

## 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 nonurban 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

## Section 2.4

### Derivation of the New Default CBP-Approved Rate

Since the first stream restoration estimate was approved in 2003, more research has been completed on the nutrient and sediment dynamics associated with urban stream restoration. These studies indicated that the original credit for stream restoration was too conservative.

Chesapeake Stormwater Network (CSN) (2011) proposed a revised interim credit that was originally developed by the Baltimore Department of Public Works (BDPW, 2006). This credit included five additional unpublished studies on urban stream erosion rates located in Maryland and southeastern Pennsylvania. These additional studies were found to have substantially higher erosion rates than those originally measured at Spring Branch (Table 3).

The rationale of using the Baltimore City data review as the interim rate is based on the assumption that the higher sediment and nutrient export rates are more typical of urban streams undergoing restoration. The Commonwealth of Virginia requested that the higher rate in Table 3 be accepted as a new interim rate in December of 2011, and EPA Chesapeake Bay Program Office (CBPO) approved the rate in January 2012, pending the outcome of this Expert Panel. 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. As a result of the 6-month Test Drive, several projects resulted in excessively high removal rates when using the default rate, in some cases exceeding the watershed loading estimates. Further review of the studies used to develop the interim rate revealed that a 50% restoration efficiency was applied to the rate for TP, but not to the TN and TSS rates. The Expert Panel met to discuss this and the other observations from the 6-month test drive and determined the default rate should be adjusted for TN and TSS to make it consistent with TP. The only known study with TN and TSS removal efficiencies associated with stream restoration is Spring Branch (Stewart, 2008) in Baltimore County. The Panel felt the efficiencies from this study should be applied to the default rate (37.5% for TN and 80% for TSS; Table 3, Row 3). Additional information about the revised default rate is provided in Appendix G.

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). Sediment and nutrient load reductions will always differ, given the inherent differences in stream order, channel geometry, landscape position, sediment dynamics, restoration objectives, design philosophy, and quality of installation among individual stream restoration projects. Instead, the Panel focused on predictive methods to account for these factors, using various watershed, reach, cross-section, and restoration design metrics.

**Table 3. Edge-of-Stream 2011 Interim Approved Removal Rates per Linear Foot of Qualifying Stream Restoration (lb/ft/yr)**

Source	TN	TP	TSS*
<b>Interim CBP Rate</b>	0.20	0.068	56.11
<b>Revised Default Rate</b>	<b>0.075</b>	<b>0.068</b>	<b>44.88 non-coastal plain</b> <b>15.13 coastal plain</b>

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.