

### Literature Cited

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling, 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, 2<sup>nd</sup> Ed.; EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D

**TAB 6**

**Cumulative Impacts Assessment Information**

## **TAB 6: SITE SPECIFIC CUMULATIVE IMPACT ASSESSMENT**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2009-00741

KDNR #848-0290

Revised February 9, 2013

### **INTRODUCTION TO ASSESSMENT**

ArcGIS Desktop 10.0 was utilized to overlay the National Hydrologic Dataset (NHD) streams for the cumulative impact analysis. These layers were obtained from the United States Geological Survey and were used to estimate cumulative impacts to “waters” within the watersheds. Direct impacts are limited to “waters” and their immediate riparian zones, thus the direct, indirect, and cumulative impact scenario considers “waters” and their immediate riparian zones throughout the HUC 12 watershed. This analysis evaluates the interactions between all activities in the cumulative impacts scenario.

Overall, the cumulative impact assessment was conducted to investigate the impacts that the following activities have had on the aquatic resources within the HUC12 watershed:

- Highway Development
- Agriculture
- Mining
- Logging
- Commercial and Residential Development
- Socioeconomics

### **Setting**

The Puckett Creek watershed encompasses approximately 30,998.55 acres of watershed within the Upper Cumberland River Basin (**Figure 6-1**). This watershed is located within USEPA Ecoregion 69 (Central Appalachians) of the Eastern Kentucky Coal Fields.

### **PAST, PRESENT, FUTURE ACTIVITIES ANALYSIS**

#### **Highway Development**

**Figure 6-2** illustrates one current road project within each of the assessed watersheds. Within the Clear Creek watershed there is one active road project described as a major widening of US 119 from mile point 13.0 to mile point 15.88 along the existing corridor. Discharges into “waters” by any highway project are subject to regulation under Section 10 and 404 of the Clean Water Act and would require a USACE authorization and mitigation for any of the discharges that have occurred or will occur.

#### **Mining**

Past, present, and future surface mining acreages are categorized in **Tables 6.1-6.3**. Based on data obtained from the Kentucky Division of Mine Permits (DMP), surface mining operations have been separated into either active or reclaimed. Older permits (prior to 1985) that do not have a classification status, have been included in the total acreage, but are not considered either active or reclaimed, although it is highly likely that these areas have transitioned back to forestland. In order to keep from overlapping and overestimating mined acreages, only new

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mining has been calculated. Areas that have been re-mined are only considered once and based on original acreage.

Table 6.1 Past Mining (Through 1985)

HUC 12	Total	Past Mined Area		Percent Mined Acres		Percent Total Acres	
	(acre)	(acre)	(%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)
Puckett Creek	30,998.55	2,028.98	6.55	0	78.09	0	5.11

<sup>1</sup>Active mining includes areas designated as active by Kentucky Division of Mine Permits (DMP) as of December, 2012

<sup>2</sup>Reclaimed mining includes areas designated as released completely (RC) as of December, 2012. This does not include permits that have gone into Final Forfeiture (FF) or do not have a Mine Status listed by Kentucky Division of Mine Permits (DMP), although these areas have likely transitioned back to forestland.

Table 6.2 Present Mining (Through 2006)

HUC 12	Total	Cumulative Mined Areas		Additional Percent Mined Acres		Additional Percent Total Acres	
	(acre)	acres	(%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)
Puckett Creek	30,998.55	5,272.14	17.01	70.99	27.09	7.43	2.83

<sup>1</sup>Active mining includes areas designated as active by Kentucky Division of Mine Permits (DMP) as of December, 2012

<sup>2</sup>Reclaimed mining includes areas designated as released completely (RC) as of December, 2012. This does not include permits that have gone into Final Forfeiture (FF) or do not have a Mine Status listed by Kentucky Division of Mine Permits (DMP), although these areas have likely transitioned back to forestland.

Table 6.3 Future Mining (Through 2017)

HUC 12	Total	Cumulative Future Mined Areas		Percent Mined Acres		Percent Total Acres	
	(acres)	(acres)	(%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)	Active <sup>1</sup> (%)	Reclaimed <sup>2</sup> (%)
Puckett Creek	30,998.85	9,897.04	31.93	100	0	14.92	0

<sup>1</sup>Active mining includes areas designated as active by Kentucky Division of Mine Permits (DMP) as of December, 2012

<sup>2</sup>Reclaimed mining includes areas designated as released completely (RC) as of December, 2012. This does not include permits that have gone into Final Forfeiture (FF) or do not have a Mine Status listed by Kentucky Division of Mine Permits (DMP), although these areas have likely transitioned back to forestland.

The proposed action would add less than 1% of active mining to the watershed.

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### Mining Impacts – Loss to “Waters of the U.S.”

Using GIS analysis it was estimated that the total length of “waters” within the Puckett Creek watershed is 341,031 linear feet (LF). All discharges into “waters” are subject to regulation under Section 10 and 404 of the Clean Water Act and would require a USACE authorization and/or mitigation for any of the discharges that have occurred or will occur.

Surface mining areas including hollow-fills, streams between fills and ponds, and the ponds themselves were evaluated as illustrated on **Figure 6-3** and estimated on **Table 6.4**.

Table 6.4 Estimated Accumulated Impacts

HUC 12	Total (LF)	Past Mined Area (LF)		Present and Current Mining Areas (LF)		Past, Current, and Future Mining Areas (LF)	
		LF	%	LF	%	LF	%
Puckett Creek	341,031	7,895	2.32	37,795	11.08	59,332	17.40

Based on this information it was determined that 341,031 linear feet of “waters of the U.S.” have been impacted by surface mining. Future projects are estimated to impact 21,537 linear feet of “waters”, therefore the cumulative estimated impacts to “waters” in the watershed is 59,332 LF (17.4%). All present and future mining operations are required to obtain Clean Water Act permits which ensure that no significant impacts to “waters of the U.S.” should occur.

### **Impacts to Water Quality**

Due to the localized nature of these projects, no significant downstream impacts to water quality are anticipated. The Section 402 KPDES permit provides monitoring of water quality throughout the life of the permit.

### **Land Cover Disturbances**

**Figure 6-4** illustrates the land cover of the HUC12 watershed during the available 1992 (Past) and 2006 (present) data. As illustrated, the majority of land cover in these watersheds is forestland and most changes have occurred in the upland areas. Land cover transitions have occurred primarily as a result of open, low, medium, and high intensity developments and grasslands.

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**Table 6.5** illustrates the 1992 dataset while **Table 6.6** illustrates the 2006 dataset.

Table 6.5 1992 Land Cover of Puckett Creek HUC 12

NLCD 1992		HUC 12	
		Puckett Creek	
LU Code	Land use Description	Acres	Pct%
41	Deciduous Forest	27,859.17	89.881%
43	Mixed-Forest Areas	1,852.71	5.977%
42	Evergreen Forest	531.62	1.715%
11	Open Water	190.44	0.614%
81	Pasture/Hay	190.39	0.614%
91	Woody Wetlands	128.99	0.416%
23	Developed, Medium Intensity	86.08	0.278%
82	Cultivated Crops	63.62	0.205%
21	Developed, Open Space	55.78	0.180%
33	Transitional	18.68	0.060%
32	Quarries, Strip Mines, Gravel Pits	7.61	0.025%

Table 6.6 2006 Land Cover of Puckett Creek HUC 12

NLCD 2006 Landuse/Landcover		HUC 12	
		Puckett Creek	
LU Code	Land use Description	Acres	Pct%
41	Deciduous Forest	23,797.40	76.77%
71	Grassland/Herbaceous	3,373.62	10.88%
21	Developed, Open Space	1,298.21	4.19%
43	Mixed-Forest Areas	915.57	2.95%
31	Barren Land (Rock/Sand/Clay)	711.65	2.30%
22	Developed, Low Intensity	360.40	1.16%
81	Pasture/Hay	156.04	0.50%
11	Open Water	143.94	0.46%
52	Shrub/Scrub	112.57	0.36%
42	Evergreen Forest	81.50	0.26%
23	Developed, Medium Intensity	47.65	0.15%

Forested areas within the watershed decreased by 15.59 percent from 95.57 percent to 79.98 percent. The increase in low, medium, and high intensity development went from 0.46% to 5.50%, while grasslands within the watershed now cover 10.88%.

### Oil and Gas Well Activities

**Figure 6-5** depicts existing and abandoned oil and gas wells in the watershed. Approximately 52 completed wells and 4 dry and abandoned wells exist in the watershed.

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### **Riparian Zones**

**Figure 6-6** illustrates the canopy coverage of the HUC 12 watershed. The overall canopy cover in the watershed is high, and the riparian zones have not typically been eliminated but have been reduced in many areas. The proposed action would directly impact approximately 78.05 acres of riparian zone within the HUC12.

### **Cumulative Socioeconomic Impacts**

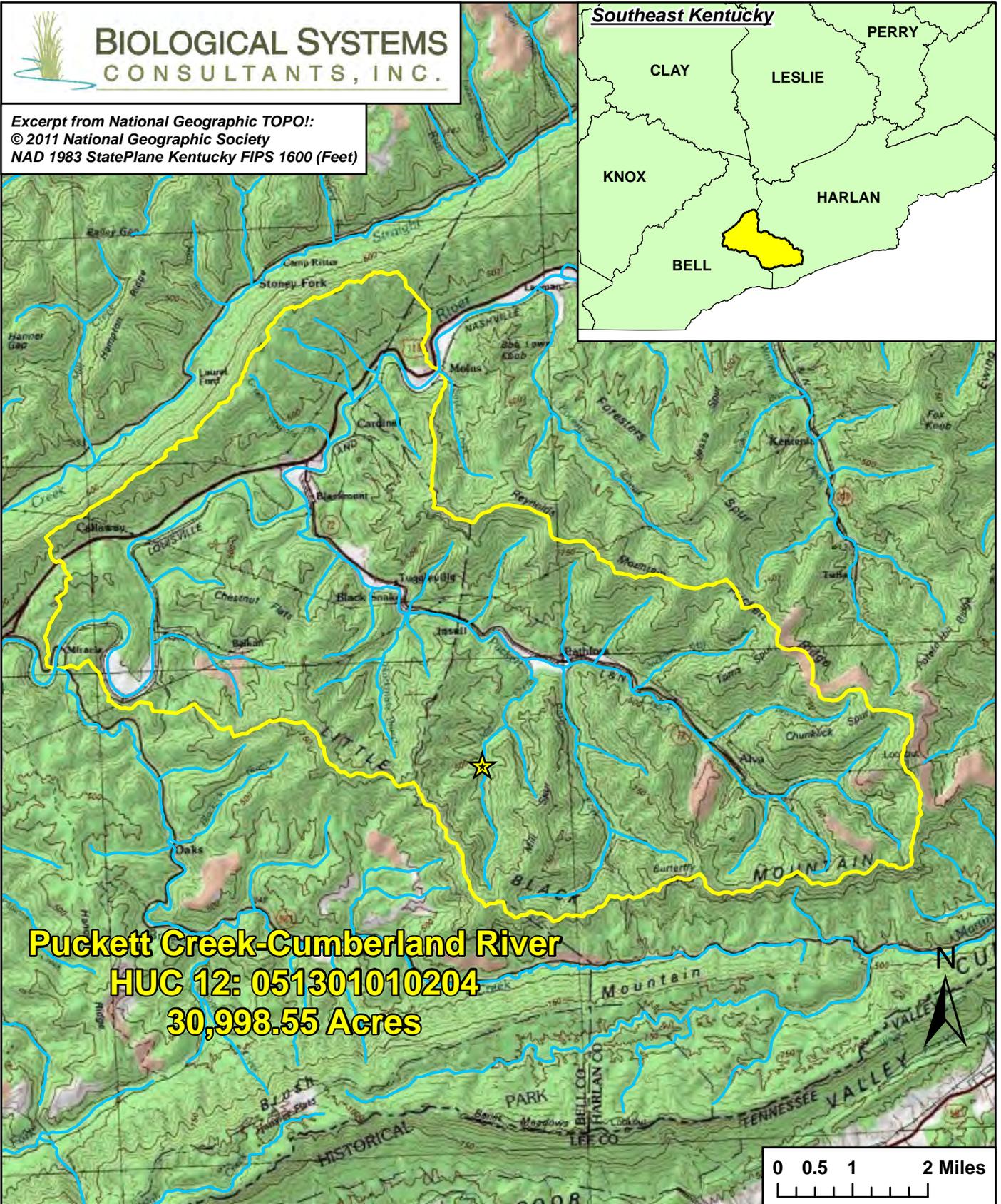
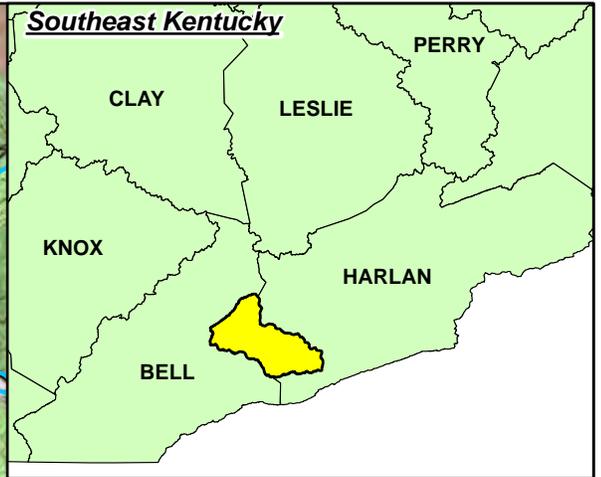
Tab 8 summarizes the expected economic impact of the proposed action. As illustrated the proposed action would have a beneficial cumulative impact to socioeconomics in the area. If this project does not occur the cumulative impacts could have adverse impacts to the local and regional communities.



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Excerpt from National Geographic TOPO!  
© 2011 National Geographic Society  
NAD 1983 StatePlane Kentucky FIPS 1600 (Feet)

**Southeast Kentucky**



**Puckett Creek-Cumberland River  
HUC 12: 051301010204  
30,998.55 Acres**

**Legend**

-  Project Location
-  National Hydrologic Dataset (NHD) Streams
-  HUC 12 Boundary

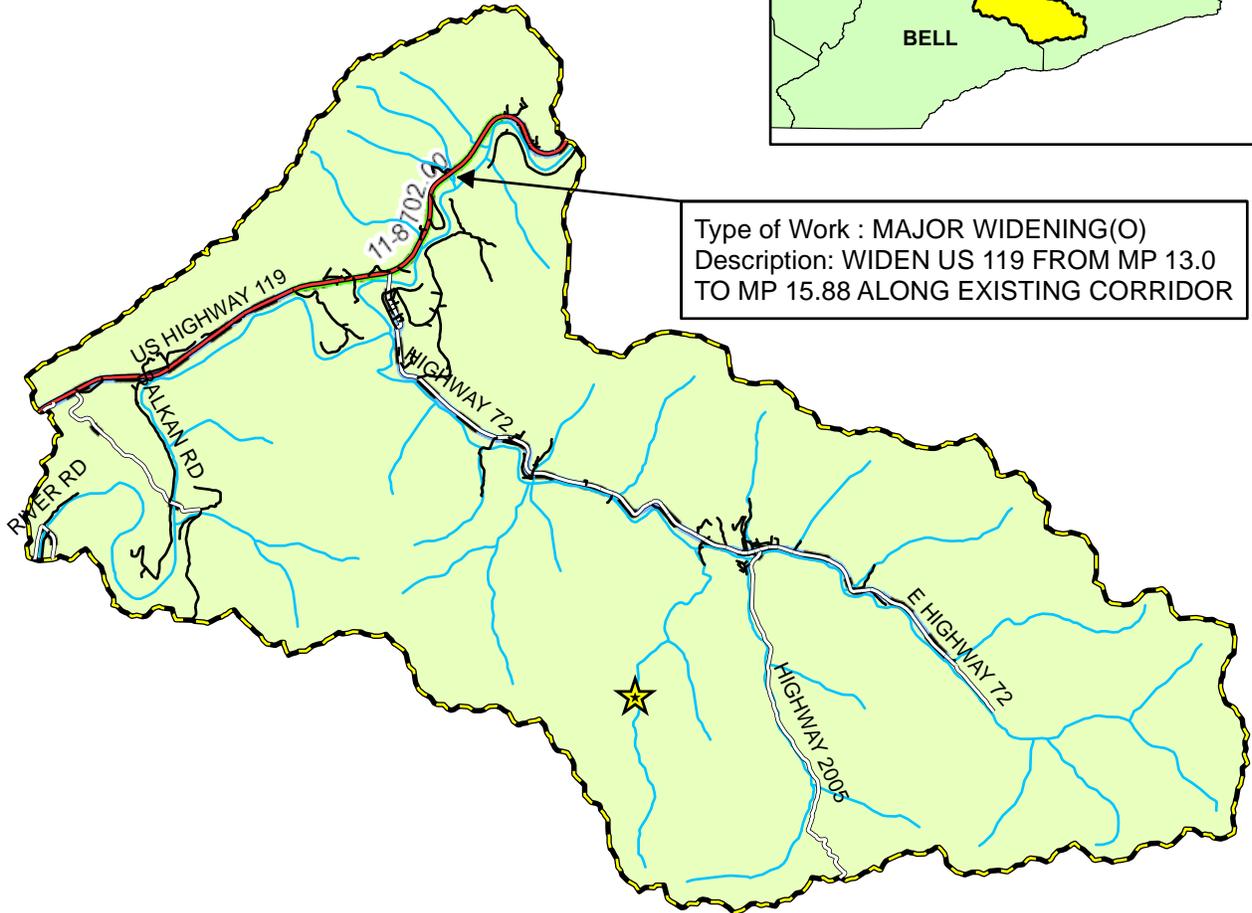
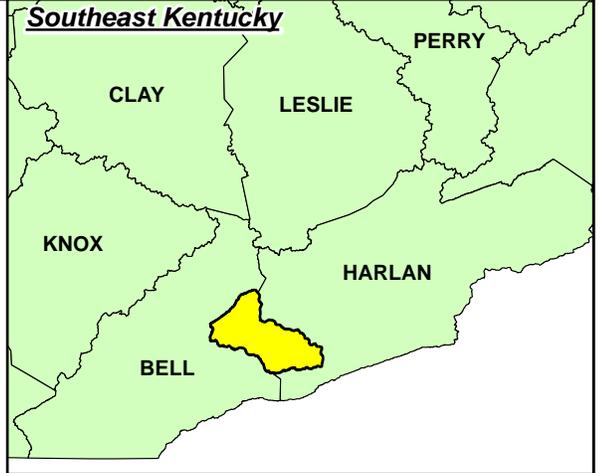
**DRAWING NAME:**

Figure 6-1 - HUC 12 Location Map  
CLIENT: Nally & Hamilton Enterprises, Inc.  
KDNR#: 848-0290  
BSC#: 2924  
DATE: 1/31/2013  
DRAWN BY: BES CHECKED BY: JRR



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Figure 6-3 shows past KY Transportation Cabinet projects (KYTC).  
Data obtained via ArcGIS server connection:  
<http://maps.kytc.ky.gov/arcgis/services>.



**Puckett Creek-Cumberland River**  
**HUC 12: 051301010204**  
**30,998.55 Acres**



### Legend

-  Project Location
-  HUC 12 Boundary
-  National Hydrography Dataset (NHD) Streams

### KYTC Projects

-  Active KYTC Design Projects
-  Past KYTC Projects

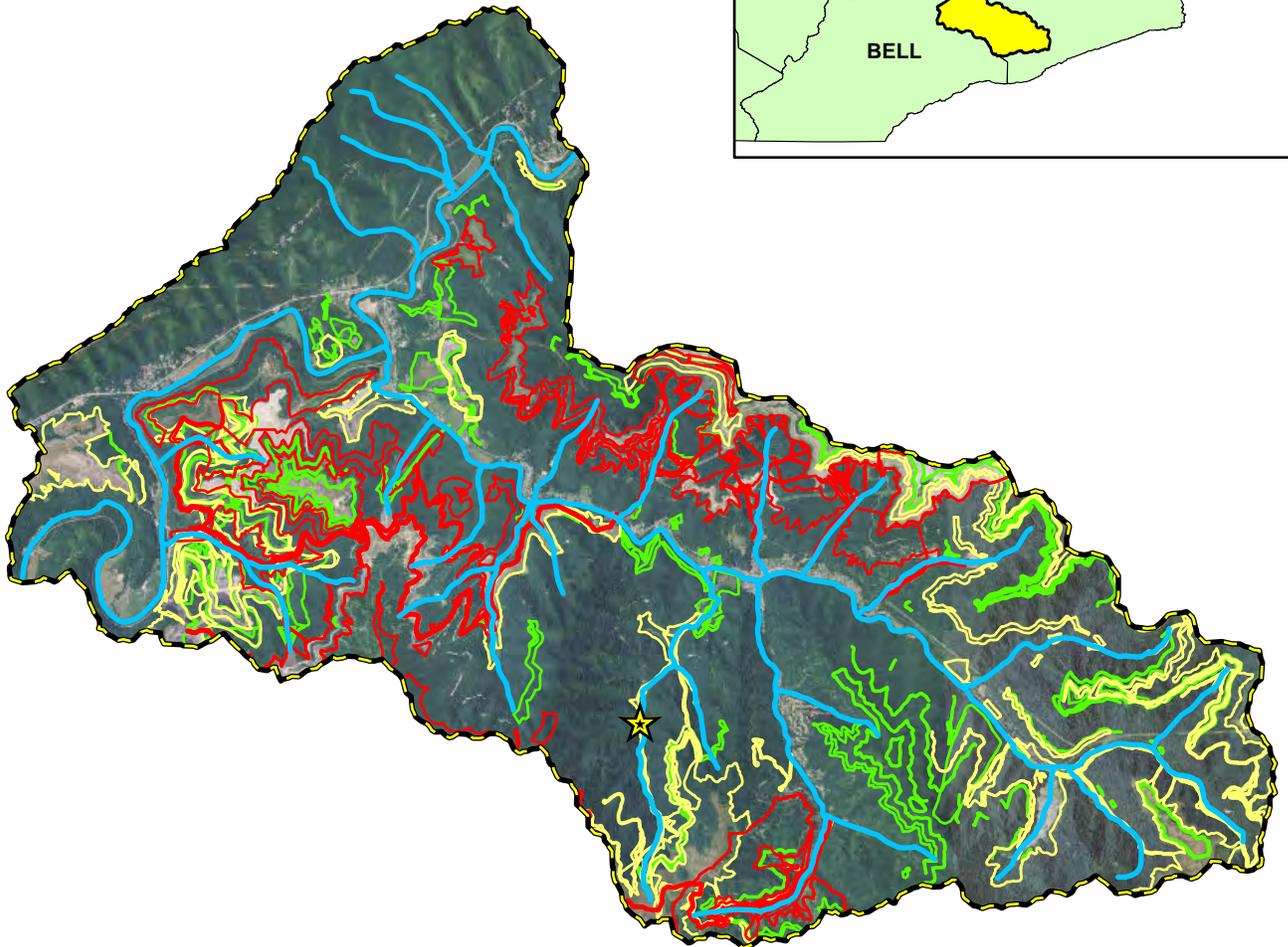
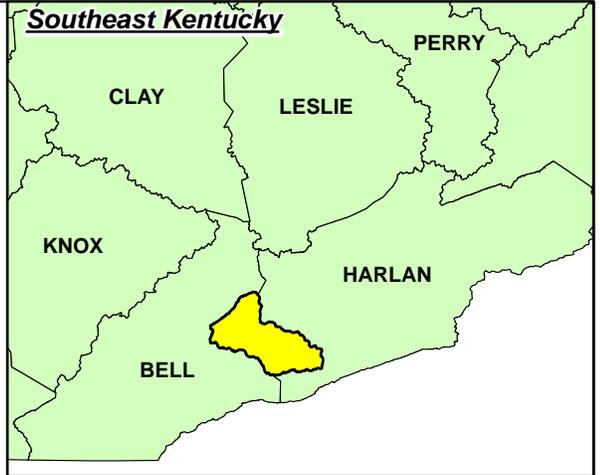


**DRAWING NAME:**  
Figure 6-2 Highway Projects Map  
**CLIENT:** Nally & Hamilton Enterprises, Inc.  
**KDNR#:** 848-0290  
**BSC#:** 2924  
**DATE:** 1/31/2013  
**DRAWN BY:** BES **CHECKED BY:** JRR



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Aerial imagery obtained via  
2012 National Agriculture Imagery Program.  
NAD 1983 StatePlane Kentucky FIPS 1600 (Feet)



**Puckett Creek-Cumberland River**  
**HUC 12: 051301010204**  
**30,998.55 Acres**



**Legend**

-  Project Location
-  Puckett NHD
-  HUC 12 Boundary
-  Surface Mining: Through 1985
-  Surface Mining: 1986 2006
-  Surface Mining: 2007 Present



**DRAWING NAME:**  
Figure 6-3 - Mined Areas Map  
**CLIENT:** Nally & Hamilton Enterprises, Inc.  
**KDNR#:** 848-0290  
**BSC#:** 2924  
**DATE:** 1/31/2013  
**DRAWN BY:** BES **CHECKED BY:** JRR



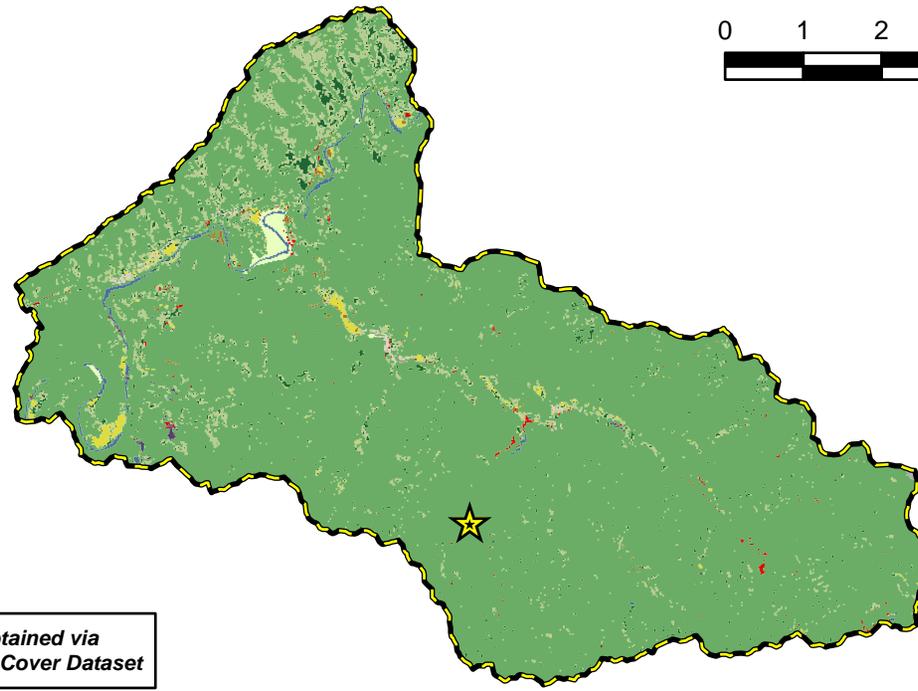
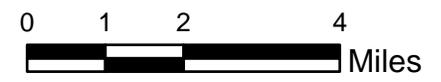
**Legend**

★ Project Location

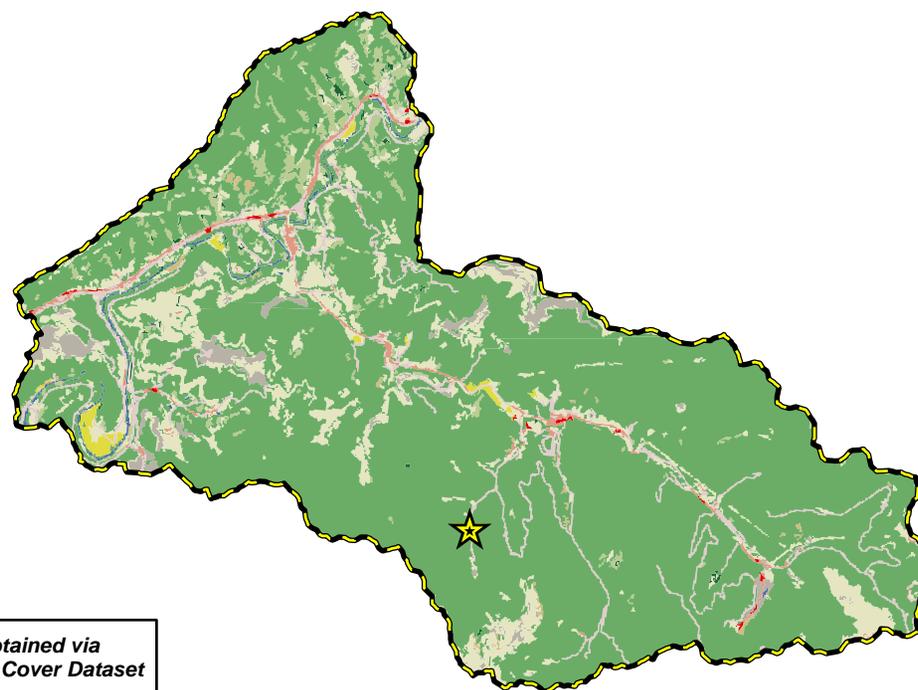
▭ HUC 12 Boundary

**National Land Cover Class**

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock/Sand/Clay)
- Quarries, Strip Mines, Gravel Pits
- Transitional
- Deciduous Forest
- Evergreen Forest
- Mixed-Forest Areas
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Urban/ Recreational Grasses
- Woody Wetlands
- Emergent Herbaceous Wetlands



*Land Cover Data obtained via  
1992 National Land Cover Dataset*



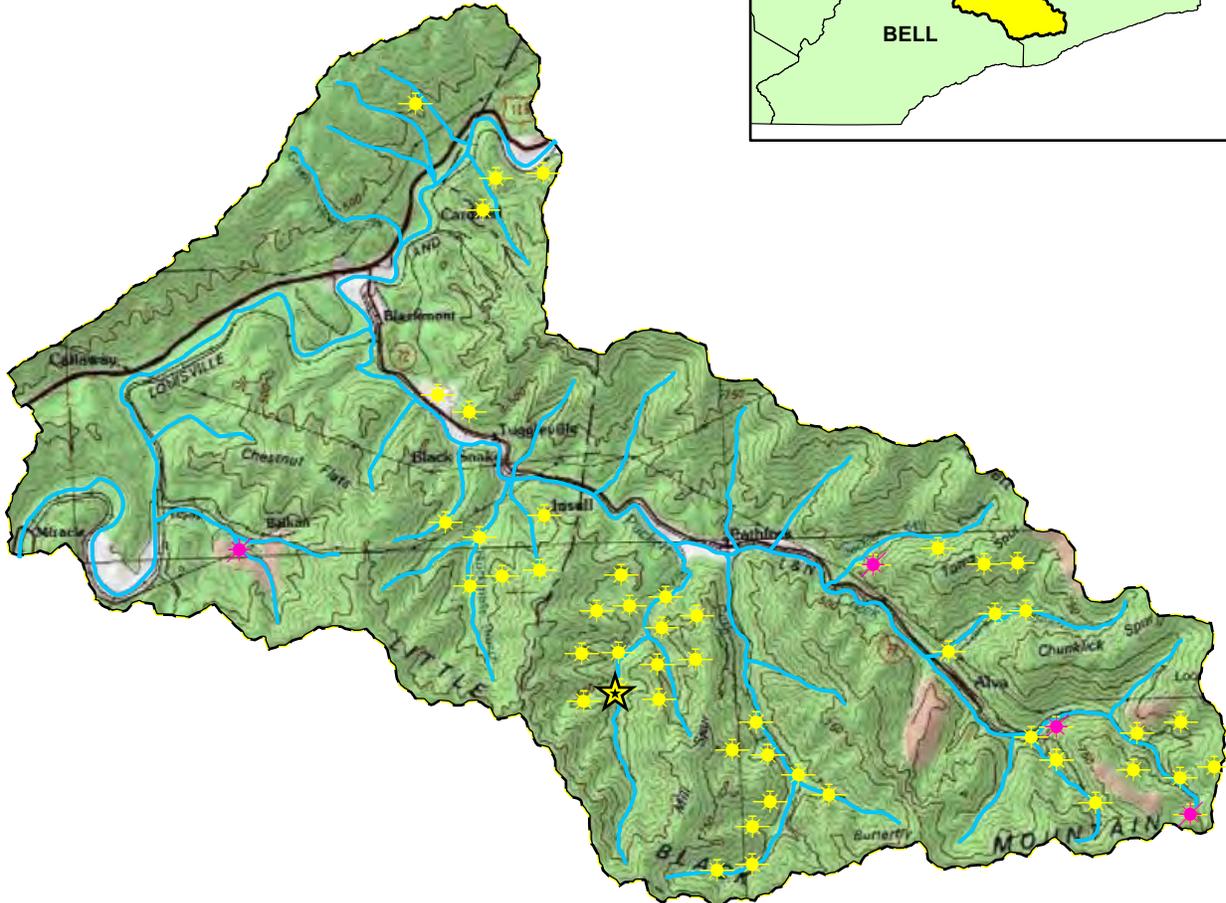
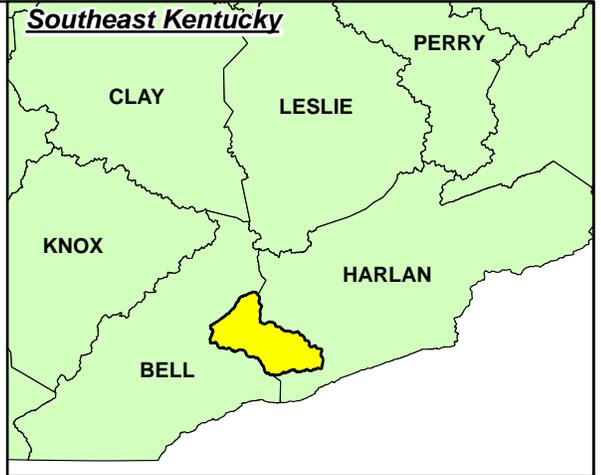
*Land Cover Data obtained via  
2006 National Land Cover Dataset*

**DRAWING NAME:**  
Figure 6-4 Land Cover Map  
**CLIENT:** Nally & Hamilton Enterprises, Inc.  
**KDNR#:** 848-0290  
**BSC#:** 2924  
**DATE:** 1/31/2013  
**DRAWN BY:** BES **CHECKED BY:** JRR



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Oil & Gas Well data obtained via Kentucky Geologic Survey:  
[http://www.uky.edu/KGS/emsweb/data/kyog\\_1z.zip](http://www.uky.edu/KGS/emsweb/data/kyog_1z.zip)  
 Basemap from National Geographic TOPO!  
 © 2011 National Geographic Society



**Puckett Creek-Cumberland River  
HUC 12: 051301010204  
30,998.55 Acres**



**Legend**

- Project Location
  - National Hydrography Dataset (NHD) Streams
  - HUC 12 Boundary
- Oil and Gas Wells**
- Dry & Abandoned Well 4
  - Completed Gas Well 52
  - Completed Oil & Gas Well 0
  - Completed Oil Well 0

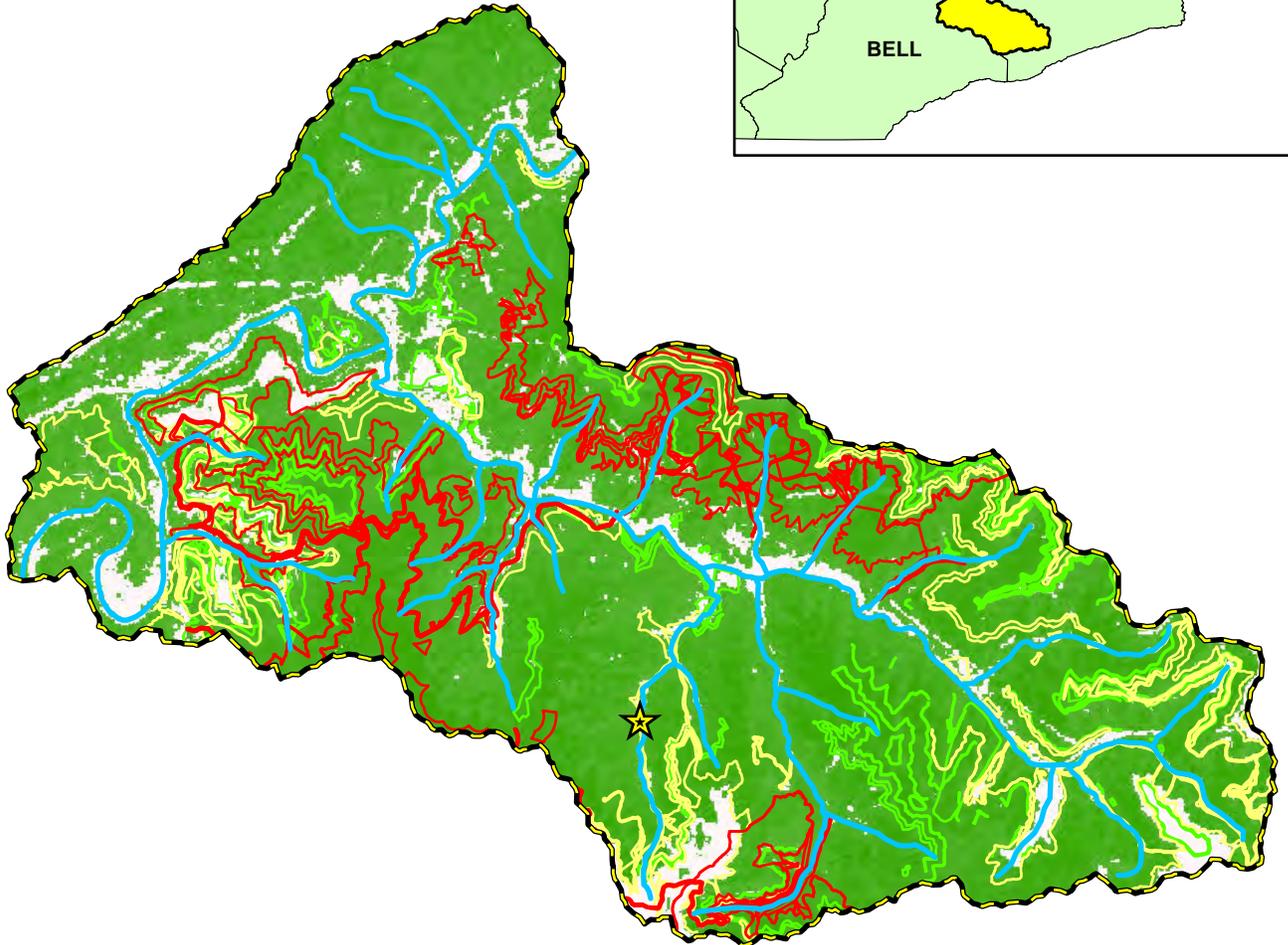
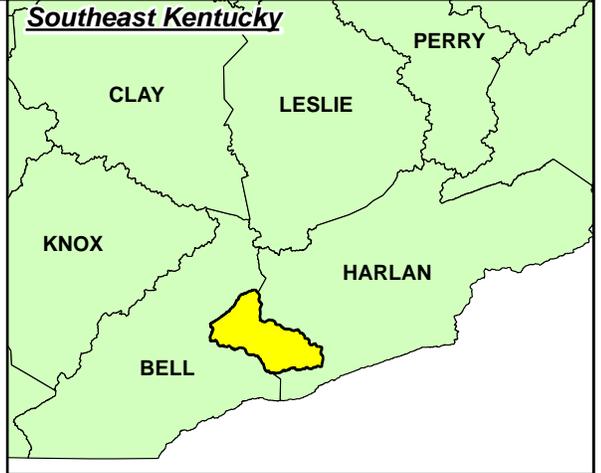


**DRAWING NAME:**  
 Figure 6-5 - Oil & Gas Wells Map  
**CLIENT:** Nally & Hamilton Enterprises, Inc.  
**KDNR#:** 848-0290  
**BSC#:** 2924  
**DATE:** 1/31/2013  
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Kentucky Tree Canopy Closure mapped using the National Land Cover Database 2001 (NCLD01). Downloaded from KY Geonet: [ftp://ftp.kymartian.ky.gov/kls/KY\\_TCanopy01.zip](ftp://ftp.kymartian.ky.gov/kls/KY_TCanopy01.zip)



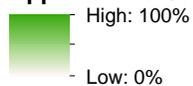
## Puckett Creek-Cumberland River HUC 12: 051301010204 30,998.55 Acres



### Legend

-  Project Location
-  Puckett NHD
-  HUC 12 Boundary
-  Surface Mining: Through 1985
-  Surface Mining: 1986 2006
-  Surface Mining: 2007 Present

### Approximate Canopy Cover



### DRAWING NAME:

Figure 6-6 - HUC 12 Riparian Areas  
 CLIENT: Nally & Hamilton Enterprises, Inc.  
 KDNR#: 848-0290  
 BSC#: 2924  
 DATE: 1/31/2013  
 DRAWN BY: BES CHECKED BY: JRR

**TAB 7**

**Avoidance and Minimization**

## **TAB 7: AVOIDANCE AND MINIMIZATION**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

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### **ALTERNATIVES ANALYSIS**

In accordance with 40 CFR 230 Section 404(b)(1), an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

#### **No Action Alternative**

Under this alternative the proposed action as previously described would not take place and the impacts as described would not be incurred. No direct impacts to streams are anticipated from the No Action Alternative. There would be no discharge of material into “WoUS” under this alternative and the project would not take place. This alternative does not meet the applicant’s purpose and need, nor does it meet the industrial need for energy. Additionally, future actions may occur regardless of the proposed action including oil/gas well activities, mining of the seams at a later date by the lessee or property owners, or any other activities potentially performed by the property owner. This alternative was eliminated for these reasons.

#### **On-Site Mining Method Alternatives**

Mining method alternatives are determined during the SMCRA permitting process based on those regulations as well as on the composition and location of the coal seams at a particular site. To be practicable, the alternative must be capable of accomplishing recovery of coal resources consisting of sufficient quality, quantity, and size while maintaining effective and economical ratios to achieve the overall project purpose in light of existing technology, cost, and logistics. Each mining alternative was evaluated based on equipment requirements, economics, site-specific conditions, and safety and regulatory considerations. These criteria are different for each mining technique. The economic evaluation of each method includes profits and start up cost, coal quality, predicted coal recovery, supply, labor, repair, start-up and reclamation costs, mitigation, royalty rates, transportation/belting costs, current market conditions, and demand. As such, “practicability” can change significantly based on many factors, the most critical being current market condition (price and demand for coal). In general, for a method to be economically feasible it must produce a net return of 15% on the initial investment. As described below, several of the methods reviewed (deep mining, contour with auger/highwall miner, area mining, contour with auger/highwall/area mining) were determined not to be practicable.

**1. Underground Mining:** To determine the feasibility of this alternative, the applicant compared the coal seam against a set of criteria for estimating the removal potential of available coal reserves by underground methods. These criteria have been specifically developed for this site using the underground mining method. Based on the location of the coal seams and the required subsidence protection zones, this mining method would not be technically feasible. For these reasons, it was determined that deep mining would not be a practicable mining alternative. Based on the logistical and technical limitations associated with this method it was determined that it would not meet the project purpose of extracting high quality coal in an efficient and cost-effective manner.

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**2. Surface Mining Techniques:** Various surface mining techniques include: contour, contour with auger/highwall miner, area mining, and contour with auger/highwall/area mining. The surface mining procedure recovers the coal product without the inclusion of extraneous rock or impurities that affect the overall quality of the coal and was considered a practicable alternative, therefore has been considered further.

The viability of surface mining methods is dictated by the presence of recoverable coal seams in sufficient volumes for extraction to be logistically practicable and economically beneficial. For most surface coal removal operations, the principle method of assessing the practicability of mining a particular coal seam is its stripping (mining) ratio, which is defined as cubic yards of in-place overburden moved per clean tons of coal produced. Practicability is typically defined as a minimum of 60% recovery of the established coal reserve while providing adequate storage for excess overburden, and accomplishing coal removal with existing equipment and technology. All alternatives were analyzed based on the project purpose.

**a. Contour Method:** Contour mining consists of removing coal located around the outside of the slope along its contour. The excavation associated with this method creates a highwall on the up-hill side of the excavation to expose the coal seam. Backfilling and grading is accomplished as the mining progresses across the site by placing overburden from the active mining areas into the previously mined areas. These activities are typically conducted within 60 days or 1,500 linear feet following coal removal. The overburden is placed in either the back-stack and/or hollow-fill and is graded to the approximate original contour (AOC). This method allows contemporaneous reclamation as mining activities progress through the site. To safely conduct contour mining as a stand along method at this site, the minimum bench width must be a minimum of 150 feet. It was determined that this was technically feasible therefore the contour mining method was found to maximize coal recovery at the site.

**b. Contour with Highwall/Auger Mining Method:** This method of mining is dependent on contour mining to provide seam access and flat operation area to contain the highwall equipment (highwalls and benches). This method utilizes the bench and highwall to remove coal that could not be accessed by contour mining alone. To conduct highwall mining a large bench is required to support the equipment. The highwall machinery (continuous miner) breaks up the coal and carries it back to the bench via a conveyor belt. For highwall mining to be safely conducted, a minimum of 6.5 feet of coal must be left between each entry. These columns act as a foundation to support the highwall as well as the interior of the mountain. This method also results in excess overburden due to the broken non-coal fragments returned to the surface by the conveyor. During the review of this method it was determined that it would be economically infeasible to use the highwall/auger mining method at this site. This is due to the required recovery ratios necessary to support the use of the machinery would. As a result, the combination of these two methods would eliminate the economic feasibility of the proposal and it would not result in maximum coal recovery at the site as required by SMCRA. As such, it was eliminated from further consideration.

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**c. *Area Mining Method:*** Based on the target coal seam elevations this method would not be technically feasible.

**TAB 7: AVOIDANCE AND MINIMIZATION**

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<b>Table 7.1 Analysis of Anticipated Changes to Various Resources for Contour Mining Alternative and No Action Alternative</b>		
<b>Resource</b>	<b>Contour Mining Alternative</b>	<b>No Action Alternative</b>
<b>Geology</b>		
Modification of Topography	Topography would be altered by removal of overburden then returned to approximate original contour (AOC).	No modification by proposed action.
<b>Groundwater</b>		
Groundwater levels in project and surrounding area	No anticipated adverse impacts to groundwater users. SMCRA permit contains alternative water supply plan.	No impact to groundwater by proposed action.
<b>Surface Water</b>		
Removal/impact of surface waters	Approximately 3.32 acres of “waters” would be temporarily impacted. Compensatory mitigation and reclamation provides no net loss of aquatic resources.	No filling of surface waters would occur at this site.
Flood Hazards	The proposed structures would be built to convey a 10 year or 100 year 24-hour storm event so no more than minimal impacts on flood control functions are anticipated.	No impact on flood hazards.
Floodplains	No impacts on floodplains based on FEMA mapping.	No impacts on floodplains.
Water Quality	No adverse impacts based on Section 401, 402 permits, reclamation, drainage control plan, and BMPs.	No adverse impacts on water quality.
Erosion and Sedimentation	No adverse impacts following Section 401, 402, reclamation, drainage control plan, and BMPs.	No impacts on erosion and sedimentation.

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<b>(Table 7.1 continued)</b>		
<b>Soils</b>		
Accelerated erosion in disturbed areas	Impacts to soils would be minimized by erosion control measures, BMPs, and reclamation.	No impact on erosion.
<b>Vegetation</b>		
Impacts to Vegetation	Temporary loss of woody-species and herbaceous vegetation would occur, but be off-set by reclamation.	No impacts on vegetation.
<b>Fish and Wildlife</b>		
Loss of aquatic habitat	3.32 acres of ephemeral, intermittent, and perennial stream would be directly or indirectly impacted. These impacts would be offset through on-site mitigation and EIU credit purchases.	No loss of WoUS would occur.
Impacts to endangered or threatened species	No impacts to threatened or endangered species are anticipated.	No impacts to endangered and threatened species.
Direct habitat loss or alteration	Temporary impacts as a result of direct disturbance to 42.8 acres which currently provides riparian zone wildlife habitat. These would be offset through reclamation and EIU credit purchases.	No impacts to habitat.
<b>Cultural Resources</b>		
Potential impacts to cultural resources	No impacts to cultural resources identified (See SHPO correspondence TAB 2)	No impacts to cultural resources.
<b>Air Quality</b>		
Impacts of dust on air quality	Impacts would be minimized by implementation of proper fugitive dust control measures within SMCRA permit.	No impacts on air quality.

**TAB 7: AVOIDANCE AND MINIMIZATION**

Nally & Hamilton Enterprises, Inc.  
 Individual Permit Application and Stream Restoration Plan  
 LRN-2009-00741  
 KDNR #848-0290  
 Revised February 9, 2013

<b>(Table 7.1 Continued)</b>		
<b>Social and Economic Values</b>		
Population change	Maintenance and potential increase in local population due to available employment.	No direct impact on population. Potential indirect decrease in population due to lack of employment.
Employment and income change	Maintenance and potential increase in employment at peak production.	Adverse impacts due to lack of employment and income.
<b>Land Use and Recreation</b>		
Impacts on recreational activities	The proposed action is not considered an intensive recreational area and the land is privately owned with restricted access. Thus no impacts are anticipated.	No impacts on recreational activities.
Loss of hunting opportunities	No impacts to hunting are anticipated as the project area is privately owned and trespassing is prohibited.	No impacts to hunting.
Impacts to prime farmland	No prime farmland exists in the project area thus no impacts are anticipated.	No impacts to prime farmland.
Impacts to navigation	These are non-navigable waters thus no impacts on navigation are anticipated.	No impacts to navigation.
<b>Transportation</b>		
Heavy truck traffic	Temporary potential for increases would exist during the initial construction phase. The proposed haulage roads have historically been utilized for hauling.	No impacts to traffic in the area.
<b>Noise and Aesthetics</b>		
Loss of landscape	Due to the isolated nature of the impact sites minimal landscape impacts are anticipated (steep slopes/forestland).	No impacts to landscape.

**TAB 7: AVOIDANCE AND MINIMIZATION**

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<b>(Table 7.1 Continued)</b>		
Aesthetics	Due to the isolated nature of the impact sites minimal aesthetic impacts are anticipated (steep slopes/forestland). Any impacts would be offset through reclamation.	No impacts to aesthetics
Increase in ambient and annoyance noise levels	Temporary increases in ambient noise levels during the life of the operation.	No increase in noise levels.
<b>Hazardous Materials</b>		
Spill and storage of hazardous materials during operation	Hazardous material transporters are required to have spill response plans that can be implemented in the event of an accidental spill. The operation would follow State and Federal regulations.	No hazardous material transport or storage would occur.
<b>Public Health and Safety</b>		
Impacts to health and safety of local population	No adverse health impacts would be anticipated due to impacts on water quality, air quality, or noise.	No impacts to public health.
<b>Environmental Justice</b>		
Low income or minority population disproportionately impacted	Section 401, 402, SMCRA permits address environmental justice issues.	Adverse impacts on local communities due to the lack of employment and tax revenue.

## **TAB 7: AVOIDANCE AND MINIMIZATION**

Nally & Hamilton Enterprises, Inc.

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### **Off-Site Alternatives**

This project is site specific due to the contracts and lease agreements at this site.

### **MINIMIZATION MEASURES**

The following measures provide additional minimization of the proposed impacts:

1. The applicant has evaluated practicable alternatives in the alternatives analysis and avoided permanent stream impacts that would increase the environmental impacts of the project.
2. Water quality monitoring through the Section 402 Kentucky Pollutant Discharge Elimination System (KPDES) program also provides avoidance and minimization of adverse affects and would provide remedial actions should any exceedance occur.
3. Compensatory mitigation provided through purchase of EIU credits from approved mitigation banks as well as the contingency plan for the on-site mitigation areas should ensure a successful mitigation project.
4. The applicant has proposed within the SMCRA permit that the permit area would be returned to approximate original contour upon the reclamation phases.
5. SMCRA permits Best Management Practices minimize overall impacts.

### **Best Management Practices (BMPs)**

The following BMPs within the SMCRA permit are proposed to ensure the protection of the lower lying streams and the associated areas. Erosion will be minimized by the immediate seeding, mulching, and re-vegetation of disturbed areas including ponds and out slopes. During pond construction, hay checks will be placed below the disturbance to filter runoff. Likewise, hay checks will be used if necessary along roadway ditches or any temporary ditches or drainage channels created. Rip-rap will be used when velocities or volume of runoff dictate.

Throughout the mining process, care will be taken to minimize erosion and protect surface and groundwater quantity and quality. Measures will be taken, as conditions dictate, to prevent adverse impacts to the area.

#### Embankment Pond BMPs

- Sediment and erosion control measures will be inspected to ensure the structures and measures are functioning properly and to identify any required maintenance.
- Existing vegetation will be retained to the extent practicable.

## **TAB 7: AVOIDANCE AND MINIMIZATION**

Nally & Hamilton Enterprises, Inc.

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- Temporary sediment control structures such as silt fence, straw bales, rock checks, dikes, and/or channel barriers will be used, as necessary, to prevent the transportation of sediment downstream.
- Backfill areas will be vegetated during construction after being brought to final grade to reduce erosion of the material.
- Chemical treatment of the ponds will be used, if necessary and practicable, to facilitate compliance with the project's Section 402 permit.
- Where practicable and available, the applicant would use flocculants designed specifically to reduce total suspended and dissolved solids.

**TAB 8**

**Public Interest Factors Discussion 404(b)(1) Guidelines**

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

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### **HUMAN USE CHARACTERISTICS AND IMPACTS**

#### **Existing and Potential Water Supplies; Water Conservation**

Conservation of surface and ground water will be implemented in the immediate zone through material handling, expedient coal removal, compliance with contemporaneous reclamation requirements and best management practices. Any potential adverse impacts to surface and ground water resources have been addressed in this permit which provides protective measures for the surface and ground water systems. The nearest municipal water supply intake is within the Cumberland River, approximately 43 miles downstream of the proposed project near Barbourville, Kentucky. Due to the distance from public water intakes and because of the limited scope of the impacts, it is not anticipated that this proposed project would affect the water supply.

#### **General Water Quality**

The Section 401 Water Quality Certification is pending but upon issuance it is assumed that this would indicate compliance with the State water quality standards.

#### **Aesthetics**

The existing forested setting would change during mining activities, but this change would be minimized by the reclamation of the mine site. Whether this impact is adverse or an improvement is a matter of individual judgment. The aesthetics of the mitigation impact areas would be improved by the restoration of the streams to a similar pattern and profile and by the restoration of the riparian forest adjacent to the streams. Additionally, to a certain extent, aesthetics are subjective to personal opinion.

#### **Recreation**

Recreational opportunities currently associated with Mill Creek would be limited due to their locations. The riparian forest would offer hunting and/or wildlife observation opportunities, but has limited accessibility due to private property ownership. Hence, any effect of the proposed project on this characteristic would be minimal.

#### **Parks, National and Historic Monuments, Wild and Scenic Rivers, Wilderness Areas, Research Sites, Etc.**

There are no such sites at or near the proposed project location. Therefore, the project would have no impact on these features.

#### **Traffic/Transportation Patterns**

Overall, traffic and transportation patterns are outside the scope of this analysis. Locally, traffic would increase during the initial phases of the mining activities. All access to the mine would be obtained through existing roads which have historically been used for mine traffic.

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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### **Energy Consumption or Generation**

The coal produced from this mine operation would become part of a market supply for electric power generation facilities, metallurgical industries and other consumers. Almost half of the United States' and practically all of the regional electric power is generated by coal-fired facilities (see **Figures 8-1 and 8-2** on the following page). In general, coal is an abundant, economically efficient, and stable resource. While natural gas is currently at record low prices, it still remains more expensive than coal on a per-unit of heat basis. Additionally, coal is the only commodity produced locally in Kentucky in sufficient quantities to meet electricity demands.<sup>1</sup> The coal recovered through this project will supply the energy needs/demands for a variety of consumers, therefore energy consumption and generation would be positively supported by the action.

### **Mineral Needs**

The project would prove beneficial toward supplying local, state, and national needs for mineral coal supplies (see Energy Consumption or Generation above).

### **Navigation**

These are non-navigable waters of the U.S. thus no impacts navigation would occur.

### **Safety**

Impacts are assumed only to occur within the immediate permit area, and public protection is provided through the SMCRA permit and the Mine Safety and Health Administration (MSHA); these permits are required before mining commences. All structures and activities are designed, annually inspected, and certified by professional engineers. Routine inspections are made by MSHA and Kentucky Department for Natural Resources personnel. Public safety measures are incorporated into Kentucky's surface mining regulations in the form of design and construction standards for sediment control structures, roads and other construction features, performance standards for blasting, and general provisions for identifying and managing potential hazards. The MSHA exercises regulatory control over the safety plan for the mine operation to ensure compliance with federal standards. If the mining activities are conducted in compliance with all State and Federal safety requirements, no appreciable direct, indirect or cumulative effect on public safety would be expected to occur as a result of the proposed activities.

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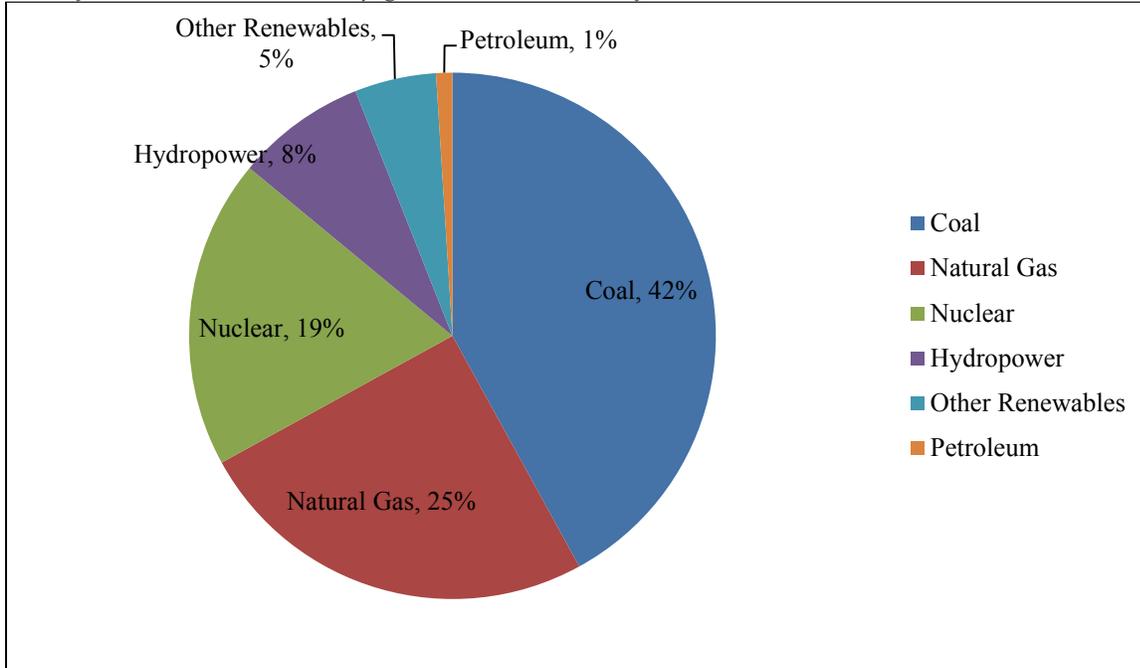
<sup>1</sup>*Kentucky Coal Facts 12<sup>th</sup> Edition*. Published by the Kentucky Energy and Environment Cabinet, and the Department for Energy Development and Independence.

**TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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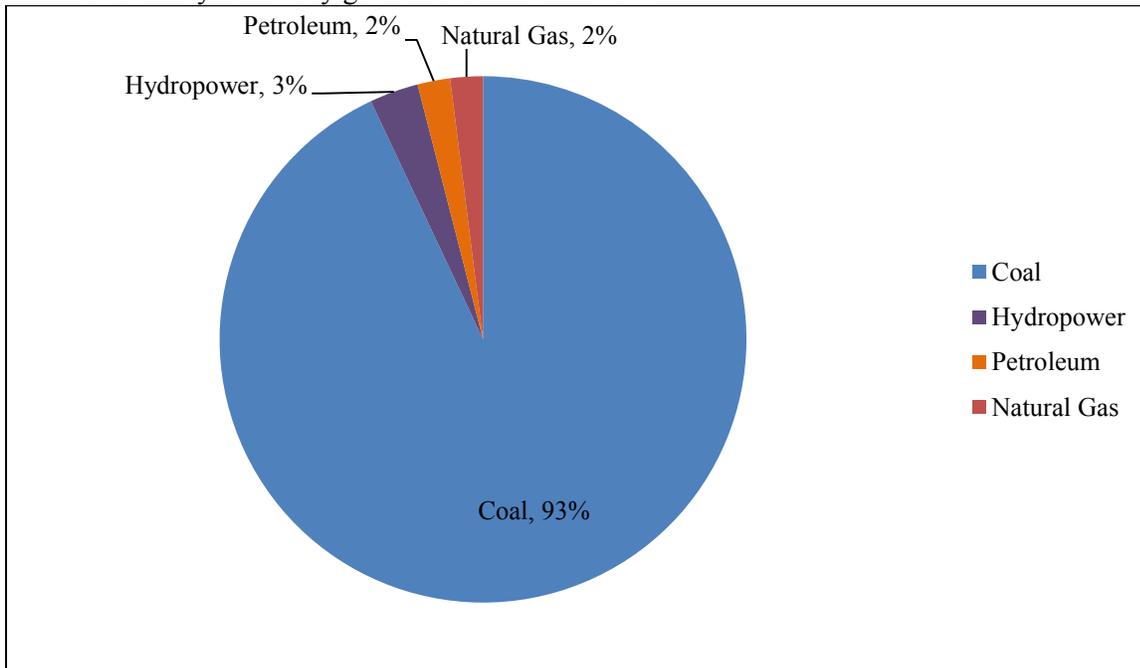
**Figure 8-1 United States Electricity Generation by Fuel Type (%), 2011**

*42% of United States electricity generation is derived from coal.*



**Figure 8-2 Kentucky Electricity Generation by Fuel Type (%), 2011**

*93% of Kentucky electricity generation is derived from coal.*



*(Source: energy.ky.gov, Kentucky Coal Facts)*

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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### **Food and Fiber Production**

No croplands or soils located within the immediate permit boundary or local area are designated as prime farmland, and therefore no impacts would be incurred to food or fiber production.

### **Prime and Unique Farmland**

The proposal would not impact any prime or unique farmland.

### **Air Quality**

Overall mine site air quality is covered by the KDMP permit. However, the air quality would be temporarily impacted during the construction and operation phases of this project. The mechanized land clearing and grubbing activities associated with site preparation and the operation of mining equipment would generate some level of fugitive dust. Permissible levels of air quality degradation were evaluated by the KDMP.

### **Environmental Justice**

No low income residences would be relocated due to the project. The SMCRA and USACE permit determinations (i.e Section 106, 107, 401,402), cumulative impact assessments, property owner information, post-mining land use, fugitive dust control, and the fact that no public water supplies are located near the project indicate that no disproportionate impacts to minority or low-income communities should be incurred.

### **Noise**

Overall mine noise levels are covered by the KDMP review. The noise level would rise temporarily during the construction and operational phases of the project. Generally, mining activities such as blasting of geologic overburden and operation of heavy machinery would occur in a structured sequence within the project area. Noise levels would be dependent on the relative position of the individual to the mining activity. Any increase in noise levels would be temporary and would return to pre-project conditions after successful reclamation.

### **Historic Properties**

There will be no effect on historic and cultural properties. Cultural resources identification and assessment within the project area is covered under the SMCRA review process by the KDNR and is coordinated with the KHC/State Historic Preservation Office (SHPO). On November 13, 2009 comments were received from SHPO which stated that there are no historic properties present within the undertaking's area of potential impact and thus they had no further comments (See Tab 2).

### **Property Ownership**

Property ownership within the immediate permit and adjacent areas is addressed in the SMCRA permit application and newspaper advertisements were published to provide local owners the opportunity to express their concerns. Property ownership outside the local area should not be impacted.

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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### **General Environmental Concerns**

Minimization of off-site damage and public safety issues is provided through the SMCRA permit including a blasting plan and fugitive dust control which will ensure the minimization of these concerns. The watering of roads and re-vegetation of the landscape will aid in the minimization of dust in the area.

### **Land Use Classification**

The project site contains selectively harvested forest areas. The KDMP permit requires secured lease agreements with affected landowners for the purpose of mining. The project would change the current land use classification consistent with those leases and the KDMP permit.

### **Economics**

The jobs supplied by this mining operation, the energy generated by the harvested coal reserves and the additional demand for mine service and supply vendors would be beneficial to the local, state, and national economy.

### Boundaries of the affected community

This project is expected to benefit the Eastern Coal Field region within the Central Appalachian ecological region which includes Harlan County.

Projects like the one proposed do not only have a local impact, but also impact Kentucky's greater economy. Kentucky's executive budget sites the mining industry as a major factor in the stability of the economy, stating, "By most accounts, the losses endured by Kentucky from the national recession that ended in June 2009 were somewhat less severe than most states. The loss of household wealth was muted in Kentucky since the Commonwealth never really experienced a pronounced run-up in home values. Second, Kentucky's abundance of coal provided stable employment and wealth in the mining sector." The budget goes on to say, "The weakness in employment has been stubborn across nearly every sector of Kentucky employment, with mining being the primary exception."<sup>2</sup>

### The effect on employment in the affected community

Employment in each community will be both directly and indirectly impacted with the creation of new employment. The county of Harlan, Kentucky historically has an unemployment rate higher than the state and national averages (See figure 8-1 below).

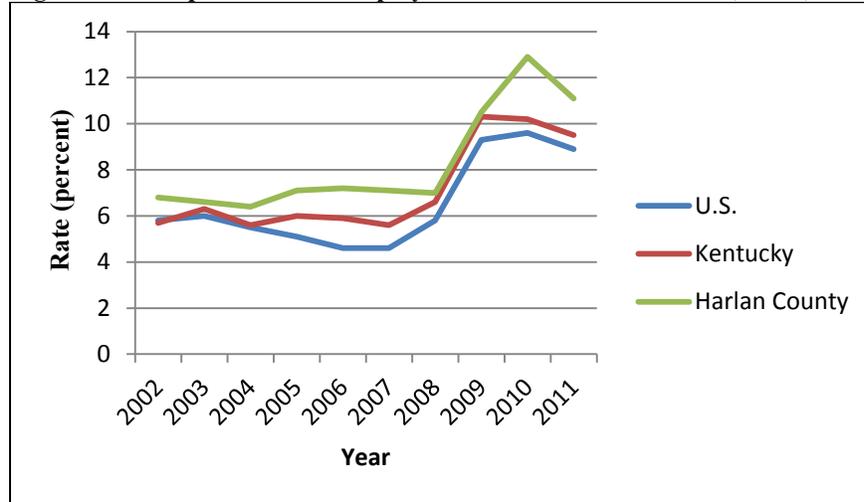
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<sup>2</sup> *The Commonwealth of Kentucky Budget in Brief 2012-2014.*

## TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION

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Figure 8-3 Comparison of Unemployment Rates on the National, State, and County Levels (2002-2011)



(Source: United States Department of Labor Bureau of Labor Statistics).

In 2011, Harlan County's direct mining employment (meaning the statistic does not include the administrative/professional employees of coal companies located in these areas, and does not include any private services or indirect employment) made up 21.63% of the labor force.<sup>3</sup> Given the rate of unemployment in Harlan County and the percentage of the work force that rely on the mining industry and mining opportunities, this project will have a positive influence on local employment rates and the local job market.

Based on similar operations of the client, this specific project is expected to provide direct employment to approximately 40 residents. Additionally, studies show that the mining industry creates at least 3 indirect related jobs for each actual direct mining position.<sup>4</sup> Based on these indicators, at least 120 additional jobs will potentially be supported by this development. Therefore, the ongoing work of this project will not only provide direct employment, but also contribute significantly to indirect employment opportunities; including equipment sales, manufacturing, construction, engineering services, food services, fuel sales, transportation, other general business services, government/regulatory services, etc. Indirect benefits include new income flowing into the coal industry that is re-spent creating a multiplier effect. The top five industries that will receive the most impact from any new investment are outlined below<sup>5</sup>:

<sup>3</sup> *Kentucky Coal Facts, id.*

<sup>4</sup> Haywood and Baldin, *University of Kentucky Center for Business and Economic Research: "Economic Impact Analysis of Coal in Kentucky." (1995-2004).*

<sup>5</sup> Dr. Christopher Jepsen, Associate Director and Dr. Anna Stewart, Economic Analyst, University of Kentucky Gatton College of Business and Economics, Center for Business and Economic Research (Outlined in *Kentucky Coal Facts, i.d.*)

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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- 20% of indirect spending would be spent in industries defined as mining coal and support activities for mining. This is essentially intra-industry trade that does show up as new revenue.
- 15% would be spent in the transportation industry by rail or truck.
- 14% would be spent in professional services industries. These are typically industries such as architectural and industrial engineering, management companies, legal services, financial institutions and other industries that provide services that might not be offered in house.
- 9% would be spent in the petroleum industry, natural gas and electric power transmission.
- 9% would be spent in industries that sell or maintain commercial equipment and structures used to support the coal industry.

If these job opportunities are removed, this could have an adverse impact on employment rates and economic stability. Changes in the industry can often have a significant impact on the rate of social welfare dependency in Appalachian counties like Harlan. In particular, “losses in coal mining earnings in these counties often lead to increased poverty and dependence on social welfare programs. The opposite is also true. As earnings in the industry increase, poverty and social welfare dependency often decrease.”<sup>6</sup>

### Median Household Income Levels in the Affected Community

This project would provide a positive contribution to median household income, as well as the market value of taxable property in the county and region. The influx of monies will allow these households the ability to maintain and/or enhance their economic status and provide improved social welfare.

The median household income of Harlan County is \$26,914.<sup>7</sup> In 2009, the average weekly wage of a miner in Kentucky was \$1,214.<sup>8</sup> Based on this number, the projected annual income for an employee of this project is estimated at \$63,128. This is significantly higher than the current median household income in Harlan County, and does not include the expected increase in income due to indirect effects of the proposed project’s employment in the county.

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<sup>6</sup> Roenker, Jonathan. *Kentucky Annual Economic Report 2002: The Economic Impact of Coal in Appalachian Kentucky*. The article is based on and draws from the 2001 University of Kentucky Center for Business and Economic Research publication “*A Study on the Current Economic Impacts of the Appalachian Coal Industry and its Future in the Region*,” whose research was sponsored by the Appalachian Regional Commission.

<sup>7</sup> Source: U.S. Census Bureau Social, Economic, and Demographic Characteristics for Harlan County, Kentucky.

<sup>8</sup> Kentucky Coal Facts, Id

## **TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

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### Tax Revenues of the Affected Community

Taxation of the coal industry is a significant source of revenue for state and local governments, and is an important part of public financing. This project is expected to increase local, state, and federal revenues from the following aspects and activities associated with the mining, processing, and sales of the recovered resource:

- Recovered reserves as well as reserves in situ are subject to taxation.
- Severance taxes.
- Corporation income taxes.
- Wages paid to employees are subject to state, federal, and local taxes.
- Tangible equipment and properties are taxed.
- Wages received by local workers will increase sales in the local economy.
- Reclamation Fees.
- Taxes generated from goods and services purchased through this operation.
- Long-term post site reclamation and development will increase property taxes in the area.

While all tax revenues will benefit the communities, severance tax in particular will directly improve the welfare of local citizens. These revenues are significant for maintaining the quality of life, school funding, and public infrastructures. According to Kentucky's Budget of the Commonwealth 2012-2014, the coal severance tax serves "to strengthen and to improve the environment for new industry and to improve the quality of life of the residents." Below are examples of priority categories that the severance tax is used to improve:<sup>9</sup>

- Public safety, including law enforcement, fire protection, ambulance service, etc.;
- Public transportation;
- Research grants;
- Environmental protection;
- Health programs;
- Recreation;
- Libraries and educational facilities;
- School technologies;
- Scholarships;
- Services for the poor, aged, and handicapped;
- Industrial and economic development.

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<sup>9</sup> Information and categories on list taken from The Commonwealth of Kentucky 2012-2014 Executive Budget, Volume 1, pp. 22-23.

**TAB 8: 404(b)(1) AND PUBLIC INTEREST FACTOR DISCUSSION**

Nally & Hamilton Enterprises, Inc.  
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 LRN-2009-00741  
 KDNR #848-0290  
 Revised February 9, 2013

As shown in Table 8-1, during the 2009-2010 fiscal year Harlan County generated \$32,598,573 in total coal severance tax receipts.<sup>10</sup> This does not include business taxes, sales taxes, employee income taxes, and other related tax revenues, and therefore only represents a small portion of the Kentucky tax revenue generated from coal production. Tax revenues will provide socioeconomic benefits on the county, regional, and state levels. Taxes that are returned to the respective county will benefit children, teachers, schools, parents and their work, local community activities, etc. The youth will have increased opportunities for furthering their education beyond high school; and therefore will help raise Kentucky into a higher ranking educated state.

**Table 8.1 Coal Severance Revenue; Kentucky State, East KY, Harlan County 2009-2010 Fiscal Year**

Region	Taxes Collected				Taxes Returned to County		
	Gross Value of Severed Coal	Severed Coal Tax	Gross Value Processing	Total Receipts	LGEAF*	LGEDF**	Unmined Mineral Taxes
State Total	\$5,656,656,607	\$241,305,000	\$831,233,257	\$270,341,379	\$32,845,283	\$60,533,908	\$16,903,420
East KY	\$4,380,132,034	\$189,144,948	\$672,053,462	\$217,507,319	\$26,238,221	\$34,189,458	\$14,676,207
Harlan County	\$659,987,635	\$29,269,635	\$80,486,084	\$32,598,573	\$3,061,470	\$3,246,148	\$2,052,735

*(Source: energy.ky.gov, Kentucky Coal Facts)*

*\*Local Government Economic Assistance Fund*

*\*\*Local Government Economic Development Fund*

As illustrated this project will also benefit retailers, service industry personnel, food establishments and entertainment industries in the community. In addition, severance tax dollars not only fund basic needs such as water and sewer projects but also fund recreational, social and cultural developments.

**Environmental Justice**

The section (including but not limited to) 401, 402, 106, and 7 efforts taken by the applicant indicate that environmental justice considerations should be fulfilled. Local communities are provided the opportunity to comment on proposed projects during the SMCRA permitting process.

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<sup>10</sup> Kentucky Coal Facts, Id.

**TAB 9**

**Compensatory Mitigation Plan**

## **TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.  
Individual Permit Application and Stream Restoration Plan  
LRN-2012-00914  
KDNR#848-0290  
Revised May 8, 2013

### **MITIGATION GOALS AND OBJECTIVES**

The goal of the compensatory mitigation project is to restore all stream habitats as close as possible to the pre-impact condition.

The mitigation areas (A through P) will have a total length of 18,273 linear feet (**Figure 9-1**).

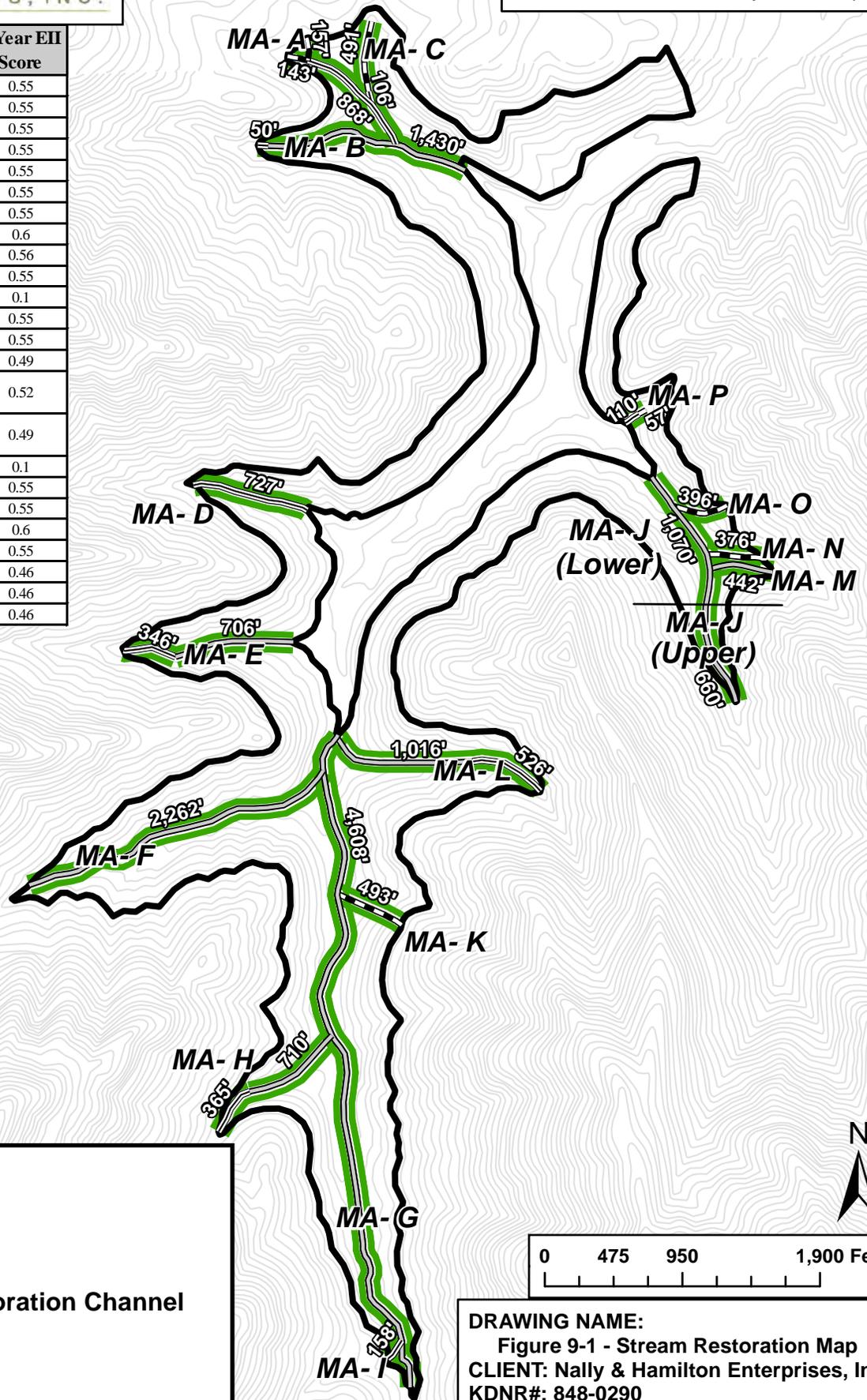
During the first phase of mitigation the pre-impact stream geometry will be restored using the reference data. This includes longitudinal profiles, sinuosity patterns, plan views, pool and riffle cross sections, and substrate pebble counts of the existing streams. All work should be performed during low flow conditions and proceed in a downstream direction to avoid re-suspension of sediment into restored reaches. After in-stream work is completed and stable, the riparian vegetation will be planted, beginning at the ordinary high water mark (OHWM) (**Figure 9-2**). Hydro-mulch will also be used to promote the success of this process. A minimum riparian corridor of 50 feet from each bank (or until natural forest limits are encountered) will be established in all mitigation areas. The riparian corridor vegetation plan will follow the guidelines, Technical Reclamation Memorandum #21.<sup>1</sup> Vegetation efforts will utilize native tree and shrub species. The grasses to be used during vegetation efforts will include temporary and permanent plantings. Annual rye (*Lolium multiflorum*) and Ladino clover (*Trifolium repens*) are proposed as a temporary species while Orchard grass (*Dactylis glomerata*) is proposed as a permanent species. The temporary species will offer quick ground coverage and begin providing nitrogen back into the areas. Native tree species will be used based on what is available at the time of planting.

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<sup>1</sup> Kentucky Department of Fish and Wildlife Resources. (1995). Plants Species, Distribution Patterns, Seeding Rates and Planting Arrangements for Revegetation of Mined Lands, Technical Reclamation Memorandum #21



Mine Area	Stream Type	Length (Feet)	5 Year EII Score
MA-A	RPW:S	868	0.55
	NRPW	300	0.55
MA-B	RPW:S	50	0.55
	RPW:P	1,430	0.55
MA-C	RPW:S	106	0.55
	NRPW	491	0.55
MA-D	RPW:S	727	0.55
MA-E	RPW:P	706	0.6
	RPW:S	346	0.56
MA-F	RPW:P	2,262	0.55
MA-G	RPW:P	4,608	0.1
MA-H	RPW:P	710	0.55
	RPW:S	365	0.55
MA-I	RPW:S	158	0.49
MA-J Lower	RPW:P	1,070	0.52
MA-J Upper	RPW:P	660	0.49
MA-K	NRPW	493	0.1
MA-L	RPW:P	1,016	0.55
	RPW:S	526	0.55
MA-M	RPW:P	442	0.6
MA-N	NRPW	376	0.55
MA-O	NRPW	396	0.46
MA-P	RPW:S	110	0.46
	NRPW	57	0.46



**Legend**

Permit Boundary

**MA-** Mitigation Area

**Natural Stream Restoration Channel**

NRPW (Ephemeral)

RPW:S (Intermittent)

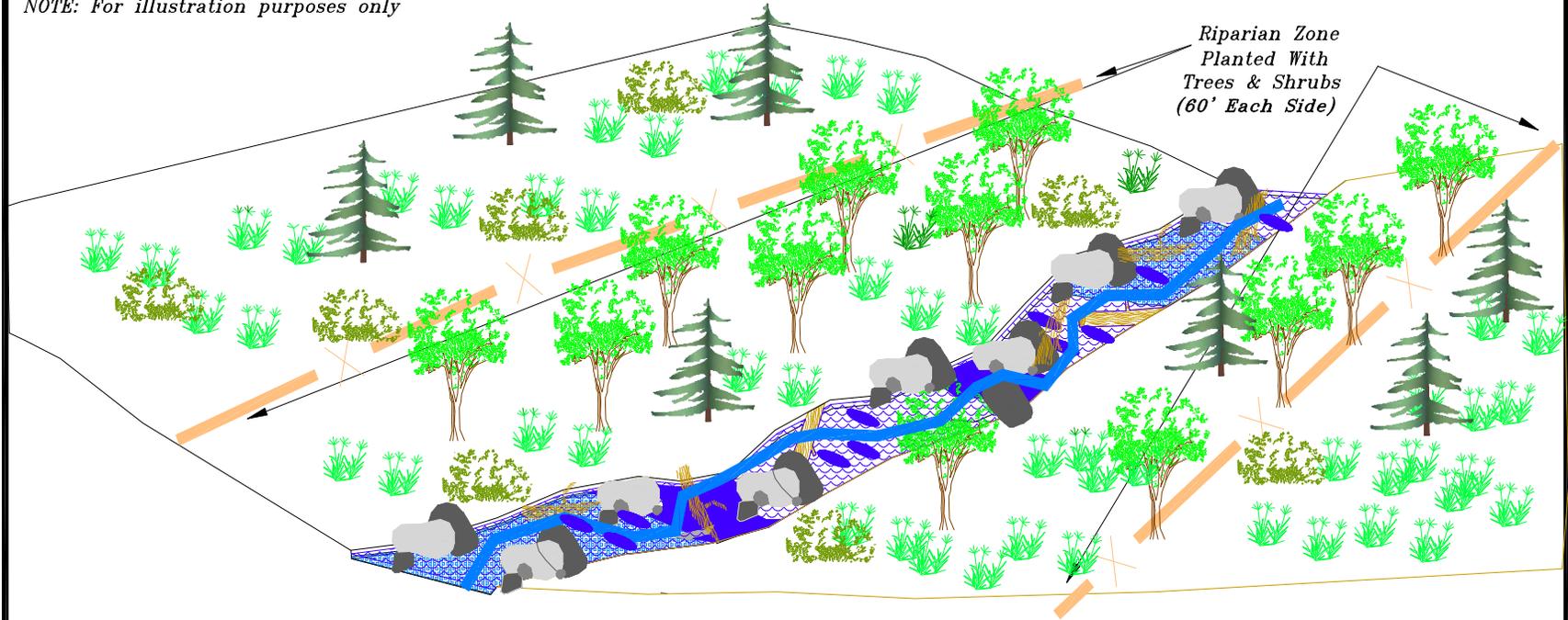
RPW (Perennial)

Riparian Planting Zone (60' from each bank)

**DRAWING NAME:**

Figure 9-1 - Stream Restoration Map  
 CLIENT: Nally & Hamilton Enterprises, Inc.  
 KDNR#: 848-0290  
 BSC#: 2924  
 DATE: 8/24/2012  
 DRAWN BY: BES CHECKED BY: SRL

NOTE: For illustration purposes only



**LEGEND:**

-  Deep Pools
-  Riffle Areas
-  Thalweg
-  Step Pools
-  Riparian Area Trees
- 
-  Riparian Shrubs
-  Logs
-  Boulders
-  Grasses

DRAWING NAME:  
Figure 9-2 - Stream Restoration Planview  
CLIENT: Nally & Hamilton Enterprises, Inc.  
KYDNR#: 848-0290  
PROJECT#: 2924  
DRAWN BY: BES CHECKED BY: JRR  
DATE: 02/04/2013

## **TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2012-00914

KDNR#848-0290

Revised May 8, 2013

### **TIMELINES**

It is projected that mine areas A through P mitigation construction activities will be performed within a year of the impacts occurring at each impact site.

### **SUCCESS CRITERIA**

Final success criteria for compensatory mitigation of streams shall be based on the replacement of physical, chemical, and biological functions. The success criteria will be evaluated as illustrated by **Table 9.1**.

<b>PARAMETER</b>	<b>SUCCESS</b>	<b>METHOD</b>
Riparian Corridor	Riparian zone contains a variety of species alive and healthy	Measure replanted width and estimated stem count
Ecological Integrity Units	Equal to or Greater than Proposed Scores	EKSAP
Stream Geometry	Similar To Approved Plans	Longitudinal Profile, Cross-sections
Stream Substrate	Similar To Existing Substrates	Pebble Counts

### **MONITORING AND MANAGEMENT PROGRAM**

The monitoring and management plan will evaluate the success of the mitigation as described in the previous section. It will include inspection and grading of mitigation sites in October-November of each year beginning the following year after enhancement and restoration efforts are initially completed. Those items as listed above will be examined and reported to USACE in an annual monitoring report before December 31st of the first year following mitigation activities. Monitoring will be conducted for a period extending through 5 years after the mitigation efforts commence, and the reports will include photographs and assessment locations noted on site plan views. Successes and/or failures of the mitigation effort will be noted and any maintenance activities performed the previous year will be described. The reports will also assess the degree to which performance standards are being met and any proposed corrective actions. Adaptive management will be utilized to address challenges presented on-site. Results from monitoring will be evaluated by the applicant and management measures will be taken when necessary to achieve mitigation success.

### **RESPONSIBLE PARTIES AND FINANCIAL ASSURANCES**

The applicant is responsible for implementation of the mitigation efforts and providing financial assurances:

## **TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.  
Individual Permit Application and Stream Restoration Plan  
LRN-2012-00914  
KDNR#848-0290  
Revised May 8, 2013

### (1) The Applicant:

Nally & Hamilton Enterprises, Inc.  
P.O. Box 2323  
London, KY 40741

### (2) Preparer of Stream Restoration Plan:

Biological Systems Consultants, Inc.  
P.O. Box 54954  
Lexington, KY 40555

## **CONTINGENCY PLAN**

Where proposed, mitigation would be considered satisfied upon the purchase of the EIU credits. If the on-site mitigation success criteria are not met by the end of the 5 year mitigation monitoring schedule, an alternate mitigation plan will be provided to compensate for the impacts.

## **CONSERVATION EASEMENT**

Based on the applicant owning the property, no property easements are needed for the stream restoration areas.

## **EKSAP COMPUTATIONS AND MITIGATION DISCUSSION FOR INDIVIDUAL MITIGATION REACHES**

The Eastern Kentucky Stream Assessment Protocol (EKSAP) was used to compare the existing stream conditions with the proposed stream conditions after mitigation has been completed. Table 9-2 summarizes the impact length, mitigation length, flow regime, existing EII, existing EIU, mitigation location, 5 year EII, 5 year EIU value, and EIU debit at 5 years for each mitigation area. In order to compensate for the potential EIU debits after the on-site stream mitigation has been completed, the applicant will purchase credits from the Kentucky Department of Fish and Wildlife Resources (KDFWR) Kentucky Wetland and Stream Mitigation Fund or an approved mitigation bank. A summary of EIU purchase credits is presented as Table 9-3.

## **STREAM RESTORATION DISCUSSION**

The mitigation areas will be restored concurrent with the stream impacts and with the progression of the operation (anticipated within 1 year of impacts). These areas will be restored after backfilling has been completed. The stream geometry detailed in the profile and cross section drawings included in this section will be established during the first phase of mitigation. Log vanes, step-pool, riffles and boulder clusters are anticipated to be utilized to enhance in-stream habitat conditions (Figure 9-2).

**TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2012-00914

KDNR#848-0290

Revised May 8, 2013

<b>Table 9-2 EKSAP MITIGATION SUMMARY</b>									
<b>Impact (Mine Area)</b>	<b>Impact Length (ft)</b>	<b>Mitigation Length (ft)</b>	<b>Flow- regime</b>	<b>Existing EII</b>	<b>Existing EIU</b>	<b>Mitigation Area <i>see Fig. 9- I</i></b>	<b>5 Year EII</b>	<b>5 Year EIU Value</b>	<b>EIU Debit at 5 Years</b>
<b>MA-A</b>	868	868	RPW:S	0.61	529.48	MA- A	0.55	477.4	52.08
	300	300	NRPW	0.55	165		0.55	165	0
<b>MA-B</b>	50	50	RPW:S	0.69	34.5	MA-B	0.55	27.5	7
	1,430	1,430	RPW:P	0.72	1029.6		0.55	786.5	243.1
<b>MA-C</b>	106	106	RPW:S	0.55	58.3	MA-C	0.55	58.3	0
	491	491	NRPW	0.55	270.05		0.55	270.05	0
<b>MA-D</b>	813	727	RPW:S	0.77	626.01	MA-D	0.55	399.85	226.16
<b>MA-E</b>	830	706	RPW:P	0.75	622.5	MA-E	0.6	423.6	198.9
	346	346	RPW:S	0.71	245.66		0.56	193.76	51.9
<b>MA-F</b>	2,262	2,262	RPW:P	0.71	1606.02	MA-F	0.55	1244.1	361.92
<b>MA-G</b>	4,796	4,608	RPW:P	0.28	1342.88	MA-G	0.1	460.8	882.08
<b>MA-H</b>	710	710	RPW:P	0.73	518.3	MA-H	0.55	390.5	127.8
	365	365	RPW:S	0.72	262.8		0.55	200.75	62.05
<b>MA- I</b>	158	158	RPW:S	0.68	107.44	MA-I	0.49	77.42	30.02
<b>MA-J Lower</b>	1,070	1,070	RPW:P	0.84	898.8	MA-J	0.52	556.4	342.4
<b>MA-J Upper</b>	660	660	RPW:P	0.73	481.8	MA-J	0.49	323.4	158.4

**TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2012-00914

KDNR#848-0290

Revised May 8, 2013

<b>MA-K</b>	493	493	NRPW	0.2	98.6	MA-K	0.1	49.3	49.3
<b>MA-L</b>	1,016	1,016	RPW:P	0.75	762	MA-L	0.55	558.8	203.2
	526	526	RPW:S	0.75	394.5		0.55	289.3	105.2
<b>MA-M</b>	442	442	RPW:P	0.79	349.18	MA-M	0.6	265.2	83.98
<b>MA-N</b>	376	376	NRPW	0.70	263.2	MA-N	0.55	206.8	56.4
<b>MA-O</b>	396	396	NRPW	0.59	233.64	MA-O	0.46	182.16	51.48
<b>MA-P</b>	110	110	RPW:S	0.56	61.6	MA-P	0.46	50.6	11
	57	57	NRPW	0.53	30.21		0.46	26.22	3.99
<b>TOTAL</b>	<b>18,671</b>	<b>18,273</b>			<b>10,992.07</b>			<b>7,683.71</b>	

## **TAB 9: COMPENSATORY MITIGATION PLAN**

Nally & Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2012-00914

KDNR#848-0290

Revised May 8, 2013

7,673.15 EIUs are anticipated to be re-established to the mitigation areas within 5 years.

### **EKSAP Discussion for Mitigation Areas**

- Mitigation Area A includes restoration of 868 linear feet of intermittent stream and 300 linear feet of ephemeral stream. The restoration effort is projected to restore the Ecological Integrity Index (EII) score to 0.55.
- Mitigation Area B includes 1,430 linear feet of perennial stream and 50 linear feet of intermittent stream. The restoration effort is projected to re-establish the EII score within to 0.55.
- Mitigation Area C will occur along 106 linear feet of intermittent stream and 491 of ephemeral stream. These areas are projected to contain an EII score of 0.55.
- Mitigation Area D restores 727 linear feet of intermittent stream. It is projected to re-establish an EII score of 0.55.
- Mitigation Area E will restore 830 linear feet of perennial stream and 346 linear feet of intermittent stream. The restoration effort is projected to restore the EII score in the perennial section to 0.6, and the intermittent section is proposed to be restored to a 0.56.
- Mitigation Area F will restore 2,262 linear feet of perennial stream. The mitigation is projected to restore the EII to 0.55.
- Mitigation Area G will restore 4,608 linear feet of perennial stream. The restored stream is projected to contain an EII score of 0.1.
- Mitigation Area H will re-establish 710 linear feet of perennial stream and 365 linear feet of intermittent stream. The restoration effort is projected to contain an EII score of 0.55.
- Mitigation Area I will restore 158 linear feet of ephemeral stream to an EII of 0.53.
- Mitigation Area J lower will restore 1,070 linear feet of perennial stream to an EII of 0.52, while the upper section is proposed to contain a score of 0.49.
- Mitigation Area K will re-establish 493 linear feet of ephemeral stream. The restoration effort is projected to restore the EII score to 0.1.
- Mitigation Area L will restore 1,016 linear feet of perennial stream and 526 linear feet of intermittent stream to an EII of 0.55.
- Mitigation Area M will re-establish 442 linear feet of perennial stream. The restoration effort is projected to restore the EII to 0.6.
- Mitigation Area N will restore 376 linear feet of ephemeral stream. The restoration effort is projected to restore the EII to 0.55.
- Mitigation Area O will restore 396 linear feet of ephemeral stream to an EII of 0.46.
- Mitigation Area P will restore 110 linear feet of intermittent stream and 57 linear feet of ephemeral stream. The restoration effort is projected to return the EII scores to 0.46.

**TAB 9: COMPENSATORY MITIGATION PLAN**

Nally &amp; Hamilton Enterprises, Inc.

Individual Permit Application and Stream Restoration Plan

LRN-2012-00914

KDNR#848-0290

Revised May 8, 2013

Based on these projections there would be a total debit of 3,308.36 EIUs which is proposed to be offset through the purchase of mitigation credits (**Table 9-3**). These credits would be purchased incrementally by watershed prior to the impacts occurring. No credits would be purchased if the impacts did not occur.

**Table 9-3 EIU Calculations for Purchasing Mitigation Credits**

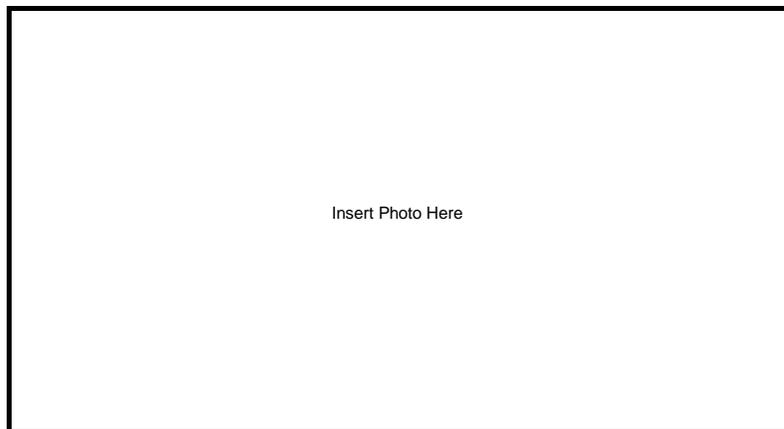
<b>Watershed</b>	<b>Impact Site</b>	<b>Debit at 5 Years (EIUs)</b>	<b>Watershed Total</b>
<b>Right Fork Mill Creek</b>	MA-A	52.08	302.18
	MA-B	250.1	
<b>UT to Mill Creek</b>	MA-D	226.16	226.16
<b>UT to Mill Creek</b>	MA-E	250.8	250.8
<b>Poplar Lick Branch</b>	MA-F	361.92	361.92
<b>Mill Creek</b>	MA-G	882.08	882.08
<b>UT to Mill Creek</b>	MA-H	189.85	189.85
<b>UT to Mill Creek</b>	MA-I	30.02	30.02
<b>UT Mill Creek</b>	MA-K	49.3	49.3
<b>UT to Mill Creek</b>	MA-L	308.4	308.4
<b>Left Fork Mill Creek</b>	MA-J	500.8	707.65
	MA-M	106.08	
	MA-N	56.4	
	MA-O	51.48	
	MA-P	16.7	

EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)  
 \*\*(Genus/species Level Taxonomy - Riffle Only Sample)\*\*

<b>Project ID:</b>	LRN-2012-00914
<b>Stream Reach</b>	Mine Area A Ephemeral
<b>Assessment Objectives:</b>	5 Years

NA	<b>Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)</b>
0.55	<b>Ecological Integrity Index (Habitat Integrity + Conductivity)</b>

Variables	Measure	Units	
<i>Enter quantitative or categorical measure from Field Data Sheet in shaded cells</i>			
<b>RBP Habitat Parameters</b>			
1. Epifaunal Substrate	10	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	4	no units (0-20)	
4. Sediment Deposition	10	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	11	no units (0-20)	
8. Bank stability (both combined)	8	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
<b>Total Habitat Score</b>	<b>79</b>	no units	<b>Subindex</b>
<b>Habitat Integrity</b>			<b>0.10</b>
<b>Macroinvertebrate Data - Genus/species Level</b>			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
<b>Macroinvertebrate Bioassessment</b>	<b>NA</b>	no units	<b>NA</b>
<b>Conductivity</b>	<b>70</b>	microMHOs	<b>1.00</b>

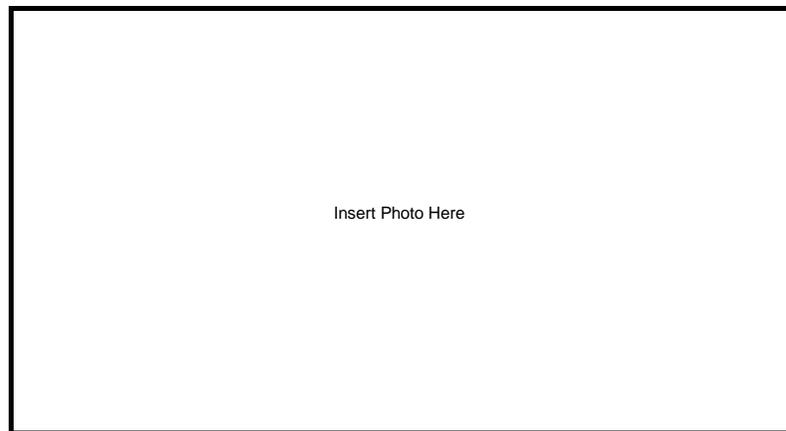


EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)  
 \*\*(Genus/species Level Taxonomy - Riffle Only Sample)\*\*

<b>Project ID:</b>	LRN-2012-00914
<b>Stream Reach</b>	Mine Area A Intermittent
<b>Assessment Objectives:</b>	5 Years

NA	<b>Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)</b>
0.55	<b>Ecological Integrity Index (Habitat Integrity + Conductivity)</b>

Variables	Measure	Units	
<i>Enter quantitative or categorical measure from Field Data Sheet in shaded cells</i>			
<b>RBP Habitat Parameters</b>			
1. Epifaunal Substrate	10	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	4	no units (0-20)	
4. Sediment Deposition	10	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	11	no units (0-20)	
8. Bank stability (both combined)	8	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
<b>Total Habitat Score</b>	<b>79</b>	no units	<b>Subindex</b>
<b>Habitat Integrity</b>			<b>0.10</b>
<b>Macroinvertebrate Data - Genus/species Level</b>			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
<b>Macroinvertebrate Bioassessment</b>	<b>NA</b>	no units	<b>NA</b>
<b>Conductivity</b>	<b>70</b>	microMHOs	<b>1.00</b>



EII Calculation for High Gradient Streams in Eastern Kentucky Coalfield (VERSION 2002.6)  
 \*\*(Genus/species Level Taxonomy - Riffle Only Sample)\*\*

<b>Project ID:</b>	LRN-2012-00914
<b>Stream Reach</b>	Mitigation Area B Intermittent
<b>Assessment Objectives:</b>	5 Years

NA	<b>Ecological Integrity Index (MBI + Habitat Integrity + Conductivity)</b>
0.55	<b>Ecological Integrity Index (Habitat Integrity + Conductivity)</b>

Variables	Measure	Units	
<i>Enter quantitative or categorical measure from Field Data Sheet in shaded cells</i>			
<b>RBP Habitat Parameters</b>			
1. Epifaunal Substrate	12	no units (0-20)	
2. Embeddedness	14	no units (0-20)	
3. Velocity/Depth Regime	7	no units (0-20)	
4. Sediment Deposition	9	no units (0-20)	
5. Channel Flow Status	6	no units (0-20)	
6. Channel Alteration	0	no units (0-20)	
7. Freq. Of Riffles (bends)	13	no units (0-20)	
8. Bank stability (both combined)	12	no units (0-20)	
9. Veg. Protection (both combined)	8	no units (0-20)	
10. Riparian Width (both combined)	8	no units (0-20)	
<b>Total Habitat Score</b>	<b>89</b>	no units	<b>Subindex</b>
<b>Habitat Integrity</b>			<b>0.10</b>
<b>Macroinvertebrate Data - Genus/species Level</b>			
11. Genus/species Taxa Richness		# of taxa sampled	
12. Genus/species EPT Richness		# of EPT species sampled	
13. % Ephemeroptera		% Mayflies (0-100)	
14. % Chironomidae & Oligochaeta		% Midges & Worms (0-100)	
15. % Clingers		% Clingers (0-100)	
16. mHBI		no units	
<b>Macroinvertebrate Bioassessment</b>	<b>NA</b>	no units	<b>NA</b>
<b>Conductivity</b>	<b>70</b>	microMHOs	<b>1.00</b>

