

**CUMULATIVE IMPACTS ANALYSIS
OHIO COUNTY, KENTUCKY
Lewis Creek West Mine 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 Lewis Creek West Mine site, has a footprint of approximately 1,142 acres; but the cumulative impact analysis has been expanded to the two 12-digit HUC watersheds the site lies within. The "Review Area" now refers to Nelson Creek – Green River, HUC 051100030504, and Lewis Creek, HUC051100030502; a combined area of approximately 69.1 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 2006 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 for accuracy. 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 58.7% of the Review Area (approximately 25,000 acres). Forests are concentrated in higher-relief areas and stream floodplains away from established communities and the

mainstem Green River; large blocks often are connected by forested riparian corridors. Agricultural lands, established in the 19th century, occupy 25.6% of the Review Area (approximately 11,000 ac). Remaining landuses generally reflect more recent land development. Urbanized areas occupy only 1.3% of the land surface (530 acres), and are concentrated around Centertown, Hartford, and outskirts of Central City. Grassland occupies 4.5% of the area (approximately 1,900 acres), and is a result of agricultural development, residential development, mine reclamation. Open water, scrub/shrub, and barren land represent other minor landcovers (approximately 6% together), and often are the result of land manipulation related to surface mining and reclamation activities. Wetlands, both natural and manmade, represent the remaining 6.8% (or approximately 2,900 acres) of the Review Area (NLCD, 2001).

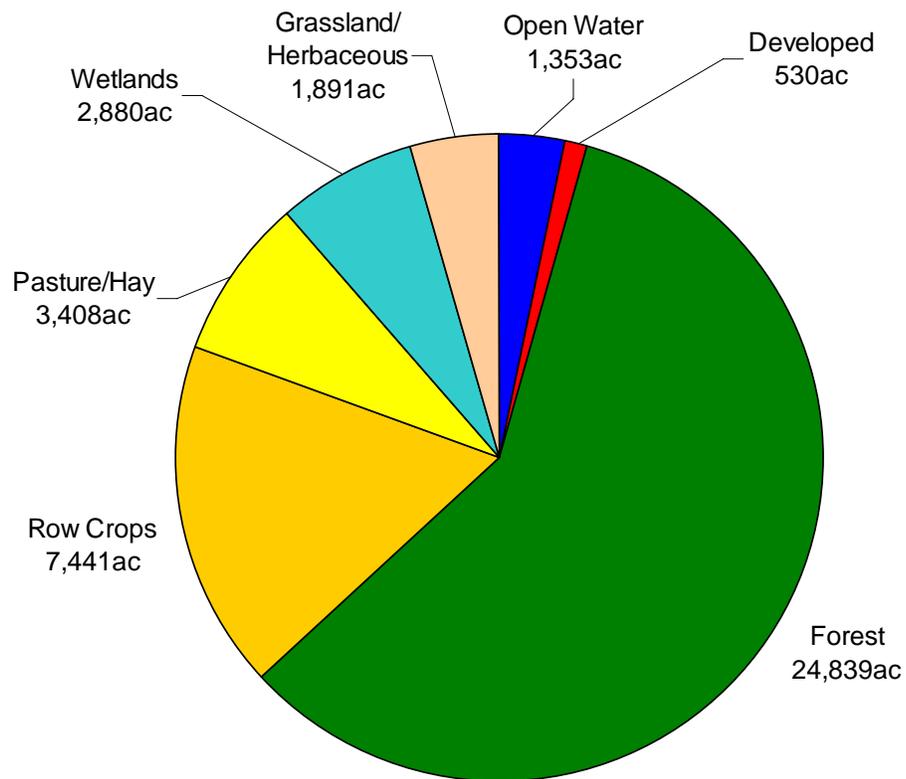


Figure 1. Review Area landcover totals. Data extracted from USGS NLCD 2006 dataset.

Agriculture has been extremely important to the economy of the region, and remains a significant source of employment and revenue, though to a lesser degree than historically. Still, the large areas cleared for pasture or row crops have converted much of the review area landcover to agricultural use. Cultivated agricultural land occupies 17.6% of the Review Area (approximately 7,440 acres), and is concentrated in the southwest of the Review Area along the Green River floodplain. Farm production is roughly evenly 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 (1963, 1971, 1973a, 1973b, 1983, 1997), 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 proprietary Armstrong Coal Co. development data. There were 99 issued mine permits in the Review Area; however, only 15 are active, 74 have been reclaimed and have full bond release, and 10 are bond forfeitures. In the previous ten years, there have been only 5 new permits issued in the Review Area; all others (19 actions) have been revisions or owner successions. Records indicate that there were approximately 15,000 acres of the Review Area (34%) have previously been or are currently subject to surface mining activities. Nearly all mines, even pre-law and those subject to bond forfeiture, have been reclaimed; NLCD data show only 44 acres as barren ground, and aerial photo review shows mines indicated as abandoned or bond forfeitures have groundcover established, and often are agricultural or forested areas.

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 13,070 acres of wetland in the Review Area, approximately 2,880 acres remain, a loss of approximately 78% (Exhibit 3). While extensive, this total is in less than the approximately 80%-85% estimated for the state as a whole. 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 wetlands in the Review Area are 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	135	2,596.7
Palustrine Scrub-Shrub	40	235.8
Palustrine Emergent	21	44.5
Palustrine Aquatic Bed	2	2.7
Lacustrine Fringe	13	177.3
Pond Fringe	135	2724.0
Open Water Fringe	152	597.6
Riverine Fringe	3	313.8
Total:	733	4,502.4

**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 suggests agriculture has impacted as much as 4,704 acres of wetland, more than twice as much mining (2,124 acres) (Exhibit 4).

Streams also have been impacted by previous landuses. Examination of the NHD dataset (USGS, 2012), topographic maps (USGS 1954, 1963, 1971, 1973, 1983, 1997), and aerial photos (USGS, 2010) show significant stream channelization in the Nelson Creek watershed, which has been subject to heavy agricultural development. Smaller tributaries in the Lewis Creek watershed often have riparian zones only of herbaceous vegetation, whether caused by agriculture, mining, or some other agent. Despite previous impacts, water quality in the review area generally is good. Only three 303(d) impaired streams are found in the Review Area (Table 3, Exhibit 5)(EPPC, 2011).

Table 2. Baseline stream data for the Review Area.

HUC 12	Stream Type	Number of Reaches	Length (ft)
Nelson Creek – Green River	Intermittent	28	118,4298
	Perennial	38	167,698
Lewis Creek	Intermittent	49	201,172
	Perennial	40	170,655

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

HUC 12	Stream Name	Status	Impairment	Length (mi)
Nelson Creek – Green River	Green River	Full Support	None	8.1
Lewis Creek	Render Creek	Not Supporting	Warmwater Aquatic Habitat; Recreational Contact	2.2
	UT West Fork Lewis Creek	Not Supporting	Warmwater Aquatic Habitat	2.2
	Lewis Creek	Partial Support	Warmwater Aquatic Habitat	5.2

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 occurred fairly continuously in the Review Area, with an upswing in activity over the previous five years. Armstrong Coal has pending surface mining permits in the Review Area, totaling an additional 547 acres, and is investigating another 3225 acres of mining (including this project) with surface methods in the foreseeable future as well. Based on an average project time span of five years, future mining is expected to progress at approximately 570 acres of surface disturbance per year (or approximately 1.4% of the Review Area annually).

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 will continue at a moderate pace in the review area. Construction of residences has increased in the previous ten years (Sperling, 2008; USCB, 1990) and likely will continue at similar rates in the future. Soil data for the Review Area indicate this development will be constrained to areas outside of much of the Impact Area, as most soils within are moderately, to very, limited for construction by flooding and shallow saturation zones (NRCS, 2010). It is expected that most development will occur around established communities, as supported by an analysis of population change projections for 2010 to 2020 (US Census Bureau, 2010); which shows approximately 6% expected population growth in the Review Area near Central City, Centertown, Hartford, and McHenry. 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 17.2 acres of wetland, representing 0.6% 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 offset by significant restoration activities. The client has elected to pay an in-lieu fee to offset wetland losses. These funds will be used by resource agencies to restore priority streams and wetlands in places with impacted hydrology and vegetation in the local watershed. 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 proposed project will remove approximately 940 acres of forest cover in the Review Area, but most of this will be re-established on site during stream restoration activities, reclamation of the mine facility to fish and wildlife post mining landuse, and 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 Lewis Creek West Area, the Review Area contains several relatively unfragmented forest blocks, most with

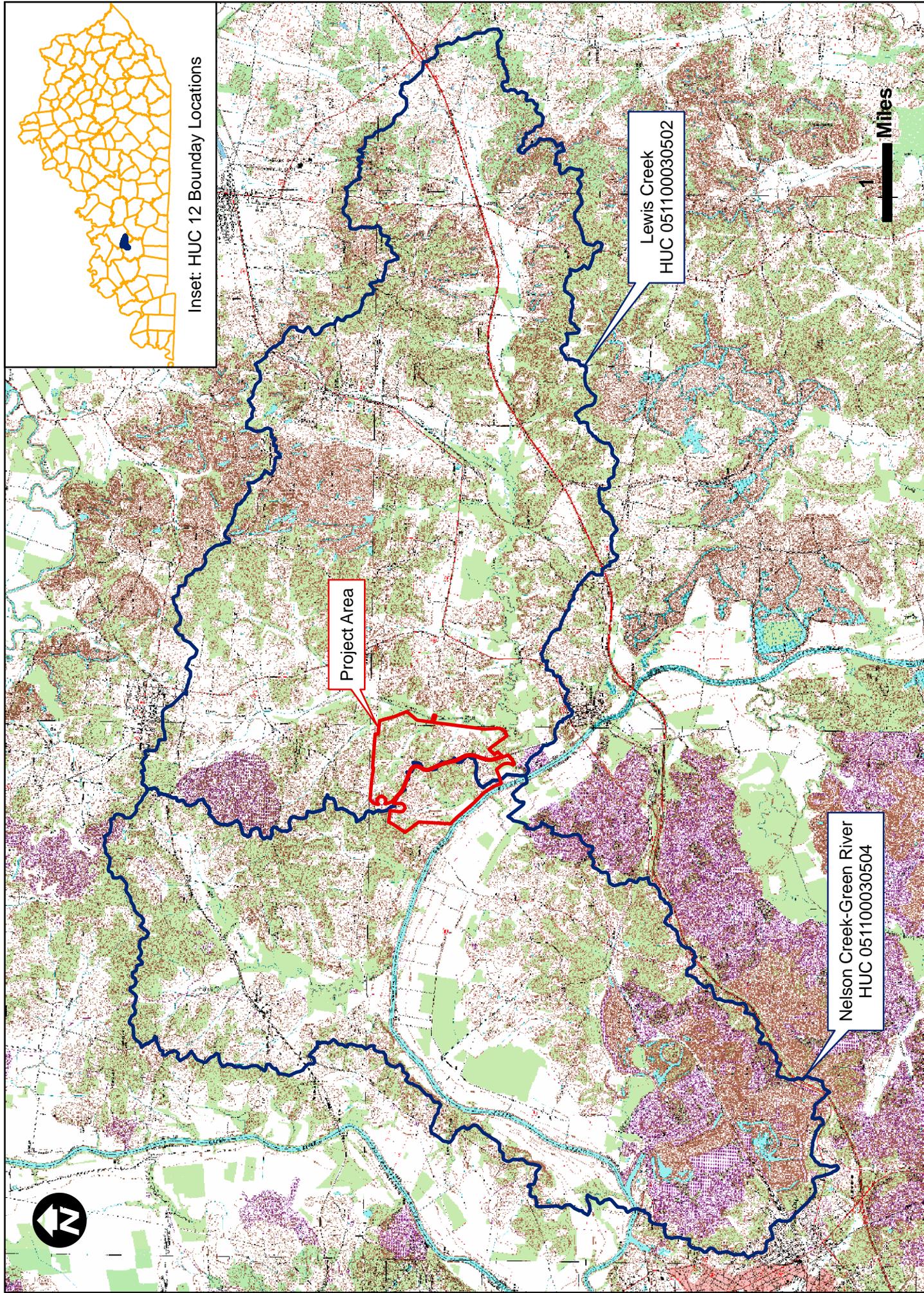
corridors to adjacent stands. Forested wetlands that will be impacted by the project will be offset by re-creation onsite. Overall forest acreage and ecological function is expected to remain near current levels during the review period; cumulative impacts on ecological systems of concern are therefore 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 Lewis Creek West site has approximately 20 acres currently used for agricultural purposes.

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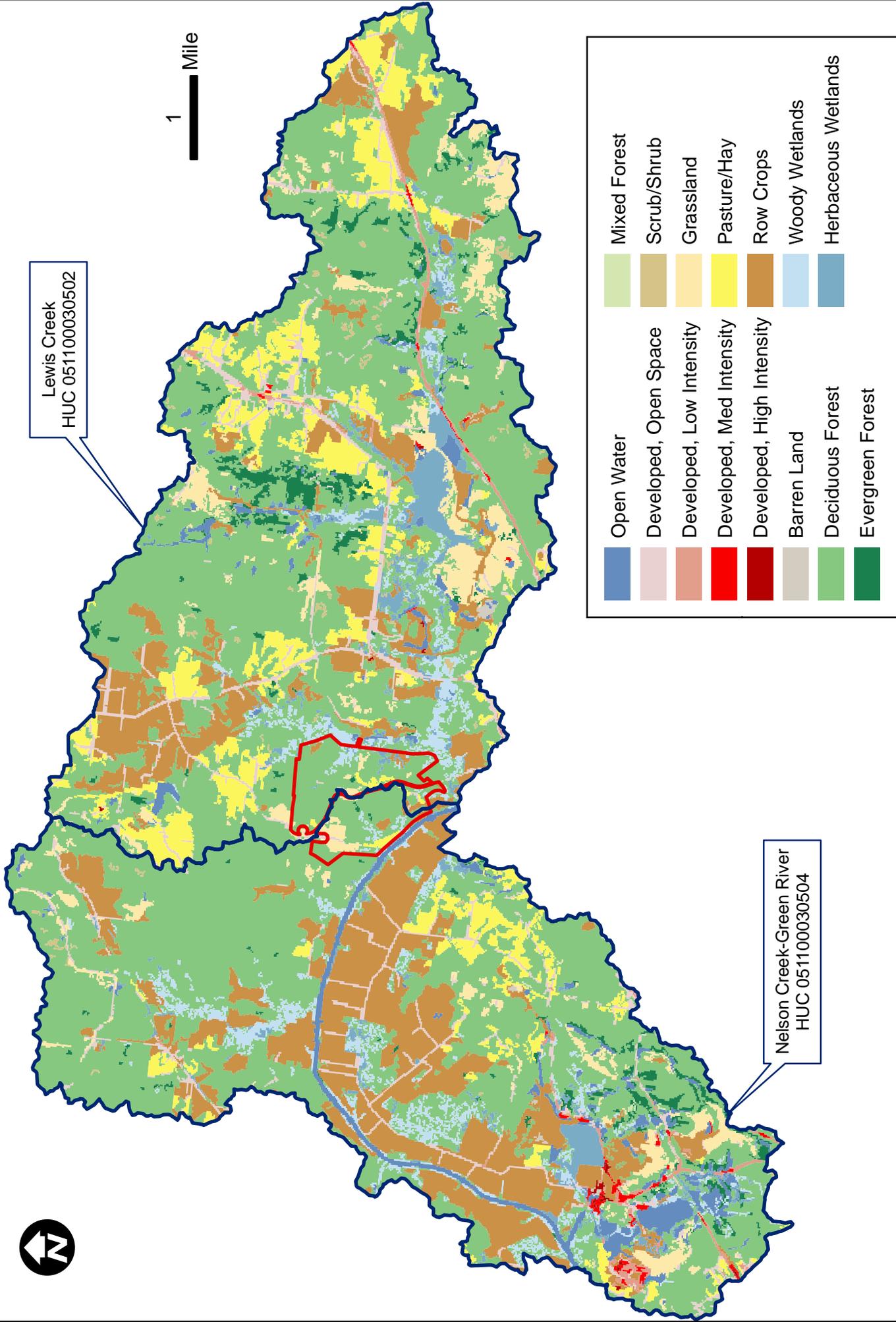
Project Area

Lewis Creek
HUC 051100030502

Nelson Creek-Green River
HUC 051100030504

1 Miles

Inset: HUC 12 Boundary Locations



1 Mile

Lewis Creek
HUC 051100030502

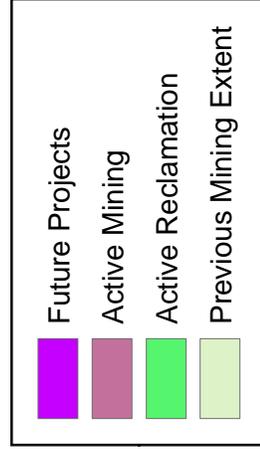
Nelson Creek-Green River
HUC 051100030504





Lewis Creek
HUC 051100030502

1 Mile



Nelson Creek-Green River
HUC 051100030504

	PROJECT: Lewis Creek West	Mining Extents Within Review Area
	COUNTY: Ohio	STATE: Kentucky
		NEAR: Centertown
		EXHIBIT 3



Lewis Creek
HUC 051100030502

1 Mile

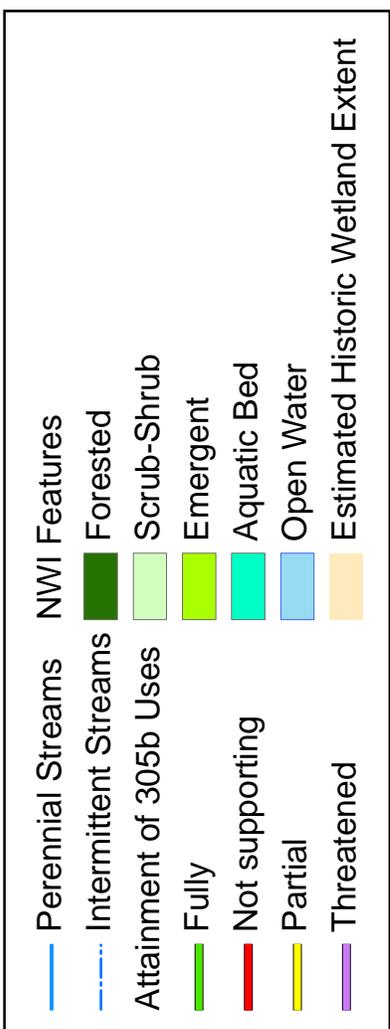
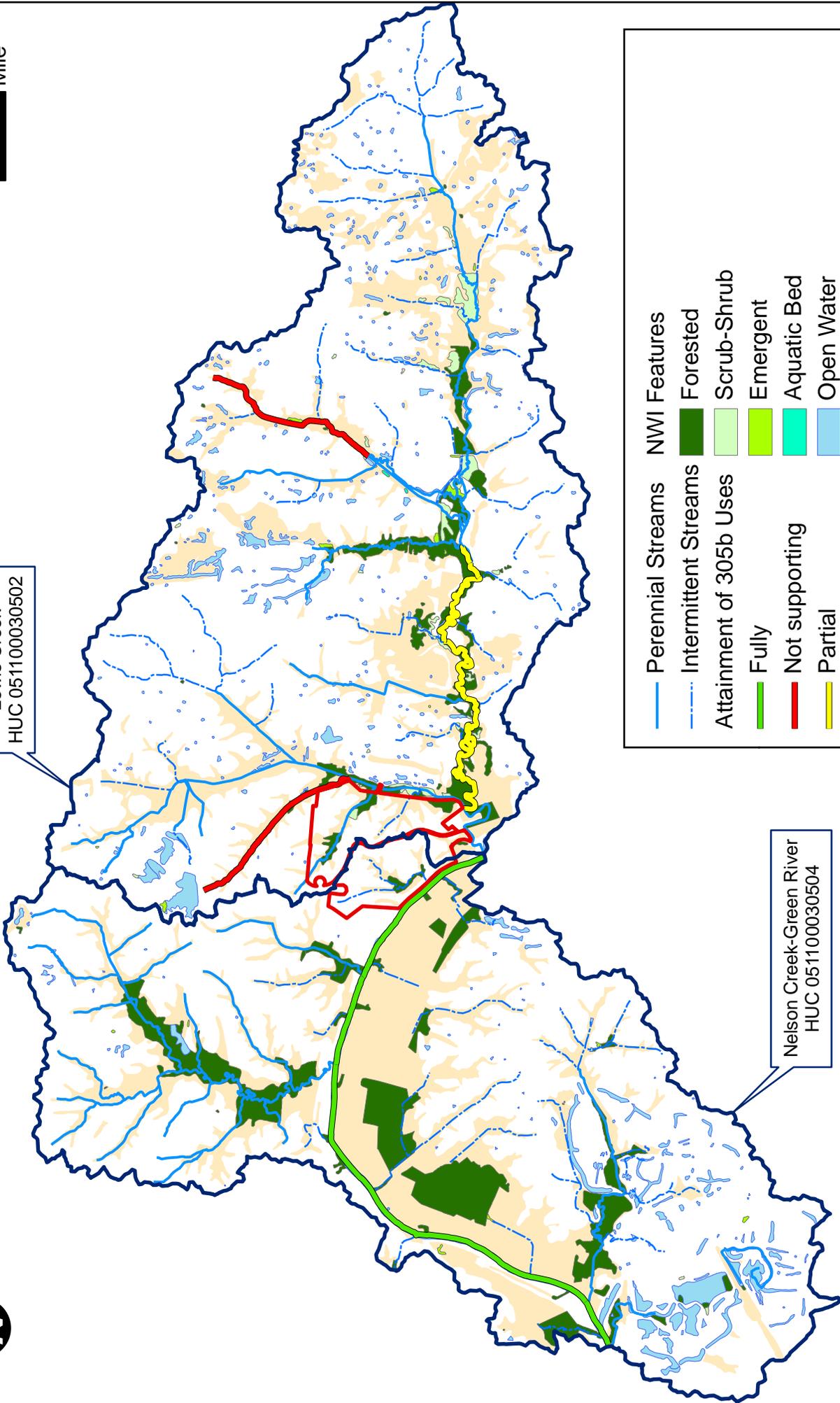
Nelson Creek-Green River
HUC 051100030504





Lewis Creek
HUC 051100030502

1 Mile



Nelson Creek-Green River
HUC 051100030504