

# Moving Forward: Stream Restoration BMPs on Non-Urban Lands

June 18th, 2020

# WQGIT December 9th

- **Decision:** The WQGIT approved the Stream Restoration Prevented Sediment Memo (with subsequent added language to address PA concerns).
- **Action:** The project leads of the Stream Restoration Prevented Sediment Memo will add clarifying language that indicates the memo is **only for urban stream restoration**, with the understanding that the AgWG will create their own expert panel regarding non-urban stream restoration BMPs.
- **Grandfathering Clause:** All new definitions, qualifying conditions and Protocol 1 methods will **take effect on July 1, 2021**.

**FINAL Report**  
**USWG Approved: 10/15/19**  
**WQGIT Approved: 12/9/19**  
**Revised: 2/18/20**

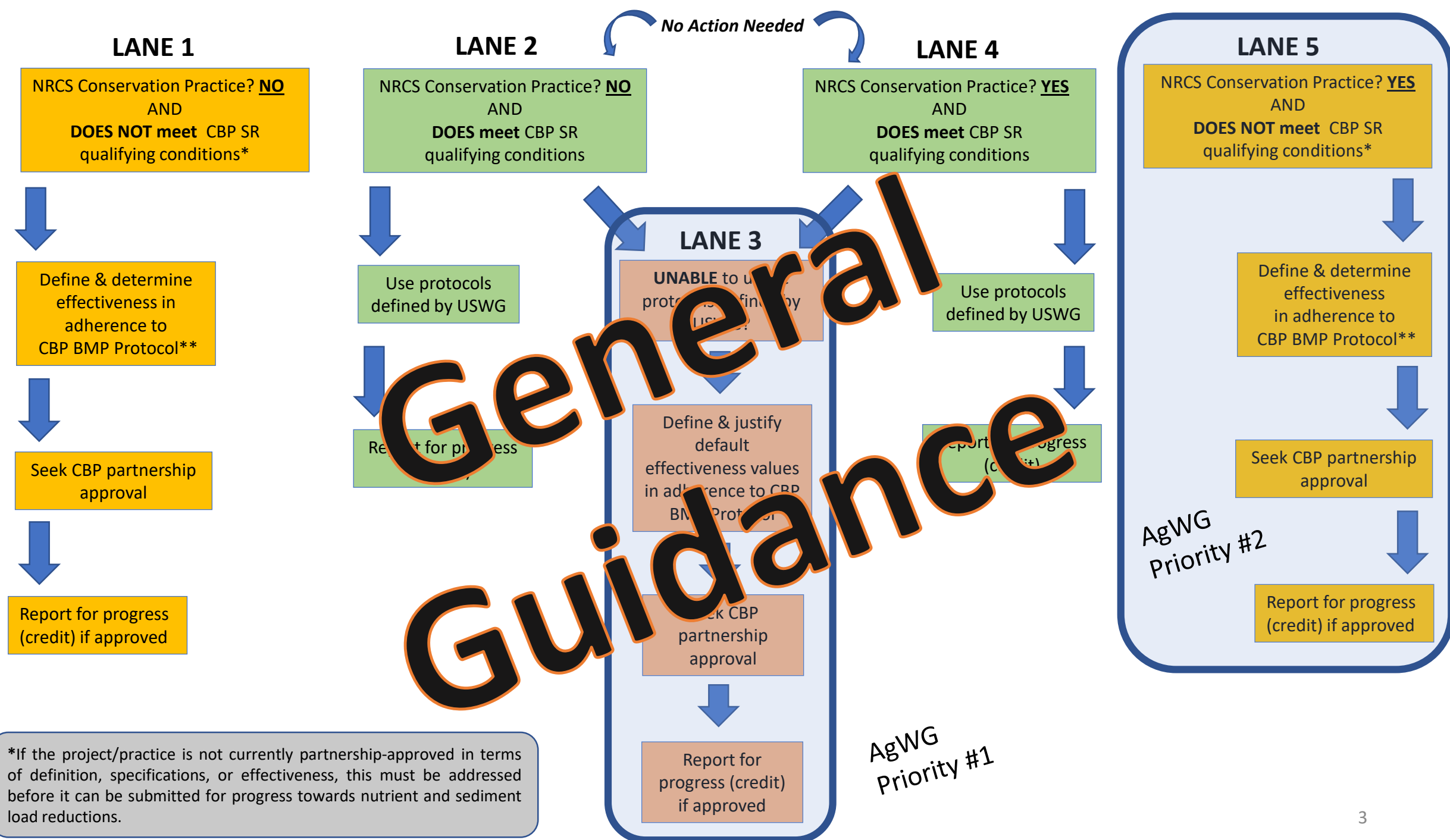
Consensus Recommendations  
for Improving the Application of the Prevented Sediment Protocol  
for Urban Stream Restoration Projects Built for Pollutant Removal Credit



Drew Altland, Joe Berg, Bill Brown, Josh Burch,  
Reid Cook, Lisa Fraley-McNeal, Matt Meyers,  
Josh Running, Rich Starr, Joe Sweeney,  
Tess Thompson, Jeff White and Aaron Blair

October 15, 2019

Prepared by:  
David Wood, Chesapeake Stormwater Network



## LANE 2

NRCS Conservation Practice? **NO**  
AND  
**DOES meet** CBP SR  
qualifying conditions

## LANE 4

NRCS Conservation Practice? **YES**  
AND  
**DOES meet** CBP SR  
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## LANE 3

**UNABLE** to utilize  
protocols defined by  
USWG?

Define & justify  
default  
effectiveness values  
in adherence to CBP  
BMP Protocol

Seek CBP  
partnership  
approval

Report for  
progress (credit)  
if approved

## ISSUE #1: Defaults

The USWG 2019 Prevented Sediment report recommends discontinuing use of the 2013 EP report's overall default removal rates for TN, TP and TSS, thus requiring submission of site-specific pollutant load calculations for each SR project.

- Site-specific collection of data for bulk density and nutrient concentrations may not be possible or available
  - Without a default for load reduction- **incentive for implementation may be lost.**
- Defaults based on minimal data
  - May not be representative of non-urban projects
  - May **over-estimate effectiveness** of non-urban projects
- **More and better data may be available in 2020**

## ISSUE #2: NRCS Conservation Practice Standards

States must decide if an USDA-NRCS funded project meets the qualifying conditions defined by the USWG.

- Detailed NRCS project information not available to states
- NRCS supports many projects: accurate accounting of WQ benefits from these stream restorative practices is imperative

USGS  
compiles  
NRCS data



NRCS data  
sorted into  
state BMPs  
names



Submitted to  
NEIEN



Mapped to  
Scenario  
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category



Urban Stream  
Restoration  
Urban Stream  
Restoration Protocol  
1,2,3  
Non-Urban Stream  
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### LANE 5

NRCS Conservation Practice? **YES**  
AND  
**DOES NOT meet** CBP SR  
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Define & determine  
effectiveness  
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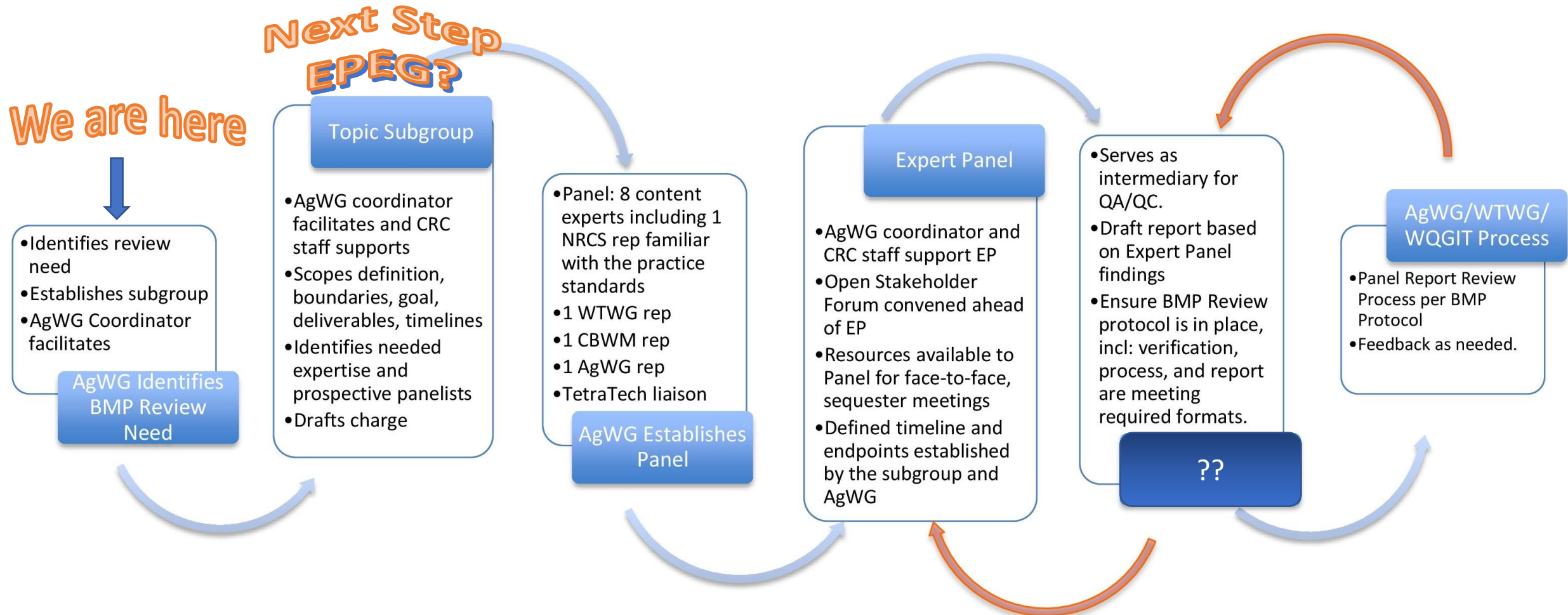
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# Expert Panel Establishment Group (EPEG)

*A good faith effort towards a science-based approach*



# EPEG Basics

## Temporary ad hoc group

- Develops a recommendation report
  - preliminarily defines how the proposed BMP(s) could address an agricultural load on specific land uses
  - Provides a scope of work & charge for BMP evaluations which **can**\* lead to the formation of BMP Expert Panels
    - Suggest appropriate expertise for BMP Expert Panel members.

## Membership

- Individuals with an expertise in the related subject matter (5-8 people)
  - AgWG, academic institutions, federal, state or county agencies, and non-governmental organizations without a potential conflict of interest.
- Nominated, vetted and approved by AgWG

\*EPEG may or may not result in an BMP Expert Panel, depending on recommendations made.

# Summary of Feedback Received

## **General support for an EPEG**

- OK

## **Support for evaluating default values for NRCS practices NOT re-evaluating protocols**

- *Protocols for evaluating effectiveness of stream restoration projects have been approved by the CBP partnership.*



# Summary of Feedback Received (cont'd)

## Difference btw “urban” & “non-urban” unclear:

Does urban =

- MS4 areas?
- Developed land use?
- % of developed vs ag land use (50/50, 60/40)?

Should be clarified regarding practical application of the protocols in both urban & non-urban sectors.

- *Agreed. Part of EPEG charge.*

## Defining the Terms

### CBP Stream Restoration (2013):

any NCD, RSC, LSR\* or other restoration project

that **meets the qualifying conditions** for credits,

including environmental limitations and stream functional improvements.

The Panel did not have a basis to suggest that any single design approach was superior,

as any project can fail if it is inappropriately located, assessed, designed, constructed, or maintained.

\*NCD = Natural Channel Design; RSC = Regenerative Stormwater Conveyance; LSR = Legacy Sediment Removal

### Urban

subwatershed >5% impervious cover  
(state definitions may vary)

### Non-Urban

subwatershed <5% impervious cover  
primarily composed of forest, ag, or  
pasture land uses  
(state definitions may vary)

Note:

Greater than 80% of the total feet of stream restoration reported in NEIEN\*\* for 2019 was in the “non-urban” category.

\*\*NEIEN = National Environmental Information Exchange Network  
(where jurisdictions report implemented BMPs)

# Summary of Feedback Received (cont'd)

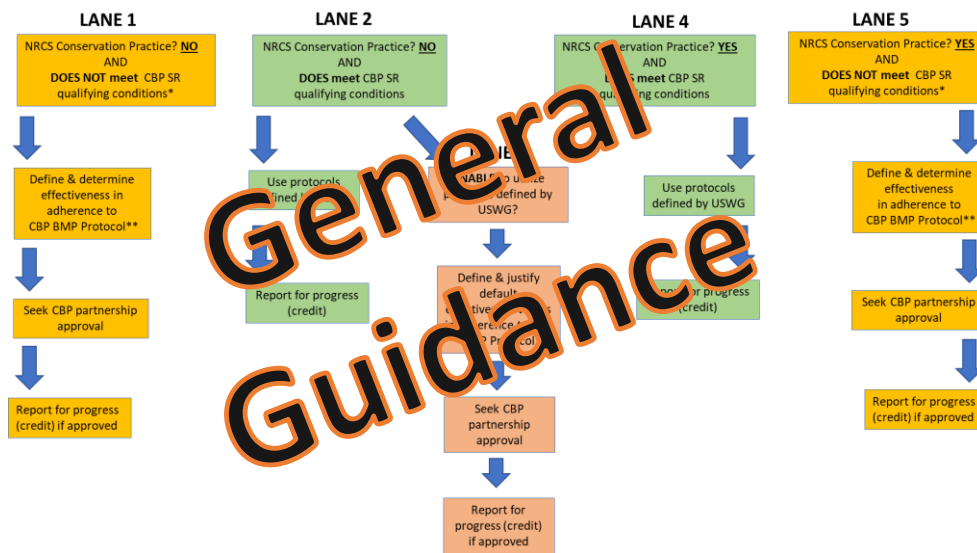
## What is the charge of the EPEG?

- *An EPEG is an adhoc group that creates a charge for an Expert Panel or recommends an alternative option (i.e. the charge is to create a charge).*
- *Language added to “[Memo](#)” to focus the EPEG under “Next Steps.”*

1. Clarify the definitions of “urban” vs. “non-urban” in relation to stream restoration projects (with consultation from USWG representatives).
2. Assess available scientific literature and field data to address Issue #1 (default removal rates; Figure 3, Lane 3) and appropriate next step following that assessment.
3. Identify and characterize the stream-related NRCS projects implemented in the Chesapeake Bay watershed and determine if/how they relate to the approved CBP SR qualifying conditions. Recommend appropriate next steps based on determination (NRCS CPS projects; Figure 3, Lane 5).

# Summary of Feedback Received (cont'd)

**Fig. 3 appears to give authority to CBP partnership to approve/deny a jurisdiction's determination on a project when the USWG protocols are not followed.**

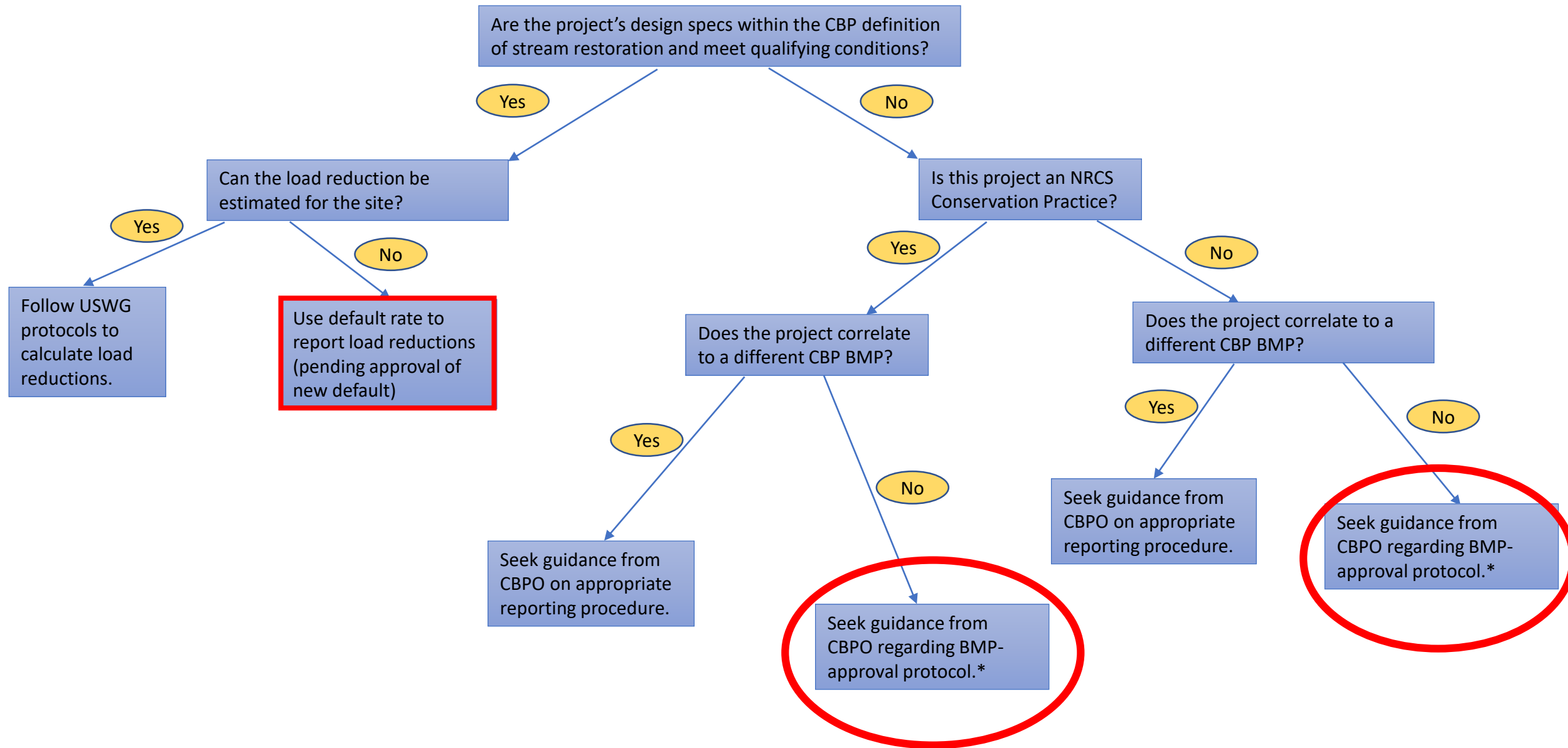


*Unintended. Language added to “Memo” to clarify:*

*Figure 3 provides general guidance for jurisdictions on classifying stream-related projects, in light of the USWG’s recent updates of the 2013 EP report and the December request from the WQGIT.*

*When preparing BMP data for submission to NEIEN, it is up to each jurisdiction to decide if a stream-related project meets the SR qualifying conditions defined by the USWG.*

*Figure 3: CBW jurisdictions decide through their tracking and reporting mechanisms to which lane their stream-related projects belong. <sup>11</sup>*



\*If the project/practice is not currently partnership-approved in terms of definition, specifications or effectiveness, this must be addressed before it can be submitted for progress towards nutrient and sediment load reductions.



*From this discussion:*

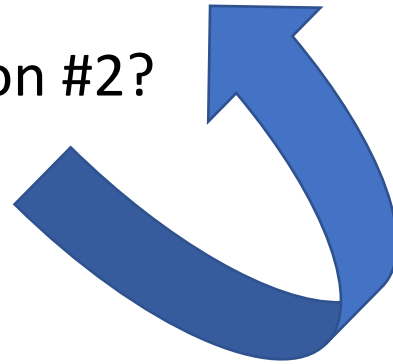
Decide on steps forward for clarifying the issues to be addressed to ensure that states can continue to rely on stream restoration on non-urban land as a creditable BMP:

- **Decision:** The AgWG is asked to approve the formation of an Expert Panel Establishment Group (EPEG) to address concerns that have arisen regarding non-urban stream restoration tracking, reporting, and crediting
  - Timeline?
- **Decision:** The AgWG is asked to approve language of the associated “Memo to the Water Quality GIT Regarding Non-Urban Stream Restoration Best Management Practices,” a summary of concerns and proposed next steps.
- June 22 Water Quality GIT call: Quick update



# Summary of Feedback Received (Apr 2020)

- Default Removal Rates for non-urban stream restoration are needed
  - Support for reviewing and revising values based on new field data
  - Concern that default rates are not scientifically defensible
    - Can we find away to get soil data and monitoring for individual projects?
- Concern that CBP “Stream Restoration” BMP does not address all stream projects beneficial to water quality (both NRCS and non-NRCS)
  - These practices “need a home”
- Expert Panels are resource intensive
  - Is it worth the effort?
  - It will take too long
    - Incremental Recommendations- expediting element of EP charge and review is allowable
- Can we do both Option #1 and Option #2?
  - An ad hoc group for the default rate
  - An Expert Panel later...



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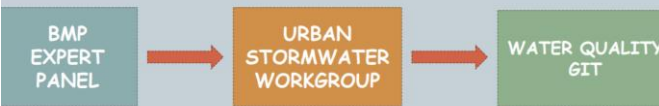


# Possible Paths Forward:

	Advantages	Disadvantages
<b>Option #1: Form an Expert Panel</b>  Issue #1: Default recovery rate (Lane 3)  Issue #2: NRCS Conservation Practice Standards (Lane 5)  Issue #3: Credit duration ( <a href="#">WQGIT exercise</a> )	<ul style="list-style-type: none"> <li>• Fits within CBP BMP Expert Panel protocol- avoid controversy</li> <li>• Address all issues</li> </ul>	<ul style="list-style-type: none"> <li>• Long process, likely 1 year +</li> <li>• Resource intensive</li> <li>• No dedicated funds for BMP Expert Panels</li> </ul>
<b>Option #2: Ad hoc group of experts and specialists</b>  Issue #1: Default recovery rate (Lane 3)  Issue #3: Credit duration ( <a href="#">WQGIT exercise</a> )	<ul style="list-style-type: none"> <li>• <i>Might</i> be faster</li> <li>• Addresses #1 priority issue (Lane 3)</li> </ul>	<ul style="list-style-type: none"> <li>• Need to justify with CBP BMP Expert Panel protocol</li> <li>• Subject to scrutiny</li> <li>• Will not address NRCS CPS questions</li> <li>• Must work within “qualifying conditions” for stream restoration projects defined by USWG</li> <li>• Will not address projects outside of USWG conditions</li> </ul>

# Background: 2013 Report & Approval Process

- 7 calls, 2 workshops, 5 drafts over 12 months
- Product: Technical Memo and 5 Appendices



The Agriculture Work Group, Watershed Technical Workgroup and Stream Habitat GIT is also actively involved in the review process.

## Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects

Joe Berg, Josh Burch, Deb Cappuccitti, Solange Filoso, Lisa Fraley-McNeal, Dave Goerman, Natalie Hardman, Sujay Kaushal, Dan Medina, Matt Meyers, Bob Kerr, Steve Stewart, Bettina Sullivan, Robert Walter and Julie Winters

Accepted by Urban Stormwater Work Group (USWG): February 19, 2013  
Approved by Watershed Technical Work Group (WTWG): April 5, 2013  
Final Approval by Water Quality Goal Implementation Team (WQGIT): May 13, 2013  
Test-Drive Revisions Approved by the USWG : January 17, 2014  
Test-Drive Revisions Approved by the WTWG: August 28, 2014  
Test-Drive Revisions Approved by the WQGIT: September 8, 2014



Prepared by:  
Tom Schueler, Chesapeake Stormwater Network  
and  
Bill Stack, Center for Watershed Protection

Dec 2012

Joint Meeting: AgWG, USWG, WTWG

Jan 2013

AgWG Discussion

Feb 2013

USWG approval (Intent to revisit in 2017)

April 2013

WTWG approval- "interim rate" to be used as default removal rate for historic and new projects that cannot conform to protocols

May 2013

Water Quality GIT approval (WQGIT)

From minutes:

*Davis-Martin: Does this report apply to non-urban stream restoration until non-urban is considered separately?*

*Stack: Yes, the AgWG was supportive of these protocols until such time as an AgWG expert panel is convened to make recommendations for non-urban stream restoration specifically.*

2014

"Test Drive Revisions" approved by USWG, WTWG, WQGIT including revised default removal rate

## Section 4.5 Applicability to Non-Urban Stream Restoration Projects

As noted in Section 2.3, the CBP-approved removal rate for urban stream restoration projects has been extended to non-urban stream restoration projects. Limited research exists to document the response of non-urban streams to stream restoration projects in comparison to the still limited, but more extensive literature on urban streams.

However, many of the papers reviewed were from rural streams (Bukaveckas, 2007; Ensign and Doyle, 2005; Mulholland et al., 2009; and Merritts et al., 2010).

The Panel was cognizant of the fact that urban and non-urban streams differ with respect to their hydrologic stressors, nutrient loadings and geomorphic response. At the same time, urban streams also are subject to the pervasive impact of legacy sediments observed in rural and agricultural watersheds (Merritts et al., 2011). The Panel further reasoned that the prevented sediment and floodplain reconnection protocols developed for urban streams would work reasonably well in rural situations, depending on the local severity of bank erosion and the degree of floodplain disconnection.


Consequently, the Panel recommends that the urban protocols can be applied to non-urban stream restoration projects, if they are designed using the NCD, LSR, RSC or other approaches, and also meet the relevant qualifying conditions, environmental considerations and verification requirements.

At the same time, the Panel agreed that certain classes of non-urban stream restoration projects would not qualify for the removal credit. These include:

- Enhancement projects where the stream is in fair to good condition, but habitat features are added to increase fish production (e.g., trout stream habitat, brook trout restoration, removal of fish barriers, etc.)
- Projects that seek to restore streams damaged by acid mine drainage
- Riparian fencing projects to keep livestock out of streams

Limited research for non-urban stream restoration

Urban and non-urban streams are different, but developed protocols should work reasonably well



Protocols can be used for non-urban projects if all relevant conditions are met\*

\*EP report did not encompass all ag BMP practices being implemented for stream restoration

AgWG would use recommendations until revised by future sector-specific EP

# CBP Stream Restoration BMP

## Basic Qualifying Conditions (abbreviated)

*Designed to promote a watershed-based approach for screening and prioritizing stream restoration projects to improve stream function and habitat.*

### **Stream reach must be greater than 100 feet in length:**

- Still actively enlarging or degrading in response to upstream development or adjustment to previous disturbances in the watershed (e.g., a road crossing and failing dams)
- Most likely located on first- to third-order streams

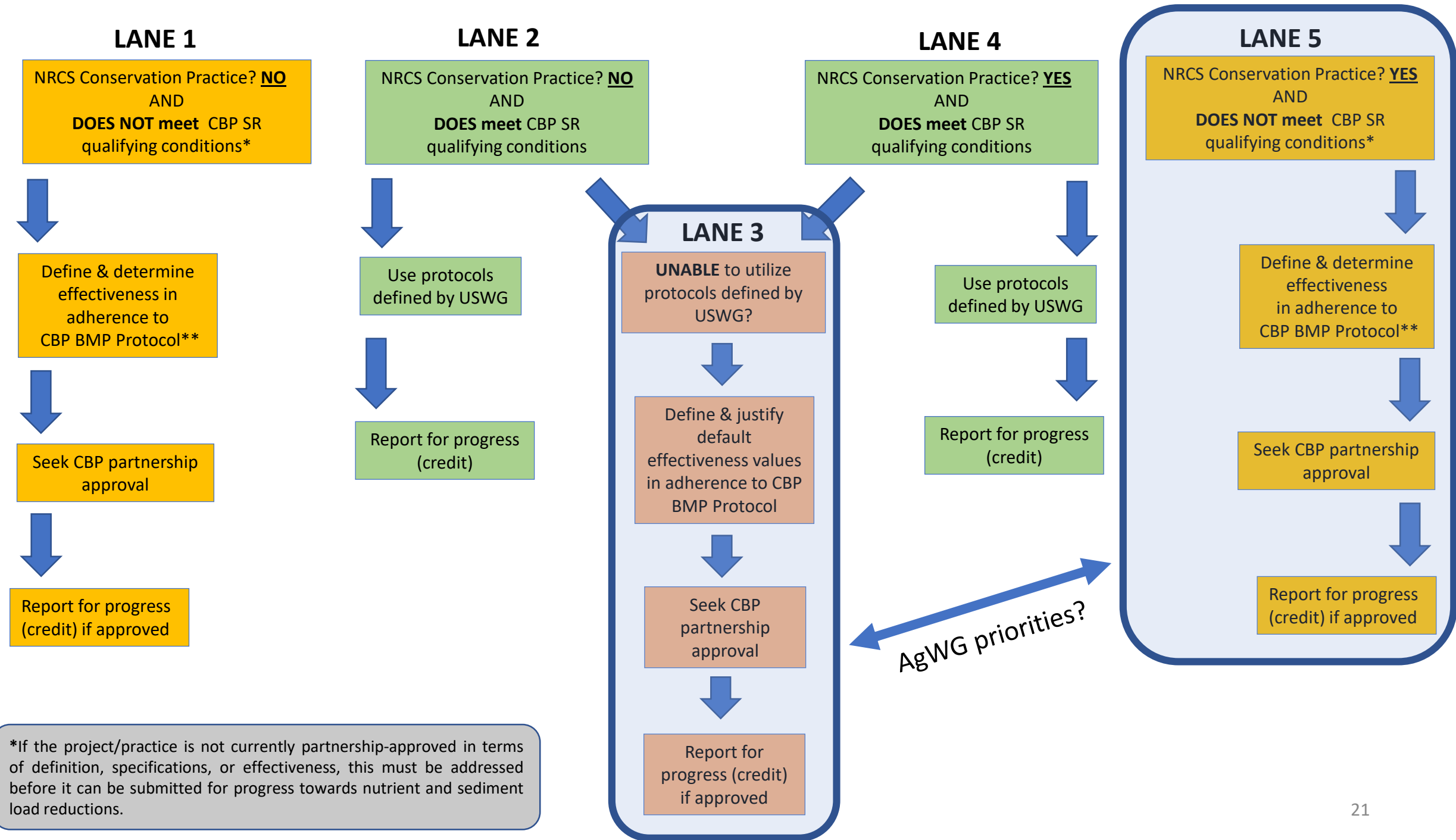
### **Must utilize a comprehensive approach to stream restoration design:**

- Addressing long-term stability of the channel, banks, and floodplain

### **Special consideration to projects that are explicitly designed to:**

- Reconnect the stream with its floodplain
- or
- Create wetlands and instream habitat features known to promote nutrient uptake or denitrification.

**Possibility that certain project design conditions that must be satisfied in order to be eligible for credit under one or more of the specific protocols.**





# Quantifying Stream Restoration Load Reductions

(2013 Expert Panel)

Summary of Stream Restoration Credits for Individual Restoration Projects <sup>1, 2</sup>					
<i>Protocol</i>	<i>Name</i>	<i>Units</i>	<i>Pollutants</i>	<i>Method</i>	<i>Reduction Rate</i>
1	Prevented Sediment (S)	Pounds per year	Sediment TN, TP	Define bank retreat using BANCS or other method	Measured N/P content in streambed and bank sediment
2	Instream Denitrification (B)	Pounds per year	TN	Define hyporheic box for reach	Measured unit stream denitrification rate
3	Floodplain Reconnection (S/B)	Pounds per year	Sediment TN, TP	Use curves to define volume for reconnection storm event	Measured removal rates for floodplain wetland restoration projects
4	Dry Channel RSC as a Retrofit (S/B)	Removal rate	Sediment TN, TP	Determine stormwater treatment volume	Use adjustor curves from retrofit expert panel
<sup>1</sup> Depending on project design, more than one protocol may be applied to each project, and the load reductions are additive. <sup>2</sup> Sediment load reductions are further reduced by a sediment delivery ratio in the CBWM (which is not used in local sediment TMDLs) S: applies to stormflow conditions, B: applies to base flow or dry weather conditions					

Additive  
Use one, two or all three!

OR

# Default Removal Rates

## 2013 Report

**One rate applies to entire project!**

Table 3. Edge-of-Stream 2011 Interim Approved Removal Rates per Linear Foot of Qualifying Stream Restoration (lb/ft/yr)			
Source	TN	TP	TSS*
Interim CBP Rate	0.20	0.068	56.11
Revised Default Rate	0.075	0.068	44.88 non-coastal plain 15.13 coastal plain
Derived from six stream restoration monitoring studies: Spring Branch, Stony Run, Powder Mill Run, Moore's Run, Beaver Run, and Beaver Dam Creek located in Maryland and Pennsylvania			
*To convert edge of field values to edge of stream values a sediment delivery ratio (SDR) was applied to TSS. The SDR was revised to distinguish between coastal plain and non-coastal plain streams. The SDR is 0.181 for non-coastal plain streams and 0.061 for coastal plain streams. Additional information about the sediment delivery ratio is provided in Section 2.5 and Appendix B.			

At its January 25, 2012 research workshop, the Panel concluded that there was no scientific support to justify the use of a single rate for all stream restoration projects (i.e., the lb/ft/yr rates shown in Tables 2 and 3).

The Watershed Technical Work Group decided in their April 1, 2013 meeting as part of their review of this report that the interim rate will be used as a default rate and will apply to historic projects and new projects that cannot conform to recommended reporting requirements as described in Section 7.1.



# Technical Groups to Improve Stream Restoration Protocols (USWG)

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Protocol	Name	Units	Pollutants	Method	Reduction Rate
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## Sept 2018 USWG Memo: **Formation of Technical Groups to Improve Stream Restoration Protocols**

*The Stream Restoration expert panel report ... continues to generate controversy among practitioners, researchers, managers and regulators... Both the public and private sector have struggled to properly apply the new protocols, given the fast pace by which this new nutrient credit has been implemented across the Bay watershed.*

See [Jan AgWG](#) meeting for review of process.

# WQGIT December 9th

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# Default Removal Rates

## Stream Restoration Prevented Sediment Report (*Dec 2019*)

### Stream Restoration Default Rates

The original expert panel provided default nutrient and sediment removal rates per linear foot of stream restoration. Due to the changes in how sediment and nutrient delivery is simulated in the new Chesapeake Bay Watershed Model, those default rates will differ for each project, depending on the stream's location in the watershed.

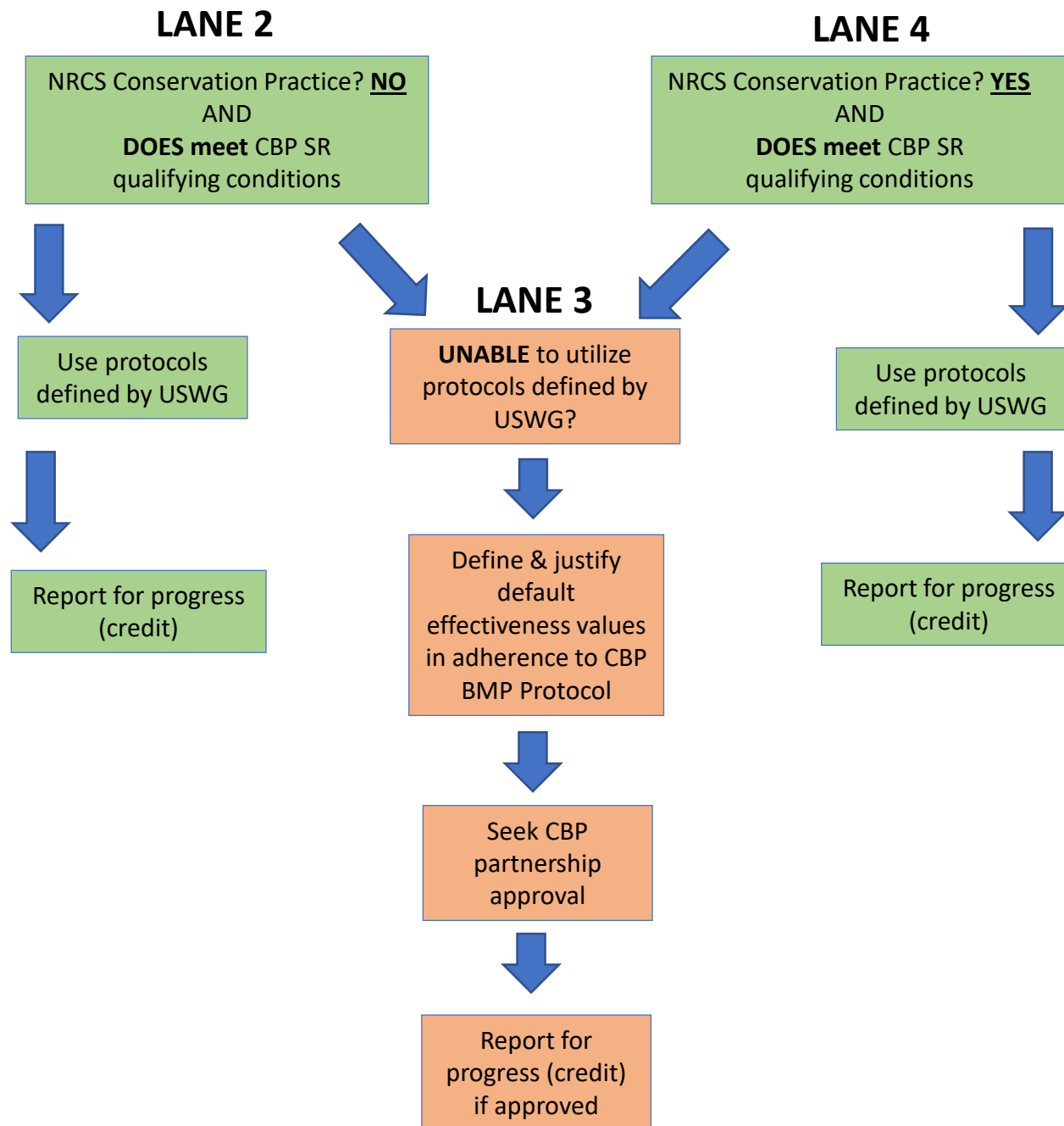
Practitioners who previously relied on the default rates for planning purposes should adjust the default rates in Table 5 by the sediment and nutrient delivery factors calculated using the steps in Appendix B in order to get an estimate based on planned linear feet of restoration.

**Table 5.** Default Nutrient and Sediment Reductions per Linear Foot of Qualifying Stream Restoration (lb/ft/yr), Applied at Edge-of-Stream.

	TN	TP	TSS
Reduction	0.075	0.068	248

The default rates should never be used for project reporting to the state, and thus should not be accepted as a credit after a new project has been completed. Practitioners should use the recommended new Protocol 1 guidelines above to determine the prevented sediment and nutrient erosion.

Only for urban  
stream restoration



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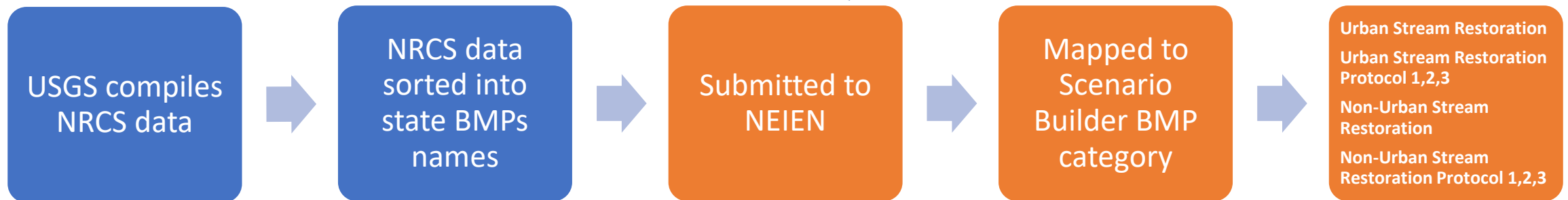
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# Non-Urban Projects Using Protocols?

- Each state has its own tracking and reporting processes...
- No state has reported lbs TN/TP/TSS reduced using *Non-Urban Stream Restoration Protocol* [1, 2, and/or 3] for progress as of 2019
  - Monitoring challenge?
  - Reporting challenge?
    - Are protocols being successfully reported?



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- More and better data may be available in 2020

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Urban Stream  
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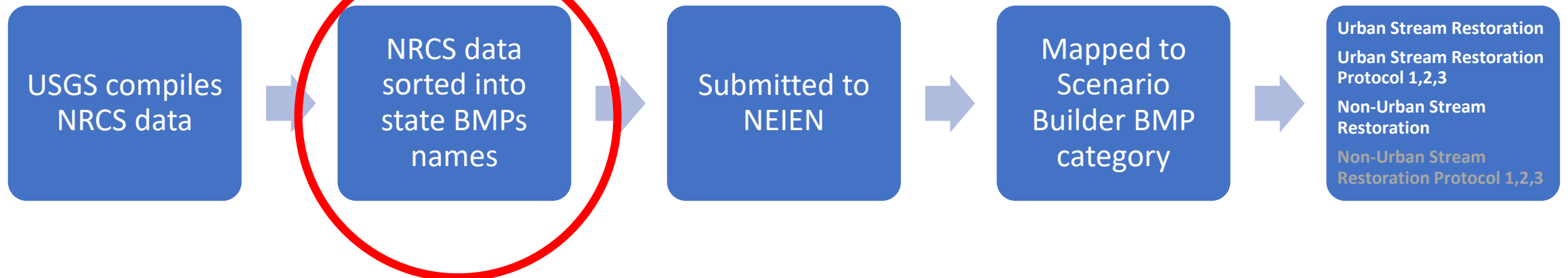


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# Relevant NRCS Practices

- Two NRCS Conservation Practice Standards (CPS) most likely to meet qualifying conditions (see [CAST](#) guidance)
- NRCS Conservation Practices are NOT embedded in NEIEN reporting structure

NRCS Code	NRCS Practice	Definition	Shape	Units	NRCS Lifespan	Sector- CAST	Practice Name- NEIEN	Status- NEIEN	Official BMP- CAST?	Credit Duration- NEIEN	Within Stream Restoration Guidelines?
395	Stream Habitat Improvement and Management	Improve, restore, or maintain the ecological fu...	Polygon	Ac	5	Ag	Soil Conservation and Water Quality Plans	Draft	Yes	10	NO
580	Streambank and Shoreline Protection	Treatment(s) used to stabilize and protect bank...	Line	Ft	20	Natural	Non Urban Stream Restoration	Release	Yes	10	?
584	Channel Bed Stabilization	Measure(s) used to stabilize the bed or bottom ...	Line	Ft	10	Natural	Non Urban Stream Restoration	Release	Yes	10	?





# ISSUE #3: Credit Duration

NEIEN Appendix 2019

## Duration of Stream Restoration Credit

- Max duration for the removal credits is 5 years
- Can be renewed based on a field performance inspection that verifies the project still exists, is adequately maintained and operating as designed.
- Duration of the credit is shorter than other structural urban BMPs, as these projects are:
  - subject to catastrophic damage from extreme flood events
  - have requirements for 3 to 5 years of post-construction monitoring to satisfy permit conditions



BMP_NAME	DEFAULT_SB_LAND_US	TARGET_U	CREDIT_DURATION
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 2	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 2	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5

## Documentation?

### AgWG Jan 2013 Minutes

- Urban Stream Restoration cont.
  - NGO comment on short length of credit life span based on value of investments
  - Response: renewal available via inspections for longer crediting period

NRCS Code	NRCS Practice	Definition	Shape	Units	Effective	Lifespan
580	Streambank and Shoreline Protection	Treatment(s) used to stabilize and protect bank...	Line	Ft	11/6/2018	20
584	Channel Bed Stabilization	Measure(s) used to stabilize the bed or bottom ...	Line	Ft	11/7/2018	10

### AgWG 2015 Credit Duration Discussions

## LANE 1

NRCS Conservation Practice? **NO**  
AND  
**DOES NOT meet** CBP SR  
qualifying conditions\*



Define & determine  
effectiveness in  
adherence to  
CBP BMP Protocol\*\*



Seek CBP partnership  
approval



Report for progress  
(credit) if approved



**Chesapeake Bay Program**  
*Science. Restoration. Partnership.*

## Best Management Practice (BMP) Expert Panels

### Independent Peer Review

- Protocol in accordance with [National Academy of Sciences](#) standard practices
- Effectiveness Estimates for Proposed BMPs

*The National  
Academies of*

SCIENCES  
ENGINEERING  
MEDICINE

### Key Components:

- Consistent
- Transparent
- Scientifically Defensible

BMP Expert  
Panel

Recommendations

Sector  
Workgroup

(e.g., Ag, Urban  
Stormwater,  
Wastewater)

Watershed  
Technical  
Workgroup

(Compliance with  
watershed model)

Water Quality  
Goal  
Implementation  
Team

(Partnership  
approval)

## LANE 5

NRCS Conservation Practice? **YES**  
AND  
**DOES NOT meet** CBP SR  
qualifying conditions\*



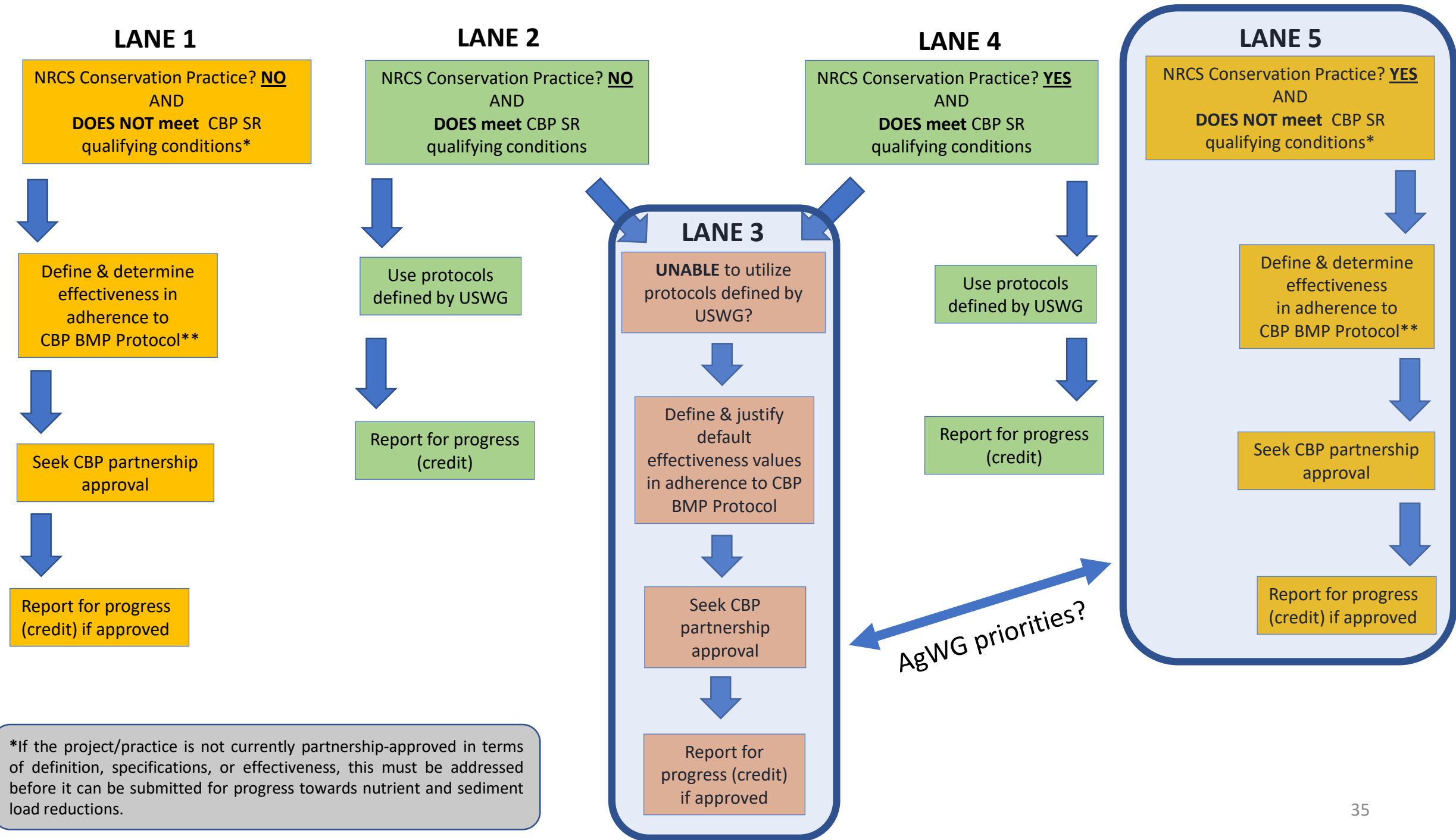
Define & determine  
effectiveness  
in adherence to  
CBP BMP Protocol\*\*

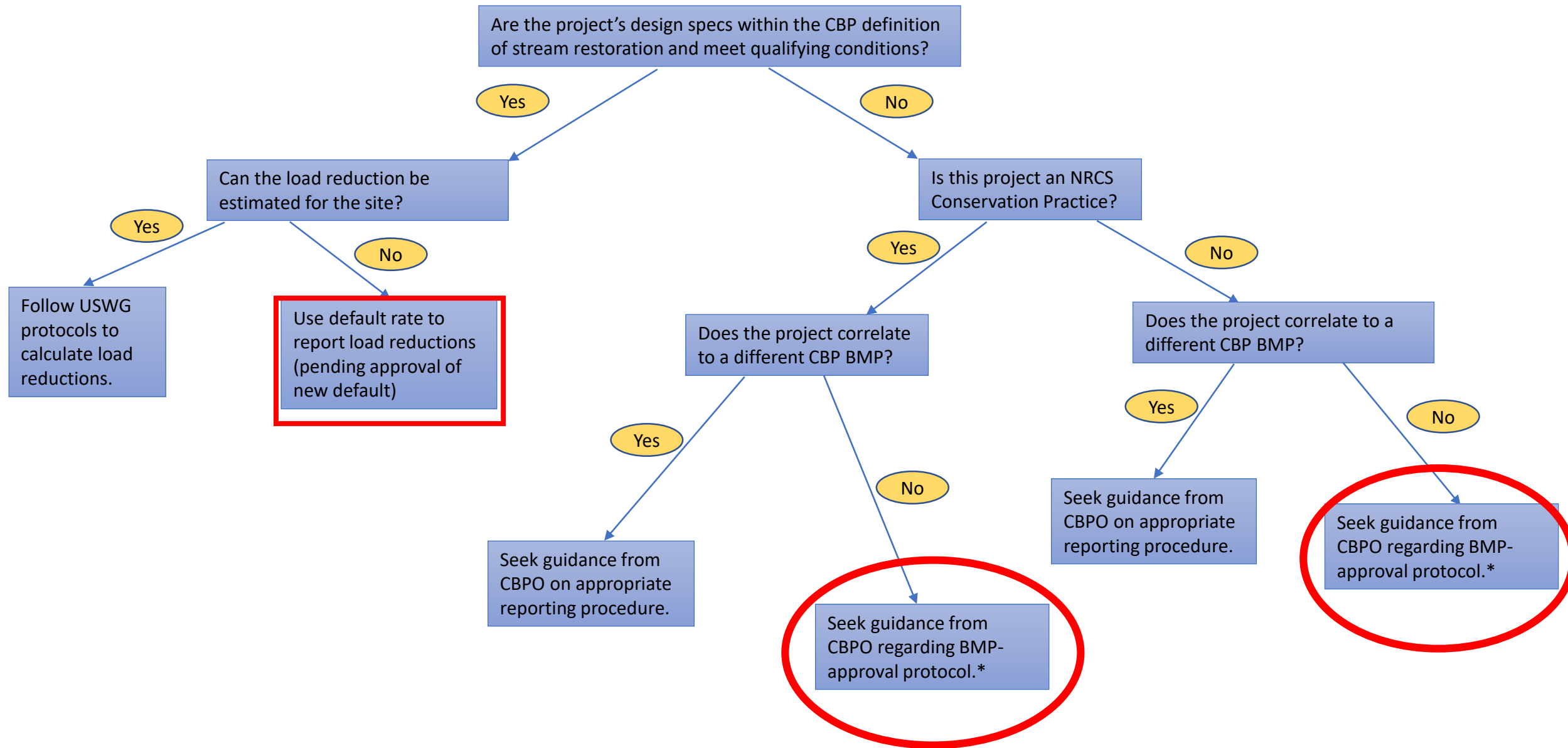


Seek CBP partnership  
approval



Report for progress  
(credit) if approved





\*If the project/practice is not currently partnership-approved in terms of definition, specifications or effectiveness, this must be addressed before it can be submitted for progress towards nutrient and sediment load reductions.