experience in designing and implementing mitigation projects.
3. **Project Location**. List the project area in acres and location from the nearest intersection of roads. List the nearest town, county, state, HUC-8 watershed, HUC-12 watershed, ecoregion (Level III) and provide project coordinates in decimal degrees (NAD 83).
4. **Access to Property**. Provide written documentation of permission from the property owner to access the proposed mitigation site.
5. **Project Goals**. Describe the purpose and goals of the project. Provide a description of any physical, chemical, and/or biological degredation occurring within the proposed project area. The purpose and goals should address improving specific physical, chemical, and/or biological functions at the site.
6. **Project Objectives**. Describe how the goals or correction of the problem(s) will be achieved. The objectives will be more specific and should be quantitative.
7. **Site Constraints**. Describe constraints that would limit the restoration potential of the project. This should include a description of any watershed, physical, chemical, or biological constraints that would limit riparian buffer width, construction methodology, site protection, stream function, etc. Examples of constraints include, but are not limited to adjacent landuse, roadways, utility lines, stormwater outfalls, liens, easements, or encumbrances on the property, inability to acquire property and or long-term protection, presence of threaten or endangered species (state and federal), and historic properties. Identify any portion of the project that would occur on public lands and the public entity that owns the land.



Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Basic information required in the submittal:
  - ►Owner – project sponsor, landowners, etc.
  - ►Agent – consultants and qualifications
  - ►Project location – coordinates, town, HUC, ecoregion, etc.
  - ►Written permission to access the property

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

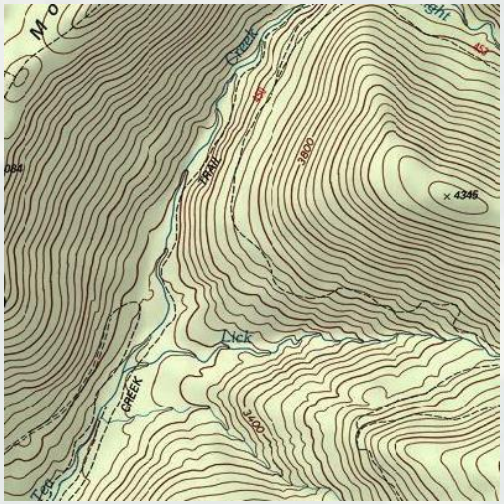
- Project Goals
  - ►Why are you proposing the project?
  - ►Address specific physical, chemical, and/or biological functions that will be improved
    - Example: Restore reach functions to meet upstream reference reach condition.
- Project Objectives
  - ►How will the goals be achieved?
  - ►Objectives will be specific and quantitative
    - Examples. Establish a 200' riparian buffer, restore floodplain connectivity (BHR =1), improve bedform diversity (pool max depth ratio >1.5), etc.

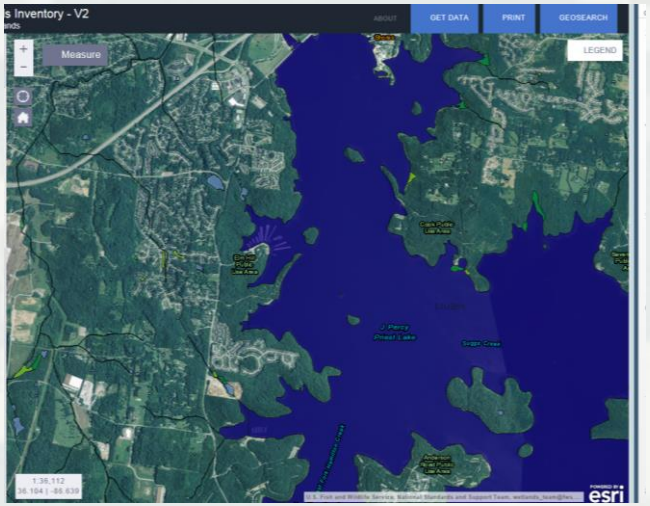
Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Site Constraints
  - ►Describe constraints that would limit restoration potential
    - Site protection
    - Roadways
    - Utility lines
    - Construction methodologies
    - Easements
    - Etc.

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Maps
  - ►Parcel map
  - ►Estimation of aquatic resource boundaries
  - ►NRCS soil map
  - ►National Wetland Inventory Map
  - ►Topographic map
  - ►Aerial maps (current and historic)
  - ►Bank service area (if applicable)
- Site Photos





Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Historic Properties
  - ►List the presence of any known cultural, archaeological, and or historic resources at or near the site
- Threatened and Endangered Species
  - ►List any know species or critical habitat known to exist at or near the site.


Nashville Crayfish

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Catchment Assessment Form
  - ►Used to determine restoration potential
  - ►Identify Site Risks and Site Constraints

Catchment Assessment Form

Rater(s):

Date:

Purpose: This form is used to determine the project's restoration potential.

Overall Watershed Conditon

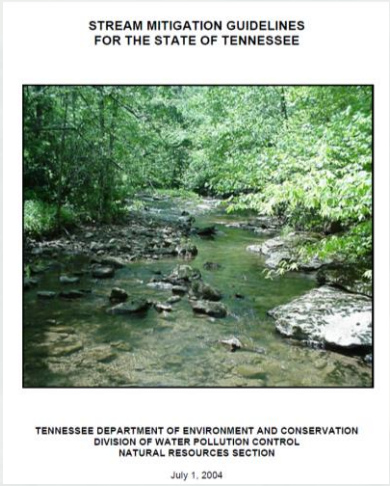
CATCHMENT ASSESSMENT

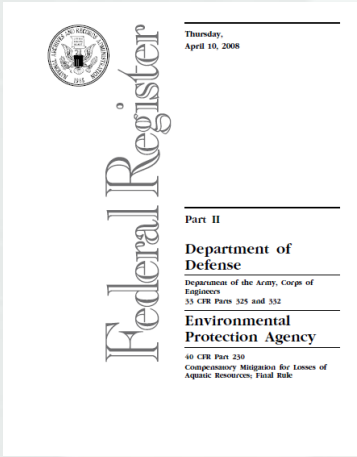
	Categories	Description of Catchment Condition			Rating (P/F/G)
		Poor	Fair	Good	
1	Concentrated Flow (Hydrology)	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	No potential for concentrated flow/impairments from adjacent land use	
2	Impervious cover (Hydrology)	Greater than 15%	Between 7% and 15%	Less than 7%	
3	Land Use Change (Hydrology)	Rapidly urbanizing/urban	Single family homes/suburban	Rural communities/slow growth or primarily forested	
4	Distance to Roads (Hydrology)	Roads located in or adjacent to project reach and/or major roads proposed in 10 year DOT plans	No roads in or adjacent to project reach. No more than one major road proposed in 10 year DOT plans.	No roads in or adjacent to project reach. No proposed roads in 10 year DOT plans.	
5	Watershed Hydrology (e.g., flow regime, basin characteristics) (Hydrology)	Flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	Moderate flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	Not Flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	
6	Percent Forested (Watershed) (Hydrology)	<= 20%	>20% and <70%	>=70%	
7	Riparian Vegetation (Geomorphology)	<50% of contributing stream length has > 25 ft corridor width	50-80% of contributing stream length has > 25 ft corridor width	>80% of contributing stream length has > 25 ft corridor width	
8	Sediment Supply (Geomorphology)	High sediment supply from upstream bank erosion and surface runoff	Moderate sediment supply from upstream bank erosion and surface runoff	Low sediment supply. Upstream bank erosion and surface runoff is minimal	
9	Located on or downstream of a 303(d) listed stream TMDL list (Physicochemical)	On, upstream, or downstream of 303(d) and no TMDL/WS Mgmt plan to address deficiencies	On, upstream, or downstream of 303(d) and TMDL/WS Mgmt plan addressing deficiencies	Not on 303(d) list	
10	Agricultural Land Use (Physicochemical)	Livestock access to stream and/or intensive cropland immediately upstream of project reach.	Livestock access to stream and/or intensive cropland upstream of project reach. A sufficient reach of stream is between Ag. land use and project reach.	There is little to no agricultural land uses or the livestock or cropland is far enough away from project reach to cause no impact to water quality or biology.	
11	NPDES Permits	Many NPDES permits within watershed or some within one mile of project reach	A few NPDES permits within watershed and none within one mile of project reach	No NPDES permits within watershed and none within one mile of project reach	
13	Watershed impoundments (Biology)	Impoundment(s) located within 1 mile upstream or downstream of project area and/or has a negative effect on project area and fish passage	No impoundment within 1 mile upstream or downstream of project area OR impoundment does not adversely affect project area but a blockage could exist outside of 1 mile and impact and fish passage	No impoundment upstream or downstream of project area OR impoundment provides beneficial effect on project area and allows for fish passage	
14	Organism Recruitment (Biology)	Channel immediately upstream or downstream of project reach is concrete, piped, or hardened.	Channel immediately upstream or downstream of project reach has native bed and bank material, but is impaired.	Channel immediately upstream or downstream of project reach has native bed and bank material.	
15	Percent of Catchment being Enhanced or Restored	Less than 40% of the total catchment area is within the project reach.	40 to 60% of the total catchment area is within the project reach.	Greater than 60% of the total catchment area is within the project reach.	
16	Other				

Version 1.0 Catchment Assessment Form 1 of 1 12-8-2015

Synchronizing the 2004 Stream Mitigation Guidelines with the 2008 Mitigation Rule

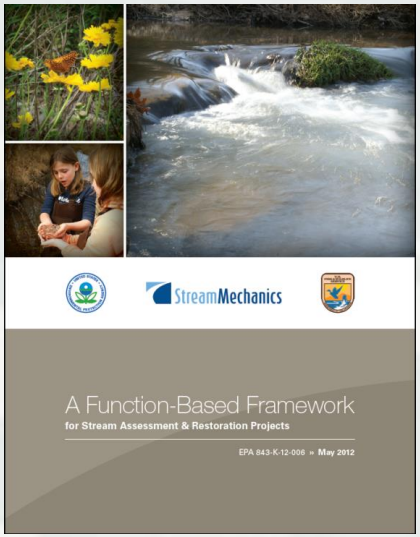
- Historically, the Corps and TDEC (401 agency) has used the "*2004 Stream Mitigation Guidelines for the State of Tennessee*" as guidance for determining stream mitigation credit ratios.
- The document uses a ratio system for providing stream mitigation credit.
  - 1.5:1 Restoration, 3:1 Enhancement, etc.
- Mitigation ratio determinations are dependent on work related definitions, instead of functional lift
  - Example: Definition of restoration: "Restoration will typically include rebuilding the appropriate channel pattern, profile, dimension, and riparian zone"
- The *2004 Stream Mitigation Guidelines* do not evaluate aquatic resource functions / lift and the definitions apply to a wide range of projects with varying degrees of functional lift.

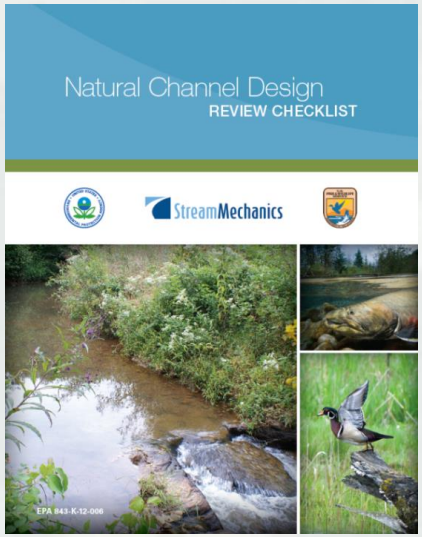


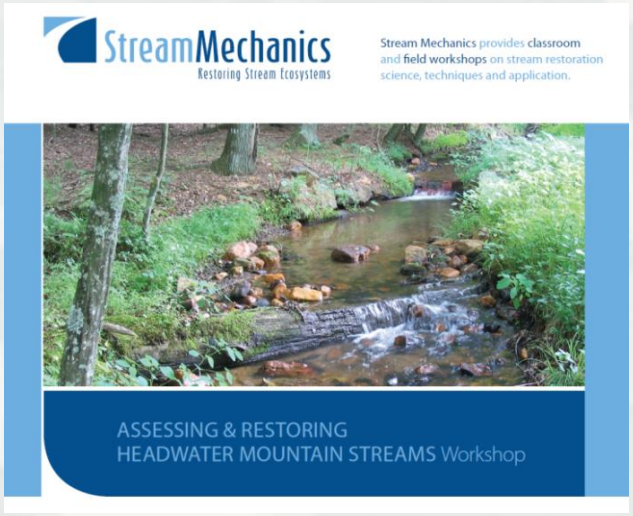


Functional Framework for Stream Assessment and Restoration

- Background: The IRT attended three stream assessment and mitigation review workshops
  - ► Three Workshop Series
    - Function-based Framework for Stream Assessment and Restoration
    - Natural Channel Design Review Checklist
    - Assessing and Restoring Headwater Mountain Streams

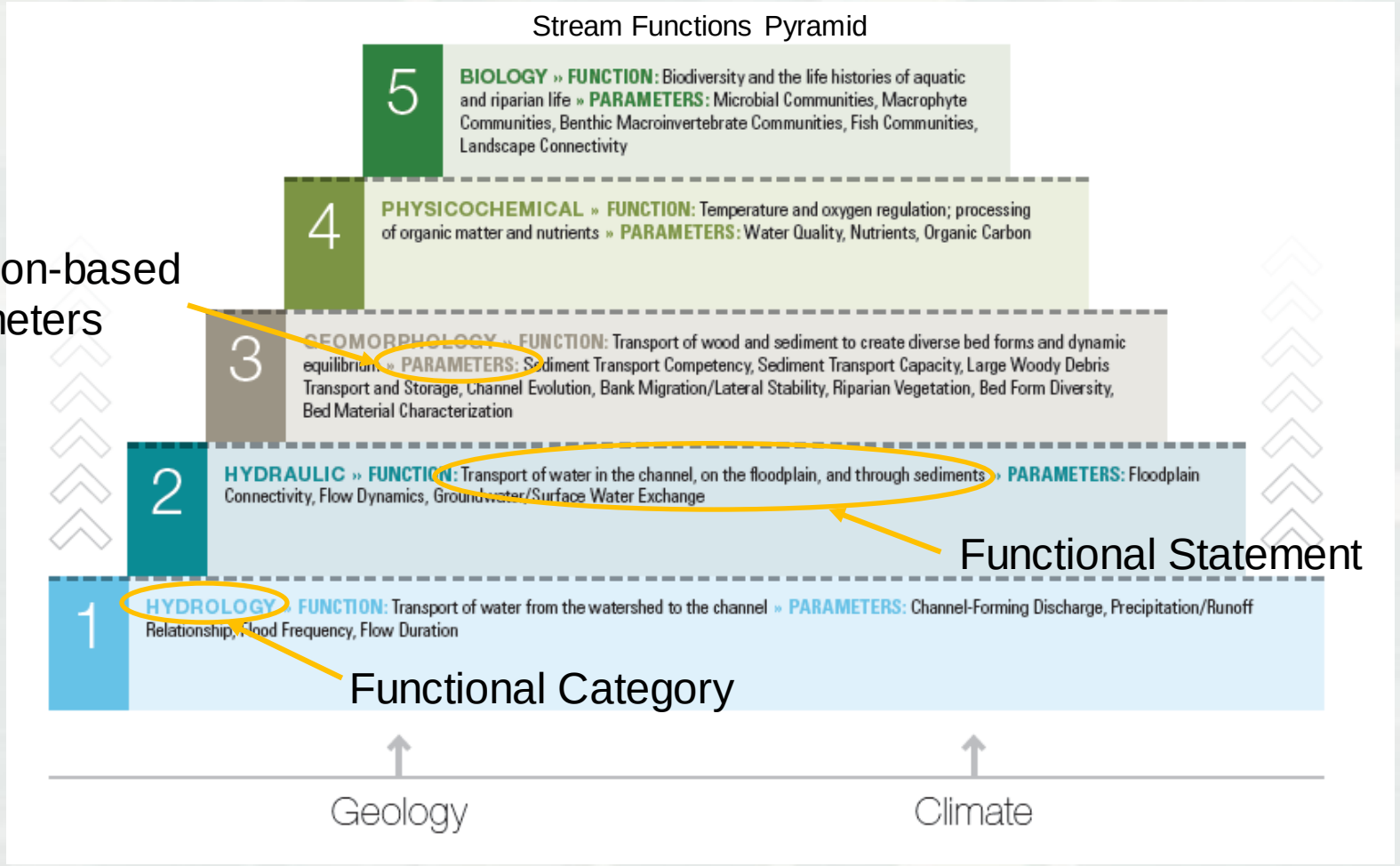






Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006. https://streammechanics.egnyte.com/h-s/20120914/cde14b2bb9f2456d

Functional Framework for Stream Assessment and Restoration

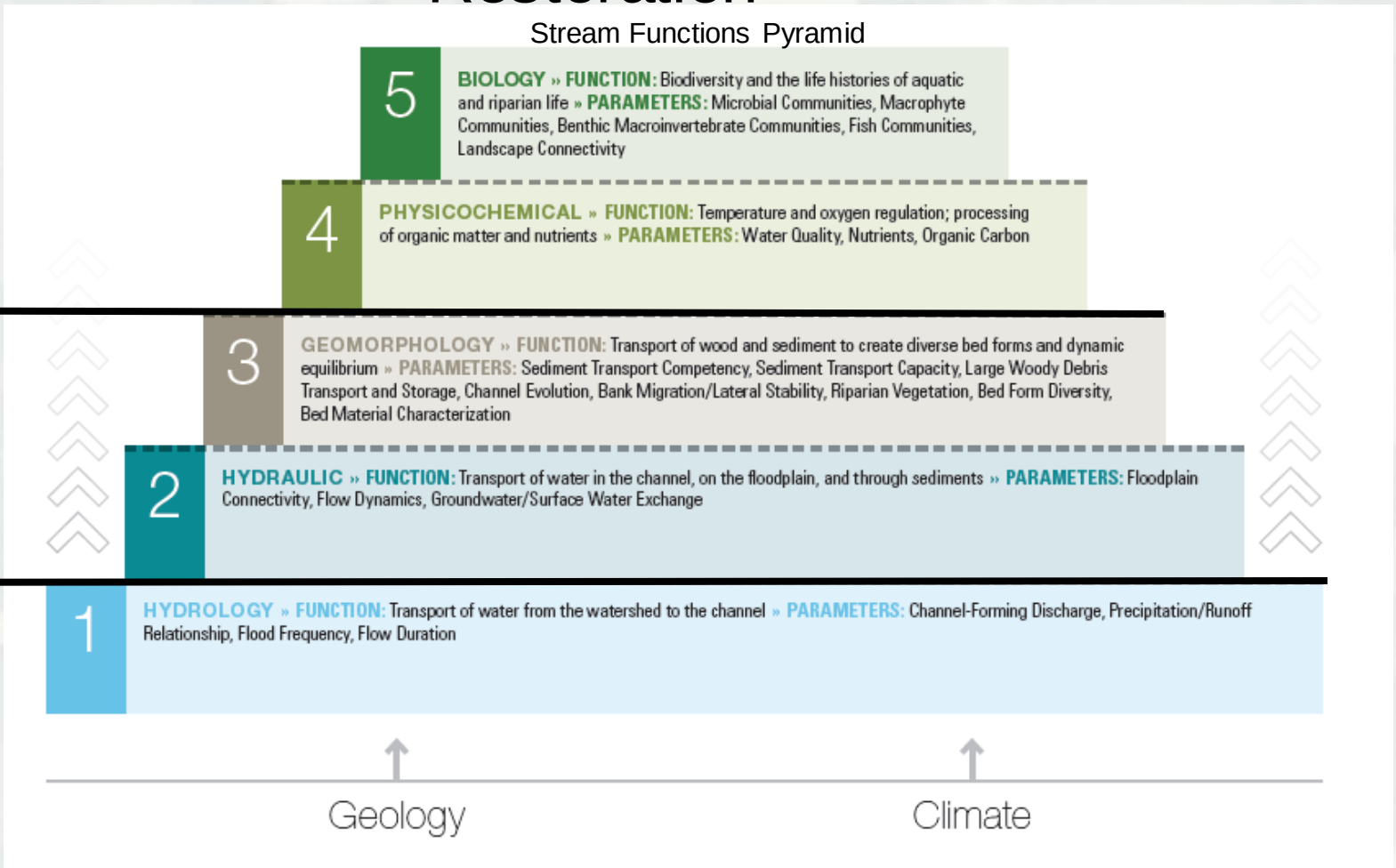


Functional Framework for Stream Assessment and Restoration

Site Selection

Reach Scale Improvements

Generally independent variables. May be altered in headwaters, large projects, BMPs



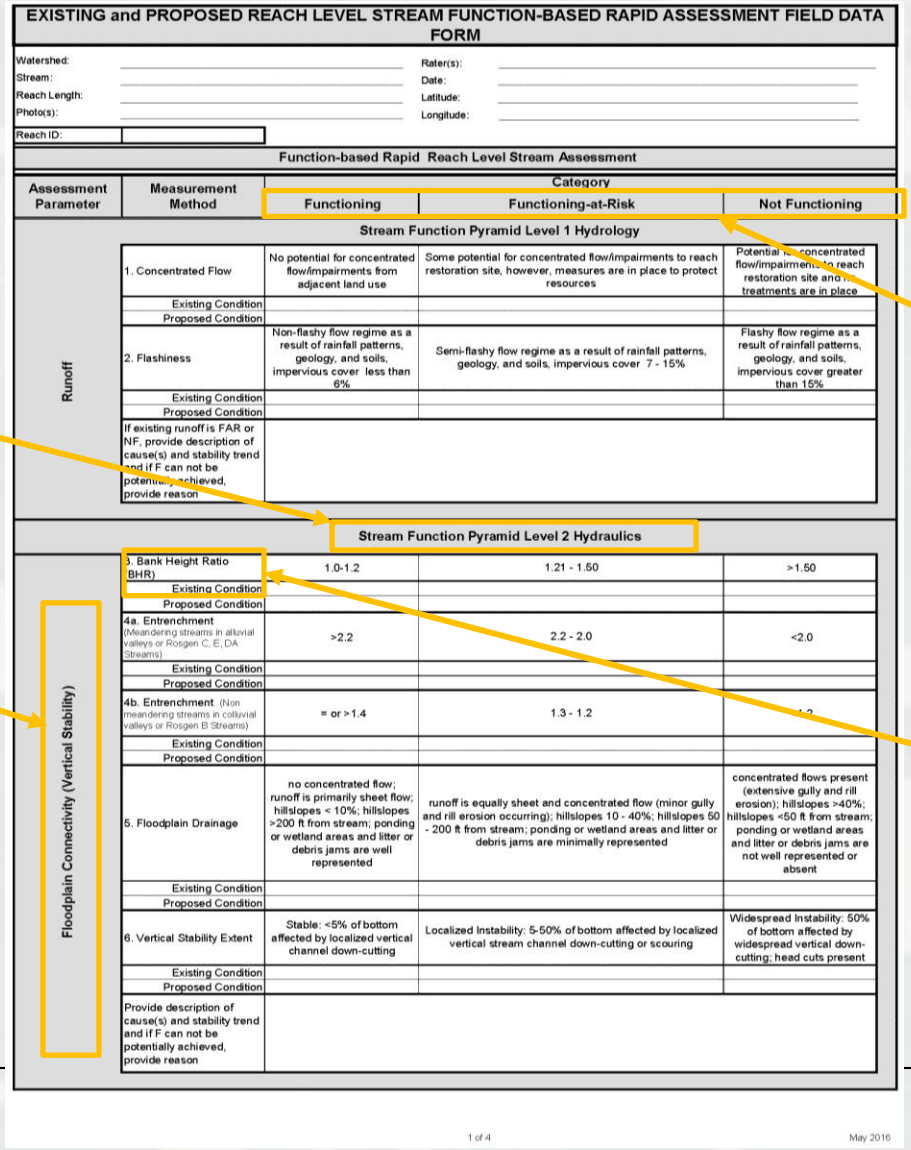
Functional Framework for Stream Assessment and Restoration

- This assessment approach will help us describe a project's functional lift and inform our determination of appropriate mitigation ratios.
- The assessment approach evaluates the existing and proposed stream function-based conditions.
  - It does not assess all stream functions but rather those critical to understanding stream process. Appropriate assessment parameters can be added or removed based on project objectives.
  - Specific measurement methods are used to quantify or describe function-based parameters, which are used to describe functions.


TSMP's Green Valley Farms – Before


After

Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form



EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed: _____ Rater(s): _____
Stream: _____ Date: _____
Reach Length: _____ Latitude: _____
Photo(s): _____ Longitude: _____
Reach ID: _____

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and ... treatments are in place
	Existing Condition			
	Proposed Condition			
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			
	Proposed Condition			
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			
	Proposed Condition			
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			
	Proposed Condition			
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	...
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	no concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition			
	Proposed Condition			
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

1 of 4 May 2016

Functional Category

Function-Based Parameter

Categories of measurement values

Measurement Method

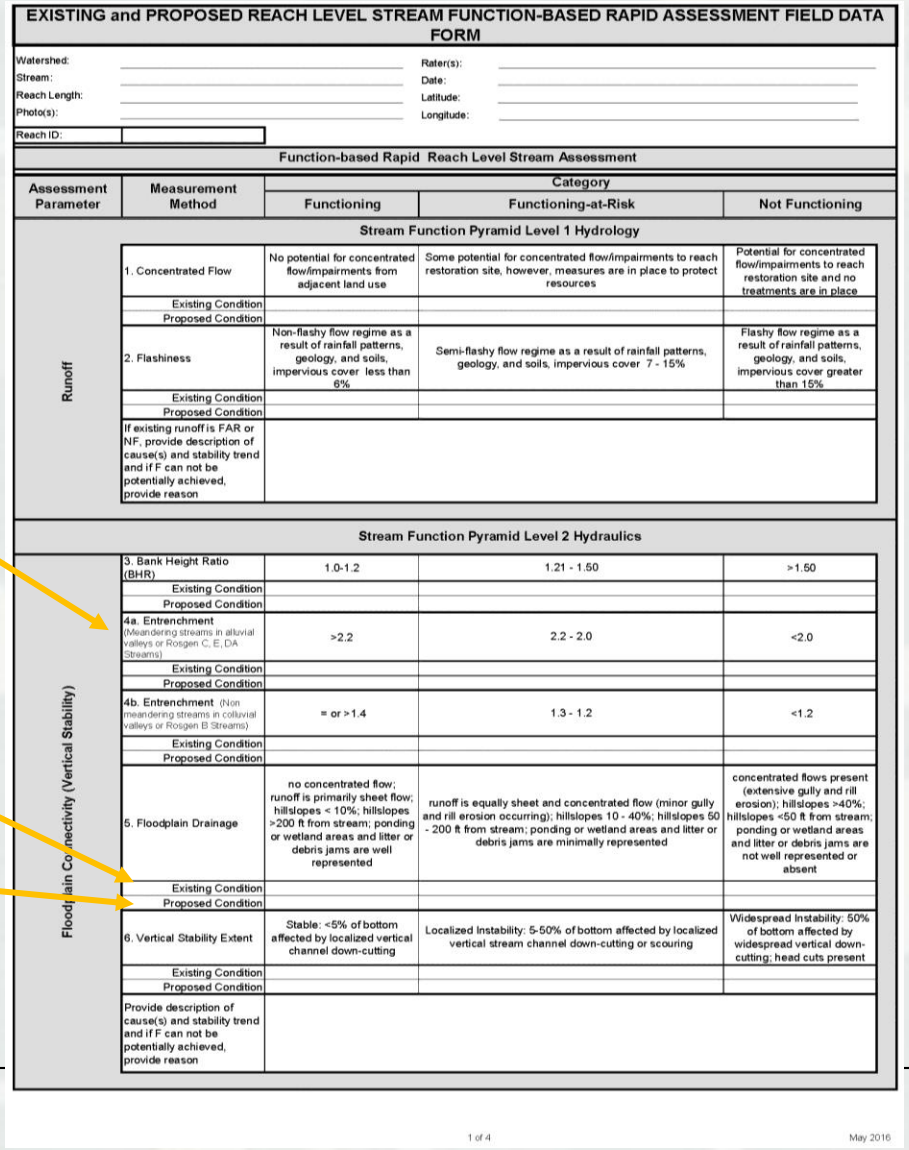
Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form

Numerical and descriptive values were developed from peer-reviewed journals, government documents, books, proceeding papers, and professional judgement

Many measurements are stratified by Rosgen stream type, slope, and, drainage area

Data collected from existing stream

Condition resulting from proposed mitigation



EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed: _____ Rater(s): _____
Stream: _____ Date: _____
Reach Length: _____ Latitude: _____
Photo(s): _____ Longitude: _____
Reach ID: _____

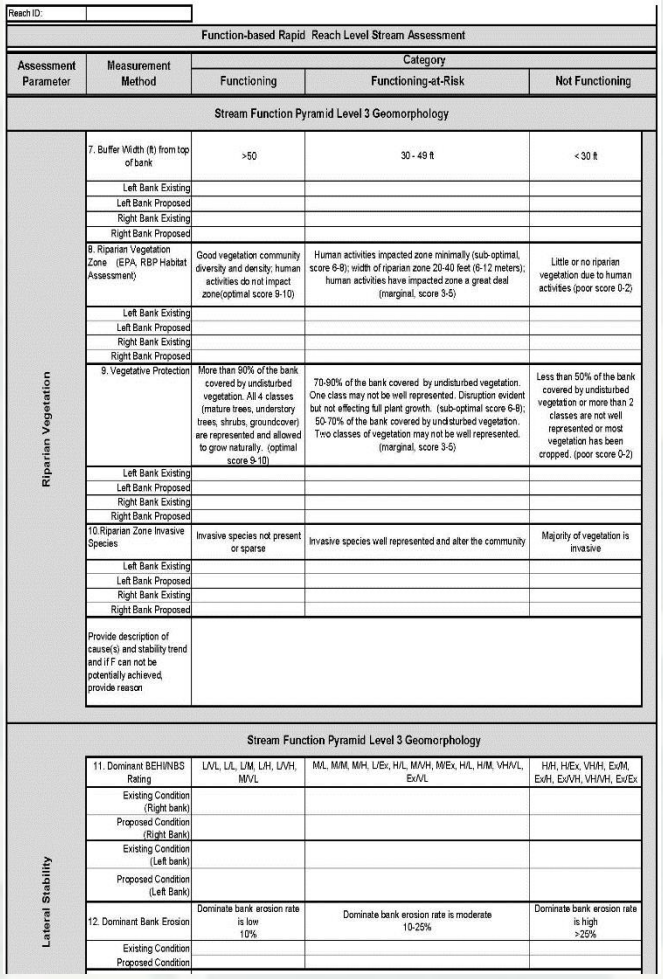
Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			
	Proposed Condition			
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			
	Proposed Condition			
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			
	Proposed Condition			
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			
	Proposed Condition			
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	no concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition			
	Proposed Condition			
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

1 of 4 May 2016

Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form

Function	Assessment Parameter	Measurement Method
Hydrology	Runoff	Concentrated flow, flashiness
Hydraulics	Floodplain Connectivity	BHR, Entrenchment, Floodplain drainage, vertical stability
Geomorphology	Riparian vegetation, lateral stability, bedform diversity,	Buffer width, Buffer quality (vegetation RBP scores, invasive presence), BEHI/NBS, %bank erosion, LWD, % riffle, pool to pool spacing ratio, max depth ratio
Physicochemical	Water Quality and Nutrients	Water appearance and nutrient enrichment, detritus
Biology	Biology	Macroinvertebrate Index (SQSH), Macroinvertebrate tolerance, fish presence



Reach ID:

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			
	Left Bank Proposed			
	Right Bank Existing			
	Right Bank Proposed			
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			
	Left Bank Proposed			
	Right Bank Existing			
	Right Bank Proposed			
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			
	Left Bank Proposed			
	Right Bank Existing			
	Right Bank Proposed			
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing			
	Left Bank Proposed			
	Right Bank Existing			
	Right Bank Proposed			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)			
	Proposed Condition (Right Bank)			
	Existing Condition (Left bank)			
	Proposed Condition (Left Bank)			
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition			
	Proposed Condition			

Refer to *A Function-Based Framework for Stream Assessments and Restoration Projects* document for supporting information to completing the form.

Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form

- The Hydraulic and Geomorphic Assessment Form will be used to calculate and record data used in the Rapid Assessment Field Data Form.

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed: ______ Rater(s): ______
Stream: ______ Date: ______
Reach Length: ______ Latitude: ______
Photo(s): ______ Longitude: ______
Reach ID: ______

Function-based Rapid Reach Level Stream Assessment

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Stream Function Pyramid Level 1 Hydrology				
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	Existing Condition			
	Proposed Condition			
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			
	Proposed Condition			
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.60	>1.50
	Existing Condition			
	Proposed Condition			
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			
	Proposed Condition			
	4b. Entrenchment (Non-meandering streams in colluvial valleys or Rosgen B streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	no concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition			
	Proposed Condition			
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 6-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 60% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Hydraulic and Geomorphic Assessment Data Form

I. Bankfull Verification

A. Regional Curve ______
B. Drainage Area ______ sq. miles
C. Difference between bankfull stage and water surface ______ feet
D. Bankfull Width (Measured) ______ feet
E. Bankfull Area (Measured) ______ sq. feet
F. Bankfull Mean Depth (Area/Width) ______ feet
G. Bankfull Width (Regional Curve) ______ feet
H. Bankfull Area (Regional Curve) ______ sq. feet
I. Bankfull Mean Depth (Regional Curve) ______ feet

Area Calculations

II. Stream Classification

A. Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$ ______ ft/ft.
B. Bankfull Max Riffle Depth (Dmax) ______ feet
C. Floodprone Area Width ______ feet
D. Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$ ______ ft/ft.
E. Slope Estimate ______ ft/ft.
F. Channel Material Estimate ______
G. Rosgen Stream Type ______

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)				
Dmax				
Bank Height Ratio (LBH/Dmax)				
Riffle Length				

Stream Mechanics (modified by Corps on 5/17/2016) 1

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

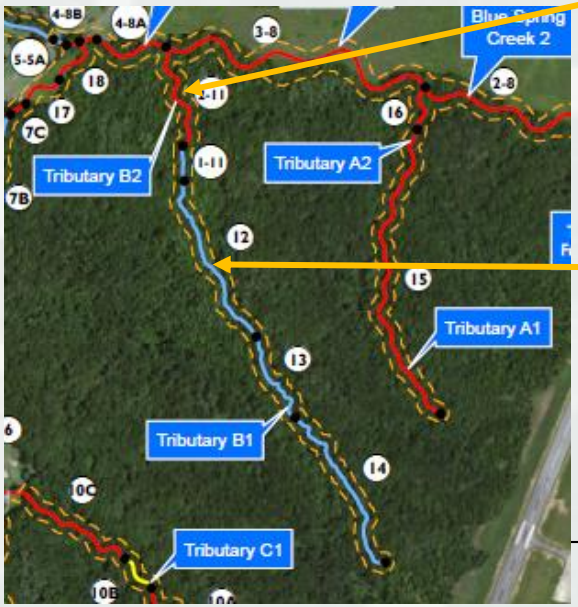
- Biological Assessment Required for:
  - Determining Waterbody Status
  - "Only stream segments considered impaired will qualify for compensatory mitigation credit" (2004 Stream Mitigation Guidelines for the State of Tennessee)
- Biological Data
  - Contact TDEC to obtain any pre-existing biological scores for the waterbody at or near the proposed project reach
  - In consultation with TDEC, the applicant may provide the biological scores *(Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys)*
- Rapid Assessment Field Data Form (Measurement Methods 23 & 24)

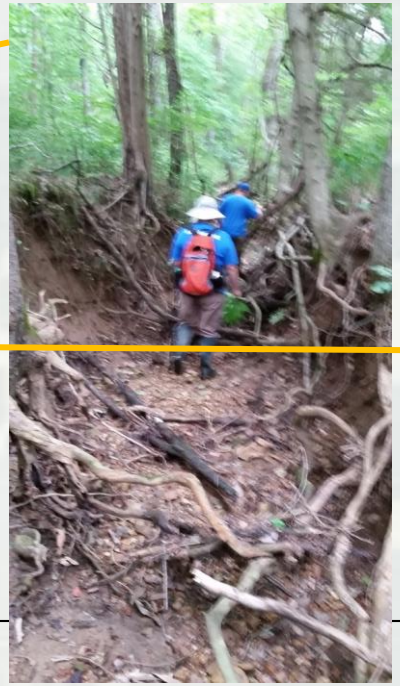
Stream Function Pyramid Level 5 Biology

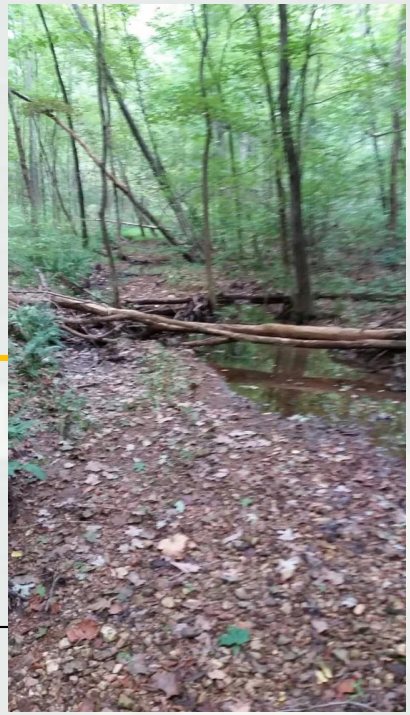
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			

Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form

- One form is completed for each stream reach
  - ►Changes in gradient, Rosgen classification, floodplain connectivity, lateral stability, riparian vegetation, etc. should be used to delineate each stream reach

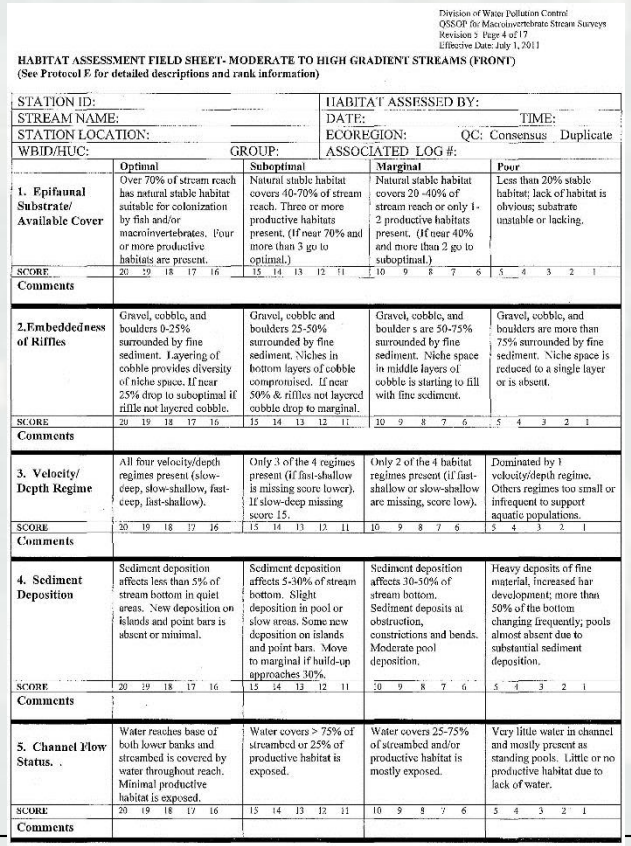






Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Visual Habitat Assessment
  - ► Provide habitat assessment data sheets for each unique stream reach.
  - ► These field sheets are modified from *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (Barbour et. al., 1999).



Division of Water Pollution Control
QSSOP for Macroinvertebrate Stream Surveys
Revision 5 Page 4 of 17
Effective Date: July 1, 2011

HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS (FRONT)
(See Protocol E for detailed descriptions and rank information)

STATION ID:		HABITAT ASSESSED BY:	
STREAM NAME:		DATE:	TIME:
STATION LOCATION:		ECOREGION:	QC: Consensus Duplicate
WBID/HUC:	GROUP:	ASSOCIATED LOG #:	

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Over 70% of stream reach has natural stable habitat suitable for colonization by fish and/or macroinvertebrates. Four or more productive habitats are present.	Natural stable habitat covers 40-70% of stream reach. Three or more productive habitats present. (If near 70% and more than 3 go to optimal.)	Natural stable habitat covers 20 -40% of stream reach or only 1-2 productive habitats present. (If near 40% and more than 2 go to suboptimal.)	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
2.Embeddedness of Riffles	Gravel, cobble, and boulders 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. If near 25% drop to suboptimal if riffle not layered cobble.	Gravel, cobble and boulders 25-50% surrounded by fine sediment. Niches in bottom layers of cobble compromised. If near 50% & riffles not layered cobble drop to marginal.	Gravel, cobble, and boulder s are 50-75% surrounded by fine sediment. Niche space in middle layers of cobble is starting to fill with fine sediment.	Gravel, cobble, and boulders are more than 75% surrounded by fine sediment. Niche space is reduced to a single layer or is absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
3. Velocity/ Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing score lower). If slow-deep missing score 15.	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime. Others regimes too small or infrequent to support aquatic populations.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
4. Sediment Deposition	Sediment deposition affects less than 5% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Sediment deposition affects 5-30% of stream bottom. Slight deposition in pool or slow areas. Some new deposition on islands and point bars. Move to marginal if build-up approaches 30%.	Sediment deposition affects 30-50% of stream bottom. Sediment deposits at obstruction, constrictions and bends. Moderate pool deposition.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
5. Channel Flow Status. .	Water reaches base of both lower banks and streambed is covered by water throughout reach. Minimal productive habitat is exposed.	Water covers > 75% of streambed or 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or productive habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Proposed Mitigation Approach
  - Stream reach id
  - Stream length
  - Establishment, re-establishment, rehabilitation, enhancement, preservation
  - Proposed mitigation ratio

Example table

Stream Reach	Existing Length	Mitigation Approach	Proposed Length	Mitigation Ratio	Credits
Reach 1	800	Rehabilitation	800	1.5:1	533
Reach 2	500	Enhancement	500	3:1	167

- Functional Lift
  - Describe how proposed project will increase stream functions above pre-project levels
  - Use information collected in the Rapid Assessment Data Forms

Draft Prospectus Submittal Guidance for Stream Mitigation Banks or Stream In-Lieu Fee Projects

- Site Protection
  - ► Describe the long-term site protection
    - conservation easement
    - restrictive covenant
    - Etc.
- Long-term Management
  - ► Proposed ownership arrangements
  - ► Potential easement holder

Summary

- The draft prospectus guidance document is applicable for banks and ILF programs
- It facilitates early feedback to mitigation providers
- The Rapid Stream Assessment will help describe a project's potential functional lift and inform the our determination of appropriate mitigation ratios

Questions?

http://www.lrn.usace.army.mil/Missions/Regulatory.aspx