

# Northern Virginia Stream Restoration Bank- The Glade- Reaches 1 and 1A

Fairfax County, Virginia  
WSSI #20030, Task I4

## Mitigation Monitoring Report Third Growing Season (2011)

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**Introduction**

The Glade – Reaches 1 and 1A of the Northern Virginia Stream Restoration Bank are located between Steeplechase Drive and Colts Neck Road, immediately upstream of Colts Neck Road, in Fairfax County, Virginia (Exhibit 1: 38°55'49"N, 77°21'57"W). Restoration of Reaches 1 and 1A of The Glade occurred in early 2009, in accordance with the Northern Virginia Stream Restoration Bank Mitigation Banking Instrument (MBI), dated February 17, 2006 (modified April 2007, June 2009, and June 2010), the Concept Plan dated May 15, 2006<sup>1</sup>, the subsequent Nationwide Permit 27 verification<sup>2</sup>, and the corresponding construction plans. Periodic monitoring to evaluate the success of the stream restoration is required by the MBI. This monitoring report documents that all success criteria have been met at The Glade – Reaches 1 and 1A during the third growing season, as set forth in the MBI and associated mitigation plans.

Northern Virginia Stream Restoration Bank, The Glade – Reaches 1 and 1A includes a total of 1,995.5 linear feet of stream restoration, resulting in a total of 16,407.4 Stream Condition Units, per the As-Built Survey, dated May 2009, revised May 15, 2009.

**Monitoring Success Criteria**

According to the MBI (§V.E.2) the monitoring success criteria shall consist of the following:

- (a) *Reforested Riparian Buffer Areas*
  - (i) *Plant density of at least 400 living woody stems (including volunteers) per acre of trees and shrubs must be achieved by the end of the first growing season following planting and maintained through the end of the monitoring period or until canopy coverage is greater than 30%.*
  - (ii) *Herbaceous plant coverage of at least 60% must be achieved by the end of the first growing season and at least 80% each monitoring year thereafter. Said criterion shall not be applicable if canopy coverage is greater than 30%. Canopy coverage shall be visually estimated at each plot and photodocumented to determine whether coverage has exceeded 30%. If canopy coverage exceeds 30%, herbaceous coverage shall continue to be assessed and documented each monitoring period for reporting purposes only.<sup>3</sup>*
  - (iii) *Woody plant coverage (from live-stakes, tublings, container grown material, and volunteers) along stream banks shall achieve a density of at least 5 l.f./stem (i.e., 1 stem per 5 l.f.) by the end of the first growing season and for each monitoring year thereafter.*

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<sup>1</sup> The Concept Plan was approved by the COE and DEQ on June 22 and 30, 2009, respectively.

<sup>2</sup> COE # 2009-0064, dated January 26, 2009, and DEQ Notification of No Permit Required #08-1919, dated January 26, 2009.

<sup>3</sup> Note that the later criterion was incorporated into the MBI in Modification #3 (dated June 2010) and was not included in the 2009 Monitoring Report.

(b) *Stream and Riparian System*

- (i) Dimension – The analysis of each permanent cross-section specified on the Stream Restoration Site Plan shall indicate that:
- 1) The Width/Depth Ratio (defined as the width at bankfull divided by the mean riffle depth at bankfull) did not increase or decrease by an amount greater than 1.2 of the as-built cross section.
  - 2) The bankfull Cross-Sectional Area did not increase or decrease by an amount greater than 20% of the as-built cross-section.
  - 3) The Bank Height Ratio (defined as the low bank height divided by the maximum riffle depth) did not increase or decrease by an amount greater than 0.2 of the as-built cross section.
- (ii) Pattern – The analysis of the plan-view survey of field measurements shall indicate that:
- 1) The Sinuosity of the stream (defined as the stream length along the thalweg divided by the valley length) did not increase or decrease by an amount greater than 0.2 of the as-built pattern.
  - 2) The Radius of Curvature/Width ratio did not increase or decrease by an amount greater than 0.2 of the as-built condition.
- (iii) Profile – The analysis of the longitudinal profile shall indicate that the slope of the longitudinal profile did not increase or decrease by an amount greater than 0.3% of the as-built slope.
- (iv) Structures – The analysis of each instream structure shall indicate that:
- 1) The angle of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 3 degrees from the as-built angle, and remains between 20 and 30 degrees from the streambank.
  - 2) The slope of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 2% from the as-built slope (i.e. if the design slope was 5%, than any slope from 3% to 7% would be acceptable) and remains between 2% to 7%.

## **Methods**

For the 2011 monitoring year, vegetative, photographic, and survey monitoring is required to assess the success criteria. Vegetation monitoring field work was conducted on August 2, 2011 by Benjamin N. Rosner PWS, PWD, CE, CT to collect vegetation data and take photographs at the three vegetation monitoring stations. Field surveys to document the required dimension, pattern, profile and structure criteria were completed in March 2011. The following general supporting documentation is included at the end of this report: monitoring locations map ([Exhibit 2](#)); a Spring 2011 WSSI natural color aerial photograph ([Exhibit 3](#)) and representative monitoring photographs ([Exhibit 4](#)). Additional supporting data is available in separate [Appendices](#)<sup>4</sup> including: monitoring photographs; percent cover data; woody plant data; stream survey data for dimension, pattern, profile and structure criteria; and bank pin, scour chain, pebble count and bar sample data.

Per the DEQ §401 Certification, photographic monitoring of temporary wetland impacts is required in years 1 and 2<sup>5</sup>. Since this is year 3, monitoring of the temporary wetland impacts is no longer required.

<sup>4</sup> This information is included in separate Appendices due to report size limitations as set forth in COE Regulatory Guidance Letter 06-03.

<sup>5</sup> Per correspondence from Mike Rolband to Bettina Rayfield (Sullivan) dated August 26, 2009 and approved by Ms. Rayfield on August 28, 2009 (see [Appendix F](#) for details).

## **Monitoring Program Protocol and Results**

In accordance with the guidelines of §VI.B of the MBI, the 2011 monitoring program results are as follows:

1. *With respect to the riparian buffer areas:*
  - a. *Visual description – ground level photographs shall be taken at each monitoring station, and an aerial photograph shall be taken the 3<sup>rd</sup> or 5<sup>th</sup> year following final grading.*

Photographs were taken in four standard directions (upstream, downstream, left bank, right bank) as well as overhead at the canopy coverage at each of the three permanent monitoring stations during the August 2011 monitoring field work. The representative photographs (Exhibit 4) demonstrate that herbaceous and woody vegetation is becoming established throughout The Glade – Reaches 1 and 1A reforestation areas. An aerial photograph of the site is provided in Exhibit 3. All vegetation and canopy coverage photographs from the riparian monitoring plots are provided within Appendix A.

- b. *Vegetation – sample plots shall be randomly located over reforested riparian buffer and streamside areas at a rate of 1 plot per 750 linear feet of stream length in order to sample all habitat areas of buffer area locations adjacent to each photo location marker. Each plot shall include no less than a 100-foot x 3-foot belt transect (or equivalent area) for woody riparian plants, a 3-foot diameter for riparian herbaceous plants, and a 100-foot long line transect along stream banks (and adjacent to the belt transect) to assess the stream bank woody plants criteria. The vegetation data shall include: dominant species identification, coverage assessment, number of woody plant stems (total and #/acre), and indicator status.*

The reforested stream length is 1,995.5 linear feet; therefore 3 vegetation monitoring plots were established.

The average density of living woody stems (as measured by the number of stems per acre) is 2,856. On individual plots, the number of stems per acre ranged from 2,614 to 3,340. These results meet and exceed the success criteria [MBI §V.E.2(a)(i)] of an average of 400 living woody stems per acre in reforested areas. Species are provided within Appendix C.

The average percent cover by herbaceous vegetation was 90. The success criteria [MBI §V.E.2(a)(ii)] of 80 percent cover by the end of the third growing season was met in all plots; however, because the aerial canopy coverage now exceeds 30% at all plots, the percent cover criteria is not applicable for this growing season. Dominant species and indicator status are provided within Appendix B.

2. *With respect to the stream system:*

- a. *Woody plant coverage shall be quantified by species and density (1 stem per 5 l.f. along the stream edge).*

The average density of woody stems along the stream banks was 1.27 stems per 5 linear feet of stream bank. On individual plots, the number of stems per 5 l.f. ranged from 1.0 to 1.45. These results meet and exceed the success criteria [MBI §V.E.2(a)(iii)] of an average of 1 stem per 5 linear feet. Species are provided within Appendix C.

- b. *Exposure of bank pins shall be quantified to provide an assessment of bank erosion.*

This data is provided within Appendix E, Sheets 7 and 8.

- c. *Scour chains shall be assessed to provide data on movement of sediment.*

This data is provided within Appendix E, Sheets 7 and 8.

- d. *Pebble counts and bar samples will be collected and analyzed to document changes in streambed material size.*

This data is provided within Appendix D.

- e. *Each stream stabilization structure shall be surveyed, photographed and a narrative statement provided as to whether or not specific Success Criteria have been violated.*

All success criteria were met for the Dimension, Pattern, Profile, and Structures parameters [MBI §V.E.2(b)]. See Appendix E, Sheets 3-15, for numerical survey data and photographs supporting the achievement of the success criteria, including a narrative statement.

- f. *One cross section per 1,000 l.f. shall be provided, with a representative mix of riffles and pools.*

Three cross sections have been provided within these Reaches. See Appendix E, Sheets 3 through 5, 7, and 8, for cross section location and details.

- g. *A surveyed profile of the stream shall be provided immediately following completion, and in years 1, 3, 5, and 10.*

Provided within Appendix E, Sheets 3 through 6, and 10.

- h. *Location of any riparian areas with excessive erosion that needs replanting or protection shall be identified.*

No riparian areas with excessive erosion or that needed replanting were identified during this monitoring year, though additional streamside planting may be warranted in the vicinity of monitoring plot 1, which has only 1 stem per linear foot.

- i. *An assessment of biological conditions (habitat) shall be provided pre-restoration and in years 1, 5, and 10.*

Biological assessment reaches are not located within Reaches 1 and 1A of the Glade, due to the non-perennial nature of the streams, thus no post-construction monitoring was conducted (and no biological monitoring is required in Year 3 for any portion of the NVSRB). Biological Conditions Assessments for perennial stream reaches within The Glade watershed will be provided in separate monitoring reports, and three separate pre-construction reports (for years 2007, 2008, and 2009) were previously provided to the MBRT.

- j. *Within one week after any storm event that exceeds 3.2 inches in 24 hours or 2.0 inches in 2 hours, the subject stream reach shall be visually inspected for damages. Any damage noted shall be reported to the Corps in writing.*

During the 2011 year no storm events meeting the criteria of §VI.B.2(j) occurred.

### **Maintenance/Corrective Measures**

Only minor maintenance activities and corrective measures were undertaken in 2011. These activities included spraying invasive species including mile-a-minute (*Polygonum perfoliatum*), multiflora rose (*Rosa multiflora*), Japanese hops (*Humulus japonicus*), and princess tree (*Paulownia tomentosa*) on four occasions, from May to July, during the 2011 growing season. Note, however, that the success of the NVSRB is **not** predicated upon the presence/absence of invasive species. In addition, fallen trees were removed from the stream on an as-need basis.

### **Mitigation Credit Analysis**

The MBI requires a summary of credits created by the bank and the permits that have been debited against these credits. A credit ledger for the entire NVSRB is provided annually to the chair of the Mitigation Bank Review Team.

### **Summary**

This investigation indicates the successful restoration of The Glade – Reaches 1 and 1A in the third growing season. Monitoring of these reaches confirm the successful reforestation/revegetation of riparian buffers and the successful establishment of a stable stream system.

## Limitations

This study is based on examination of the vegetation and geomorphology at the referenced site. Field indicators can change with variations in hydrology and other factors. Therefore, our conclusions may vary significantly from future observation by others. This report assesses the presence of vegetation and the stability of geomorphic features at the site at the time of our review and does not address conditions prior to our review or at a given time in the future.

Our review and report have been prepared in accordance with the MBI and with generally accepted guidelines for the conduct of monitoring reports for mitigation banks.

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