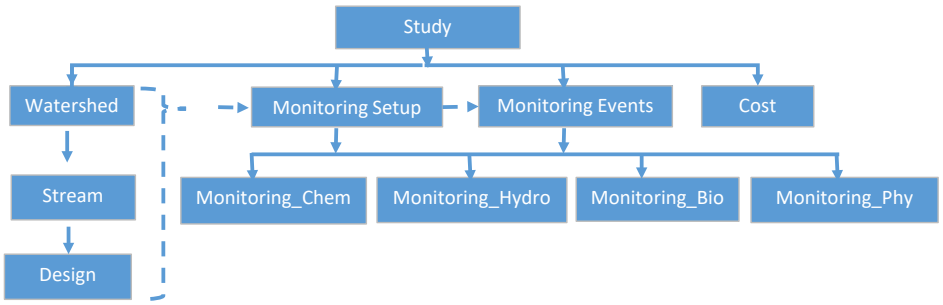
Appendix A. International Stormwater BMP Database: Stream Restoration Module Database Structure

August 2016, Version 1.0

The Stream Restoration BMP Database Module is available for download by the public in Microsoft Access 2013 (which is backward compatible with Access 2010). Data entry and upload are accomplished through entry of data into an Excel 2013 Workbook, which can be uploaded to the master database in Access. Web-based tools may be developed in the future using an SQL version of the database.

This appendix outlines the major tables and data elements in the Microsoft Excel spreadsheets that comprise the database. For purposes of this Appendix, the data elements are provided in a vertical list, but data entry will occur in a horizontal manner (i.e., data elements will be column headers consistent with a standard database format).

Simplified Database Structure and Overview of Spreadsheets for Data Entry



Data Priorities:

The data entry spreadsheets request a significant amount of information. Most studies will not have all of the requested data. Data entry should be completed for all "Required" fields, at a minimum. "Important" data are needed to maximize the usefulness of the study and should be entered when such data are available. "Supplemental" data are of interest to many researchers; however, missing supplemental data would not limit the general use of study findings.

R = Required
I = Important
S = Supplemental

Data Types:

When data elements are created in Access, a Data Type must be specified. All data entered into the spreadsheets must comply with validation rules associated with the data type (i.e., text cannot be entered into a number field). The most common data types include:

Text or Short Text (< 255 words)
Long Text (previously called "memo" in Access)
Date/Time
Number (additional validation may include integer, decimal, percentage, etc.)
Autonumber (e.g., simply a record number assigned when the record is uploaded)
Currency
Yes/No

"Picklist" is shown when the user must select an entry type from a mandatory picklist.

Study

Data Element	Data Type	Entry Options/Notes as Needed	Priority Level
Site_ID	Number	8=digit code assigned by Clearinghouse based on upload year & 3-digit study number (e.g., 2015001).	R
General Information:			
Project Purpose(s):		Project purposes generally follow the NRRSS (National River Restoration Science Synthesis) pick-list	
Aesthetics, Recreation, and/or Education	Yes/No		R
Bank Stabilization	Yes/No		R
Channel Incision Stabilization	Yes/No		R
Reestablish Sediment Balance	Yes/No		R
Channel Reconfiguration	Yes/No		R
Dam Removal/Retrofit	Yes/No		R
Fish Passage	Yes/No		R
Improve Flood Conveyance	Yes/No		R
Floodplain Reconnection	Yes/No		R
Flow Modification	Yes/No		R
In-stream Habitat Improvement	Yes/No		R
In-stream Species Management	Yes/No		R
Riparian Vegetation Re-establishment	Yes/No		R
Stormwater Management	Yes/No		R
Water Quality Management	Yes/No		R
Public Safety	Yes/No		R
Other	Yes/No	e.g., permit requirement, supplemental environmental project, infrastructure protection, etc.	R
Study Scale	Pick-list	Network, Segment, Reach, Subreach (see note)	R
Performance Assessment Method/Study Design	Pick-list	Before-after, before-after with control, upstream/downstream, paired watershed	R
Study Start Year	Date	4-digit year	R
Study Duration	Text		R
Summary/Abstract	Long Text		R
Comments	Long Text		S
Geographical Data:			
City (closest)	Text		R
County (or non-U.S. state/province)	Text		R
State (in U.S.)	Pick-list		R
Country	Pick-list		R
Hydrologic Unit Code (10-digit)	Number	Provide link in User's Guide.	R
EPA Ecoregion	Number	Provide link in User's Guide.	R
Decimal Latitude	Number	At approximate midpoint of project.	R
Decimal Longitude	Number	At approximate midpoint of project.	R
Site Elevation (m)	Number	Approximate to nearest 100 m.	I
Bibliographical Info:			
Literature Type	Pick-list	Journal, Report, Unpublished Data, Other	R
Short Reference (Author[s], year)	Text	e.g., Smith et al. 2015	R
Authors/Researchers	Text		R
Year of Publication	Date		R
Title	Text		R
Report Source Citation	Text	e.g., journal name	R
Sponsoring Program(s)	Text	e.g., who funded the study	R
Monitoring Entity(s)	Text	e.g., who conducted the study	R
Weblink	Hyperlink		S
Benefits Documented by Researcher:			
Water Quality	Yes/No		R
Biological	Yes/No		R
Physical/Habitat	Yes/No		R

Study

Data Element	Data Type	Entry Options/Notes as Needed	Priority Level
Floodplain Modification	Yes/No		R
Infrastructure Protection	Yes/No		R
Public Safety	Yes/No		R
Aesthetics/Recreation	Yes/No		R
Property Value	Yes/No		R
Other	Yes/No	Describe in Comments.	R
Monitoring Data Types Available:		(corresponding to monitoring data tables in	
Water Quality	Yes/No		R
Hydrologic /Hydraulic	Yes/No		R
Physical	Yes/No		R
Biological	Yes/No		R
Describe Data Type	Text	Brief narrative describing type of data available (e.g., TSS, TP, TN, flow data)	S
Attachments Submitted:			See Note (1)
Report	Yes/No		R
Photos	Yes/No		R
Channel Cross-Sections	Yes/No	These cross-sections are important to supplement channel geometry data entered in the Stream table.	R
Channel Profiles	Yes/No	These cross-sections are important to supplement channel geometry data entered in the Stream table.	R
Site Diagrams	Yes/No		R
Design Drawings	Yes/No		R
Calculations/Model Results	Yes/No		R
Sampling and Analysis Project Plan (SAPP)	Yes/No		R

(1) Note: Yes/No questions must be answered ("Required"), even if information is not provided.

Supplemental Description of Terms:
Network - multiple segments of stream with intervening tributaries.
Segment - multiple reaches of stream between two tributaries.
Reach - stream length of 10-20 annual flood top widths with relatively homogeneous stream type.

Watershed

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R
Watershed_ID	Number	Autopopulated in spreadsheet (9-digit number = site ID plus two digits)	R
Watershed Name	Short Text	User-identified watershed name. More than one watershed condition may need to be identified over the course of the study period.	R
General Characteristics:			
Year of Watershed Characterization	Date/Time	4-digit year during which watershed characteristics were documented. Particularly important to document if watershed conditions change significantly over study period, warranting more than one watershed condition.	R
Narrative Description	Short Text		R
Drainage Area (hectares)	Number		R
Average Annual Precipitation (mm)	Number		I
General Geologic Setting	Short Text		I
Dominant Upland Soil Map Unit Symbol ID	Short Text	Alphanumeric codes from the NRCS SSURGO Database. Provide comma-delimited list of all significant Map Units.	I
Dominant Floodplain Soil Map Symbol Unit ID	Short Text	Alphanumeric codes from the NRCS SSURGO Database. Provide comma-delimited list of all significant Map Units.	I
Dominant Upland Hydrologic Soil Group	Short Text		I
Dominant Floodplain Hydrologic Soil Group	Short Text		I
Soil Narrative	Short Text		I
Watershed Slope (avg %)	Number		I
Total Watershed Imperviousness (%)	Number		I
Hydraulically Connected Watershed Imperviousness (%)	Number		S
Controls on Hydraulic Regime (e.g., dams, diversions)	Long Text		I
Describe Extent of Watershed Served by BMPs (urban/ag/timber)	Long Text		I
Land Use:			
General Land Use (Urban, Agriculture, Forest, Mixed)	Picklist	Urban, Agriculture, Forest, Mixed, Other	R
Land Use (acres):		Provide acreages of dominant land uses.	
Residential	Number		I
Commercial	Number		I
Industrial	Number		I
Freeway	Number		I
Institutional	Number		I
Agriculture-Crops	Number		I
Agriculture-Livestock	Number		I
Forest	Number		I
Rangeland	Number		I
Open Space	Number		I
Other	Number	Describe other land uses in Comments, as needed.	I
Describe Directly Adjacent Land Use	Text	Predominant land use along stream corridor.	I
Comments	Long Text		S

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R
Watershed_ID	Number	Autopopulated in spreadsheet	R
Stream_ID	Number	Autopopulated in spreadsheet (11-digit number = watershed ID plus two digits)	R
Stream Name	Short Text	User-identified stream name. Multiple stream records may be entered for the study, either spatially or temporally.	R
Identify Stream Condition Being Characterized:			
Stream Condition Type	Picklist	See Note 1 for picklist.	R
Describe Channel Evolution Stage	Text	See Note 2. Use key words to describe stage of channel evolution, which is important for anticipating benefits gained from stream restoration.	I
Valley Setting			
Valley Slope (%)	Short Text	This will allow calculation of sinuosity	I
Lateral constraint [Describe]	Short Text	Describe degree of hillslope coupling, planform confinement	I
Valley type [Describe]	Short Text	Describe valley type - e.g., open floodplain, canyon, gorge, glacial, fan, delta	I
Channel Geometry/Condition:		User's Guide to provide diagrams/guidance to assist data entry.	
Channel Type [Describe]	Short Text	See Note 3. e.g., alluvial vs. non-alluvial, single thread vs. multi-thread, and preferred classification (e.g., Church, Montgomery and Buffington, Rosgen, etc.), channel evolution stage (Schumm et al., Booth and Fischenich, etc.).	I
Bedforms [Describe]	Short Text	e.g., cascade, step-pool, plane bed, pool-riffle, dune-ripple, other	I
Planform [Describe]	Short Text	e.g., straight, meandering, braided, anastomosing, other	I
Return Period that Reaches Floodplain (yr)	Number		S
Average Bank Height (m)	Number	Provide measurement guidance in User's Guide.	I
Average Bank Angle (%)	Number	Provide measurement guidance in User's Guide.	I
Effective Channel Slope (%)	Number	Provide measurement guidance in User's Guide.	I
Average Channel Width (m)	Number	Provide measurement guidance in User's Guide.	I
Average Channel Depth (m)	Number	Provide measurement guidance in User's Guide.	I
Channel Geometry/Condition Comments	Short Text	Allows narrative description of channel geometry/condition.	S
Flow Regime:			
Type	Picklist	Perennial, Intermittent, Ephemeral	R
Primary Hydrologic Source	Picklist	Rain, Rain+Snowmelt, Snowmelt, Groundwater, Reservoir Release, Effluent, Multiple	I
Flow Regime Estimates:			
Dominant Discharge Type	Picklist	bankfull, effective, half-load discharge, other	I
Dominant Discharge (m3/sec)	Number		I
Flow Estimates:			
1.3-yr Flow (m3/sec)	Number		I
1.5-yr Flow (m3/sec)	Number		I
2-yr Flow (m3/sec)	Number		I
5-yr Flow (m3/sec)	Number		I
10-yr Flow (m3/sec)	Number		I
50-yr Flow (m3/sec)	Number		I
25-yr Flow (m3/sec)	Number		I
100-yr Flow (m3/sec)	Number		I
Design Storm Duration (hrs) (if flow estimates are from Event-Based Modeled	Number		I
Bank Materials--Toe:			
Bank Materials (Describe)	Short Text	Briefly describe bank layering/stratigraphy, distinguishing between toe and rest of bank.	R
Soil Bulk Density (g/cm3)	Number		S
Consolidation	Picklist	Moderately- or well-consolidated, poorly or unconsolidated fine, poorly or unconsolidated coarse	R
Gradation of Bank Materials:			
% clay	Number		S
% silt	Number		S
% sand	Number		S
% gravel	Number		S
% other mineral	Number		S
% organic matter	Number		S
Bank P Content (mg/kg)	Number		S
Bank N Content (mg/kg)	Number		S
Describe Methods for Bank Content Analysis	Short Text	Laboratory methods used for measuring P&N bank content.	S
Bank Materials--Dominant Materials above Toe and below the 2 yr Discharge Stage:			
Bank Materials (Describe)	Short Text	Briefly describe bank layering/stratigraphy, distinguishing between toe and rest of bank.	R
Soil Bulk Density (g/cm3)	Number		S
Consolidation	Picklist	Moderately- or well-consolidated, poorly or unconsolidated fine, poorly or unconsolidated coarse	R

Data Element	Data Type	Entry Options/Notes	Priority Level
Gradation of Bank Materials:			
% clay	Number		S
% silt	Number		S
% sand	Number		S
% gravel	Number		S
% other mineral	Number		S
% organic matter	Number		S
Bank P Content (mg/kg)	Number		S
Bank N Content (mg/kg)	Number		S
Describe Methods for Bank Content Analysis	Short Text	Laboratory methods used for measuring P&N bank content.	S
Bed Materials:			
Gradation of Surficial Bed Materials:			
D10 (mm)	Number		S
D16 (mm)	Number		S
D50 (mm)	Number		S
D84 (mm)	Number		S
D90 (mm)	Number		S
Fines included or truncated in D estimates?	Yes/No		S
% Bed surface area that is exposed hardpan or bedrock	Number		S
% Bed surface area covered in fines < 2 mm	Number		S
Ratio of D50 Surface Pavement to D50 of Subpavement in Coarse Grained Beds	Number	To characterize bed armoring.	S
Vegetation Types:			
Bank Vegetation Condition	Short Text		I
Floodplain Vegetation Condition	Short Text		I
General Vegetation Type	Picklist	forest, herbaceous (native), herbaceous (urban manicured), herbaceous (cultivated), other	R
% Canopy Closure	Number		
% Native Vegetation Intact	Number		S
% Invasive Species	Number		S
Describe Vegetation Types	Short Text		R
Describe Methods for Vegetation Assessment	Short Text	List methods used to characterize	S
Comments	Short Text		S

Notes:

(1) Stream Condition Type Picklist:

- Pre-Development (Reference)
- Pre-Development (Agriculture)
- Pre-Restoration (Urban)
- Pre-Restoration (Agriculture)
- Pre-Restoration (Other)
- Post-Restoration (1 yr)
- Post-Restoration (2 yr)
- Post-Restoration (3 yr)
- Post-Restoration (4 yr)
- Post-Restoration (5 yr)
- Post-Restoration (10 yr)
- Post-Restoration (15 yr)
- Post-Restoration (20 yr)
- Post-Restoration (other)

(2) Stream Response Potential: Use key words such as those included in diagram below, or regionally specific comparable diagrams.

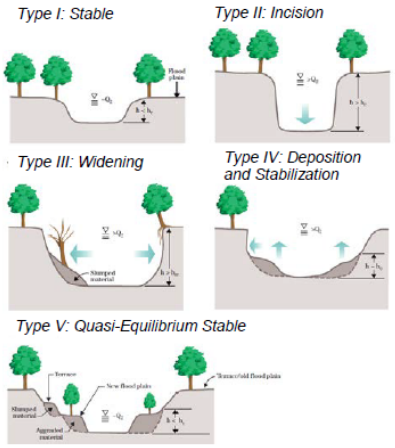


Figure 6: Channel cross sections illustrating the 5 CEM classes (NRCS 2007, Ch3).

(3) Describe dominant stream characteristics - Alluvial vs. non-alluvial, single thread vs. multi-thread, preferred classification (e.g., Church, Montgomery and Buffington, Rosgen, etc.), and channel evolution stage (Schumm et al., Booth and Fischenich, etc.). Additional guidance to be provided in User's Guide for this data element.

Design

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R
Watershed_ID	Number	Selected from dropdown by user.	R
Stream_ID	Number	Selected from dropdown by user.	R
Design _ID	Number	Autopopulated in spreadsheet (13-digit number = watershed ID plus two digits)	R
Stream Restoration Practice Type	Picklist	See Note 1.	R
Channel Length Restored (m)	Number		I
Riparian Width Restored (m)	Number		I
Reference/Guidance for Design	Short Text		S
Design Approach	Picklist	Picklist to be developed. e.g., reference, shear stress, sediment continuity	I
Fluxes Managed	Short Text	Describe fluxes managed: e.g., water, sediment, wood, other organic matter, nutrients, heat	R
Describe Goals of Restoration Design	Long Text	Enables additional discussion regarding targeted outcomes, building upon fluxes managed.	I
Describe Measures Implemented to Achieve Benefits:			R
Bank Stabilization Measures	Long Text	Describe practices implemented. e.g., barbs, vanes, bendway weirs, spur dikes, soil bioengineering, toe wood, log jams , rock walls, riprap	R
Bed Stabilization Measures	Long Text	Describe practices implemented. e.g., grade control, vanes, weirs, drops	R
Riparian Condition/Buffer Reestablishment	Long Text	Describe practices implemented. Enter none or unknown if information not available.	R
Floodplain Connectivity/Reconfiguration	Long Text	Describe practices implemented. Enter none or unknown if information not available.	R
Habitat Enhancement/Instream Features	Long Text	Describe practices implemented. Enter none or unknown if information not available.	R
Channel Reconfiguration/Planform Changes	Long Text	Describe practices implemented. Enter none or unknown if information not available.	R
Barrier Removal/Fish Passage	Long Text	Describe practices implemented. Enter none or unknown if information not available.	R
Other Approaches	Long Text	Describe practices implemented (e.g., fencing, beaver management). Enter none or unknown if information not available.	R
Other Characteristics:			
Design Return Period(s) (yr)	Short Text	Describe design return period(s).	S
Operation, Maintenance and Replacement Description/Frequencies	Long Text		S
Expected Stabilization/Establishment Period (months)	Number		S
Expected Response Time (range of yrs)	Text		S
Expected Design Life (range of years)	Text	Longevity of practices will vary depending on the design and other factors. Include basis of calculation or estimate.	S
Comments	Long Text		S

Practice Design Notes:

Note 1: Picklist for Stream Restoration Practice Type (general)
Redirective Practice
Resistive Practice
Grade Control
Flow Control
Riparian Condition/Buffer Reestablishment
Floodplain Connectivity/Reconfiguration
Habitat Enhancement/Instream Features
Channel Reconfiguration/Planform Changes
Barrier Removal/Fish Passage
Passive Approaches (e.g., fencing, beaver reintroduction)

Monitoring_Setup

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R
Watershed_ID	Picklist	Selected from picklist generated from previous input by user.	R
Stream_ID	Picklist	Selected from picklist generated from previous input by user.	R
MS_ID	Number	Autopopulated in spreadsheet	R
Monitoring Station Name	Short Text	Multiple monitoring station records (rows) can be added in this table. User-defined monitoring station name (or monitoring unit name), e.g., Up-1, Down-1, Reach-1, Reach-2. If same location is monitored over a phased implementation period for major improvements, create a new monitoring station ID for new major phases so that data are not comingled.	R
Monitoring Station Type	Picklist	Picklist to be developed. e.g., pre-restoration, post-restoration, upstream, downstream, reference/control, other.	R
Decimal Latitude	Number		I
Decimal Longitude	Number		I
Additional Spatial Information	Short Text	Monitoring station distance from project (approximate).	I
Major Influences during Monitoring Period	Short Text	e.g., large storms, drought, forest fire, etc.	I
Describe Protocol(s) Followed	Short Text	e.g., USGS Techniques of Water-Resources Investigations, Rapid Bioassessment Protocol (Barbour et al. 1999), others. Note: specific laboratory methods are requested for each chemical result in Monitoring_Chem.	I
Describe Equipment/Instrumentation	Short Text	e.g., ISCO automated sampler, bedload sampler	I
Describe Calculation Methods	Short Text	Most applicable for "physical" monitoring data.	I
Comments	Short Text		s
Data Types Collected at Monitoring Station:			
Chemical	Yes/No		R
Hydrologic/Hydraulic	Yes/No		R
Biologic	Yes/No		R
Physical	Yes/No		R

Note: User-assigned narrative names for test site, watershed, stream and design may be "carried" in this table in addition to numeric IDs to improve user friendliness for inexperienced database users.

Monitoring_Events

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R
Event_ID	Number	Autopopulated in spreadsheet	R
Monitoring Event Period	Picklist	Event, Annual, Multi-year	R
General Monitoring Date(s)	Short Text	General date description or period monitored in text format.	R
Start Date	Date/Time	Applies to a series of individual sample dates.	I
End Date	Date/Time		S
Start Time	Date/Time		S
End Time	Date/Time		S
Monitoring Trigger	Short Text	e.g., routine, post 5-year event, etc.	I
Monitoring Data Types Collected:			
Chemical Data (Y/N)	Yes/No	Water quality data.	R
Hydrologic Data (Y/N)	Yes/No	Hydrologic data include precipitation, flow, groundwater, etc. Ideally flow data will be provided with water quality samples.	R
Biological Data (Y/N)	Yes/No	Biological data (e.g., fish, macroinvertebrates).	R
Physical Data (Y/N)	Yes/No	Channel and riparian corridor-related measurements.	R
Other	Short Text		S

Monitoring_Chem

Data Element	Data Type	Entry Options/Notes	Priority Level
MS_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Event_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Monitoring Station Name	Picklist	Selected from picklist generated from previous input by user.	R (if data provided)
Sample Type	Picklist	Picklist to be developed (e.g., flow-weighted composite, grab)	R
Flow Condition	Picklist	Picklist to be developed (e.g., baseflow, storm flow, unspecified)	R
Reported Statistic Type	Picklist	Picklist to be developed (e.g., total, average, etc.)	R
Characteristic Monitored	Picklist	Picklist to be developed (e.g., phosphorus, nitrogen, TSS, temperature).	R
Sample Fraction Monitored	Picklist	Picklist to be developed (e.g., Total, Total Recoverable, Dissolved, Unspecified, Other)	R
Result	Number	Results may be concentrations and/or mass (loads), or other.	R
Units	Short Text	Picklist to be developed. e.g., kg/yr, mg/L	R
Qualifier	Picklist	Picklist to be developed. U-nondetect, J-estimated, etc.	R
Method	Short Text	Laboratory Method, Field Method, etc.	I
Detection Limit	Number	Provide in same units as result.	I
Comments	Short Text		S

Monitoring_Hydro

Data Element	Data Type	Entry Options/Notes	Priority Level
MS_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Event_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Monitoring Station Name	Picklist	Selected from picklist generated from previous input by user.	R (if data provided)
Media	Picklist	Surface Flow, Groundwater, Pore Water, Precipitation	R
Reported Statistic Type	Picklist	Picklist to be developed. e.g., total, average, median	R
Characteristic Monitored	Picklist	Picklist to be developed. e.g., Depth, Volume, Flow Rate, Velocity, Percent Saturation, Shear Stress, Stream Power, Other	R
Result	Number		R
Units	Short Text	Picklist to be developed. e.g., mm, cm, m, m3/sec	R
Stream Gauge Data Available	Yes/No	Identify whether stream gauge data are available to support study. If so, identify gauge in comments.	S
Comments	Short Text		S

Monitoring_Bio

Data Element	Data Type	Entry Options/Notes	Priority Level
MS_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Event_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Monitoring Station Name	Picklist	Selected from picklist generated from previous input by user.	R (if data provided)
Biological Data Type	Short Text	User defined. e.g., erosion rate, bedload, suspended load, vegetative coverage, canopy coverage	R
Reported Statistic Type	Short Text		R
Characteristic Reported	Short Text	e.g., % coverage, stems/m2, m/day	R
Result	Number	e.g., basis of measurement, calculation, depth integrated sample technique	R
Units	Short Text		R
Comments	Short Text		S

Monitoring_Phys

Data Element	Data Type	Entry Options/Notes	Priority Level
MS_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Event_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Monitoring Station Name	Picklist	Selected from picklist generated from previous input by user.	R (if data provided)
Characteristic Monitored	Short Text	User defined. e.g., canopy coverage, erosion rate, vegetative coverage	S
Result	Number		S
Units	Short Text	% coverage, stems/m2	S
Method	Short Text	Basis of measurement, calculation.	S
Comments	Short Text		S

This general table is provided as an initial placeholder to enable further development of this table in the future.

Costs

Data Element	Data Type	Entry Options/Notes	Priority Level
Site_ID	Number	Autopopulated in spreadsheet	R (if data provided)
Design_ID	Picklist	Selected from picklist generated from previous input by user.	R (if data provided)
Year of Cost Estimate	Date/Time	4-digit year	S
Cost Data Type	Picklist	See Note 1.	S
Cost Period	Picklist	Total, Annual, Event	S
Cost	Currency		S
Description of Items Included in Cost	Short Text	User's Guide will further describe information that should be included in narrative description.	S
Describe Funding Sources	Picklist	Public, Private, Public-Private, Other	S
Comments	Long Text		S

(1) Cost Data Type Picklist (allows a range of specificity from "lumped" costs to individual cost components):

Total Capital Costs
Materials and Construction
Engineering
Permitting
Maintenance
Rehabilitation
Contingency (if contigency fund provided)
Whole Life Cycle Cost (if whole life cycle cost selected, duration of life cycle must be described in Description of Items Included in Cost)
Monitoring