



AQUATIC RESOURCES MANAGEMENT, LLC

27 December, 2011

United States Army Corps of Engineers
Louisville District
845 Sassafra Creek Road
Sassafra, KY 41759-8806



Re: DNR# 897-5061 AM 3, LRL-2006-60-teh

Dear Reviewer,

Please find enclosed one (1) original copy of the Third Year Monitoring report for the Bear Branch Mitigation site.

Should you require any more information upon your review of this package or require a site visit feel free to contact me at 859-388-9595 or by e-mail at nbaker@aquaticresources.us.

Sincerely,

Nick Baker
Vice President and Environmental Scientist

BDCC Holding Company, Inc. Bear Branch Mitigation Year Three Monitoring Report

Project Overview

This report is to notify the United States Army Corps of Engineers (USACE) of the completion of three full growing seasons for the BDCC Holding Company, Inc. (BDCC) Bear Branch Mitigation site. This USACE permit is an **Individual Permit** associated with BDCC KDSMRE **Permit # 897-5061 AM 3**. Aquatic Resources Management is the agent responsible for conducting the monitoring reports on behalf of BDCC. The inspection date of the field visit was conducted on **December 22, 2011**.

Purpose of the Approved Project

This mitigation project was conducted in order to offset stream impacts associated with BDCC's 897-5061 Am. 3 mining project. Stream impacts occurred from the surface mining method of extraction of coal reserves. **Ten hollowfills were necessitated** by this method to contain all byproducts as well as the in-stream ponds needed to control the sediment runoff. The hollow fills will be **permanently impacting approximately 2,225 linear feet of intermittent stream and 4,168 linear feet of ephemeral stream**. The in-stream ponds will be temporarily impacting 1,901 linear feet of intermittent stream and 3,149 linear feet of ephemeral streams. The mitigation provided for the associated impacts to this permitting action equates to 7,318 linear feet of intermittent stream mitigation.

Site Location

Bear Branch is located 1 mile northwest of the intersection of Highway 7 and Highway 699 in Perry County Kentucky. The latitude and longitude of the project

is 37° 07' 32.9" and -83° 06' 37.5" respectively. Bear Branch is located in the North Fork of the Kentucky River watershed Hydrologic Unit Code (HUC) 05100201.

Mitigation Commencement and Completion Dates

Construction on Bear Branch started in January of 2006 and was completed in March of 2006.

Performance Standards

After three full growing seasons since construction completion all performance standards are being met. As previously reported, last monitoring year, the owner of the gas well located adjacent to the mitigation site mowed the riparian area impacting the riparian width due to the removal of planted species. BDCC planted trees in the riparian area during the dormant season between year two and year three. Overall restoration activities have decreased the amount of sediment entering the stream from past impacts, created macroinvertebrate habitat, as well as achieved channel stability.

Requirements

The requirements as stated in the approved Clean Water Act Section 404 permit are as follows; Mitigation efforts were implemented by the applicant using their own qualified equipment operators to conduct the mitigation plan under Best Management Practices. The stream morphology will be determined successful when the proposed structures are constructed in the approximate location proposed in this mitigation plan. Stream stability will be examined for successful erosion controls. The erosion controls will be considered successful if the stream and proposed stream structures are stable laterally and vertically. The limits of

the mitigation sites will be delineated and flagged with surveyor's stake to indicate restored reaches.

The vegetation will be maintained at an 80% success rate for native species in the riparian corridors. It is also anticipated that natural succession of native species will occur on-site in the riparian zones. Non-native and invasive species will be kept to less than 20% overall on the project restoration area.

After stream restoration standards have been met for all areas, the applicant or consultant will be responsible for conducting annual monitoring reports to inform the Louisville District of the United States Army Corps of Engineers of progress. The applicant is obligated to maintain the project area mitigation by following requirements set forth by DSMRE and USACE. Monitoring and maintenance of the mitigation site will continue until final mitigation approval is achieved.

The compensatory mitigation project site is successfully achieving the standards set forth in the approved USACE permit. As stated, the aforementioned tree plantings and maintenance will be performed by BDCC to meet performance standards. The Rapid Bioassessment Protocol demonstrates trends toward the stated mitigation goals in table 1.

Table 1:

Bear Branch Mitigation Monitoring						
Upper Reach Bear Branch						
RPB Habitat Parameters	Pre-mitigation	Year One	Year Two	Year Three	Year Four	Predicted Year Five
Epifaunal Substrate	4	12	12	13		12
Embeddedness	3	12	12	12		12
Velocity/Depth Regime	3	10	10	13		14
Sediment Deposition	4	12	12	13		12
Channel Flow Status	2	10	12	14		12
Channel Alteration	2	13	13	14		15
Frequency of Riffles	4	13	13	13		14
Bank Stability (both)	6	14	14	14		14
Veg. Protection (both)	0	14	12	12		14

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Riparian Width (both)	3	10	10	12		14
Total Habitat Score	31	120	120	130		133
Middle Reach Bear Branch						
RPB Habitat Parameters	Pre-mitigation	Year One	Year Two	Year Three	Year Four	Predicted Year Five
Epifaunal Substrate	4	10	12	11		12
Embeddedness	3	8	10	10		12
Velocity/Depth Regime	8	11	11	10		14
Sediment Deposition	3	10	12	11		13
Channel Flow Status	5	12	12	14		14
Channel Alteration	10	14	14	12		13
Frequency of Riffles	8	11	12	12		12
Bank Stability (both)	10	12	12	12		14
Veg. Protection (both)	12	12	12	12		16
Riparian Width (both)	12	10	10	12		16
Total Habitat Score	75	110	117	116		136

Summary Data

The success of the project is based on the stabilization of the stream as well as the creation of macroinvertebrate habitat. The Pre-mitigation vs. year one, two, and three post mitigation scores are listed in table 1 above. The table shows the general trend toward the stated goals in the compensatory mitigation plan with the exception of the impacts to the riparian area.

The Bear Branch stream restoration project had various challenges to overcome to ensure its success. Two of the major challenges were the steep slopes that dominated the upper section of the project and the clay that was extracted from the gas well bore hole that indirectly entered the stream. The steep slopes presented the problem of maintaining long term stability, so to overcome this BDCC installed a number of closely spaced step pools. The step pools not only stabilized the stream naturally, but they also created macroinvertebrate habitat.

The clay that entered the stream as a result of the gas well over widened the stream and caused impounding of water. The solution to this problem was to remove the clay from the stream, while concurrently placing large rock to provide a more natural foundation for the stream bed. Once the base was established, channel dimensions were constructed and substrate suitable for macroinvertebrate habitat was placed in-stream. Pictures of the mitigation site illustrating the current condition (figures 1-6), as well as a map showing the locations of the photos (figure 7), and map depicting the site location (figure 8) are included.



Figure 1. Bear Branch 12/22/11
Pic. 054 Facing Upstream, 37.12629, -83.11925



Figure 2. Bear Branch 12/22/11
Pic. 067 Facing Upstream, 37.12593, -83.10969



Figure 3. Bear Branch 12/22/11
Pic. 060 Facing Upstream, 37.12638, -83.11688



Figure 4. Bear Branch 12/22/11
Pic. 058 Facing Upstream, 37.12633, -83.11724



Figure 5. Bear Branch 12/22/11
Pic. 063 Facing Upstream, 37.12630, -83.11591



Figure 6. Bear Branch 12/22/11
Pic. 069 Facing Upstream, 37.13116, -83.10237

Conclusions

The Upper reach and middle reach of the Bear Branch mitigation site are meeting all performance standards. The BDCC mitigation site is trending toward the stated mitigation performance standards in the approved Clean Water Act section 404 permit.