

**CUMULATIVE IMPACTS ANALYSIS
OHIO COUNTY, KENTUCKY
P Ridge South Pit Mine, Amendment No. 1 Site**

Introduction

This document will use terminology following current EIS guidance. An impact, or effect, means the change or modification to an environmental resource brought about by an outside action. Impacts can, and will, vary in significance, magnitude, and duration. Impacts may also be beneficial or adverse depending on the action and resource affected. For this analysis, short-term impacts are those with effects evident for a few years, generally less than the lifetime of the project (e.g. ground clearing activities). Long-term impacts generally would be those with effects extending beyond the lifetime of the project (i.e. beyond reclamation). Impact magnitude will be defined as follows: major impacts could cause significant change, stress, or depletion to an environmental resource, potentially resulting in irretrievable loss; moderate impacts could cause some change in a resource, generally with readily apparent effects; minor impacts are those that are detectable but slight; negligible impacts are those at the lower limit of detection causing insignificant change or stress to resources; and no impact applies to a level at which no discernable or measurable impacts are observed. In cases where quantitative resource evaluation was not possible, analyses were based on best available information and professional judgment. (Office of Surface Mining, 2006).

The proposed project area, also referred to as the P Ridge South Pit Mine Amendment No. 1 site, has a footprint of approximately 114 acres, but the cumulative impact analysis has been expanded to the 12-digit HUC watershed it lies within. The "Review Area" refers to Barnett Creek, HUC 051100040506, an area of approximately 39 mi² (Exhibit 1). Few data, other than coal severance tax records, are available prior to the advent of SMCRA permitting in the late 1970's. As a result, much of the discussion of past impacts is qualitative. Current and future impacts are based upon the best available data for resources of concern, but still involve a degree of speculation. Cumulative impacts were considered based upon present-day baseline conditions defined. The future time boundary of the analysis is determined by the release of project areas from agency oversight. The estimated lifetime of the project is five years, and an additional five years for reclamation and bond release of the mine areas will be assessed. Therefore, the cumulative impacts analysis will focus on a period of earliest available data for each resource to ten years after mining begins, and will refer to this timeframe as the "Review Period" for the remainder of the document.

Baseline Conditions

Landuse data were extracted from the NRCS National Landcover Database 2001 raster dataset. Rasters were converted to polygon shapefiles in ArcGIS 9.3.1, clipped to the Review Area extents, and totals of each landcover were tabulated. Landcover classifications were then spot-checked against USDA NAIP 2010 aerial imagery and found to be accurate. From these data, it is obvious that landuse changes have impacted much of the landscape (Exhibit 2). However, large forested areas remain. Forest still covers 49% of the Review Area (approximately 12,000 acres). Forests are concentrated in higher-relief areas and along the periphery of the Review Area, and large blocks often are connected by forested riparian corridors. Agricultural lands mostly were established in the 19th century, while remaining landuses generally reflect more

recent land development. Developed areas occupy roughly 0.5% of the land surface (121 acres), and are dispersed along US 231. Undeveloped grassland and pasture occupy 6% of the area (approximately, 1500 acres), and is a result of either agricultural development or mine reclamation. Open water, scrub/shrub, and barren land represent other minor landcovers (1%), are present and often are the result of land manipulation related to surface mining and reclamation activities. Wetlands, both natural and manmade, represent the remaining 9% (or approximately 1,400 acres) of the Review Area (NLCD, 2001; USFWS, 2013).

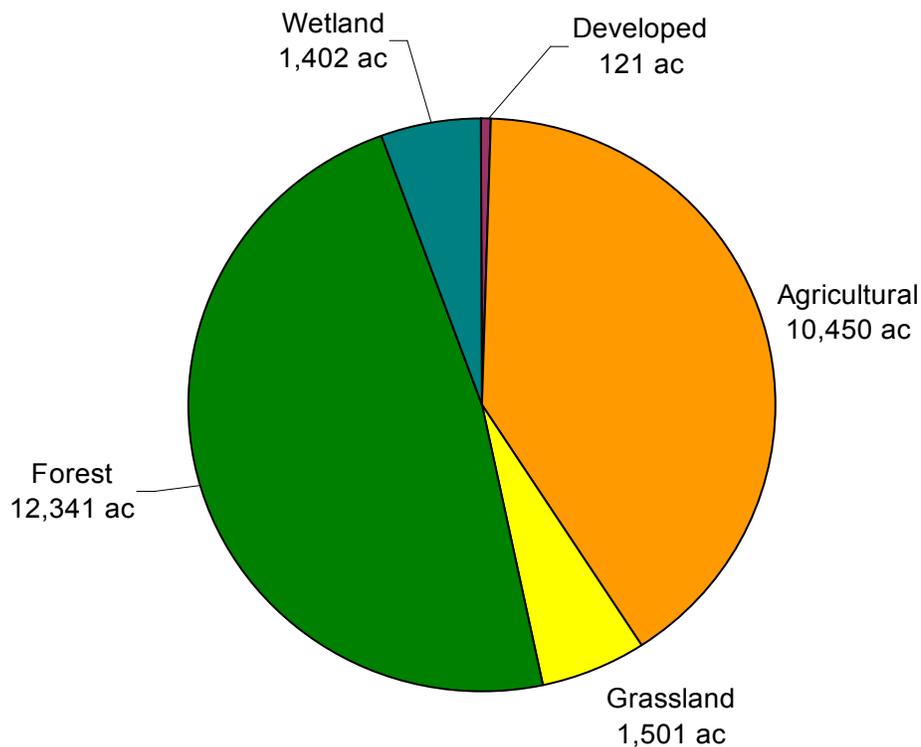


Figure 1. Review Area landcover totals. Data extracted from USGS NLCD 2001 dataset.

Agriculture has been extremely important to the economy of the region, and remains a source of employment and revenue, though to a lesser degree than historically. As a result, much of the review area landcover (approximately 42%) has been converted to agricultural use. Row crops occupy 22% of the Review Area (approximately 5,600 acres), and is most common in the central and southern portions of the Review Area. Farm production is divided between soybean and corn (US Department of Agriculture, 2002).

Resource extraction is second only to agriculture as an agent of landuse change (Exhibit 3). Although mining has long been practiced in the Review Area, data for activities prior

to the passage of SMCRA sometimes are sparse. Data presented in Exhibit 3 are drawn from surface mined areas indicated on USGS topographic maps (1973a, 1973b, 1983a, 1983b), historic mine data compiled by the Kentucky Commerce Cabinet (EEC, 2012), modern permitting data from the Kentucky Division of Mine Permits (SMIS, 2012; KMMI; 2012), and Western Kentucky Minerals, LLC. There were 31 issued mine permits in the Review Area; however, none are active, and all but one (a bond forfeiture) have been reclaimed. In the previous ten years, there have been no new permits issued in the Review Area; however there are two proposed permits (including this one), both involving Western Kentucky Minerals and affecting 750 acres. Records indicate that approximately 2,980 acres of the Review Area (11.9%) have been impacted by surface mining. NLCD data shows only two acres of barren ground, and the mine indicated is a bond forfeiture with groundcover established.

Overall loss of wetlands was estimated following Indiana Department of Environmental Management methodology; hydric soil extent is used as a proxy for historic wetland extent and is then compared to current wetland area (IDEM, 2008). For this CIA, an intersect analysis of hydric soil map units versus NWI wetland polygons (excluding Cowardin classifications representing open water) was run in ArcGIS 9.3.1. Results suggest of potentially 5,077 acres of wetland in the Review Area, approximately 1,402 acres remain, a loss of approximately 72% (Exhibit 3). While extensive, this total is significantly less than the approximately 80%-85% estimated for the state as a whole. Much of this loss occurred during initial settlement and clearing of land within the Review Area, but losses continued even after passage of the Clean Water Act, declining by approximately 1.8% of the remaining area annually (Dahl and Johnson, 1991). From 1998 to 2006, declines have been approximately 0.5% for marshes (~0.08% annually), but increases of 1.1% (~0.2% annually) have been seen in forested wetlands as scrub-shrub areas mature. Relatively large overall wetland increases are inflated by construction of ponds, and may mask an overall loss of wetland function (Dahl, 2006). Remaining wetland area is primarily palustrine forested, with minor contributions from palustrine scrub-shrub, emergent, and aquatic bed wetlands (Table 1).

Table 1. Baseline wetland resources in Review Area.

Cowardin Classification	Number of Water Bodies	Acreage*
Palustrine Forested	55	1,373
Palustrine Scrub-Shrub	6	22
Palustrine Emergent	6	7
Pond Fringe	265	141
Riverine Fringe	1	14
Total:	333	1,557

**Note all fringe wetland classifications excluded from spatial analyses*

This analysis was extended to compare wetland loss due to the two dominant agents of landuse change, agriculture and surface mining. The extents of both were run in a second intersect analysis versus original wetland extent. This indicates agriculture has impacted 3,400 acres of wetland, more than six times as much mining (536 acres) (Exhibit 4).

Streams in the Review Area have also been impacted by previous landuses. Examination of the NHD dataset (USGS, 2012), topographic maps (USGS 1973a, 1973b, 1983a, 1983b), and aerial photos (USGS, 2010) show significant stream channelization in the central portion of the Review Area, which has been subject to heavy agricultural development. Despite previous impacts, water quality in the review area generally is good. Two monitored reaches are found in the Review Area, with two-thirds of the monitored length meeting all designated uses (Table 3)(EPPC, 2011). Project stream impacts will be mitigated on site through restoration activities at approved mitigation ratios; cumulative impacts are expected to be minor.

Table 2. Baseline stream data for the Review Area.

HUC 12	Stream Type	Number of Reaches	Length (ft)
Barnett Creek	Intermittent	63	172,350
	Perennial	112	366,070

Table 3. Designated use support of monitored streams in Review Area.

HUC 12	Stream Name	Status	Impairment	Length (mi)
Barnett Creek	Mainstem Barnett Creek	Full Support	None	6.1
	North Fork Barnett Creek	Partial Support	Siltation from general agriculture & row crops	2.8

Future Actions

Estimates and projections of future development follow methods discussed in the Final Programmatic Environmental Impact Statement on Mountaintop Mining/Valley Fills in Appalachia issued by EPA 28 October 2005. Even though this method of mining is not utilized in Western Kentucky, the projection method is still applicable. In this method, coal mine permit information for the previous ten years was used to determine a rate of impact for that time period. Assuming this rate will continue at this level in the future, cumulative impacts were then extrapolated from the data set. This method was used in the current cumulative impacts analysis and was further applied to other potentially significant agents of change in the Review Area.

Mining has not been a significant driver of landuse change in nearly 30 years; the last permit was issued in 1989. However, in addition to the proposed action, Western Kentucky Minerals looking to develop a mine immediately to the northwest to be known as the P Ridge North Pit Mine. This additional area will be approximately 635 acres. Based on an average project time span of five years, future mining is expected to progress at approximately 150 acres of surface disturbance per year over the Review Period.

The economic impact of agriculture has been declining in the Review Area; farmland in the region has declined since 1992 (USDA 1997 & 2002). As crop production is

expected to remain relatively static, future projections therefore assume no net expansion of agricultural land over the review period (although use of existing agricultural land may become more intensive). Residential development is likely to be relatively static, given the sparse population of the Review Area, and most likely will be constrained to established areas along US 231; most soils within are moderately, to very, limited for construction by flooding and shallow saturation zones (NRCS, 2010). Commercial development faces the same constraints due to flood-prone soils and shallow zones of saturation and is likely restricted to the same areas where residential development is expected to occur. Based on physical limitations and the lack of historical and current commercial development within the Review Area, future commercial development is likely negligible.

The current project will directly impact 0.769 acres of wetland, representing 0.05% of the total wetland area in the Review Area. The loss of wetland associated with the project plus current estimated background loss rates exceeds historic losses, but project impacts will be compensated for at an off-site location where mitigation will restore water resources to an area with impacted hydrology and vegetation. Cumulative impacts on wetlands therefore are expected to be minor, elevated above negligible by temporal loss of wetland function between project construction and mitigation activities. The project will also directly impact 3252 feet of intermittent and 5149 feet of ephemeral stream. The intermittent impacts represent 1.9% of intermittent stream length in the Review Area, but only 0.6% of the blue-line streams in the area. However, the impacts to these intermittent, and ephemeral streams, will be compensated for on-site at approved mitigation ratios and designed according to nationally accepted natural design methodologies; also resulting in a minor cumulative impact from the project.

The proposed project will remove approximately 108 acres of forest cover in the Review Area, but most of this will be re-established on site during reclamation of the mine facility to fish and wildlife post mining landuse, and within the watershed during mitigation activities. Low levels of forest loss with concurrent gains as well as low levels of projected development suggest minor future forest conversion. No net loss of forest will occur as a result of the proposed project. In addition, outside the Project Area, the Review Area contains several relatively unfragmented forest blocks, most with corridors to adjacent stands. Forested wetlands that will be impacted by the project will be offset by re-creation onsite. Overall forest acreage and ecological function is expected to remain near current levels during the review period; cumulative impacts on ecological systems of concern are therefore expected to be minor.

Historically, agricultural lands in the Review Area have been protected. Agriculture is not expected to expand significantly during the review period, but farmland may be converted to residential land near urban centers. As nearly all of the Review Area is rural, development of existing farmland is expected to be minor. Mining may impact areas currently in crop production, but stockpiling of prime farmland top soils and restoration of these areas to pre-mining production levels are required by Kentucky reclamation regulations (405 KAR 16:020; 16:040; 16:200). The South Pit Amendment #1 site has approximately 8 acres currently used for agricultural purposes.

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