# YEAR TWO MONITORING REPORT
# UNITED STATES CORPS OF ENGINEERS
## Bear Branch Mitigation
## KDNR PERMIT NO. 897-5061 AM 3

***BDCC Holding***



***Company, Inc.***

Prepared:
November 29, 2010

Prepared by:

Aquatic Resources Management

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AQUATIC RESOURCES MANAGEMENT, LLC

29 December, 2010

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

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

Dear Reviewer,

Please find enclosed one (1) original copy of the Second 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

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# BDCC Holding Company, INC. Bear Branch Mitigation Year Two Monitoring Report

## Project Overview

This report is to notify the United States Army Corps of Engineers (USACE) of the completion of two 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 11, 2009.

## 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 North West 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 two full growing seasons since construction completion all performance standard are being met. However, the owner of the gas well located adjacent to the mitigation site has mowed the riparian area during this monitoring year, to maintain access to the well and the transmission line. This has impacted the riparian width due to the removal of planted species. BDCC has contacted the owner and informed them of the mitigation and the riparian requirements associated with the mitigation site. It is anticipated that there will be no more future impacts to the riparian area. BDCC will plant trees in the riparian area during the dormant season between year two and year three of the monitoring. After the transplanting trees BDCC will be meeting all of their performance standards. After the completion of construction project a steep road was left for access to tend to the gas operations and mitigation site. Water diversions were not created on the steep section of the road, therefore, during intense rain events "headcuts" and erosion rills formed resulting in excess sediment load into the restored stream. From the inlet point, a significant amount of sediment had

entered the stream and was hindering the performance standard set forth in the permit. Water diversions have been constructed as noted in the first report and they have blocked the sediment from entering the restored stream. The remaining sediment found in-stream was transported naturally downstream. As a result, the stream has returned to its intended state. The pools have scoured out the excess sand/sediment and the riffles are no longer embedded. As previously mentioned, some of the riparian trees have not survived the transplant and will need to be replaced to maintain the overall 80% success rate. Overall the 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. When the issues mentioned in the performance standards are ameliorated the compensatory mitigation project site will continue to be successfully achieving the standards set forth in the approved USACE permit. The Rapid Bioassessment Protocol scores show the impacts to the riparian area as well as the improvements in the epifaunal substrate and embeddedness related to the events of the last monitoring year 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 | | | 12 |
| **Embeddedness** | 3 | 12 | 12 | | | 12 |
| **Velocity/Depth Regime** | 3 | 10 | 10 | | | 14 |
| **Sediment Deposition** | 4 | 12 | 12 | | | 12 |
| **Channel Flow Status** | 2 | 10 | 12 | | | 12 |
| **Channel Alteration** | 2 | 13 | 13 | | | 15 |
| **Frequency of Riffles** | 4 | 13 | 13 | | | 14 |
| **Bank Stability (both)** | 6 | 14 | 14 | | | 14 |
| **Veg. Protection (both)** | 0 | 14 | 12 | | | 14 |
| **Riparian Width (both)** | 3 | 10 | 10 | | | 14 |
| | | | | | | |
| **Total Habitat Score** | 31 | 120 | 120 | | | 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 | | | 12 |
| **Embeddedness** | 3 | 8 | 10 | | | 12 |
| **Velocity/Depth Regime** | 8 | 11 | 11 | | | 14 |
| **Sediment Deposition** | 3 | 10 | 12 | | | 13 |
| **Channel Flow Status** | 5 | 12 | 12 | | | 14 |
| **Channel Alteration** | 10 | 14 | 14 | | | 13 |
| **Frequency of Riffles** | 8 | 11 | 12 | | | 12 |
| **Bank Stability (both)** | 10 | 12 | 12 | | | 14 |
| **Veg. Protection (both)** | 12 | 12 | 12 | | | 16 |
| **Riparian Width (both)** | 12 | 10 | 10 | | | 16 |
| | | | | | | |
| **Total Habitat Score** | 75 | 110 | 117 | | | 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 and year two 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 are illustrating the current condition (figures 1-6), as well as the map showing the locations of the photos (figure 7). The only part of the mitigation that is not meeting the stated standards is the riparian survival rate as aforementioned.

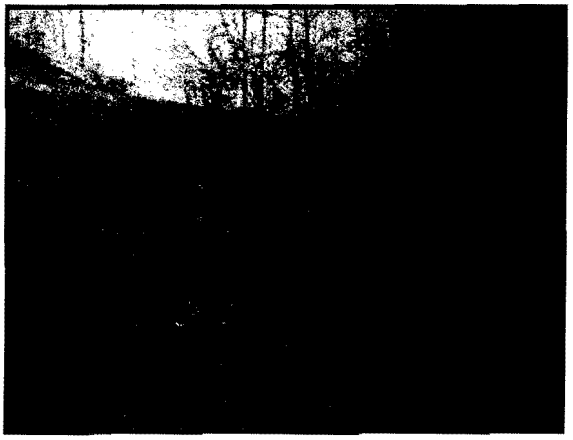

Figure 1 Looking Downstream Upper Reach 12/11/09 Pic. 2543

Figure 2 Looking Upstream Upper Reach 12/11/09 Pic. 2544

Figure 3 Looking Downstream Middle Reach 12/11/09 Pic. 2558

Figure 4 Looking Upstream Middle Reach 12/11/09 Pic. 2559

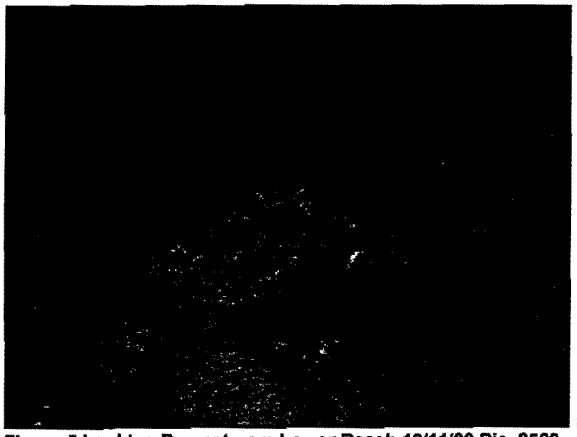

Figure 5 Looking Downstream Lower Reach 12/11/09 Pic. 2568

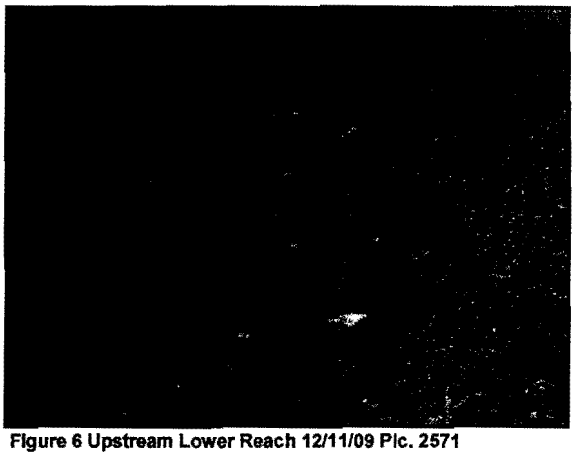

Figure 6 Upstream Lower Reach 12/11/09 Pic. 2571

## Conclusions

The Upper reach and middle reach of the Bear Branch mitigation site is meeting all performance standards with the exception of the tree survival rate. BDCC is proposing to return to the site and transplant more trees during the dormant season of this year. This will restore the riparian area that was removed by the gas well owner this past year. Once this condition is corrected BDCC will be on track to meet the stated mitigation performance standards in the Clean Water Act 404 permit.