Principles for Verifying Stream Restoration Projects

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Verification of the initial and long term performance of urban and non-urban stream restoration projects is critical to ensure that pollutant reductions are achieved and sustained across the watershed and provides a means by which state agencies/regulators can also measure functional loss or gain related to these projects. The Principles included in this document are based on the premise that the most important step to assure a project is performing correctly is to first assure that the project is designed correctly and supports clearly articulated goals and objectives. The Principles were adapted from the 2012 Urban Stormwater Workgroup Memo, *Final Recommended Principles and Protocols for Urban Stormwater BMP Verification*, because elements are applicable to stream restoration and should guide the verification process in each of the Bay States. In addition, the Maryland Department of the Environment and U.S. Fish and Wildlife Service are partnering to develop guidelines for a detailed function-based stream assessment method, a rapid function-based stream assessment method, and a stream restoration design review method (USFWS, 2012). These methods will be based on the guidelines provided in the document: *A Function-based Framework for Stream Assessment and Restoration Projects* (Harman et al, 2012) (Stream Functions Framework). While these methods include assessments for the purposes of design, they ensure that the design supports clearly articulated goals and objectives which are critical to the verification and evaluation process. Further, monitoring stream restoration projects is key to make links between performance and goals. Although developed for Maryland, these methods could serve as a model for all Bay states to provide the basis for a consistent function-based stream assessment protocol used in the verification of stream restoration projects. The USFWS are also finalizing a performance-based Rapid Stream Restoration Monitoring Protocol which will provide greater detail in verifying project performance after construction.

1. *Verification Methods will Differ Slightly among Individual Stream Restoration Projects.* The level of detail needed for verification will be based on the type of project (natural channel design, regenerative stormwater conveyance, and removal of legacy sediments), as well as the size, complexity, and landscape position of the proposed project. The stream assessment methods that are being developed by USFWS (2012) include a post construction checklist which may serve as a useful guide to develop project specific verification methods . The value of using this approach is that it ties together the assessment, design and project goals to the verification process.

2. *Maintenance and Monitoring in Performance.* Regular inspections and maintenance of stream restoration projects are critical to ensure their pollutant removal performance is maintained and extended over time, as well as to maintain other local design objectives (e.g., habitat improvement, channel stability, and landscape amenity). Therefore, a core verification principle is to ensure that stream restoration projects are installed and maintained properly over their design life to qualify for their pollutant removal rates. To ensure this, verification protocols are needed to define (1) the frequency for field verification of stream restoration practices and (2) the process for downgrades if maintenance is not performed. All qualifying projects must have a designated authority responsible for development of a project maintenance program that includes routine maintenance and long-term repairs. The stream assessment method being developed by USFWS (2012) may serve as a useful guide to define maintenance triggers for stream restoration projects as well as the Rapid Stream Restoration Protocol that is under development. Again these tools are part of a comprehensive approach to stream restoration design that includes assessment, design and monitoring. The monitoring is the actual part of verification which can be used to determine if

the project is functioning as designed. If it is not functioning as designed, then the monitoring data may be used to identify factors such as improper construction or the need for maintenance.

3. *Utilize Existing Maintenance and Inspection Frameworks.* The existing MS4 and 404 Permit/401 Certification inspection and maintenance framework and local sediment control regulations for hundreds of communities in the Bay watershed should be the foundation of any stream restoration verification system for the Bay TMDL. Routine maintenance data collected under these frameworks will ultimately inform the verification process described in #8. In addition, maintenance and inspection included in state and federal agricultural cost-share programs should be incorporated into verification of non-urban stream restoration projects. The Habitat Goal Implementation Team (Habitat GIT) will work with the state and federal regulatory agencies to determine how their existing maintenance and inspection programs can support the Chesapeake Bay Program.

4. *Removal Rate Tied to function-based field methods*. These methods referenced in "Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration" are similar to those being developed by the USFWS that are cited above. The maximum duration for which the stream restoration pollutant removal rate applies is 5 years, which can be renewed based on a field performance inspection that verifies the project still exists, is adequately maintained, and is operating as designed. The protocols being developed by USFWS (2012) may be helpful in defining performance indicators to assess project performance.

5. *Stream Restoration Verification as Adaptive Management.* The purpose of verification is to credit appropriately the pollutant removal performance of existing and future stream restoration projects. Field assessments are used to identify which projects are working well and which ones require preventative or corrective maintenance to maintain their functions. In addition, field verification enables local governments to analyze their historical inventory of private and public stream restoration projects to identify which individual projects present the best opportunities to retrofit for additional sediment and nutrient reduction. The assessment tools used in verification may also be adapted to allow local governments to determine if other stream restoration objectives (e.g., habitat) are being met.

   Until recently, post-project monitoring has been rarely conducted to assess how well stream restoration projects meet their intended design objectives over time. Real world data collected on actual stream restoration performance enables local and state agencies to improve the next generation of projects in an adaptive management process. This process can isolate the specific site conditions, design features and maintenance tasks that influence stream restoration longevity and performance, and incorporate these into improved design specifications, review and inspection procedures and maintenance requirements. Future stream restoration expert panels would review such data to determine if these improved projects would qualify for a higher removal rate, and refine restoration methods and practices that ultimately ensure greater project success.

6. *Stream Restoration Reporting Must Be Consistent with CBP Standards.* Each state has a unique system to report stream restoration projects as part of their MS4 and 404/401 permits. In some cases, states are still developing and refining their reporting systems. Consequently, it may not be possible or even desirable to implement a Bay-wide stream restoration reporting format. However, to get credit in the context of CBWM progress runs, stream restoration implementation data using CBP-approved rates or methods, reporting units and geographic location (consistent

with NEIEN standards), and periodically updated data based on the local verification of projects in the field is needed. The Habitat GIT again will initiate discussions with regulatory agencies to determine how their operations may support this data reporting, with a goal of not increasing the burden to regulatory agencies.

7. *Initial Verification of Stream Restoration Installation.* The installing agency will need to provide a post-construction certification that the stream restoration project was installed properly, meets or exceeds its functional restoration objectives, and is hydraulically and vegetatively stable, prior to submitting the project for credit in the state tracking database.

8. *Recommended Cycle for Field Verification of Stream Restoration Projects.* The installing agency needs to conduct inspections initially two years after construction as this is the most critical period especially for assurance that vegetative practices are surviving. After this initial two year period, the frequency of inspections should be once every 5 years or within a year after a catastrophic event of at least a 25 year return interval to ensure that individual projects are still capable of removing nutrients and sediments. The protocols being developed by USFWS (2012) may be helpful in defining performance indicators to assess project performance. The routine maintenance and inspection frameworks referenced in #3 are a critical component to assure that stream restoration projects are functioning between the verification periods.

9. *Suggested Process for Stream Restoration Project Downgrades.* If a field inspection indicates that a project is not performing to its original specifications, the locality would have up to one year to take corrective maintenance or rehabilitation actions to bring it back into compliance. If a project is not fixed after one year, the pollutant reduction rate for the project would be eliminated, and the locality would report this to the state in its annual MS4 report. Non-permitted municipalities would be expected to submit annual progress reports. The load reduction can be renewed, however, if evidence is provided that corrective maintenance actions have restored its performance.

10. *Special Procedures for Stream Restoration Projects Used for Offsets, Mitigation and Trading.* Some stream restoration projects are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. In other cases, stream restoration projects may be built for purposes of trading nutrient credits within a community or a state. Special procedures need to be developed in both cases to prevent double counting of practices.

11. *State Oversight of Local Stream Restoration Reporting.* The installing agency must submit basic documentation to the appropriate state agency to document the nutrient and sediment reduction claimed for each individual stream restoration project installed. Localities should check with their state agency on the specific data to report for individual projects. Some typical reporting information includes:

    a. Type, length and width of stream restoration project
    b. Location coordinates
    c. Year of installation and maximum duration of credit
    d. 12 digit watershed in which it is located
    e. Protocol(s) used
    f. Projected sediment, nitrogen, and phosphorus load reduction

    In addition, the installing agency should maintain an extensive project file for each stream restoration project installed (i.e., construction drawings, as-build survey, credit calculations,

digital photos, post construction monitoring, inspection records, and maintenance agreement). The file should be maintained for the lifetime for which the load reduction will be claimed.

To provide accountability, Bay states will be asked to use their existing MS4 regulatory authority that could include periodic field inspections review of local maintenance inspection records, to verify performance of local stream restoration practices. The state oversight process should be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real.

12. *EPA Review of State Verification Oversight.* So as to not create an additional regulatory burden, The Habitat GIT will discuss with EPA Region 3 the feasibility of using its existing NPDES MS4 permit review process , to provide periodic reviews the implementation of state BMP verification protocols to ensure they are being effectively implemented.

13. *Review and Verification of CBP BMP Accounting.* The accounting methods and verification procedures used by the Bay Program must be clear and transparent so that local governments and the states can readily understand how the stream restoration projects they report are being used to calculate pollutant reductions in the Bay Model. Better communication among the Bay Program and its state and local government partners will help to improve BMP reporting and ensure a fair representation of State and local program implementation.

References:

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