

ALTERNATIVES ANALYSIS

Lewis Creek West Mine
Ohio County, Kentucky

I. INTRODUCTION

The purpose of the proposed Lewis Creek West mine is to recover coal from properties owned and/or leased by Armstrong Coal Co. and sell this resource to local and regional utilities. The proposed action is needed to meet the energy demands of the United States, as well as to stimulate the local economy. Armstrong Coal must do this in a manner that returns a reasonable profit on investments in land and mineral rights, site development, infrastructure, and equipment while being environmentally responsible and complying with regulatory requirements. Clean Water Act Section 404(b)(1) requires that all reasonable alternatives be considered for projects that impact Jurisdictional Waters of the United States. As discussed in federal guidelines established for this regulation (45 FR 85344), an alternative is considered practicable if it may be implemented considering environmental impact, cost, existing technology, and logistics as they relate to the project's purpose. An alternative is considered reasonable if it is practicable and feasible from a common sense technical or economic standpoint. This document will demonstrate there are no practical offsite options for mine site development, the selected mining method is the only one practicable for the proposed mine site, and that the preferred mine configuration is the most reasonable choice.

II. NON-PRACTICABLE ALTERNATIVES

Alternate Sites

Mineral mining is unique among industrial operations in that it is generally able to be performed only where the resource is present in sufficient quantity and quality to be economically recoverable. Bearing this in mind, significant resources were allocated to evaluate locations for the Lewis Creek mine where discharge of fill material into jurisdictional Waters of the United States would be minimized. Some sites were rejected because of greater impact to aquatic resources and prime farmland, while geologic conditions excluded others based on low recovery ratios or previous mining. Adjacent sites also were excluded due to distance from existing Armstrong facilities, which would require longer hauls of draglines and heavy equipment, distance from existing private haul roads, and lack of access to prep plant and rail facilities. Additionally, the project area Armstrong Coal was unable to obtain mineral rights and 100% surface control for the project area.

Underground Mining

Geological analysis of the Lewis Creek West site indicates the thickness of unconsolidated material ranges from 6' to 14' and consists of topsoil, clay and sandy clay. Consolidated material below this mainly consists of soft, sandy shales, friable sandstone, siltstone and underclay. Layers of carbonaceous shale exist between #13 and #13A coal seam. Intermittent thin layers of limestone exist above the #11 coal seam. Average thickness for the #13A seam is 36 inches and is located 40 to 60 feet below surface; the #13 seam is 30 inches thick on average and 4 to 9 feet below the 13A seam. The #11 seam ranges from 10 to 20 inches thick and is 15 to 25 feet below #13 seam. OSM and MSHA regulations require two times the width of the entry portal or forty feet of competent material for roof support; however, other mines in the region are unable to hold a stable roof with less than 120 feet of overburden. Therefore the seams at the Lewis Creek West site cannot be mined by underground methods due to seam thickness, inadequate overburden cover (less than 120'), and poor quality, non-durable consolidated material, which could lead to mine adit collapse and subsidence. Resulting instability in these areas would create hazardous conditions for miners and high potential for subsidence problems on the surface. Further, coal seams need to be at least 36 inches thick to be economical for underground mining; the seams on site average 15-30 inches thick, with a maximum of only 36 inches in the #13A. Coal recovery by this method is significantly lower than by surface methods and incurs a corresponding increase in cost. The combination of lower coal recovery and higher capital investment renders underground mining option economically unfeasible for this project.

Auger Mining Only

Auger mining is cost prohibitive compared with surface methods over the majority of the proposed mine site. Auger mining requires a continuous face-up, into which an auger is drilled to excavate coal. The method generally is applied in areas with steep topography or at the edges of mine pits which provide suitable face-ups. The proposed permit area has significant relief in some areas, but the rolling coal seam, variations in coal thickness, non-uniform dipping, and general configuration of the mine plan would require digging pits over the majority of the site to allow auger machinery to operate. The delays and cost of pit backfilling and reclamation to allow augering would far exceed the revenue and/or coal production associated with augering. Thus, utilizing the method would cause surface disturbance nearly equivalent to area mining with a significantly higher monetary cost and an approximate 45% reduction in production.

Stream and Wetland Buffers

Avoiding impacts to Jurisdictional Waters by establishing stream and wetland buffers is not feasible, given their locations onsite and the equipment involved. The 1142 acre surface mining project includes approximately 70,000 linear feet of stream and 14.9 acres of wetland. Avoiding these jurisdictional waters would require mining along and between the jurisdictional waters; this would require approximately 327 acres of buffer zones, as well as construction of at least 71,000 linear feet of box cut pits. The additional average cost to develop box cut pits with the required depth of 90 feet and width of 120 feet would increase the total mining cost by more than 200% when compared to area surface mining, due to increased blasting, overburden handling, and use of additional equipment. Additionally, the recoverable coal from this project would be decreased from 9 million tons to approximately 5.9 million tons due to the buffer areas.

The preceding cost analysis assumes that developing and implementing a mining plan to avoid jurisdictional waters is physically possible or practical. Due to the density and configuration of the jurisdictional waters, areas of mining would be very small and irregularly shaped, which would not allow for efficient pits. Off-road trucks would be required for the tight quarters created, which Armstrong Coal would have to purchase specifically for the project. The equipment change would result in an additional mining cost increase of approximately 50%, making the project even more economically unviable. Even attempting to employ this methodology would not fully avoid impacts to Jurisdictional Waters. Constructing so many box cuts would greatly alter watershed hydrology. Stream flow regimes and drainage patterns would change significantly as flow and watershed runoff would be significantly reduced. Hydrological changes would result in indirect wetland impacts by changing hydric soil conditions and vegetation. Indirect impacts created by altered hydrology likely would decrease the functions and values of the aquatic resources that were buffered.

III. REASONABLE ALTERNATIVES CONSIDERED

No-Action (No Impact) Alternative

The no-action alternative does not meet the purpose and need of this project, namely allowing Armstrong Coal to recover coal at the project site and deliver it to the marketplace, thereby satisfying future energy needs and stimulating the local economy. This alternative would impose an undue financial burden to the coal company. To date, the Armstrong Coal has invested approximately \$18 million in obtaining land and mining rights, and \$38 million in equipment.

The local economy would be adversely impacted by the loss of this investment and revenues from future coal production. Not developing the site would eliminate 85 direct mining positions, as well as jeopardize 50 jobs at the Midway wash plant and rail loading facility. Lewis Creek West positions are projected to have an average salary of \$60,000 and would be particularly beneficial in a county with an unemployment rate of 8.5% and an average per capita income of approximately \$19,500 (Sperling's Best Places, 2011). Potential annual revenues lost to the state and county over the ten-year life of the mine is an estimated \$560,000 in property tax, \$50 million in payroll taxes, and \$18 million in coal severance taxes. Assuming 2,260 kWh generated per ton of coal burned, material from the site will generate over 20,000 megawatts of power. This option represents a loss of that energy generation. A final consideration is the existence of contracts with several energy partners. Eon (LG&E), Alcoa, East Kentucky Power Cooperative, Owensboro Municipal Utilities, Kenergy, and Tennessee Valley Authority are expecting deliveries of coal from the Lewis Creek West mine. In addition to loss of revenue to Armstrong Coal Co., electric power customers potentially face an increase in rates if these providers must find alternate sources of coal.

Impacts: None

Criteria for Exclusion: Does not meet project plan and purpose.

Mine Configuration 1 (Study Area)

Once the general proposed permit area was selected, geological explorations were conducted, and other mining methods were eliminated as potential mining methods, a general mining plan and permit boundary were established for the site. The conventional variable cut area surface mining method consists of developing a series of open pits approximately 120 feet wide across the area being mined. Prior to disturbing individual watersheds to be mined, sediment control structures and diversion ditches are constructed to control all surface water runoff from the area to be affected. A box cut open pit is initially excavated to allow mining equipment access to the coal to be recovered. Overburden material from subsequent open pits is placed directly into the previously developed adjacent open pit by cast blasting, dozing or hauling with mobile equipment, and direct casting with a dragline. The pits advance through the permitted project area until all recoverable coal has been uncovered and recovered. As mining progresses, the overburden material placed in open pits where coal has been removed is graded to approximate original pre-mining contour by dozers and other units of mobile equipment. Once final reclamation grade is established, topsoil is distributed over the area and liming, fertilizing,

seeding, and mulching activities are completed. Once vegetation cover is established to stabilize the individual reclaimed watersheds, final stream channels, hydraulic structures, and riparian zones are established. See Exhibit 1 for the approximate extent of mining for this configuration (defined by the red Study Area Boundary).

This alternate includes the relocation and reconstruction of KY 1903, an asphalt paved rural local road currently posted for 55 mph. However, the alignment geometry and typical section is deficient compared to present-day design standards for this speed limit. The existing typical section, consisting of 9 ft lanes with 2 ft paved shoulders and several horizontal curves, only meets 40-45 mph requirements. Lane widening will provide a safer environment for vehicles traveling at the desired 55 mph and sight distance will be improved throughout the corridor as well. Thus, reconstruction will allow designers to greatly improve the geometry of this road, providing a much safer highway for the community.

Impacts: Mining utilizing Configuration 1 would impact 1,194.5 acres of land surface. Within the disturbance area, 72,171 linear feet of stream would be impacted. Thirty-one wetlands of three different Cowardin classifications would be directly impacted; totaling 27.794 acres, as well as 3 open water bodies totaling 0.375 acres.

Table 1. Impacts to Aquatic Resources from Mine Configuration 1

Stream/Wetland Type	Acres Impacted	Length Impacted (ft)
Perennial	-----	200
Intermittent	-----	22,589
Ephemeral	-----	49,382*
Forested Wetland	19.010*	-----
Scrub-Shrub Wetland	6.204	-----
Emergent Wetland	2.580*	-----
Open Water	0.375	-----
Total Impact:	28.169 ac	72,171 ft

*Excludes isolated waters

Benefits: Meets project plan and purpose, allowing extraction of coal on the Lewis Creek West Site. Mine will produce 20,000 MW of energy for the regional power grid, and will continue 85 high-paying jobs, as well as provide significant tax monies to the county and state.

Criteria for Exclusion: Significant disturbance of land surface and impacts to aquatic resources.

Mine Configuration 2 – Boundary Revision, Reconstruction of KY 1903

Surface mining in general would proceed in the same manner as described for Mine Configuration 1; however, the mining area is revised to minimize aquatic resource and community impacts. In Configuration 2, the permit boundary (Exhibit 1, yellow polygon) is pulled back from the Green River in the southeast, shifted west along the eastern boundary to avoid wetlands, and pulled back in the northwest to avoid homes and other structures on two farms. The mining extent also was revised to preclude impacts to the Fulkerson Cemetery (Exhibit 1, purple polygon). This avoids impacts to several forested wetlands in the West Fork Lewis Creek floodplain, reduces encroachment on the Green River floodplain, avoids impacting nearly 2,200 feet of stream, and reduces impact to the West Fork to a stream crossing (See Table 2 and Exhibit 1). Revision of the boundary in other areas is not practical. Expansion into other areas would increase surface disturbance or overlap areas with no recoverable coal; further reduction of the permit area would reduce the amount of recoverable coal and not meet the project purpose and need. Thus, the current boundary represents the largest available adjacent minable area with the least environmental impact, while remaining economically viable.

This alternate also includes the relocation and reconstruction of KY 1903, and will provide the same improvements (lane widening that will provide a safer environment for vehicles traveling at the desired 55 mph and sight distance improvements throughout the corridor). Again, the reconstruction will allow designers to greatly improve the geometry of this road, providing a much safer highway for the community.

Impacts: Configuration 2 would impact 1,142 acres of land surface. Within this area, 69,997 linear feet of stream would be impacted. Twenty-three wetlands of three different Cowardin classifications would be directly impacted; totaling 17.157 acres, as well as 3 open water bodies totaling 0.375 acres.

Table 2. Impacts to Aquatic Resources from Mine Configuration 2

Stream/Wetland Type	Acres Impacted	Length Impacted(ft)	Avoidance
Perennial	-----	200	0 ft
Intermittent	-----	22,045	544 ft
Ephemeral	-----	47,752*	1,630 ft
Forested Wetland	16.260*	-----	2.750 ac
Scrub-Shrub Wetland	0.379	-----	5.825 ac
Emergent Wetland	0.518*	-----	2.062 ac
Open Water	0.375	-----	0 ac
Total Impact/Avoidance:	17.532 ac	69,997 ft	2,174 ft 10.637 ac

*Excludes isolated waters

Benefits: Economically, the same as Mine Configuration 1, but with less direct impact to aquatic resources. It improves public safety through the reconstruction of KY 1903 to meet current design standards; providing shoulders and longer sight distances. Meets project plan and purpose, allowing extraction of coal on the Lewis Creek West Site. Mine will produce 20,000 MW of energy for the regional power grid, and will continue support of 85 high-paying jobs.

Criteria for Exclusion: Slightly less coal extraction and subsequent power production, impacts to of streams and wetlands on-site.

Other Onsite Alternatives

Coal Transport

Conveyor transport was rejected due to the lack of available infrastructure and the capital and environmental cost of establishing a conveyor line from the mine to the prep plant. The possibility of servicing the facility by rail was not considered practical, due to the site's remote location and distance to the Midway Rail Spur. The length of rail required to provide service to the Lewis Creek West site from this facility would involve environmental disturbances and capital expenditures greatly exceeding the benefit of its construction. Rail construction also would be greatly complicated by lack of right-of-way control and numerous grade and stream crossings.

IV. PREFERRED ALTERNATIVE AND CONCLUSION

The Lewis Creek West mine facility was selected and configured to maximize coal extraction efficiency while minimizing impacts to jurisdictional Waters of the U.S. Underlying geology makes it economically viable to construct the mining facility at the proposed location, and will yield 9 million tons of coal over the 11-year lifespan of the project. In addition to geological advantages, the land and mineral rights were available for purchase, making the proposed site most viable of the locations considered. Impacts were generally similar for alternate facility locations examined, so the proposed site was most advantageous because it would limit impacts to a confined area with some previous disturbance, and utilize adjacent mining infrastructure. Streams to be impacted will potentially receive significant ecological “lift” over existing conditions by reclamation to current regulatory standards and mitigation and restoration efforts within the project area, while wetland impacts will be offset by mitigation concurrent with the mining operation.

Conventional surface area mining is the safest and most practical mining method at the site. This method consists of developing a series of open pits approximately 120 feet wide across the area being mined. Prior to disturbing individual watersheds to be mined, sediment control structures and diversion ditches are constructed to control all surface water runoff from the area to be affected. A box cut open pit is initially excavated to allow mining equipment access to the coal to be recovered. Overburden material from subsequent open pits is placed directly into the previously developed adjacent open pit by cast blasting, dozing or hauling with mobile equipment, and direct casting with a dragline. The pits advance through the permitted project area until all recoverable coal has been uncovered and recovered. As mining progresses, the overburden material placed in open pits where coal has been removed is graded to approximate original premining contour by dozers and other units of mobile equipment. Once final reclamation grade is established, topsoil is distributed over the area and liming, fertilizing, seeding, and mulching activities are completed. Once vegetation cover is established to stabilize the individual reclaimed watersheds, final stream channels, hydraulic structures, and riparian zones are established. Spoil will be disposed of on-site to return the area to AOC; no permanent in-stream fills are proposed and streams re-routed during mining will be restored to their original locations during reclamation activities. Restored streams and wetland mitigation are expected to provide ecological lift to offset temporal and physical impacts to Jurisdictional Waters of the United States. All runoff will be treated within the permit boundaries with no

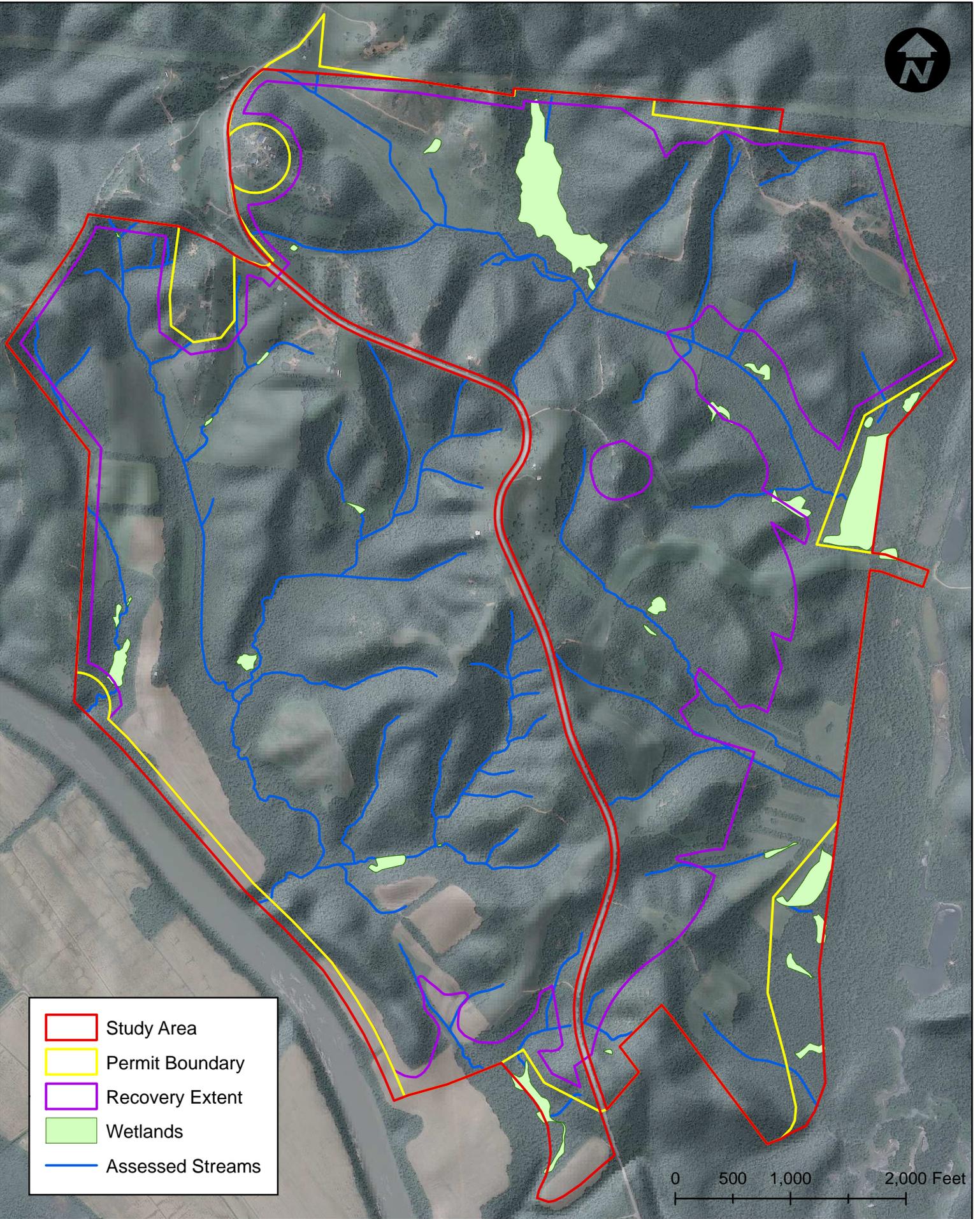
downstream water quality impacts anticipated. Surface mining activities are scheduled to begin in 2013 in the central section of the project area. Mining is scheduled to advance north and reach the north end of permit boundary in Fall 2013. Mining will then advance southward until the coal reserves in the project area are depleted. In order for actual mining to begin, pre-mining development work consisting of sediment control structure construction, land clearing, and the removal of topsoil must begin 2 to 3 months prior to pit excavation. Open pit mining will generally proceed in a northwest to southeast direction (See Exhibit 2 for site schematic).

Coal transport from the Lewis Creek West site will be accomplished in the least environmentally, socially, and economically costly manner. An existing private haul road will transport coal to a washing plant and rail loadout approximately 3.5 miles to the northeast. By eliminating excessive vehicle traffic, public safety will be protected. In addition, fugitive dust, noise and exhaust emissions associated with coal truck traffic will be avoided. The local road system is of adequate design to safely support this volume of coal truck traffic, and the sparse population indicates public safety is not likely to be effected by additional vehicle traffic.

Coal recovery at the mine and its delivery it to the marketplace has significant economic benefits. The project will extend employment for 85 workers for at least 11 years. Mine, along with its dependent prep plant and rail loadout (50 jobs) could reduce the current unemployment rate by 1% in Ohio County (Workforce Kentucky, 2012), while as significantly raising per capita and household income. The state and county would gain \$18 million in coal severance taxes over the lifetime of the project, as well as \$560,000 in property taxes and \$50 million in payroll taxes. Also, the applicant has existing contracts with Eon (LG&E), Alcoa, East Kentucky Power Cooperative, Owensboro Municipal Utilities, Kenergy, and Tennessee Valley Authority. In addition to loss of revenue to Armstrong Coal, electric power customers potentially face an increase in rates and end consumers of Alcoa products could face and increase in prices if these providers must find alternate sources of coal.

In addition to economic benefits, the reconstruction of KY 1903 will benefit the local community. The current alignment geometry and typical section is deficient compared to present-day design standards for the posted 55 mph speed limit. Shifting this alignment will allow designers to greatly improve the geometry of this road, widening lands and increasing sight distance, which a safer environment for vehicles traveling through the corridor.

Overall, the proposed facility location and configuration is believed to be the least environmentally invasive option resulting in the most cost-effective recovery of the natural resource. Alternate mining methods are not supported by local geology. The No-Action Alternate does not meet the purpose and need of the project. Mine Configuration 1 meets the project purpose and need and is practicable with existing mine technology, but has an unacceptable impact to local wetlands and streams. After evaluating alternate sites, mining methods, and on-site alternates, the applicant has chosen to proceed with Mine Configuration 2 as the Preferred Alternate. This option will provide recovery of nearly 9 million tons of coal, yielding 20,000 MWh of power while also providing significant economic benefits to the region. The facility will accomplish this while maximizing public safety and minimizing its environmental footprint.

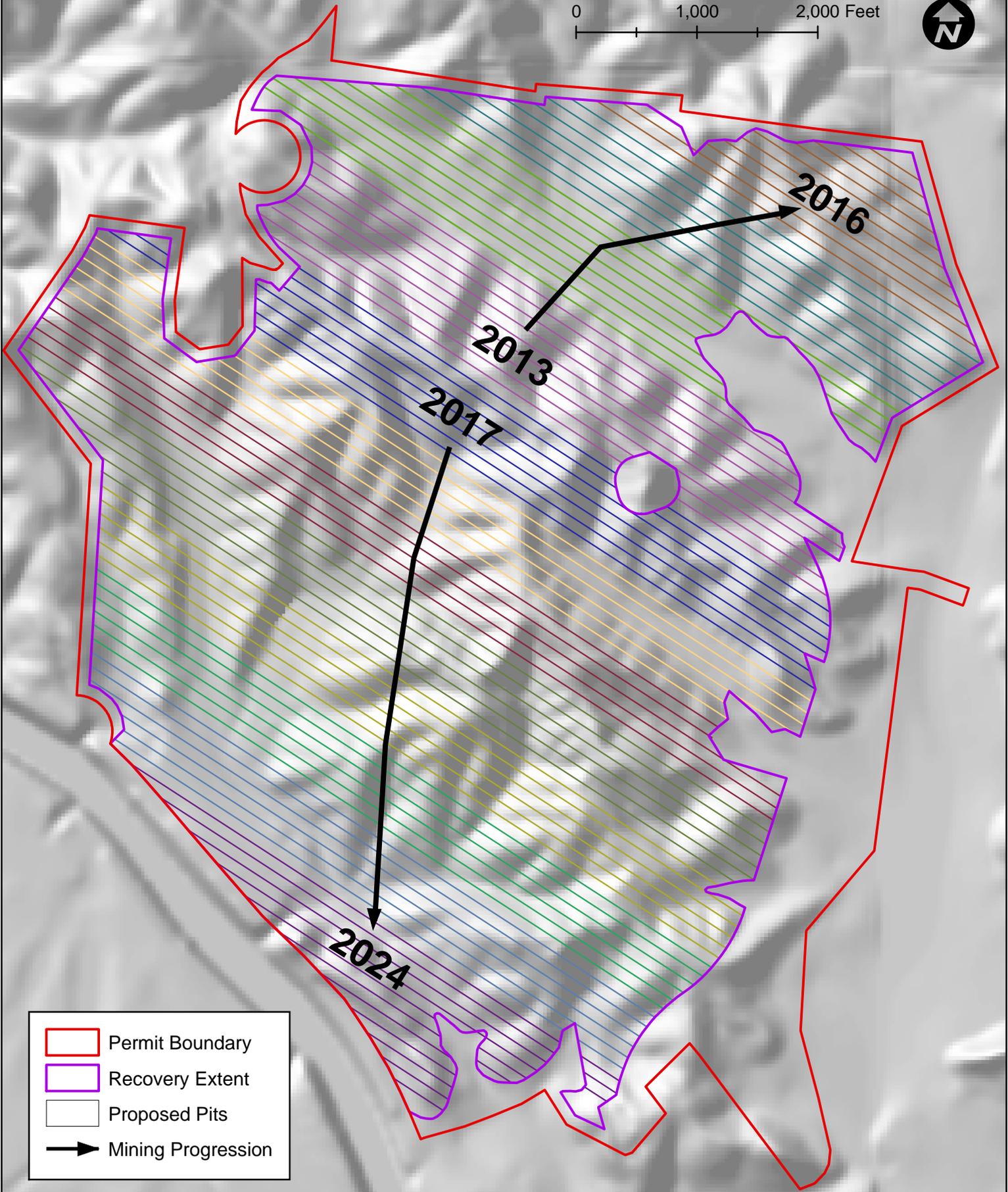


- Study Area
- Permit Boundary
- Recovery Extent
- Wetlands
- Assessed Streams

0 500 1,000 2,000 Feet

	PROJECT: Lewis Creek West Site		Extent of Alternatives Considered and Aquatic Resources	
	COUNTY: Ohio	STATE: Kentucky	NEAR: Centertown	EXHIBIT 1

0 1,000 2,000 Feet



-  Permit Boundary
-  Recovery Extent
-  Proposed Pits
-  Mining Progression