Northern Virginia Stream Restoration Bank- The Glade- Reaches 5 and 6

Fairfax County, Virginia

WSSI #20030, Task I3b

Mitigation Monitoring Report
Second Growing Season (2012)

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Introduction

The Glade – Reaches 5 and 6 of the Northern Virginia Stream Restoration Bank are located between Soapstone Drive and Twin Branches Road, immediately downstream of Soapstone Drive, in Fairfax County, Virginia (Exhibit 1). Restoration of Reaches 5 and 6 of The Glade occurred from November 2009 to December 2010, 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[1], and the subsequent Nationwide Permit 27 verification[2]. 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 5 and 6 during the second growing season, as set forth in the MBI and associated mitigation plans.

Northern Virginia Stream Restoration Bank, The Glade – Reaches 5 and 6 includes a total of 7,172.6 linear feet of stream restoration, resulting in a total of 57,206.5 Stream Condition Units, per the As-Built Surveys, dated October 2010 (Reach 5) and November 2010 (Reach 6).

Monitoring Success Criteria

According to the MBI (§V.E.2) the monitoring success criteria shall follow the guidelines below:

(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.

(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.

(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.

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[1] *The Concept Plan was approved by the COE and DEQ on June 22 and 30, 2009, respectively.*

[2] *COE # 2009-2210, dated October 21, 2009, and DEQ Notification of No Permit Required provided via email, dated October 26, 2009.*

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

Vegetation monitoring field work was conducted on August 27, 28, and 29, 2012 by Benjamin N. Rosner, PWS, PWD, CT, CE[3], Alison Robinson, WPIT, CT[4], and Jessica M. Campo to collect vegetation data and take photographs at the 9 vegetation monitoring stations. Photographs of stream stabilization structures were taken September 6 and 7, 2012. The following general supporting documentation is included at the end of this report: monitoring locations map (Exhibit 2); and representative monitoring photographs (Exhibit 3). Additional supporting data is available in separate Appendices[5] including: monitoring photographs; percent cover data; woody plant data; and photographs of stream stabilization structures.

In addition to the success criteria listed above, the DEQ §401 Certification also calls for the monitoring of temporary wetland impacts in years 1 and 2. For The Glade – Reaches 5 and 6, this is to be accomplished by ground photographs and vegetation data plots of the temporary impact locations[6]. Ground photographs were taken by Jessica Campo on August 20 and 29, 2012. Vegetation data plots were monitored by Jessica Campo on August 24, 2012 and Benjamin Rosner, Alison Robinson, and Jessica Campo on August 29, 2012. Representative photographs of the restoration of the temporary wetland impact areas are included in Exhibit 4. All temporary

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[3] *Professional Wetland Scientist #1766, Society of Wetland Scientists Certification Program, Inc. VA Certified Professional Wetland Delineator #3402-000080; North American Benthological Society (NABS) Certified Level 1 Taxonomist: All Phyla; Certified Ecologist, Ecological Society of America.*

[4] *Wetland Professional in Training, Society of Wetland Scientists Certification Program, Inc.; North American Benthological Society (NABS) Certified Level 1 Taxonomist: All Phyla; ISA Certified Arborist MA-5179A.*

[5] *This information is included in separate Appendices due to report size limitations as set forth in COE Regulatory Guidance Letter 06-03.*

[6] *Per the Nationwide Permit 27 Pre-Construction Notification provided by WSSI, dated September 2, 2009 and approved by the COE and DEQ on October 21, 2009 and October 26, 2009, respectively.*

wetland impact photographs are included in Appendix E. Percent cover data and woody stem data for these areas are included within Appendix F.

Monitoring Program Protocol and Results

In accordance with the guidelines of §VI.B of the MBI, the 2012 monitoring program and 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, an aerial photograph shall be taken the 3rd or 5th 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 9 permanent monitoring stations during the August 2012 monitoring field work. The representative photographs (Exhibit 3) demonstrate that herbaceous and woody vegetation is becoming established throughout The Glade – Reaches 5 and 6 reforestation areas. An aerial photograph of the site will be provided in year 3 or year 5. All 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.*

      Nine vegetation monitoring plots were established in the reforested area within Reaches 5 and 6. The average density of living woody stems (as measured by the number of stems per acre) is 5,727. On individual plots, the number of stems per acre ranged from 3,340 to 11,471 (due in part to a high rate of volunteers). 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 95.6. On individual plots, percent cover ranged from 75 to 100. Most of the plots meet and exceed the success criteria [MBI §V.E.2(a)(ii)] of greater than 80 percent cover by the end of the second growing season. The one plot that did not meet the success criteria (Reach 6 Plot 4) had been reseeded following construction after the September 2011 storm impacted this section of the stream reach. See Appendix G for details regarding damage from the storm. Because this area is in the first growing season following major repairs, 75 percent cover exceeds the success criteria of greater than 60 percent cover by the end of the first growing season. Dominant species and indicator status are provided within Appendix B.

2. *With respect to the stream and riparian 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 streambanks was 6 stems per 5 linear feet of stream bank. On individual plots, the number of stems per 5 l.f. ranged from 1.45 to 23.85. 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.*

      Monitoring of bank pins is not required in Year 2.

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

      Monitoring of scour chains is not required in Year 2.

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

      Pebble counts and bar samples are not required in Year 2.

   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.*

      The stream stabilization structures are not required to be surveyed in Year 2.

      Two stream stabilization structures were replaced in Reach 6 and all other structure photographs for 2012 indicate no erosion or stability issues. Photographs of all structures and structure repairs are included in Appendix D.

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

      Surveying of these cross sections is not required in Year 2.

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

      A surveyed profile of the stream is not required in Year 2.

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

      Tree tubelings and 1-3 gallon trees were planted March 2012 in disturbed and newly reconstructed stream banks (Reach 6, Plot 4) that were damaged as a result of the September 2011 storm. See Appendix G and the Maintenance/Corrective Measures section for additional details. No other

riparian areas with excessive erosion or that needed replanting were identified during this monitoring year.

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

Biological monitoring is not required in Year 2.

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 2012 year, no storm events meeting the criteria of §VI.B.2(j) occurred. However, after the submission of the Year 1 (2011) monitoring report (September 7, 2011), a major storm event meeting the criteria of §VI.B.2(j) occurred. On September 5 through 8, 2011, approximately 9.5" of rainfall was recorded within the Reston area. The magnitude of this event reached a "catastrophic" level, between a 200 and 500 year storm event. On September 12, 2011 WSSI personnel inspected The Glade watershed and submitted a detailed monitoring report describing the inspection results, in the aforementioned report entitled "Northern Virginia Stream Restoration Bank – Monitoring Report for the 5th, 2 – Year Storm Event," dated September 19, 2011, which was submitted to the COE. A copy of this report is included within Appendix G.

Additional Reporting Criteria

In accordance with the accepted conditions of DEQ's §401 certification for the Nationwide Permit 27 issued for Reaches 5 and 6, the temporary wetland impacts of less than 700 square feet[7] were photographically documented (Appendix E). Vegetation data plots were required for temporary wetland impacts exceeding 700 square feet[8] in Reaches 5 and 6 as indicated in the Nationwide Permit 27. Percent cover and the average density of woody stems was recorded in these areas as recorded in Appendix F. Representative photographs provided within Exhibit 4 depict the condition of various temporary wetland impacts following the restoration activities. Note that the Nationwide Permit 27 indicated that the permanent impacts associated with Reaches 5 (Impact 5) and 6 (Impacts 10, 15, 21, and 31) are not required to be monitored.

Maintenance/Corrective Measures

Repairs to Reach 6 were required after damage was sustained during the September 2011 storm event. Corrective measures included the installation of two new modified cross vanes and a 320 foot, 12-foot wide bankfull bench with an imbricated rock wall on the right bank, repair of the erosional area behind an existing vane arm at the beginning of the meander, and heavy planting of a native seed mix and tubelings after construction.

Other than the repairs to Reach 6 resulting from the major storm event, only minor maintenance activities and corrective measures were undertaken in 2012. These activities included

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[7] *Temporary impacts of less than 700 square feet in Reach 5; 1, 2, 3, 4, 6, and 7. Temporary impacts of less than 700 square feet in Reach 6; 1, 2, 4, 5, 6, 7, 12, 13, 16 (partially), 17, 18, 19, 20, 22 (partially), 23, 25, 26, 28, 29, 30, and 33 .*

[8] *Temporary impacts of more than 700 square feet in Reach 5; 8, 9, and 10. Temporary impacts of more than 700 square feet in Reach 6; 3, 8, 9, 11 14, 16 (partially), 22, 24, 32, and 34.*

re-planting Reach 6 Plot 4 with woody stems and an herbaceous seed mix; removal of fallen trees and dead vegetation from bank full; spraying invasive species, including Multiflora rose (*Rosa multiflora*), Japanese hops (*Humulus japonicus*), princess tree (*Paulownia tomentosa*), and Asiatic tearthumb (*Polygonum perfoliatum*) on two occasions, from June to July, during the 2012 growing season; removing paving strips from bridges; and supplemental planting. Note, however, that the success of the NVSRB is **not** predicated upon the presence/absence of invasive species.

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 5 and 6 in the second growing season. Monitoring of these reaches confirms 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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