Section 1: Baseline Information

I. PROPOSED IMPACT SITE

A. PROJECT SUMMARY

The project area for this disturbance is the surface effects for a new underground coal mine. The underground mine and the surface effects will be jointly known as the Gateway North Mine with an Illinois Department of Natural Resources (ILDNR) mining permit #416. The surface effects, which total 172.1 acres, are located in Randolph County, Illinois, immediately west of Coulterville and are shown on Map A in Appendix A. The Gateway North Mine will be an underground mine utilizing the room and pillar method to extract coal from the Herrin No. 6 Coal Seam for a shadow area of 16,489.6 acres. Mine entry development will include the construction of the slope, ventilation shafts, conveyor systems, coal and soil stockpiles, and a level pad for personnel parking and bath houses. Construction of the Gateway North Mine will begin in 2012, with operational capability beginning in 2014. Anticipated annual production is 4.8 -7.2 million raw tons from the Herrin No. 6. Full production capability is expected to be reached in 2016. Gateway North Mine is a new underground mine supplying carry-on tonnage to the customers after the Gateway Mine closes.

The reserve will be mined utilizing two to three continuous mining sections. The coal will be transported by conveyor to the surface where it will be dumped into a surge bin, where it either is temporarily stacked in the coal stockpile or continues by an overland conveyor approximately 2.0 miles to the existing Gateway Mine preparation facility. Gateway Mine is an active existing underground mine. Gateway North Mine is a new underground mine supplying carry-on tonnage to customers after Gateway Mine closes. The two mines will co-exist for approximately 6 to 8 months.

The mine entry facilities will be primarily constructed on existing agricultural fields with some disturbance for utility and maintenance shafts in a small wooded area. The overland conveyor system will be constructed across a mixed area of agricultural fields and forested areas before crossing a section of the Union Pacific rail line before angling to the coal stock piles at the Gateway Mine near its existing coal preparation plant.

The purpose of this disturbance is to develop the surface facilities required for a new underground coal mine to produce bituminous coal to contribute to the power production of this nation. With this purpose, the activities associated with the mine entry development and overland conveyor will involve the disturbance of some wetlands and streams for a period from 2012 to 2036.

Stream assessments and wetland delineations were conducted by Wetland Services, Inc. from Corydon, Kentucky in May 2010 on 25 wetlands and 20 streams in the South Fork Mud Creek and Lick Branch-Marys River watersheds. A total of 8.44 acres of wetlands were delineated with the maximum acreage of jurisdictional wetlands planned for disturbance by the surface effects being 4.71 acres of PFO, 0.02 acre of PSS, and 3.71 acres of PEM. A total of 3,597 linear feet of ephemeral streams and 2,897 linear feet of intermittent streams were assessed within the project area. See Map B in Appendix A for the locations of the existing streams and wetlands.

B. PROJECT INFORMATION

1. LOCATION

The Gateway North Mine surface effects are located approximately one-half mile west of the town of Coulterville in Randolph County, Illinois. Map A in Appendix A shows the location of the permit area, while a general description of the location is as follows:

Portions of Sections 11, 14, 22, and 23 in Township 4 South, Range 5 East in Randolph County, Illinois

UTM coordinates:	X: 269881.96	Y: 4229018.10	Zone: 16
Latitude/Longitude:	N 38°10’47”	W 89°37’38”	
7.5 Minute Quad:	Tilden and Coulterville, IL		

2. UNITED STATES GEOLOGICAL SURVEY (USGS) 8-DIGIT WATERSHED

The Gateway North Mine surface effects project is located across two 12-digit hydrologic unit code (HUC) watersheds: 1) the northern third of the project area drains to a tributary of the South Fork Mud Creek in the South

Fork Mud Creek watershed (071402040302) and 2) the remaining southern portion drains toward Marys River in the Lick Branch-Marys River watershed (071401050202). The table below summarizes the potential aerial impact within these 12-digit HUC watersheds. See Map F in Appendix A for the locations of the watershed boundaries.

Watershed Summary				
12-Digit Hydrologic Unit Code (HUC)	Permit Area	Percent of Total Permit Area	12-Digit HUC Watershed Area	Percent of 12-Digit HUC Watershed Area
	(acre)	(percent)	(acre)	(percent)
South Fork Mud Creek (071402040302)	76.4	44.4	24,496	0.31
Lick Branch-Marys River (071401050202)	95.7	55.6	32,710	0.29
Totals:	172.1	100		

South Fork Mud Creek drains to Mud Creek, a tributary of the Lower Kaskaskia River. Plum Creek is also a tributary to the Lower Kaskaskia River. The Lower Kaskaskia River flows in a southerly direction to the Mississippi River in southern Randolph County approximately 10 miles northwest of the town of Chester, Illinois. The Lower Kaskaskia River watershed drains approximately 95,493 acres[17]. The Lower Kaskaskia River watershed is part of the larger Kaskaskia River watershed which also includes the Upper Kaskaskia, Middle Kaskaskia, and Shoal Creek watersheds. The Kaskaskia River watershed, which is the largest watershed contained entirely in Illinois, covers approximately 3,712,000 acres across 22 Illinois counties and is approximately 320 miles long[20].

Marys River is a tributary of the Mississippi River which drains a small watershed between the Big Muddy River and the Kaskaskia River. The Marys River watershed drains approximately 156,000 acres across 3 Illinois counties and is approximately 34 miles long[19]. The watershed is a part of the larger Upper Mississippi-Cape Girardeau River basin, which includes the section of the Mississippi River from Kaskaskia River to its confluence with the Ohio River and any tributaries that flow directly to it in Illinois and Missouri. The drainage area of the Upper Mississippi-Cape Girardeau River basin covers approximately 609,200 acres in the state of Missouri and approximately 472,400 acres in the state of Illinois.

3. LAND USE AND SOILS

a. LAND USE

Pre-development land uses in the project area are consistent with a rural agricultural area. The major land use is cropland where topography allows and clearing and improved drainage has been implemented. Cereal grains including corn, soybeans, and wheat are the predominate crops grown on these areas. Minor land uses include forest and wildlife. The forested areas have been limited to low-lying areas in the surface effects area that are not conducive for an agricultural use. The wildlife land uses are confined to the narrow wooded corridors along the streams. The wooded areas have not been managed for timber production, but do provide wildlife habitat.

The following table categorizes the existing land uses within the project area.

Existing Land Use Summary			
Existing Land Use	Area	Percent of Total Area	Comments
	(acres)	(percent)	
Cropland	128.6	74.8	

Wildlife	9.0	5.2	
Forest	31.7	18.4	
Residential	1.6	0.9	
Industrial/Commercial	1.2	0.7	existing railroad
Totals:	172.1	100	

Post-mining land uses in the permit area are consistent with the surrounding land uses and will be achieved by a coordinated planned effort combining the reclamation capabilities, landowner comments, and state regulations. All prime farmland soils must be reclaimed to Illinois' stringent prime farmland standards which requires equivalent post-mining productivity for a minimum of three (3) crop years for the revegetation responsibility period, with corn being the successful crop for one year. The following post-mine land uses are subject to change due to property owner waivers and modifications once mining has been completed and the portal sealed up. The post-mining land uses are current as of September 30, 2010.

Post-Mining Land Use Summary			
Post-Mining Land Use	**Area**	**Percent of Total Area**	**Comments**
	(acres)	**(percent)**	
Cropland	128.6	74.8	
Wildlife	9.0	5.2	
Forest	31.7	18.4	
Residential	1.6	0.9	
Industrial/Commercial	1.2	0.7	existing railroad
Totals:	172.1	100	

b. SOILS

The *Soil Survey of Randolph County*[3] maps the following soils within the permit area.

Marine (map symbols 517A, 517B): Marine series soil is a somewhat poorly drained and occur on landforms that are loess-covered till plains with slightly convex summits. Available water capacity is high. The seasonal high water table is at a depth of about 6" to 24".

Bunkum-Coulterville (map symbol 884B2): Bunkum-Coulterville series soil is a somewhat poorly drained soil. These soils are found in loess-covered till plains on slopes along upland drainageways. Available water capacity is high. The seasonal high water table is at a depth of about 12" to 24".

Coulterville-Oconee (map symbols 909A, 909B): Coulterville-Oconee series soil is a somewhat poorly drained soil occurring loess-covered till plains around the summits and interfluves. Available water capacity is high. The seasonal high water table is at a depth of about 6" to 24".

Bunkum (map symbol 515C2): Bunkum series soil is a somewhat poorly drained soil occurring on loess-covered till plains on slopes along upland drainageways. Available water capacity is high. The seasonal high water table is at a depth of about 12" to 24".

Wakeland (map symbol 3333A): Wakeland series soil is a somewhat poorly drained soil type that occurs on flood plains. The soil is subject to frequent flooding and has very high available water capacity. The seasonal high water table is at a depth of about 6" to 24".

Blair (map symbols 5C3): Blair series soil is a somewhat poorly drained soil type found in till plains on slopes along upland drainageways. Available water capacity is high. The seasonal high water table is at a depth of about 12" to 24".

Homen (map symbol 582C2): Homen series soil is moderately well drained soil that is found on loess-covered till plains at convex summits, shoulders, and backslopes. Available water capacity is very high. The seasonal high water table is at a depth of about 24" to 42".

Orthents (map symbols 802B, 802D): Orthents series soil is a well drained soil that occurs on floodplains. The soil is subject to occasional flooding and has a high available water capacity. The seasonal high water table is at a depth of about 42" to 72".

Pierron (map symbol 31A): Pierron series soil is a nearly level, poorly drained soil that is on broad flats or in slight depressions in the uplands. It is ponded for brief periods in late winter and in spring. It is subject to crusting and restricted permeability.

Blair-Grantfork (map symbol 934D3): Blair-Grantfork series soil is a somewhat poorly drained, strongly sloping soil that is located on side slopes and hillsides, mainly adjacent to drainageways or small streams. Available water capacity is moderate. The seasonal high water table is at a depth of 12" to 42".

The following table summarizes the soils and their acreages for the Gateway North Mine surface effects project area.

Soil Summary						
Soil Series	Map Symbol(s)	Soil Type	Slope	Area	Percent of Total Area	USDA Comments
			(percent)	(acre)	(percent)	
Marine	517A*	silt loam	0 - 2	18.5	10.8	
	517B*	silt loam	2 - 5	13.7	8.0	
Bunkum-Coulterville	884B2*	silt loam	2 - 5	26.9	15.6	eroded
Coulterville - Oconee	909A*	silt loam	0 - 2	22.3	13.0	
	909B*	silt loam	2 - 5	49.8	28.9	
Wakeland	3333A*	silt loam	0 - 2	7.1	4.1	frequently flooded
Blair	5C2	silt loam	5 - 10	1.4	0.8	eroded
	5C3	silt loam	5 - 10	1.9	1.1	severely eroded
Pierron	31A	silt loam	0 - 2	6.1	3.5	
Bunkum	515C2	silt loam	5 - 10	13.6	7.9	eroded
Homen	582C2	silt loam	5 - 10	4.0	2.3	eroded
Orthents	802B	loamy		5.4	3.1	undulating
	802D	loamy		0.6	0.4	hilly
Blair - Grantfork	934D3	silt loam	7 - 15	0.8	0.5	severely eroded
Totals:				172.1	100	

Source: *Soil Survey of Randolph County*[3]

Marine and Wakeland soils are listed on the Illinois Hydric Soils List[9] while Pierron is listed in the Soil Survey of Randolph County[3] as being hydric. These soils series are shown shaded on Map WS in Appendix A and comprise a total of 45.5 acres. There is approximately 138.3 acres[14] of prime farmland which comprise approximately 80.4% of the soils in the proposed project area. The soils that are considered prime soils are denoted with asterisks (*) next to the map symbol in the table above.

4. CLASSIFICATION

Wetlands

Wetland delineations were conducted by Wetland Services, Inc. on a total of 25 wetland areas within the permit area utilizing the 1987 U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual[8] along with the Midwest Regional Supplement[18] and the Cowardin classification method. See Appendix C for detailed wetland delineations and Map B in Appendix A for their locations.

Streams

Stream assessments were conducted by Wetland Services, Inc. utilizing a modified Rosgen stream classification method, and the United States Environmental Protection Agency's Rapid Bioassessment Protocol[12] (USEPA RBP) was utilized for habitat assessments. Typically, the Rosgen stream classification method[6] is used to predict what adjustments a stream needs to achieve stability, which is the ability of a stream to transport sediment, in the present climate and streamflow regime to maintain dimension, profile, and pattern without aggrading or degrading. Because the stream mitigation for coal mining is predominately stream relocation rather than stream channel restoration, a modified Rosgen stream classification has been utilized in classifying the pre- and post-mining streams. This has been an USACE accepted method for the low gradient streams in southern Indiana and Illinois. Level I, II, and III Rosgen stream parameters are visually assessed in the field and recorded on the stream assessment sheets along with photographs of the assessment point. Buffering vegetation adjacent to the streams was assessed by type and distance out to 100 feet on either side of the stream or to the watershed divide. Non-buffering land uses such as agriculture and impervious areas were disregarded.

The streams were also inputted to the USACE's Illinois Stream Mitigation Method[7]. The method is a conditional assessment of a stream that results in a rationale for required stream mitigation based upon a credit and debit system. This method examines characteristics of the impacted streams to determine the number of mitigation credits required. These characteristics include stream type, priority area, existing condition, impact activity and duration, and linear feet of impact.

The detailed geomorphic assessments with photographs can be found in Appendix B and their locations are shown on Map B in Appendix A. The Illinois Stream Mitigation Method worksheets can be found in Appendix D, and the USEPA RBP worksheets can be found in Appendix I.

a. UNIT ID LABELING SYSTEM

Wetland Services, Inc. has developed a watershed approach in labeling the streams, wetlands, and open waters that are assessed within a permit area. A watershed has been defined as any stream that leaves the permit boundary on its own accord. For accurate record-keeping purposes, a unit specific labeling system has been developed as shown by the example below.

1NS2A1-1 = Unit ID

1 = Watershed (any single stream that leaves the permit boundary)
N = Land use (Natural, Reclaimed, Pre-law, Agriculture, Mixed, Logged, or Excavated)
S = Unit type (Stream, Wetland, Open Water, Surface Connection)
2 = Unit number (2nd surface water/connection assessed in watershed 1)
A = 1st branch of surface water/connection 2
1 = 1st branch of surface water/connection 2A
-1 = Subsequent assessment on surface water/connection 2A1

5. EXISTING CONDITIONS

Wetlands

The jurisdictional wetlands on the Gateway North Mine surface effects area are found throughout the project area. Wetlands have been delineated in depressional pockets in the wooded area adjacent to existing streams and in grassed waterways in the agricultural fields. The wetlands have not been evaluated by the Illinois Environmental Protection Agency (ILEPA) Surface Water Monitoring Unit. The wetlands were delineated using the Midwest Regional Supplement[18] to the USACE Wetland Delineation Manual[8]. The delineations are located in Appendix C.

The proposed impacts are based on the surface effects permit area. Peabody Gateway North Mining, LLC will limit potential stream and wetland impacts within the permit area when possible during mine entry development. No

additional avoidance is proposed considering that the permit area has been minimized to the greatest extent possible and still enables development of the facilities.

Information regarding the individual wetlands proposed to be impacted by the Gateway North Mine surface effects may be found in the following table which includes the wetland ID, acreage by Cowardin type, dominant vegetation, and any notable comment from the delineation form.

Summary of Wetlands Delineated within Project Area						
Wetland ID	12-Digit HUC Watershed	PFO (acre)	PSS (acre)	PEM (acre)	Dominant Vegetation	Comments
2NW7	Lick Branch/Marys River			0.05	orange jewelweed, drooping woodreed, sedges	
2NW12	Lick Branch/Marys River			0.56	sedges, clustered fescue, orange jewelweed, poison ivy	
2NW13	Lick Branch/Marys River	0.60			sugar maple, American elm, shagbark hickory, common hackberry	
2NW14	Lick Branch/Marys River	0.97			common hackberry, American elm, red maple	surrounded by ag fields
2NW18	Lick Branch/Marys River	1.56			shellbark hickory, shagbark hickory, American elm, green ash, shingle oak	
3AW1	South Fork Mud Creek			0.03	clustered fescue, sedges	
3AW6	South Fork Mud Creek			0.33	clustered fescue, sedges	grassed waterway
3MW7	South Fork Mud Creek	0.54			honeylocust, sugar maple, American elm	
3NW8	South Fork Mud Creek	0.05			sugar maple, honeylocust, American elm, boxelder, shingle oak	
3NW9	South Fork Mud Creek	0.07			honeylocust, American elm, sugar maple, common hackberry	
3MW10	South Fork Mud Creek	0.13			common hackberry, American elm, shingle oak, red oak, black locust	
3NW11	South Fork Mud Creek	0.14			sugar maple, black locust, common hackberry, American elm, shingle oak	
3NW12	South Fork Mud Creek	0.24			sugar maple, American elm, black locust, red mulberry, osage orange	
3NW13	South Fork Mud Creek		0.02		American elm, poison ivy	
3AW14	South Fork Mud Creek			0.09	clustered fescue, sedges	grassed waterway
3AW15	South Fork Mud Creek			0.04	clustered fescue, sedges	grassed waterway
3AW16	South Fork Mud Creek			0.05	clustered fescue, sedges	grassed waterway
4XW1	Lick Branch/Marys River	0.05			white ash, pin oak, sugarberry, American elm	
4NW2	Lick Branch/Marys River	0.09			pin oak, American elm, green ash	
4MW3	Lick Branch/Marys River	0.11			pin oak, American elm	
4AW4	Lick Branch/Marys River			2.59	marsh bristlegrass, clustered fescue, umbrella grass	
4XW5	Lick Branch/Marys River	0.16			eastern cottonwood, pin oak, sugarberry	
4MW6	Lick Branch/Marys River			0.05	barnyard grass, umbrella sedge	
4MW7	Lick Branch/Marys River			0.05	barnyard grass, umbrella sedge	
4XW8	Lick Branch/Marys River			0.11	phragmites, cattails	

Totals:		4.71	0.02	3.95		

A total of 8.68 acres of existing wetlands were delineated within the project area. See Map B in Appendix A for the locations of the existing wetlands along with the delineation data points and see the wetland delineations along with the summary table in Appendix C for more specific data for each wetland.

Streams

The streams on the Gateway North project area are unnamed tributaries to either Marys River or South Fork Mud Creek. All of the streams in the permit area flow to through open waters before outletting into their receiving stream. The streams in the northern 1/3 of the surface effects flows to Coulterville Reservoir with the remaining streams flowing to a freshwater lake constructed for coal preparation plant at Gateway Mine. The various unnamed tributaries have zero 7Q10 flow and are General Use waters. The tributaries have not been evaluated by the ILEPA Surface Water Monitoring Unit.

The proposed impacts are based on the surface effects permit area. Peabody Gateway North Mining, LLC will limit potential stream and wetland impacts within the permit area when possible during mine entry development. No additional avoidance is proposed considering that the permit area has been minimized to the greatest extent possible and still enables development of the facilities.

Information regarding the individual streams proposed to be impacted by the project may be found in the following table:

Summary of Streams Assessed within Project Area								
Stream ID	Name	Ephemeral		Intermittent		Deciduous Riparian Buffer Width*		RBP Score
						Left	Right	
		(feet)	(acre)	(feet)	(acre)	(feet)	(feet)	
2NS1	unnamed tributary to Lick Branch-Marys River			290	0.07	100	100	78
2NS1H	unnamed tributary to Lick Branch-Marys River			735	0.11	100	100	78
2MS1H-2	unnamed tributary to Lick Branch-Marys River	396	0.04			50	70	74
2AS1H-3	unnamed tributary to Lick Branch-Marys River	745	0.06			0	0	41
2MS1H-4	unnamed tributary to Lick Branch-Marys River	37	0.00			75	100	83
2NS1J	unnamed tributary to Lick Branch-Marys River	630	0.05			100	100	80
2AS2	unnamed tributary to Lick Branch-Marys River	61	0.00			100	100	80
3XS2	unnamed tributary to South Fork Mud Creek			186	0.03	70	70	93
3MS2-1	unnamed tributary to South Fork Mud Creek			446	0.04	100	100	98
3MS2-2	unnamed tributary to South Fork Mud Creek			705	0.08	100	100	95
3NS2A	unnamed tributary to South Fork Mud Creek	109	0.01			75	50	81
3NS2B	unnamed tributary to South Fork Mud Creek	60	0.00			50	20	80
3MS2C	unnamed tributary to South Fork Mud Creek	480	0.03			70	100	87
3NS2D	unnamed tributary to South Fork Mud Creek	24	0.00			50	25	77

*3AS2E***	*unnamed tributary to South Fork Mud Creek*	*318***	*0.02***			*0*	*0*	*69*
4MS1-2	unnamed tributary to Lick Branch-Marys River			535	0.21	100	10	112
4NS1A	unnamed tributary to Lick Branch-Marys River	234	0.03			100	100	87
4MS1C	unnamed tributary to Lick Branch-Marys River	34	0.00			0	0	51
4MS2	unnamed tributary to Lick Branch-Marys River	393	0.05			100	50	90
4NS2-1	unnamed tributary to Lick Branch-Marys River	76	0.01			0	0	51
	Totals:	3,279	0.28	2,897	0.54			

* Denotes only deciduous riparian buffer widths are shown. They are delineated out to a maximum of 100 feet, to the watershed divide, or to change in vegetation type. Non-deciduous buffers and non-buffering land uses such as agriculture and roadways are disregarded in the table.

** Denotes Stream 3AS2E is shown on the table, but not included as an impact. This stream will be reconstructed and enhanced in Mitigation Area 1.

A total of 3,279 linear feet of ephemeral streams and 2,897 linear feet of intermittent streams were assessed within the project area. Of the 20 streams assessed, 40% of the streams are Rosgen "B" channel types, 10% are Rosgen "E" channel types , 10% are Rosgen "F" channel types, and 40% are Rosgen "G" channel types. See Map B in Appendix A for the locations of the existing streams and see the stream assessments along with the summary table in Appendix B for more specific data for the individual streams.

In addition to the streams on-site, two non-jurisdictional features were assessed. They are labeled on the maps as 3ASC2E-1 and 4XSC1D. Additional field investigations were conducted to confirm that these features were not wetlands. Non-jurisdictional feature 3ASC3E-1 was assessed as a swale. The wetland delineation (3AW17) was conducted at this location and determined that hydric soils were present in the swale, but the site lacked the hydric vegetation and hydrology to consider it a wetland. The hydrology was removed by a roadside ditch and culvert and the area is in full agricultural production. Non-jurisdictional feature 4XSC1D was assessed as a roadside ditch where wetland delineation (4AW9) was conducted. The site lacked the hydric soils, hydric vegetation, and hydrology to be considered a wetland. These wetland delineations can be found in Appendix C.

The following table provides information regarding the individual stream impacts proposed for the Gateway North Mine surface effects project. Effects to the streams are categorized into four primary types: mine facilities, conveyor beltline, access roads, sedimentation basins, and sediment/drainage control and support. Mine facilities include the level pad for the portal, parking lots, maintenance buildings, warehouse, bathhouse, power drops, ventilation fans, etc. The conveyor beltline will consist of the path the beltline will take outside of the mine facility impacts. Access roads include any driveways outside of the mine facility pad as well as the conveyor beltline maintenance road. Sediment/drainage control and support areas include soils stockpiles, coal stockpiles, berms, collection/diversion ditches, and borrow areas. Basically, this will be any area outside of the mine facility, conveyor beltline, access roads, and sedimentation basin areas. These effects are based on the current pending operations map, which is subject to minor change as mine development commences. Please see Map G in the Appendix A for the current operations plan (December 2010) overlaid on the existing streams and wetlands plan map.

Summary of Streams Impacts							
Stream ID	**Ephemeral (feet)**	**Intermittent (feet)**	**Mine Facilities**	**Conveyor Beltline**	**Access Roads**	**Sedimentation Basins**	**Sediment/ Drainage Control and Support**
2NS1		290					290
2NS1H		735		20	304		411
2MS1H-2	396			20	100		276
2AS1H-3	745			319	113		313

2MS1H-4	37						37
2NS1J	630						630
2AS2	61						61
3XS2		186				186	
3MS2-1		446	163			191	92
3MS2-2		705					705
3NS2A	109					109	
3NS2B	60					60	
3MS2C	480						480
3NS2D	24						24
*3AS2E***	*318***						
4MS1-2		535		220			315
4NS1A	234			57			177
4MS1C	34			34			
4MS2	393						393
4NS2-1	76						76
Totals:	3,279	2,897	163	670	517	546	4,280

** Denotes Stream 3AS2E is shown on the table, but not included as an impact. This stream will be reconstructed and enhanced in Mitigation Area 1.

6. FIELD OBSERVATIONS

See the wetland delineations in Appendix C, stream assessments in Appendix B, and habitat assessments in Appendix I for field observations. Map B in Appendix A shows the location of the assessment points and boundaries.

7. CLIMATE

The climate of Randolph County is typical of the Eastern Interior Coal Region. The seasonally variable weather patterns are strongly influenced by cyclical movements of cold air from the northwest and warm air from the southwest. The mean surface air temperature is around 55°F and the annual range between temperature extremes is about 125°F. July is normally the warmest month averaging about 79°F, and January the coldest at 29°F. Prevailing winds are mostly from the southwest in summer and the northwest in winter. The average wind speed is about 11 miles per hour. Cumulative annual precipitation averages about 39 inches. Mean annual snowfall is about 15 inches. Monthly precipitation averages about 3 inches in autumn through winter and peaks at about 4 inches between late spring and mid-summer. Summer precipitation events are typically in the form of thunderstorms. Annual evapotranspiration totals about 27 inches.

8. WATER QUALITY

There are no known Section 303(d) impaired water bodies within this Gateway North Mine surface effects project area, but the following table lists the 303(d) listed waters found in the South Fork Mud River and the Lick Branch-Marys River 12-digit HUC watersheds.

Illinois' 2010 303(d) Listed Waters[1]					
Waterbody (Segment ID)	**12-Digit HUC Watershed**	**Status**	**Designated Use**	**Impairment(s)**	**TMDL Status**
Mud Creek (IL_OE-02)	South Fork Mud Creek	Listed	Aquatic Life	Manganese and Sedimentation/Siltation	(TMDL Ongoing)

Coulterville Reservoir (IL_ROV)	South Fork Mud Creek	Listed	Aesthetic Quality	Total Suspended Solids (TSS) and Phosphorus (Total)	
			Public Water Supplies	Atrazine and Manganese	
Marys River (IL_II91)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	
Maxwell Creek (IL_IIK-27)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	
Maxwell Creek (IL_IIK-SPC1A)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	

The following table lists the regional surface water quality as found in the USGS Open-File Reports 81-403[11].

Regional Surface Water Quality[11]			
Parameter	**Minimum**	**Maximum**	**Mean**
pH	2.00	9.00	NR
TSS (mg/l)	2.00	1,645	NR
TDS (mg/l)	144	8,280	1,287.0
Alkalinity (mg/l)	0.00	520	88.0
Acidity (mg/l)	0.00	100	NR
Sulfates (mg/l)	15.00	12,000	760.0
Total Iron (mg/l)	0.00	2,100	37.8
Total Manganese (mg/l)	0.02	240	5.6

The following table lists the local surface water quality from baseline monitoring records for the permit area.

Local Surface Water Quality[14]										
Parameter	**11SW-2**		**16SW-4**		**23SW-5**		**2SW-1**		**9SW-3**	
	Range	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**
pH	7.17-7.89	7.48	7.50-7.92	7.69	7.18-7.85	7.58	7.24-7.66	7.54	7.10-7.79	7.40
TDS (mg/l)	490-1340	1003	420-730	509	330-680	464	325-675	464	310-540	421
Alkalinity (mg/l)	72.4-211.6	145	102-215.6	150	65.6-179	112	56.4-122	86	68.4-110.4	88.6
Total Iron (mg/l)	0.136-4.36	0.575	0.536-1.58	0.964	0.894-3.34	2.016	0.46-1.05	0.68	0.581-4.54	1.90
Total Manganese (mg/l)	0.197-0.70	0.424	0.192-0.60	0.296	0.195-0.67	0.336	0.643-2.14	1.33	0.443-2.12	0.88

Surface water samples have also been collected from four additional sites within and adjacent to the project area to further characterize pre-mine water quality for the Gateway North Mine surface effects project. The locations of the sample sites can be found in the *Gateway North Mine Bioassessment* report found in Appendix I. The following table summarizes the results.

Bioassessment Surface Water Quality				
Parameter	**1MS2**	**2NS1**	**3XS2**	**4MS1-1**
pH	8.5	8.3	8.2	8.3
TDS (mg/l)	403	261	250	277

Surface Water Sampling Plan for Streams

In addition to the baseline surface water quality data provided above, surface water samples will be collected from proposed sites and analyzed to further characterize water quality before (pre-development) and after mitigation has been completed. Water sampling will be conducted at the following:

- SMCRA receiving stream sampling points
    - pH
    - Total dissolved solids
    - Alkalinity
    - Total iron
    - Total manganese

SMCRA receiving stream will be conducted on a quarterly basis to ensure adequate flow and representative water quality and their locations are shown on Map A in Appendix A.

9. MITIGATION FUNCTIONAL ASSESSMENT TOOL

Wetlands

The functional assessment tools that will be utilized to measure the successful development of the wetland mitigation are the USACE Wetland Delineation Manual[8] and the Midwest Regional Supplement[18]. Wetland success will be achieved by establishing an area that not only has wetland hydrology, hydric soils, and hydrophytic vegetation, but is also self-sustaining.

Streams

The functional assessment tools that will be utilized to assess the required mitigation for the direct stream impacts will be: 1) the Illinois Stream Mitigation Method[7] along with measuring the development of the natural design streams using the methods developed by Dave Rosgen which are based on the Rosgen Channel Morphology Matrix shown below and 2) USEPA RBP utilizing the Habitat Assessment Field Data Sheets for physical characterization and habitat. Stream success is achieved by developing a natural stream channel that has a stable cross-section, stable meander pattern, and a stable profile such that over time, the channel features and stability are maintained. The Illinois Stream Mitigation Method examines the characteristics of the impacted streams to determine the number of mitigation credits required. These characteristics include stream type, priority area, existing conditions, impact activity and duration, and linear feet of impact. Using this method, it was determined that the proposed impacts would require 20,728 credits for mitigation. It should be noted that even though every stream will not be filled within the project limits (i.e. culverts may be installed, impoundments may be developed or streams will not be impacted at all), the most conservative activity "Fill" was used to determine the mitigation credits required. The Illinois Stream Mitigation Method worksheets can be found in Appendix D.

The following table lists the types of channels that will be used in mitigation where the specific type will be dependent on the reclaimed slope of the stream and watershed size.

Rosgen Channel Morphology Matrix				
Stream Type	**A**	**B**	**C**	**E**
Bed Material and Designation	Silt-Clay (6) Sand (5) Gravel (4)	Silt-Clay (6) Sand (5) Gravel (4)	Silt-Clay (6) Sand (5) Gravel (4)	Silt-Clay (6) Sand (5) Gravel (4)
Entrenchment Ratio	<1.4	1.4-2.2	>2.2	>2.2
Width/Depth Ratio	<12	>12	>12	<12
Sinuosity	1.0-1.2	>1.2	>1.2	>1.5
Slope (percent)	4-10	2 -3.9	<2	<2

The term "entrenchment ratio" is the vertical containment of the stream. It is the ratio of the width of the flood-prone area to the surface width of the bankfull channel. The flood-prone area is determined by using the elevation of twice the maximum depth of the bankfull channel at bankfull stage. The width/depth ratio is defined as the ratio of the bankfull surface width to the mean depth of the bankfull channel at bankfull stage. This ratio is used to describe the energy and ability of various discharges to move sediment. It is also valuable for describing the channel cross-section shape. Sinuosity is the ratio of stream length to valley length. Meander geometry characteristics are directly related to sinuosity.

10. GEOLOGY

The proposed Gateway North Mine surface effects area is located in northeastern Randolph County, Illinois, within the Mt. Vernon Hill Country Section of the Southern Till Plain Division. Altitude ranges from about 560 to 510 feet within the permit area. The physiography of the Mt. Vernon Hill Country is the most removed from its glacial influences. The upland areas in the region are hilly, featuring greater local relief, and the valleys and drainage systems are well-defined. Surface material is a weathered residuum of organic matter, clay, and till of the Illinoian/Sangamonian Glasford Formation.

a. UNCONSOLIDATED MATERIALS

Surficial materials in Randolph County consist of Holocene alluvium and Pleistocene deposits of loess, till, and outwash. Pleistocene glaciation has left deposits up to 50 feet think in the county. The deposits form part of the Glasford Formation which includes deposits of till, outwash, and accretion-gley. It is the most widespread glacial formation in Illinois and represents the southern limit of continental glacial deposits[29].

b. BEDROCK

Consolidated Pennsylvanian bedrock unconformably underlies the Quaternary unconsolidated surface material within the proposed permit area. This bedrock strata of the Modesto and Carbondale Formations consist primarily of shale, limestone, sandstone, coal, and underclay. These strata were deposited near the fluctuating shoreline of a shallow sea that existed in the region during Pennsylvanian time. Such strata can vary considerably in thickness and composition over relatively short geographic distances. Mississippian strata unconformably underlie the Pennsylvanian interval, but do not outcrop within the permit area, nor were penetrated by drilling. The table below summarizes lithologic information based on test bores conducted by the applicant.

Summary of Stratigraphy			
Thickness Range (ft.)		Description *(Member Name)*	Formation
Range	Mean		
7.00 – 87.00	32.31	Quaternary unconsolidated material (clay, loess, drift, silt, alluvium)	Glasford
0 – 229.80	156.74	Black shale, coal, limestone, sandstone, shale, underlay	Modesto
0 – 3.20	1.91	**Coal-7**	
29.70 – 42.05	35.91	Black shale, coal, limestone, sandstone, shale, shaly limestone, underclay	Carbondale
5.35 – 7.80	6.62	**Coal-6**	
??	??	Limestone, shale, shaly underclay, underclay	

The coal seam proposed for extraction as a fuel resource is the Herrin No. 6 Coal Seam. The Herrin No. 6 Coal Seam is described as a bright, banded coal, with a lower portion containing a distinctive shale parting known to drillers and geologists as *blue band*. This shale parting typically ranges between 2 and 4 inches in thickness. Within the proposed permit area the Herrin No. 6 ranges from 5.35 to 7.80 feet thick and averages about 6.62 feet thick. The Herrin No. 6 is mappable in all parts of the proposed permit and shadow areas.

The base of the Herrin No. 6 exhibits locally complex undulating surficial topology. Differential compaction and/or other deformation processes have generated a localized anticlinal structure with a strike trending approximately southwest to northeast. Calculations by the applicant using site-specific drill log data indicate a resultant strike of N76°E with a dip of 0.70° in the direction of N14°W on the north side of the anticline and a strike of N85°W with a dip

of 0.27° in the direction of S5°W on the south side of the anticline. No major faults or other structural anomalies are known to be present within or immediately adjacent to the proposed permit area.

c. GEOCHEMISTRY OF BEDROCK

The overburden in the permit area is primarily alkaline in nature based upon drilling analysis in the shadow area. Historical surface and underground mining activities associated with other mining in the general vicinity of this proposed mine have resulted in alkaline discharges.

d. AQUIFERS

There are no significant unconsolidated aquifers in the permit area that qualify for use as a groundwater source. Clay and lacustrine silt typically make up the composition of local unconsolidated materials. This material rarely exhibits sufficient permeability for development as a reliable source of potable water. There are no known buried bedrock valleys or major sand and gravel aquifers to be present within or immediately adjacent to the proposed permit area.

There are no significant consolidated aquifers in the permit area that qualify for use as a groundwater source. The bedrock strata down through the coal seam proposed for extraction are primarily Pennsylvanian lutites. These strata are generally considered impermeable and act as aquicludes. The balance of strata within this interval is composed of localized carbonate and arenite lenses exhibiting variable purity and hydrologic properties. Arenilitic strata capable of storing and delivering ground water to a well bore typically do not possess adequate reservoir volume and recharge to provide yield sufficient to meet average residential use. No major bedrock aquifers are known to be present.

11. ALTERNATIVES ANALYSIS

After careful consideration, no alternatives to the planned disturbance are available without leaving a large volume of high-quality coal reserve and additionally incurring large avoidance costs. The size of the area to be disturbed has been minimized to the highest degree possible considering the area required to develop the portal including sediment control, soil stockpiles, coal stockpiles, conveyor system, parking lots and other mine support facilities (see Map G in the Appendix A for the current operations plan). Compensatory mitigation is proposed for all regulated disturbances.

The Gateway North Mine is proposed as a single-seam (Illinois Herrin No. 6 Coal Seam) underground mine. This coal seam is a high quality, economically feasible coal reserve. Peabody Gateway North Mining, LLC presently controls approximately 72 million recoverable tons across 16,489.6 acres that in today's coal market; is worth approximately $3.24 billion and could produce 464 million megawatt-hours of electricity.

Peabody Gateway North Mining, LLC continues to invest in the acquisition of land, coal reserves, mining equipment, shop and support infrastructure and an experienced mining staff. Current capital investment is significant with a continued investment for future mine development. The annual payroll (wages and benefits) at the Gateway North underground mine, at peak operation, will be approximately $40 million for 340 employees. Additionally, the mine operation will provide $250,000 in tax revenue. Mineral owners will receive significant income from the mining operation in the form of royalty payments and/or acquisition proceeds. The Summary of Alternatives table identifies the alternatives considered and their primary attributes. The table is followed by the comprehensive Alternatives Analysis narrative.

Four (4) alternatives were considered for the Gateway North Mine mining operation.

A. "No Action" Alternative (No underground mining)
B. "Project Relocation" Alternative (Relocate to another site)
C. "Alternative Mining" Alternative (Surface mine reserve)
D. "Preferred Action" Alternative (Construct surface support facilities and place initial development material for the underground mine at the proposed location)

Summary of Alternatives				
Alternative	**Description**	**Advantages**	**Disadvantages**	**Result of Implementing Alternative**
No Action Alternative	No Underground Mining at Gateway North Mine	• Eliminates mine development-related disturbance of streams and wetlands for the Gateway North Mine surface effects.	• Without regulated development activities, deforestation can occur without effective NPDES controls, without replanting and monitoring requirements and without proper Indiana Bat protection measures, • Loss of ~340 direct jobs with annual wages and benefits of ~$40 million, • Loss of ~$250,000 in annual tax revenue for Randolph, Perry and Washington Counties and state of Illinois, • Loss on investments in the acquisition of the equipment, facilities, land, coal reserve and permitting that have been made in advance of mining, • Continued degredation of existing jurisdictional waters from agriculture and downstream straightening, • Off-site mitigation will not be completed, • No protection of restored streams/wetlands through proposed deed restrictions, • Threatens necessary coal supply for regional electric utilities.	• Fails to meet Peabody Gateway North Mining, LLC's purpose and need of utilizing this viable energy reserve, • Loss of high quality coal reserve for regional electric utilities, • Does not meet project objective.
Preferred Action Alternative	Underground Mining at Gateway North Mine	• Allows Peabody Gateway North Mining, LLC's to fully utilize this viable resource and supply to regional utilities resulting in affordable electricity for the regional community, • Maximizes coal recovery of the reserve and minimizes impacts at other sites by utilizing existing facilities, • Provides ~340 direct jobs with a payroll of ~$40 million annually, • Provides tax revenue to Randolph, Perry and Washington Counties and the state of Illinois, • Impacts to existing streams and wetlands will be mitigated on-site and off-site within wetland mitigation areas, concurrently with development impacts, • Disturbance minimized to maximum extent, • Mitigated streams will be stable with riparian buffers, • Protection of streams/wetlands through proposed deed restrictions.	• Temporary loss of the functions of the disturbed streams and wetlands at the Gateway North Mine site.	• Meets Peabody Gateway North Mining, LLC's purpose and need of utilizing this viable energy reserve, • Provides high quality coal reserve for regional electric utilities.

Project Relocation Alternative	Surface Effects at another location	• Eliminates disturbance of streams and wetlands at the Gateway North Mine surface effects site.	• Does not utilize Gateway North Mine's viable reserve or existing facilities, • Does not assure the site will not be significantly disturbed by activity now or in the future without the regulated requirements contained in SMCRA and CWA Section 404 permits, • Produces greater impacts to another site with more disturbance needed to produce and process the same amount of coal, • Threatens needed coal supply to regional electric utilities while replacement supplies are located, acquired, and permitted.	• Fails to meet Peabody Gateway North Mining, LLC's purpose and need of utilizing this viable energy reserve, • Loss of high quality coal reserve for regional electric utilities, • Does not meet project objective.
Other Mining Techniques Alternative	Surface Mining	• Allows Peabody Gateway North Mining, LLC's to fully utilize this viable resource and supply to regional utilities resulting in affordable electricity for the regional community, • Maximizes coal recovery of the reserve and minimizes impacts at other sites.	• Greatly increased impacts to disturbed streams and wetlands at the Gateway North Mine site, • Peabody Gateway North Mining, LLC does not possess the surface rights to conduct this mining method, • Mining ratio is too high to technologically and economically mine the reserve using surface mining methods.	• Mining does not occur due to economic factors.

A detailed description of each of the alternatives follows:

A. The "No Action" Alternative would be to not underground mine the coal reserves. The "No Action" alternative would result in many negative side effects:

- Loss of ~340 hourly and salary jobs with a payroll of ~$40 million annually when full production is reached. Many of the employees are long term employees in the mining industry and are not currently trained for other employment. The mining industry is vitally important to the local economy of Randolph County, as well as to the region and state. Additionally, the current mine operation will provide approximately $250,000 in tax revenue to Randolph, Perry and Washington Counties on an annual basis and is a significant consumer for many local suppliers and vendors. Unemployment rates as of July 2010 were estimated at 9.5% for Randolph County, 10.6% for Illinois, and 9.7% for the United States[27].

- Approximately half of the electricity produced in the U.S. and over 50% of the electricity produced in Illinois comes from coal-fired power plants. The economical availability of high quality coal is paramount to the local, state and national economy and national security. The Energy Information Administration's 2007 Annual Energy Outlook projects U.S. electricity to grow by 39% in the residential sector, 63% in the commercial sector and 17% in the industrial sector from 2005 to 2030. During the same period, the percent of electricity produced from coal is expected to rise from 50% to 57%. The demand for coal is increasing substantially.

- The loss in future tax revenue, both direct and indirect would be significant, particularly when the replacement industry is unknown. Mining operations have greatly diminished in the Illinois Basin during the past 10 years. Mining at Gateway North would continue to contribute a much needed boost to the local economy and tax base.

- The economic losses to the company would be significant as large investments in land, coal reserves, equipment, and infrastructure have been made well in advance using a business plan dependent on maximizing recovery of the reserve. Most of these items cannot be moved to other locations. If they could be moved, it is likely the alternative site would consist of similar or higher value aquatic habitats. Many local land and reserve owners would also suffer significant loss if mining does not occur.

B. The "Project Relocation" Alternative is not a viable alternative as essentially the same or more aquatic resources would be encountered at any mining location in the Midwest. Another location would require the same disturbance of areas for infrastructure construction. In addition, the potential mining locations are dictated by the site specific geology. Unlike many other industries, coal mining cannot be relocated to more desirable areas. The mine must be located where the mine-able reserve is located. Relocation would have the same results as alternative "A". The proposed plan is for minimal impacts to a surface support area and conveyor corridor but another location would also require impacts on a large area of surface disturbance for coal processing.

C. The use of "Alternative Mining Techniques" to recover the coal reserve is considered during the planning and permitting process. In most cases, a coal reserve is essentially either suitable for surface mining or underground mining. The coal reserve at the Gateway North Mine is not conducive to surface mining for the following reasons: the thickness and physical makeup of the overburden lying above the coal seam is too thick to feasibly extract by surface mining techniques along with the extent of the reserve. The average depth to the coal seam to be mined is approximately 223 feet deep. This results in a ratio of greater than 30:1. The current feasible ratio to mine by surface methods is 20:1. Additionally, Gateway North Mining, LLC does not presently possess the surface rights to conduct surface mining.

D. The "Preferred Action" alternative is to follow the underground mining plan with construction of the surface support facility at the proposed location. This will maximize coal recovery and ensure re-disturbance does not occur in the future when coal and overall energy demand is projected to increase. Steps will be taken, as always, to *minimize* effects to the aquatic resources by placing required sediment basins and diversions as close to the surface facility area as possible. Transporting the coal via an overland conveyor is much preferred over trucking all the coal from Gateway North Mine portal to the Gateway Mine coal preparation plant. The conveyor should alleviate concerns about constant truck traffic along state and county roads. Overland conveyors provide a cost-efficient and more environmentally friendly alternative to trucking the coal.

The permit boundary has been restricted to the minimum extent possible to allow efficient and effective mining of the reserve. Soil stockpiles will also be placed in adjacent upland areas outside of the streams and wetlands. Large acreages of undisturbed land will be avoided through utilization of the existing Gateway Mine coal preparation plant and associated facilities.

The overland conveyor will be positioned in a straight line to minimize the length and number of transfer points, elevated sections, and road crossings. Several alternative conveyor routes were considered, but were rejected for this preferred route. The preferred route provides the most direct path and disturbs the least amount of overall land acreage.

One alternative overland conveyor route transferred coal from the mine to a conveyor that moved the coal west across two different landowners to the Gateway Mine refuse disposal area. The beltline would then be constructed along the eastern slope of the refuse disposal area within the Gateway Mine permit boundary before crossing the Union Pacific railroad where the beltline would require another transfer point to move the coal to the Gateway Mine preparation plant. This route is problematic from several standpoints; however, perhaps the most problematic is locating the structure along the slope of the refuse disposal area, which would impede access for reclamation and maintenance activities.

These alternatives were considered and rejected because the straight preferred route:

- is a simpler design with one less transfer point (Jean Road transfer eliminated)
- is not elevated to get over an additional county road (Jean Road)
- eliminates the elevated portion (of greater than 50 feet) to reach the top of the refuse hill
- eliminates the elevated portion coming down from the top of the refuse hill and the possible interference with the Ameren power line
- provides more practical and safe access for maintenance of the conveyor
- is 2,340 linear feet shorter and therefore less expensive
- does not bisect agricultural fields and limits interference of field access by local farmers
- offers better protection from wind impacts
- includes a landowner willing to sell
- eliminates the conveyor as an obstacle to reclamation and maintenance of the refuse area.

The preferred overland conveyor configuration has been positioned in a straight line to minimize length, transfer points, road crossings, and steep elevation transitions. The majority of the conveyor will be contained on one property owner and buffered by wooded areas from surrounding residents.

Best Management Practices will be utilized to guard against negative impacts to the aquatic ecosystem outside of the area planned for disturbance. Best Management Practices include retention and monitoring of site run-off, use of quick growing cover crops, and silt fencing. Stream and wetland mitigation will take place concurrently with the impacts and be completed before the end of the second growing season after permit approval, employing the best techniques available to ensure successful mitigation. Mitigation areas will be monitored closely by well-trained staff, and outside consultants will be utilized as needed. Staff and consultant credentials are provided in Section 5.D.

The Gateway North Mine surface effects project area has been selected for a number of factors making the site unique:

- Coal quantity is the most important component of the site selection. The Gateway North Mine reserve contains approximately 72 million tons of useable coal, which could produce approximately 464 million megawatt-hours of electricity.

- Property and mineral control – surface property and coal reserves were acquired at a substantial cost. It is not economically feasible to relocate this site to an uncontrolled area even if an acceptable reserve was available. The lost time and additional investment with an unknown conclusion eliminate this as an option from a practical business perspective. Property control/access must be acquired before aquatic resources can be evaluated.

- Existing land use and site location – land uses are primarily cropland with sporadic woodlands. Topography is flat to rolling. The site occurs in a rural sparsely populated setting and is isolated from most nearby residences.

- Coal quality – the coal seams to be mined by this operation are the Herrin No. 6 Coal Seam. This reserved is a needed, compatible fuel source for existing coal-fired power plants which must continue to operate and produce electricity that is crucial to the economy and security of the United States. The average Btu content of the final saleable coal is ~11,000. While alternate sources of power generation are being developed on varying scale throughout the country, there is no viable, scaleable or economic replacement for coal in the foreseeable future.

- Marketability - the site location allows for efficient access to existing infrastructure that currently supports transportation of coal to customers for energy production. The existing Gateway Mine has a rail loop already in place on the Canadian National Railroad that provides access to rail lines which are located strategically to coal-fired electric utilities. Rail delivery will be the primary method of delivery of coal to the mine's customers, thereby reducing potential traffic onto local public roads.

This site is ideal due to several factors: Peabody Gateway North Mining, LLC has control of the surface property, access to the state highways and rail facilities, minimal impacts to jurisdictional waters due to utilizing an existing coal preparation facility at Gateway Mine, and minimal contact with adjacent population center, Coulterville.

As stated previously, there are no legitimate alternatives to the planned disturbance for the coal removal of this reserve. After careful consideration, no alternatives to the planned disturbance are available without leaving a large volume of high-quality coal reserve and additionally incurring large avoidance costs. The size of the area to be disturbed has been minimized to the highest degree possible considering the area required to develop the portal including sediment control, soil stockpiles, coal stockpiles, conveyor system, parking lots and other mine support facilities. Compensatory mitigation is proposed for all regulated disturbances.

12. SOCIAL AND ECONOMIC IMPORTANCE

Mining is different from many other industries in that the facilities and the mine must be located where the resources are present. Other factors such as proximity to transportation, power grid, and reserve configuration dictate facility locations and are critically important to the viability and success of an operation. Reserves may be owned or controlled many years before mining occurs and involve a substantial long-term investment.

Coal mining is deemed to be of social and economic importance by Illinois statutes and corresponding regulations. Illinois Title 62 Section 1810.2 states its objective is to ensure that coal mining and reclamation operations will not only be environmentally sound, but will also provide for "[m]aximum use and conservation of the solid fuel resource being recovered so that reaffecting the land through future surface coal mining operations can be minimized; … [s]triking a balance between protection of the environment and agricultural productivity and the Nation's need for coal as an essential source of energy."

Coal is Illinois's major energy source with nearly 50% of its electricity generated from coal. Illinois coal mining provides not only many high paying jobs directly, but many ancillary jobs as well. The total payroll of the Illinois coal mining industry amounts to almost $500 million per year. A typical coal mine will thus contribute several million dollars per year to the economy. Over 7,000 people are directly employed by the Illinois coal industry, with an average annual income of $36,000. The cost of electricity is a major cost for industry and can affect the decision to locate new industries in Illinois. Approximately 50% of Illinois's electricity is consumed by industry. Even more fundamental, keeping the cost of electricity low helps to provide affordable energy to Illinois's citizens, especially those on fixed incomes. The social benefit of low cost energy is immeasurable. The Illinois Department of Natural Resources estimates that coal mining contributes $5 billion to Illinois's economy annually.

Further, coal is a vital national resource and is crucial to the security of the nation. Coal constitutes 95% of America's fossil energy reserve. Coal consumption in the United States is increasing.

The U.S. Department of Energy website, states that *Energy is the vital force powering business, manufacturing, and the transportation of goods and services to serve the American and world economies. Energy supply and demand plays an increasingly vital role in our national security and the economic output of our nation.* The website also states that, *Coal is one of the true measures of the energy strength of the United States. One quarter of the world's coal reserves are found within the United States, and the energy content of the nation's coal resources exceeds that of all the world's known recoverable oil. Coal is also the workhorse of the nation's electric power industry, supplying more than half the electricity consumed by Americans.*

13. CUMULATIVE ACTIVITY

An evaluation of the following information demonstrates that activity associated with the Gateway North Mine surface effects has minimal impacts compared to the overall impacts to the cumulative watersheds.

The Gateway North Mine surface effects project is located across two 12-digit hydrologic unit code (HUC) watersheds: 1) the northern third of the project area drains to a tributary of the South Fork Mud Creek in the South Fork Mud Creek watershed (071402040302) and 2) the remaining southern portion drains to a fresh water lake at Gateway Mine before outletting into Marys River in the Lick Branch-Marys River watershed (071401050202). The table below summarizes the potential impact the Gateway North surface effects project could have on the 12-digit HUC watersheds.

Watershed Summary				
12-Digit Hydrologic Unit Code (HUC)	Permit Area	Percent of Total Permit Area	12-Digit HUC Watershed Area	Percent of 12-Digit HUC Watershed Area
	(acre)	(percent)	(acre)	(percent)
South Fork Mud Creek (071402040302)	76.4	44.4	24,496	0.31
Lick Branch-Marys River (071401050202)	95.7	55.6	32,710	0.29
Totals:	172.1	100		

South Fork Mud Creek drains to Mud Creek, a tributary of the Lower Kaskaskia River. The Lower Kaskaskia River flows in a southerly direction to the Mississippi River in southern Randolph County approximately 10 miles northwest of the town of Chester, Illinois. The Lower Kaskaskia River watershed drains approximately 95,493 acres[17]. The Lower Kaskaskia River watershed is part of the larger Kaskaskia River watershed which also includes the Upper Kaskaskia, Middle Kaskaskia, and Shoal Creek watersheds. The Kaskaskia River watershed, which is the largest watershed contained entirely in Illinois, covers approximately 3,712,000 acres across 22 Illinois counties and is approximately 320 miles long[17].

The fresh water lake in the Lick Branch-Marys River watershed is the fresh water supply for the Gateway Mine coal preparation facilities. This lake, which has a surface area of approximately 47 acres, was constructed by damming a tributary to Marys River. All the streams in the surface effects permit area, which are in the Lick Branch-Marys River watershed, drain into this lake before discharging downstream to Marys River.

Marys River is a tributary of the Mississippi River which drains a small watershed between the Big Muddy River and the Kaskaskia River. The Marys River watershed drains approximately 156,000 acres across 3 Illinois counties and is approximately 34 miles long[19]. The watershed is a part of the larger Upper Mississippi-Cape Girardeau River basin, which includes the section of the Mississippi River from Kaskaskia River to its confluence with the Ohio River and any tributaries that flow directly to it in Illinois and Missouri. The drainage area of the Upper Mississippi-Cape Girardeau

River basin covers approximately 609,200 acres in the state of Missouri and approximately 472,400 acres in the state of Illinois.

In terms of percentages of watershed, it is not anticipated that the activities in the proposed Gateway North surface effects permit will impact the South Fork Mud Creek and Marys River watersheds given their large size.

Land Resources

The Gateway North Mine surface effects project is located in the Southern Illinoian Till Plain ecoregion[21] which is a partly dissected till plain that was once covered by forests and prairies. Broad flats, rolling hills, and subdued moraines are common. Towards the south, the terrain becomes hillier as glacial till thins and bedrock approaches the surface. Overall, dissection is greater, moraines are less prominent, and forests are more extensive. The underlying Paleozoic sandstone, limestone, coal, and shale is mantled by loess and Illinoian-age glacial till; younger Wisconsinan-age till is absent. Upland soils in the Southern Illinoian Till Plain are clayey or silty, derived from loess and till, and have poor internal drainage. Impervious fragipans or claypans are common and characteristic. Soils are droughty during dry periods, excessively wet during the spring, and acidic. Overall soil quality and productivity are lower than in the Central Corn Belt Plains ecoregion.

In the early 19th century, about 40% of the well-drained uplands were covered by prairies. The remaining uplands were covered by scattered trees, groves, and forests. Groves containing pin oak, post oak, swamp white oak, and blackjack oak are native to nearly level, poorly drained uplands with clay-rich soils. Oak-hickory forest occurred on relatively dry valley slopes.

Today, nearly all of the original prairies in the Southern Illinoian Till Plain and most of its original forest (especially in the south) have been converted to agriculture. Soybeans, corn, and wheat are the primary crops, and livestock farming is important. Forests are now largely confined to side slopes and river bottoms that are unsuitable for farming. Natural soil wetness conditions are generally unfavorable for crops, and therefore, nearly all of the ecoregion's flat and nearly level uplands have been tiles to improve drainage.

The following tables summarize the various land covers within the 12-digit HUC watersheds impacted by the Gateway North Mine surface effects project along with the acreage that has been previously affected by surface mining.

12-Digit HUC Watershed Land Cover Summary

12-Digit Hydrologic Unit Code (HUC)	12-Digit HUC Watershed Area	Agriculture including Pasture	Forest / Wildlife	Developed	Water/ Wetlands	Undeveloped	Source
	(acre)	(percent)	(percent)	(percent)	(percent)	(percent)	
South Fork Mud Creek (071402040302)	24,496	76.4	14.2	5.5	3.2	0.1	17
Lick Branch-Marys River (071401050202)	32,710	75.4	15.7	2.9	6.0	<0.1	19

Coal Resources

Illinois has the largest reported bituminous coal resources and the largest strippable bituminous coal reserve of any state in the United States. Illinois has the third largest total coal reserve of any state and is second only to Montana in terms of demonstrated reserve base. About 20 coal seams have been mined in Illinois. Most production has come from about eight coal seams, with 85 to 90% of the total production being from the Herrin No. 6 and the Springfield No. 7 seams. Illinois currently produces about 35 million tons of coal per year, down from about 60 million tons per year between 1966 and 1992. Surface mining accounts for about 10-15% of the total[30].

The Herrin No. 6 Coal Seam is the principal coal mined in the South Fork Mud Creek and Lick Branch-Marys River watersheds, as well as southwestern Illinois. The boundary between the southwestern Illinois coal field and the southeastern Illinois coals fields is along the DuQuoin Monocline. This is a relatively prominent structural feature

trending north-south that separates the deeper part of the Illinois Basin on the east from the shelf area to the west. The Herrin seam is the main seam that is mined with a thickness generally between 6 to 8 feet, but the underlying Springfield coal, not continuously well-developed, has also been surface-mined in Randolph and Perry counties.

Most production in southwestern Illinois in recent years has been from large-scale surface mining of the relatively thick Herrin coal along the western margin of the coal field. Numerous underground mines, some relatively large, have been operated in Madison, St. Clair, Randolph, and Clinton counties. This area contains the most widespread thick Herrin coal in Illinois with large reserves. A few underground mines in the Herrin seam have been operated at shallow depths (less than 150 feet) due to the relatively thick amount of stabilizing limestone present within this interval. In several areas, where the Springfield is present in sufficient thickness and at an interval of about 25 feet below the Herrin coal, both seams have been mined together by surface operations[30].

Due to the geographic location in the Illinois Basin, both underground and surface mining have affected land in the receiving watersheds. The following tables show the approximate effects in acres for Surface Mining, Surface Effects for Underground Mining, and Underground Mining in the South Fork Mud Creek and Lick Branch-Marys River watersheds.

The **Previous** areas are those that have been either reclaimed, abandoned, or mined-out. The **Current** areas are those locations that are actively being mined or affected. Due to the unknown location of an active underground mine and what has been sealed off, the entire permitted shadow area is included if the mine is active, i.e. Gateway Mine. The **Potential** areas include approved operations or operations that are pending approval such as the Gateway North Mine permit. It should be noted that the **Potential** acreages for other coal mine operators within the watersheds is not known.

Cumulative Surface Mining Effects Summary

12-Digit Hydrologic Unit Code (HUC)	Watershed Area	Previous Surface Mining		Current Surface Mining		Potential Surface Mining	
		Acreage	Percent of Watershed	Acreage	Percent of Watershed	Acreage	Percent of Watershed
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
South Fork Mud Creek (071402040302)	24,496	0	0	0	0	0	0
Lick Branch-Marys River (071401050202)	32,710	413	1.3	0	0	2,282	7.0

Cumulative Surface Effects for Underground Mining Summary

12-Digit Hydrologic Unit Code (HUC)	Watershed Area	Previous Surface Effects		Current Surface Effects		Potential Surface Effects	
		Acreage	Percent of Watershed	Acreage	Percent of Watershed	Acreage	Percent of Watershed
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
South Fork Mud Creek (071402040302)	24,496	273	1.1	0	0	76	0.3
Lick Branch-Marys River (071401050202)	32,710	unknown	0	183	0.6	96	0.3

Cumulative Shadow Areas for Underground Mining Summary

12-Digit	Watershed	Previous Shadow Areas	Current Shadow Areas	Potential Shadow Areas

Hydrologic Unit Code (HUC)	Area	Acreage	Percent of Watershed	Acreage	Percent of Watershed	Acreage	Percent of Watershed
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
South Fork Mud Creek (071402040302)	24,496	8,610	35.1	0	0	3,971	16.2
Lick Branch-Marys River (071401050202)	32,710	7,702	23.5	2,730	8.3	0	0
Archie Creek-Mud Creek (071402040301)	21,759	376	1.7	0	0	10,630	48.9
Brushy Creek-Elkhorn Creek (071402040202)	17,758	0	0	0	0	1,358	7.6

Abandoned Mine Lands (AML)

In the Gateway North Mine surface effects, there are no abandoned mine lands, but within the South Fork Mud Creek and the Lick Branch-Marys River watersheds, there are some visible signs of historic mining such as spoil piles, pit lakes, and abandoned mine shafts. A large percentage of this land was previously mined (both by underground and surface methods) prior to the Surface Mine Control and Reclamation Act (SMCRA) of 1977 resulting in ungraded spoil ridges which may or may not be vegetated, pit lakes, uncontrolled subsidence, and hazardous mine openings.

After the federal SMCRA law was passed, the Abandoned Mined Lands (AML) Reclamation Division was implemented to reclaim coal mine sites that were left abandoned prior to the implementation of SMCRA standards which contain health and safety hazards and environmental problems resulting from past coal mining activities. The Division administers an emergency program to provide immediate assistance on coal mine-related problems which occur suddenly and are life-threatening, such as structures affected by mine subsidence, open mine shafts or pits, methane gas leaks and mine refuse fires. Federal law requires problem conditions to be reclaimed in a prioritized order of relative significance. The program addresses improperly sealed mine openings, escaping mine gases, mine refuse fires, hazardous equipment and facilities, dangerous impoundments, highwalls or embankments, flooding of roads, sites contributing to off-site pollution, acid water impoundments and coal refuse or mine spoils adversely affect land or water resources. SMCRA provided for the collection of fees on active coal mining to fund this restoration and elimination of these hazards. The tonnage fees are 31.5 cents pert ton of surface mine coal and 13.5 cents per ton of coal mined underground. Approximately $146 million has been spent on AML projects in Illinois as of 2009. Thousands of acres and hundreds of sites have been reclaimed and the area will only increase. These lands are being returned to a productive state while reducing sediment, erosion, and acid mine drainage into the receiving waters. The Gateway North Mine which at full production will produce approximately 4.5 million saleable tons of coal a year will contribute a minimum of $0.6 million per year to the AML fund to remedy those adverse effects of past coal mining.

Water Quality

Within the Gateway North Mine surface effects area, there are no known Section 303(d) impaired water bodies, but the following table lists the 303(d) listed waters found in the South Fork Mud River and the Lick Branch-Marys River watersheds.

Illinois' 2010 303(d) Listed Waters[1]					
Waterbody (Segment ID)	12-Digit HUC Watershed	Status	Designated Use	Impairment(s)	TMDL Status
Mud Creek (IL_OE-02)	South Fork Mud Creek	Listed	Aquatic Life	Manganese and Sedimentation/Siltation	(TMDL Ongoing)
Marys River (IL_II91)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	
Maxwell Creek (IL_IIK-27)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	

Maxwell Creek (IL_IIK-SPC1A)	Lick Branch/Marys River	Listed	Aquatic Life	Phosphorus (Total)	

Numerous substances can cause water pollution in the project area. These can include sediment from the erosion of exposed earth, nutrients from soil amendments, oxygen-demanding wastes from septic systems, acidic ions from improperly handled coal waste, toxic metals from illegal dumping, and biological waste from septic systems and animal operations. Sources of pollutions can be divided into two categories: point source pollution and non-point pollution. Point source pollution is typically discharged from a pipe while non-point pollution is more widespread and cannot be pinpointed to one location. This pollution is discharged primarily in response to precipitation events.

No surface disturbance is proposed for the Gateway North Mine surface effects, other than the slope and the air shaft construction. During the construction period, minor amounts of surface runoff may be temporarily affected because of removal of vegetative cover. Surface runoff from the affected areas will be routed through sedimentation basins with a minimum 10-hour detention time. These sedimentation basins will have permitted NPDES outfalls and will be subject to permit specific effluent limitations. The effluent testing requirements for the NPDES permit are more stringent than the federal limits for coal mining and are sufficient to address potential problems.

Agricultural activities provide the majority of the non-point pollution within the watersheds. Land clearing and conventional tilling of the land makes soil susceptible to erosion. Soil amendments such as pesticides and fertilizers can also be washed from the fields. In Randolph County, erosion is a potential problem on approximately 70% of the cropland. Erosion can be a problem on soils that have slopes of more than 2%. Loss of the surface layer is damaging for several reasons. Soil productive is reduced as the surface soil is removed and part of the subsoil is incorporated into the planting layer. The subsoil is generally lower in plant nutrients, lower in organic matter, and higher in clay content compared to the surface soil. As the content of organic matter decreases in the planting layer and the content of clay increases, soil tilth deteriorates, resulting in soil crusting and a reduced rate of water infiltration. Erosion results in the sedimentation of streams, rivers, road ditches, and lakes. The sedimentation impacts water quality.

Erosion-control measures include both cultural and structural practices. The most widely used practice in the county is a system of conservation tillage, such as mulch tillage and zero tillage. These systems can leave 30 to 90% of the surface covered with crop residue. Another cultural practice is a crop rotation that includes 1 or more years of close-growing grasses or legumes. In areas where slopes are long and uniform, terraces and contour farming also are effective in controlling erosion. Structural practices could be placed where concentrated runoff flows overland. Erosion can be controlled by establishing grasses waterways or installing erosion-control structures.

Baseline water quality in the local watersheds and region would greatly improve if more farmers would participate in conservation tillage practices. Conservation practices would reduce the amount of sediment introduced into the streams, decrease the amount of airborne dust, slow down runoff, and decrease the need for abundant field conditioners required for crop production. Recent trends point to an increase in conservation farming practices and a decrease in conventional tillage practices.

Within the local 12-digit HUC watersheds, there are several known and regulated point sources of pollution. Dischargers must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the State of Illinois. The primary pollutants being released through a pipe, ditch, or other well defined points can be oxygen demanding wastes, nutrients, sediment, and possible toxic materials. As of October 7, 2010, the following table tabulates the number of NPDES permits within the affected watersheds and notes how many are major. Major dischargers are facilities that discharge over one million gallons per day or sustain wastewater from a population greater than 10,000. No major dischargers are within the 12-digit watersheds.

Active NPDES Permits[34]		
Watershed	**Total NPDES Permits**	**Major Discharge Permits**
South Fork Mud Creek (071402040302)	0	0
Lick Branch-Marys River (071401050202)	2	0

Within the watersheds of the permit area, there may be failing septic systems or septic systems that have been connected into field drainage tiles. Due to this area being rural in nature, homes within the area are almost entirely on septic systems except for the town of Coulterville. Failing septic systems are known sources of E. coli impairments in water bodies. Due to forested areas being concentrated along the stream corridors, wildlife can also cause impairments in water bodies. Many animals such as deer, geese, ducks, raccoons, and turkeys spend time in or around water bodies contributing to their potential impairment. There are also smaller livestock operations within these watersheds that are not regulated due to their small size under the confined animal feeding operation regulations. These operations may have an impact on the water quality.

The Gateway North Mine has a pending NPDES permit that authorizes mine-related discharges. These discharges occur from sediment basins which are located as close to the disturbance area as practicable and are monitored for pH, suspended solids, settleable solids, dissolved solids, and other constituents, thereby preserving downstream habitats. All disturbed areas will drain to a sedimentation pond to ensure acceptable quality of any drainage from the site. Prior to initiating land clearing appropriate sedimentation ponds and upstream collection channels will be constructed. Sedimentation pond spillways will be protected to minimize soil erosion by utilizing riprap or quickly germinating vegetation. Upon completion of construction of the sedimentation ponds, affected areas would be graded to drain to the sedimentation pond. All discharges from the sedimentation ponds will be required to meet the numerical effluent limits for suspended solids, per the NPDES permit. Reclamation practices at coal mines such as the use of sediment basins and terraces and have proven successful in reducing erosion and sediment loss. Best Management Practices for erosion and sediment control will be implemented and no negative impacts to the waters outside of the area planned for mining should occur. Riparian buffers will be reestablished adjacent to the stream mitigation and conservation tillage practices will be recommended to tenant farmers.

Any effects of the Gateway North Mine on surface water quality should be minimal. Effluent from NPDES discharge points is proposed to meet all applicable state and federal standards and is compatible with that in the receiving stream. Adherence to these limits will ensure that adverse impacts will not occur to the surface water quality of the receiving stream as a result of the proposed operations.

Biological Quality

Biological quality was evaluated for the Gateway North Mine surface effects. Monitoring at sampling points both within and outside of the permit area was performed and the results are provided in the Bioassessment Report, which is located in Appendix I. The biological sampling included both analysis of macroinvertebrate assemblages and fish assemblages. Macroinvertebrate evaluation methods followed the ILEPA Bureau of Water (BOW) *Methods of Sampling Macroinvertebrates in Streams*, while the fish were evaluated and scored using ILEPA BOW *Interpreting Illinois Fish IBI Scores*. Habitat assessments were done following the USEPA RBP[12].

The following table summarizes the results of the biological and habitat evaluations, along with some water quality results.

Gateway North Mine Bioassessment Results					
Sample Point	**mIBI**	**fIBI**	**RBP**	**pH**	**TDS (mg/L)**
1MS2	16	no fish	102	8.5	403
2NS1	11	2	147	8.3	261
3XS2	32	no fish	88	8.2	250
4MS1-1	23	2	107	8.3	277

The above table indicates that all sites tested were impaired for macroinvertebrates and fish, based on ILEPA BOW's *Computing the Macroinvertebrate IBI (mIBI).* ILEPA BOW sets the standard for biotic communities at a macroinvertebrate index of biotic integrity (mIBI) score of 0 - 20.8 as poor, 20.9 - 41.7 as fair, 41.8 - 72.9 as good, and 73 - 100 as exceptional. For fish, an index of biotic integrity (fIBI) of 51 - 60 is excellent, 41 - 50 is good, 31 - 40 is fair, 21 - 30 is poor, and <21 is very poor.

Further degredation of the streams within and adjacent to the Gateway North Mine are not anticipated. A recent study at a modern Midwestern coal mine found no significant effects on aquatic life associated with coal mine effluent[23]. The study was conducted at a formerly-active underground mine near Georgetown, Illinois which had both open and reclaimed gob/caked slurry coal waste facilities. Fayette Drain is a tributary to the Little Vermilion River, which is know to support populations of the Illinois state-listed endangered Little Spectaclecase mussel (*Villosa lienosa)* and the state-threatened Slippershell mussel (*Alasmidonta viridis*). Various Bioassessment techniques were used to determine if the NPDES permitted discharge was causing measurable impairment to instream communities, particularly to mussels. Based on the data generated from the study, including water chemistry, toxicity testing, benthic macroinvertebrate sampling, and bioaccumulation studies with transplanted freshwater mussels, it was concluded that the discharge from the mine did not have an adverse impact on the biota inhabiting the Fayette Drain. Benthic macroinvertebrate communities were more diverse downstream of the mine site and were dominated by mollusks, whereas the upstream site was dominated by rather tolerant midges (*Chironomidae*). None of the water or sediment samples collected were toxic to standard tests organisms. Furthermore, transplanted mussels did not accumulate significant levels of harmful metals in their tissues compared to upstream transplants after two months exposure, and their Tissue Condition Index (TCI) values were not significantly lower than those placed upstream of the mine site. Water column and sediment toxicity testing may represent snapshots, in that if they indicate toxicity or lack thereof, it is only for the moment at which samples were collected; however, benthic macroinvertebrate surveys and mussel transplants are not. The data that was collected in the report supports the fact that the coal mine effluent is not a major factor in impairing aquatic communities.

Threatened and Endangered Species

As verified by state and federal agencies, there are no sitings or critical habitats known to occur within the Gateway North Mine surface effects project area for the federally-endangered Indiana bat (*Myotis sodalis*), although the project area is within its range. The Illinois Natural Heritage Database[33] does show the project area may be in the vicinity of the protected barn owl (*Tyto alba).* The forested riparian corridors present within the permit area are potential habitat for the Indiana bat, but there are no current records of Indiana bats near the project site.

Peabody Gateway North Mining, LLC follows conservation measures to minimize the potential take of the Indiana bat by performing tree-clearing outside of the summer reproductive season. The appropriate season to clear trees is from September 30 to April 1[38]. The development of the facilities which will require tree-clearing will utilize the above dates to minimize potential takes.

It is not anticipated that the Gateway North Mine surface effects project will impact the summer habitat of the Indiana bat, but the stream and wetland mitigation will be comparable in size to the pre-development forested acreage and will include species suitable for Indiana bat habitat. Species will include exfoliating bark trees such as various hickory, ash, and oak species. The wetland/riparian buffers which will be planted adjacent to all the stream mitigation will provide additional habitat with access to water. The mitigation plantings will be concurrent with mine development activities, reducing the time of temporal loss. The buffers will be comprised primarily of hard-masted hickory and oak species suitable for Indiana bat nursery roosts.

It is not anticipated that the Gateway North Mine surface effects project will impact nesting habitat of the barn owl, if any exist in the wooded areas. Barn owls nest in a variety of areas including hollows and natural cavities in trees. The barn owl's preferred feeding habitat includes open-lying areas with abundant vole populations. The stream and wetland mitigation areas will provide ideal feeding habitat early in the mitigation. When the riparian and wetland tree species are becoming established, there is an increase in the vole population. The applicant provides roosting perches for raptors, including the barn owl to keep the vole population from affecting the success of the mitigation. Therefore, the barn owl will benefit from the proposed stream and wetland mitigation.

Cultural Resources

The cultural resources for the Gateway North Mine surface effects area covered under ILDNR mining permit #416 are pending clearance by the ILDNR. The Surface Mining Control and Reclamation Act (SMCRA) requires that any archaeological and historical issues be cleared by the ILDNR in consultation with the Illinois State Historic Preservation Officer before bond can be posted and the area developed.

Groundwater

No significant aquifers are known to exist below the lowest coal seam to be mined. Pennsylvanian bedrock units typically exhibit permeability of between 10^{-6} cm/sec to 10^{-11} cm/sec[35]. Ground water exhibits increasing salinity with depth[36]. Locally, ground water produced from depths greater than approximately 1000 feet[11] is deemed unsuitable for residential and agricultural use unless treated by reverse osmosis or other energy-intensive treatment methods. Hydrologic impact to lithologic units below the coal seam to be mined is unlikely because of the very low permeability typically exhibited by the Pennsylvanian shale.

Measures to be taken to assure the protection of the quality of the ground water systems from potential surface effects of the activities proposed within this application include:

Where warranted, construction of professionally-designed sediment control structures, including sediment basins, overland flow diversion ditches, temporary terracing, straw dikes or rip-rap filters to control flow and routing of surface water originating from the surface effects area. Chemical treatment will be utilized where necessary, of water leaving sediment basins and entering state waters. This water will meet all the applicable performance standards until final bond release through periodic monitoring of water exiting the surface effects area.

Measures to be taken to assure the protection of the quality of the ground water systems from potential underground effects from the underground mining activities include employing the room-and-pillar mining method which does not include planned subsidence. All underground mining activities are planned and conducted to minimize disturbance of the hydrologic balance in the shadow area.

No adverse effects associated with the mining operation were identified on either ground water quantity or quality. All of the measures detailed above will also act to safeguard the ground water system. It is concluded that the site will have a negligible impact on the ground water system.

Air Quality

The temporary effects to air quality at underground coal mines are mainly due to the fugitive emissions of particulate matter. The major operations producing dust are transporting and processing coal. Basically, dust sources at mines can be categorized as primary sources, actions that generate dust and secondary sources, actions that disperse the dust and carry it from place to place. Effects from dust are not allowed to pass beyond the facility or permit line.

The Gateway North Mine is regulated by the Illinois Environmental Protection Agency - Division of Air Pollution Control. The ILEPA is responsible for administering the Clean Air Act permitting, compliance and enforcement programs. There are very stringent procedures for obtaining the proper air permit and the Gateway North Mine has submitted an application for the required permit.

The Gateway North Mine will utilize the existing coal preparation plant facility at Gateway Mine which has maintained the air quality of the region by removing impurities from the Herrin No. 6 coal before it is burned at electrical generating plants. Mined coal is of variable quality and can include chemical and mineral matter such as clays, sands, sulphur, and trace constituents.

Traffic and Transport

The Gateway North Mine surface effects are located at the crossroads of two state highways and two rail lines. State Routes 13 and 153 and the Canadian National and Union Pacific Railroads.

Roads in the vicinity of the Gateway North Mine surface effects area consist primarily of state routes and county roads with either an asphalt or aggregate surface. They are all two-lane two-way roads with grades that vary from level to rolling. State Route 13 bisects the surface effects permit and is a main east-west highway through northern Randolph County. State Route 13 crosses State Route 153, a main north-south highway, at Coulterville. The Canadian National Railroad line forms the northern boundary of the surface effects permit. A commercial driveway entrance to the Gateway North Mine portal area will be constructed in conformance with Illinois Department of Transportation standards to accommodate service truck and employee traffic.

There will be negligible to minimal impact with the local community traffic due the traffic already established by the Gateway Mine workforce. It is expected that the employees will utilize the existing network of state routes to access Gateway North Mine portal area while preparation plant employees will use the county network system. The portal development area is located in the South Fork Mud Creek watershed while the coal preparation plant facility at the existing Gateway Mine is located in the Lick Branch-Marys River watershed.

The majority of coal will be transported via rail on the Union Pacific Railroad which provides access to regional rail lines and electric utilities. Rail transportation represents an important aspect of a cleaner energy supply chain. Trains are roughly three times more fuel efficient than trucks and can move one ton of freight nearly 450 miles on one gallon of diesel fuel. One coal train can do the work of 500 tri-axle dump trucks, while consuming two-thirds less fuel and produce 70 to 90 percent less emissions.[37]

Social

The potential social impacts from the Gateway North Mine are expected to be positive. Unemployment rates as of July 2010 were estimated at 9.5% for Randolph County, 10.6% for Illinois, and 9.7% for the United States[27].

The operational workforce of the Gateway North Mine is estimated to be approximately 360 skilled workers with an annual payroll (wages and benefits) of ~$40 million when full production is reached. Existing skilled workers that transfer from other mines might impact the local demographic and population by choosing to take up residence in the local area and more importantly relocate with their families. It is likely that workers who are single or have young families would be more likely inclined to move. It is unlikely that any significant change in the overall age structure of the local resident population will occur.

Economic

The economic impact of the Gateway North Mine on the local and regional area has been, and is expected to continue to be, very positive and come from three main sources:

- spending in local businesses by employees and their families;
- spending by the Peabody Gateway North Mining, LLC on goods and services with local businesses; and
- local property taxes.

As production reaches its maximum, the direct employment level will exceed 340 at the mine with annual wages and fringe benefits equaling $40 million. Additionally, the mine operation will provide significant tax revenue to Randolph, Perry, and Washington Counties and the state of Illinois. Many private landowners have received and will continue to receive significant income from the mining operation in the form of royalty payments and/or acquisition proceeds.

In terms of cumulative economic impacts, the Gateway North Mine will contribute to the basic electricity production in Illinois and surrounding states. Coal is Illinois's major energy source with nearly 50% of its electricity generated from coal. Illinois coal mining provides not only many high paying jobs directly, but many ancillary jobs as well. The total payroll of the Illinois coal mining industry amounts to almost $500 million per year. A typical coal mine will thus contribute several million dollars per year to the economy. Over 3,500 people are directly employed by the Illinois coal industry, with an average annual wage of $65,000[39]. The cost of electricity is a major cost for industry and can affect the decision to locate new industries in Illinois. Even more fundamental, keeping the cost of electricity low helps to provide affordable energy to Illinois's citizens, especially those on fixed incomes. The social benefit of low cost energy is immeasurable.

A study prepared for the Center for Coal Technology Research Energy Center at Discovery Park (Purdue University) entitled *Estimating the State and Regional Benefits of the Mining and Use of Illinois Basin Coals*[28] estimated the economic impact that coal has on the individual states of Illinois, Indiana, and Kentucky in the Illinois Basin for the year 2007 using RIMS II multipliers. In 2007, Illinois mined 34 million tons of coal. Of this amount:

- 26.7 million tons were exported out of the state at an average price of $33.60/ton for a total export value of $896 million. By applying the Illinois coal mining multiplier, the total amount of economic activity arising from the mining of this coal was $1,890 million;

- 3.3 million tons were used by Illinois industry either to generate or co-generate electricity. The total estimated economic activity from mining this coal was $733 million;
- 4.16 million tons were converted into electricity in Illinois, resulting in the generation of an estimated 9.7 billion kwh with sales of $467 million. The estimated economic activity from mining this coal was $733 million.; and
- The total estimated amount of economic activity arising from these three uses of Illinois coal for Illinois is approximately $3,917 million, or 0.6% of Illinois' Gross State Product.

Peabody Energy is investing approximately $175 million in capital to bring the Gateway North Mine up to capacity.

Connected Activities

The Gateway North Mine is not connected to Gateway Mine. Gateway North Mine is a new mine supplying carry-on tonnage to clients after Gateway Mine closes. Both mines will co-exist for approximately 6 to 8 months. The Gateway North Mine will utilize Gateway Mine's coal preparation facilities as well as its rail loadout.

Existing USACE Mitigation and Monitoring Sites

Peabody Gateway North Mining, LLC is fully capable of and committed to constructing successful stream and wetland mitigation. All levels of management and field personnel are informed of the importance of successful stream and wetland mitigation and all of Peabody's active Midwest sites. Experience of trained company personnel is included in the credentials section of this application; those listed will continue receiving the latest training available. Additional personnel are also scheduled for training. Peabody's regional and corporate engineering and environmental staffs are dedicated to providing technical support to each of its mining operations.

Currently stream and wetland mitigation is being completed on several Peabody mine sites in the Midwest including Illinois (Wildcat Hills Mine-Cottage Grove Pit, Wildcat Hills Mine-Eagle Valley Pit) and Indiana (Francisco Mine, Farmersburg Mine, Viking Mine-Corning Pit, Viking Mine-Knox Pit, Miller Creek Mine-Jenlin Pit, Air Quality Mine-Hart Street South Portal, Somerville South Mine, Somerville Central Mine, and Wild Boar Mine). Stream construction is in various stages within these sites with some fully constructed and being monitored while others are fully constructed but not formally monitored until the riparian buffers are planted. Other sites have channels being constructed and structures installed. Some are in the floodplain grading and final channel design stage.

Annual mitigation field work is completed primarily during the late spring to early fall time period when soil conditions are driest. Final floodplain grading, channel construction, and installations of structures are targeted for completion during this time to allow for proper revegetation during the appropriate fall seeding period. In addition, Peabody has found it is best to temporarily divert surface runoff entering a new stream perpendicularly, in order to allow sufficient establishment of vegetation on the banks before returning normal flows. Temporary diversions are removed when adequate vegetative stability is achieved. Also, stabilization of new channels with erosion control blankets in critical areas is very important. Use of appropriate willow cuttings within the stream channels has proven to be very effective in aiding stabilization as well as providing an early shading benefit to streams. While initial structure placement is important in critical areas, it is also important to re-evaluate structure needs following several precipitation events. Initial erosion control seems to be the biggest initial challenge. Intense precipitation during construction or prior to vegetation establishment is problematic for any construction project. Repairs and maintenance are made as needed.

Peabody is committed to continue to develop best practices for stream and wetland mitigation and meet or exceed the requirements in all of its USACE permits. Much progress is being made in terms of on ground success at all locations. Some noted examples of successes that have been viewed and evaluated by government agency and independent consultant experts include ephemeral stream mitigation at the Viking Mine-Knox Pit and intermittent mitigation of the West Fork Busseron Creek at the Farmersburg Mine. Much is being learned from all of the sites and best practices developed accordingly. Plans have not been made final, but several of Peabody's Indiana sites will be made part of the Office of Surface Mining (OSM) Stream Design Workshop to be held in Indiana and Illinois.

In terms of wetland mitigation, Peabody has completed successful mitigation both on-site and off-site. More history is available for off-site areas as the opportunity is available to complete these earlier. Noted examples of wetland

mitigation success can be found at the Wildcat Hills Mine-Eagle Valley Pit and Cottage Grove Pit in Illinois, as well as, the Francisco and Jenlin sites in Indiana. Portions of the off-site mitigation in Illinois have met the final requirements and been released from further monitoring. Other wetland sites are in various stages of construction at several sites. It should be noted that wetland mitigation at all sites is being completed as hardwood forested wetlands, replacing many lower quality wetlands. Peabody has extensive success in reforestation on mined lands from both a survival and growth standpoint. This vast experience will drive success in both the forested wetlands and stream riparian corridors.

West Fork Busseron Creek was reviewed in the field by Jeff Barry, PhD of ARCADIS U.S., Inc. formerly with ENVIRON International Corporation, in his technical memorandum concerning the restoration of Big Creek at the Wild Boar Mine in Indiana and stream channel design recommendations. Based on Dr. Barry's observations, he states that, "it is clear that the "natural stream channel" design method was a success. The most significant observation was that in 2008 two extreme rainfall events occurred, both approximately equal to a 100-year event, flowing water across the floodplain was over 6 feet deep yet there is very little evidence of floodplain, bank, or channel erosion. This observation suggests a very dynamically stable stream network.[16]"

George Anthanasakes, PE, a Principal of the Ecosystem Restoration Services for Stantec, Inc., in Louisville, Kentucky, visited several Peabody Midwest Mining, LLC stream mitigation sites in June of 2009. Mitigation sites at Somerville Central Mine, Viking Mine - Knox Pit and Corning Pit, and Farmersburg Mine were visited to get his professional opinion on how the mitigation is developing and any areas that need improvement. George who is the program manager of RIVERMorph and holds Bachelor's and Master's in Civil Engineering degrees from the University of Louisville. For over a decade, Mr. Anthansakes has served as the project manager and/or design engineer on numerous stream restoration and assessment projects incorporating natural channel design principals. George was pleased with the sites and thought the company is doing some great work. He was amazed by the natural migration of willows along the stream banks along the mitigated West Fork Busseron Creek at the Farmersburg Mine. The willows provided bank stability, shading, and habitat.

George provided several suggestions for improvement and suggested the mitigation could benefit from the development of regional curves for the mined sites, to help with sizing the channels. David Bidelspach, PE, a design engineer working for Stantec, Inc., in Raleigh, North Carolina came to Indiana and developed a mini-regional curve for Indiana, which is provided in Appendix M. Mr. Bidelspach has a master's degree in biological and agricultural engineering from The Pennsylvania State University and is currently working on a PhD in the Department of Biological and Agricultural Engineering at North Carolina State University. He has worked with the North Carolina Stream Restoration Institute at North Carolina State University, teaching educational courses in stream design.

C. MAPS

See Map A in Appendix A for a portion of the Tilden and Coulterville 7.5 minute quadrangle maps with the Gateway North surface effects project area labeled. Map B in Appendix A shows the location of the existing streams and wetlands.

D. AERIAL PHOTOGRAPHY

See the aerial version of Map B in Appendix A with the existing streams and wetlands.

E. USDA/NRCS COUNTY SOIL SURVEY

See Map E in Appendix A for the soils map.

F. PHOTOGRAPHS OF THE SITE

See Map B in Appendix A for the location of the assessment points and see Appendix B and C for photographs of the streams and wetlands on the assessment sheets.

G. RESPONSIBLE PARTIES

1. APPLICANT

Peabody Gateway North Mining, LLC
c/o Peabody Energy

7100 Eagle Crest Boulevard
Evansville, Indiana 47715

2. CONTACT PERSON

Bryce West
Authorized Representative
Telephone: 812-434-8500

3. CONSULTANT PREPARING PERMIT APPLICATION

Not Applicable

4. CONSULTANT RESPONSIBLE FOR BIOLOGICAL MONITORING

Not Applicable

5. PROPERTY OWNER(S)

See Block 24 in Appendix F for both the property owners and adjacent property owners.

II. PROPOSED MITIGATION SITE

A. MITIGATION CONCEPT AND PURPOSE

The jurisdictional streams and wetlands planned for disturbance at the Gateway North Mine surface effects area will be mitigated at three locations. One location is on-site within the permit area while the other two locations are off-site but adjacent to the permit area. The streams at the mitigation site will be constructed concurrently with the mine entry development and be completed before the end of the 2nd growing season after Section 404 permit issuance resulting in minimal temporal loss of wetland and stream functions. Presently these mitigation locations are being used for an agricultural land use (row crops). The majority of the drainage features have been cultivated through resulting in the annual creation of gullies which transport significant sediment loads downstream to the receiving waters.

The proposed stream mitigation will consist of natural channel design stream creation with enhancements which will include: creating floodplains; constructing appropriately designed channels; installing in-stream structures that will allow for aquatic habitat and provide erosion and grade control; and planting riparian vegetation to provide stability along the banks. Such improvements are intended to promote a positive biological response within the stream's aquatic communities. The existing wetlands to be disturbed by the Gateway North Mine surface effects will be mitigated by the construction of palustrine forested wetlands that contain predominately hard-mast species on land that is presently being used for an agricultural land use (row crops).

The streams will be sized using regional curve information based on their drainage areas to construct a stable cross-section that is capable of conveying both the water and sediment delivered to the system without significant alteration to the channel shape or slope. The regional curves characterize relationships for bankfull stream dimensions (cross-sectional area, width, and depth) as well as discharge based on drainage area. Additional stream enhancements will include engineered structure placement for habitat and stream stability and planting riparian buffers. Riparian buffers totaling 50-feet will be placed on each side of the stream mitigation and will consist of the same species as those suitable for planting in the mitigated wetlands. The riparian buffer will be relocated along the outside edge of the wetland boundary at locations where the wetland mitigation will be situated adjacent to the stream mitigation.

Currently, the main lacking wetland criterion for these sites is the presence of wetland vegetation. Due to the agricultural land use any volunteer herbaceous wetland species that have attempted to become established have been removed during field preparations for crop production. Land modification, such as minor land grading or removing structures blocking flow to the wetland, will be utilized to ensure the hydrology parameters are met for wetland success. The mitigation sites may be slightly regraded to promote stream and wetland development by capturing surface runoff and upstream drainage. The sites will receive sufficient hydrology from surface runoff and overbank flooding to inundate or saturate the soils for 5% of the growing season on consecutive days in most years (50% probability of recurrence). These wetland mitigation sites are ideal as the soil structures have not been

disturbed and the soils are capable of supporting plants. Hard mast-producing species will be planted with bare root trees as described in the Wetland Seeding and Planting Stock Summary Table in Section 3 of this permit narrative. These wetland and stream mitigation sites will improve downstream water quality by eliminating sediment runoff from agriculture fields; improve the quality of vegetation by the selective planting of hard mast species; and provide flood relief.

Gateway North Mine - Mitigation Area 1

The on-site stream and wetland mitigation area is designated Gateway North Mine - Mitigation Area 1 and is located in the South Fork Mud Creek 12-digit HUC watershed between State Route 13 and the Canadian National Railroad just west of the access road to the utility/rock dust drops and airshafts for the new portal. Mitigation Area 1 encompasses approximately 6.5 acres where 3.1 acres of forested wetlands, 650 linear feet of ephemeral streams, 750 linear feet of intermittent streams, and 3.2 acres of riparian buffer will be constructed and/or planted. Marine (517A) and Bunkum-Coulterville (884B2) soils cover the mitigation site. There are approximately 35 acres of watershed above the mitigation site.

Gateway North Mine – Mitigation Area 2

One of the off-site stream and wetland mitigation area is designated Gateway North Mine - Mitigation Area 2 and is located in the Lick Branch-Marys River 12-digit HUC watershed. The site abuts the surface effects permit boundary immediately east of the conveyor corridor. Mitigation Area 2 encompasses approximately 21.6 acres where 15.6 acres of forested wetlands, 300 linear feet of ephemeral streams, 2,150 linear feet of intermittent streams, and 5.6 acres of riparian buffer will be constructed and/or planted. The soils are dominated by the Coulterville-Oconee (909A) and Bunkum-Coulterville (884B2) soil series. There is approximately 100 acres of watershed above the mitigation site.

Gateway North Mine - Mitigation Area 3

Another off-site stream and wetland mitigation site for the Gateway North Mine is designated the Gateway North Mine - Mitigation Area 3. It is located in the Lick Branch-Marys River 12-digit watershed within the Gateway Mine permit area adjacent to the Union Pacific Railroad, approximately one mile southwest of the southern edge of the Gateway North Mine surface effects permit boundary. Mitigation Area 3 encompasses approximately 5.5 acres where 3.4 acres of forested wetland, 850 linear feet of ephemeral streams, and 2.0 acres of riparian buffer will be constructed and/or planted. Marine (517A) and Blair (5C2) soils cover the entire mitigation site. There are approximately 26 acres of drainage area above the wetland mitigation site.

See Map A and C in Appendix A for the proposed locations of the mitigation areas and Maps D7 through D9 for a plan view and cross-section. If the proposed mitigation sites need to be relocated to another more favorable location, a request to move the site will be submitted to the USACE for prior review and approval. Construction of the mitigation will follow this plan.

B. PRESENT OWNER OF PROPOSED MITIGATION SITE

Peabody Gateway North Mining, LLC presently controls the proposed stream and wetland mitigation sites.

C. EXPECTED OWNERSHIP OF THE MITIGATION SITE

The property control of the mitigation sites for the permit area is not expected to change. Any future landowner will be subject to the conditions and requirements of the Section 404 Clean Water Act for any impacts to the streams and wetlands and to any deed restrictions placed on the mitigation location.

A deed restriction will be placed on the mitigated wetlands and streams for the Gateway North impacts as allowed by land ownership and ability to legally encumber any property containing said mitigation. Said deed restriction will be placed only on mitigation which is physically located on property owned by Peabody Energy or its subsidiaries. The deed restrictions will be placed prior to and in conjunction with approval to cease monitoring. A copy of the deed restrictive instrument is provided as Appendix J.

Section 2: Goals and Objectives of the Proposed Mitigation

I. RESOURCE COMPARISON OF THE IMPACT SITE AND THE PROPOSED MITIGATION SITE

A. FUNCTIONS AND VALUES

1. EXISTING FUNCTIONS AND VALUES

The existing functions and values for the streams within the permit area vary from fully functional (see Stream 3NS2A and 2NS1J) to functionally impaired (see Streams 2NS1, 2MS1H-2, 2AS1H-3, 3XS2, 3MS2-2, 3NS2B, 3MS2C, 2NS2D, 3AS3E, 4MS1-2, 4MS1C, AND 4MS2). The streams within the wooded areas have slightly more function and value in regards to the physical, biological, and chemical aspect than the channelized streams in the agricultural areas. The channelized streams function only in regards to the physical aspect which entails some type of surface water storage and/or conveyance. These streams were not trenched in the landscape to benefit biological or chemical functions, but to maximize agricultural practices and expedite runoff to relieve flooding. The unchannelized streams within the wooded areas demonstrate additional physical functions by exhibiting energy controls (riffles), transporting sediment, and showing evidence of stream evolution such as meandering and barring, although the streams do show signs of channel instability and excess sedimentation from agricultural land uses upstream.

The streams within the wooded areas exhibit additional biological and chemical functions and values over the streams with little to no riparian buffer. The riparian buffer of the stream provides biological functions in the form of biomass which promotes organism growth along with providing cover and shelter for wildlife. Types of chemical functions provided by the riparian buffer are improving water quality by trapping, retaining, removing dissolved and particulate matter from the overland flow into the streams. Riparian buffers also provide temperature control of the stream waters by shading the water. In the areas where the riparian buffer has been removed for agricultural practices, the water quality degrades significantly with excess sedimentation and decrease in wildlife habitat diversity.

Wetland Services, Inc. evaluated the biological, physical, and chemical quality of the streams at the project area. Four sample points were chosen to provide a representative assessment of the intermittent streams. Sample points were located on streams 2NS1 and 3XS2 in the surface effects area and on stream 1MS1 and 4MS1-1 which are outside of the project boundary. The streams outside of the project area were selected to provide a baseline quality of the streams immediately adjacent to the project area. These streams were selected due to the drainage area threshold to adequately test for fish and macroinvertebrates. Please see Appendix H for the *Gateway North Mine Bioassessment* report.

The existing function and values for the wetlands within the permit area vary widely from fair (small natural PFO wetland) to poor (phragmites wetlands). All the wetlands provide three broad types of function: habitat, water quality, and hydrologic. Wetlands provide habitat in the form of shelter, water, and food for plants, insects, amphibians, reptiles, fish, shellfish, birds, and mammals along with areas for breeding and nurseries. Wetlands provide water quality enhancement in the form of trapping sediment, controlling pollution, and supporting biochemical processes. Finally, wetlands support a hydrological function by recharging groundwater, reducing flow velocities of surface runoff, and influencing atmospheric processes. The wetlands at the Gateway North project area perform the majority of these functions, but it should be noted that several of the wetlands at the project area are linear wetlands that have developed from the excess sedimentation that has eroded from the adjacent agricultural fields.

The value of the streams and wetlands depends on the benefit provided to the environment and the community, although this may be different from one person or community to the next. Certain groups may value the ecological importance of wetlands while others may see the wetlands having social or economic importance. Ecological importance includes pollution control, flood control, and wildlife habitat. Social importance of wetlands includes the benefit they provide to hunters, fisherman, or outdoor recreation like bird watching. Economic importance may include timber production. The greatest value of the existing streams and wetlands within the Gateway North permit is the wildlife habitat they provide.

2. PREDICTED FUTURE FUNCTIONS AND VALUES

The predicted future of the mitigation sites will be stable and self-sustaining. This is the ultimate goal for any mitigation. The principle objectives for stream mitigation will be to improve and maintain the physical and biological stability and function of the stream.

The natural design stream mitigation has many objectives: improve fish habitat and diversity, stabilize bed and banks by using natural methods rather than armoring, improve riparian habitat, reduce flood levels, route sediment, convey surface water, and create something natural looking. Habitat will be improved for the aquatic species by incorporating log vanes, utilizing riffles and pools and incorporating root wads in construction. Engineered structures which contribute to channel stability also provide habitat and refuge. Riparian buffers will be planted at the top of the banks to provide sediment control, bank stability, and travel corridors for various species of birds and animals. Stream substrates will be improved with non-toxic rock which provides habitat and spawning ground for invertebrates and fish. Constructed riffles increase substrate diversity providing habitat for invertebrates and small fish. In most small streams, riffles support the main food base for the fish community. They also increase surface turbulence, thus enhancing dissolved oxygen levels below the riffle. Placing root wads and j-hooks will increase pool development for habitat. Root wads diversify habitat complexity by varying current speed among the roots providing in-stream and overhead cover for fish, as well as an ideal substrate for other aquatic macroinvertebrates. Live staking with willows will be used to provide bank stability and shade soon after project completion. The physical, biological, and chemical functions will be achieved for the stream mitigation and it will continue to improve as the riparian buffers begin to close around the stream providing shade and additional biomass including leaf detritus and woody debris.

At the transitional zones between existing drainage systems and the natural channel design mitigation, grade control structures will be incorporated into the proposed channel design to maintain stream stability. Grade control will be provided by the installation of cross vanes, step pools, or rock sills at appropriate locations to prevent any destabilizing effects to propagate into the natural design restored reaches in the future.

The future functions and values of the wetlands will increase over the existing functions and values of the wetlands. The wetland mitigation will cumulate the small sporadic functions of the existing wetlands into wetlands with a larger footprint on the ecological environment. The proposed wetland mitigation site is currently being utilized for an agricultural land use. The wetlands will be planted with desirable hard-mast producing species while invasive undesirable species will be eradicated. The size and placement along the stream mitigation will create a diverse habitat providing food, water, shelter, breeding grounds, and nursery for many creatures. The mitigated wetlands will provide some relief to downstream flooding and improve water quality by providing flood storage. The flood storage will trap sediments, slow velocities, reduce pollution, and ultimately raise the groundwater table which will support longer base flows in the streams downstream.

B. DEBITS/CREDITS

Wetlands

Peabody Gateway North Mining, LLC proposes a wetland mitigation plan that replaces all jurisdictional wetlands impacted by mine development and related activities at the ratios in the table below. The mitigated wetlands will be measured for success by following the 1987 USACE Wetland Delineation Manual[8] along with the Midwest Regional Supplement[18].

Wetland Mitigation			
Wetland Type	Acreage (acre)	Mitigation Rate	Mitigation Acreage (acre)
PFO	4.71	3:1	14.13
PSS	0.02	2:1	0.04
PEM	3.95	2:1	7.90
Total Wetland Mitigation			**22.07 acres**

A total of 22.07 acres of deciduous forested wetlands will be the mitigation acreage for all jurisdictional wetlands that are impacted by mine development and related activities for the Gateway North Mine. The wetlands will be mitigated off-site and on-site and constructed concurrently with development impacts to produce minimal temporal loss of wetland functions and be completed before the end of the 2nd growing season after permit approval.

Wetland hydrology in the constructed forested wetland areas will be driven by connection with adjacent stream hydrology and by groundwater. Construction of stream terraces between stream banks and wetlands will facilitate the development of necessary hydrology by ensuring that: 1) adequate runoff from upland areas will inundate the wetland following precipitation events and 2) retention of above bankfull flows from adjacent streams; allowing hydric soils to develop. The wetlands will be greatly enhanced by planting red and white oak, hickory, and pecan trees for wildlife; and other species as found in the wetland planting stock table.

Streams

Peabody Gateway Mining, LLC proposes a stream mitigation plan that is designed to compensate for the anticipated impacts to the streams within the permit boundary utilizing the Illinois Stream Mitigation Method[7] as a rationale based on the conditional assessment of the impacted streams with the stream mitigation based upon a credit and debit system. Please see Appendix D for the Illinois Stream Mitigation Method worksheets. The table below summarizes the stream mitigation and the resulting credits expected.

Stream Mitigation							
Flow Regime	Length (feet) (feet)	Minimum Mitigation Rate	Mitigation Length (feet) (feet)	Illinois Stream Mitigation Method Length (feet)	In-Stream Restoration Credits	Riparian Buffer Restoration Credits	Total Credits Generated
Ephemeral	3,279	0.5:1	1,640	1,800			
Intermittent	2,897	1:1	2,897	2,900			
	6,176				12,990	7,990	
Total Stream Mitigation				4,700			20,915

Gateway North Mining, LLC proposes a stream mitigation plan that restores the "jurisdictional waters" impacted by the Gateway North Mine by constructing 2,900 linear feet of naturally designed intermittent streams and 1,800 linear feet of naturally designed ephemeral streams in agricultural fields at both an off-site and on-site mitigation locations. Riparian buffers will be planted adjacent to the stream mitigation for a width of 50 feet on each side. At locations where the wetland mitigation will be planted adjacent to the stream construction, the riparian buffer will be relocated around the edge of the wetland boundary. The plantings will be predominately hard-mast species as shown in Section 3 in the Wetland and Riparian Buffer Seeding and Planting Stock Summary table.

Although the total length of mitigated ephemeral streams may be less than the impacted lengths, the mitigated lengths will not replace actual pre-impact stream locations and therefore not cause increased velocities by shortening an overall stream length. Streams that are impacted within the portal area will be reconstructed off-site and designed so that each channel will properly convey its respective flow. Most of the streams located within the beltline corridor will maintain connection with upstream and downstream waters.

The stream mitigation is designed to handle respective upstream drainage areas and will be measured for success by incorporating the measures for a stable stream channel as developed by Dave Rosgen. Regional curves will be used to derive the appropriate bankfull channel dimensions. The regional curves were developed from measuring stable bankfull channel dimensions which typically form from bankfull discharges that occur at return interval between 1 and 2 years. These designs will best retain the type and frequency of aquatic habitats that currently exist in the streams, and will provide similar stability and energy. The replacement design for existing natural design channels employs width to depth ratios, entrenchment ratios, and sinuosity ratios similar to, or better than, the current conditions.

Engineered structures will be placed in the reconstructed stream channels for aquatic habitat, and to provide erosion and grade control. These structures could consist of, but not be limited to, rock or wood riffles, rock or wood j-hook vanes, rock or wood cross vanes, shallow to deep pools, root wad revetments, and large boulders. These structures will be placed to allow for natural stream processes to occur. This will allow for the natural development of additional riffle-pool-run complexes even though the riffle/pool structures would mainly stay inundated. The structures will provide stream stabilization, aquatic function, and help ensure the success of the mitigation. These improvements are intended to promote a positive biological response within the stream's aquatic communities.

Migration of aquatic species will come from upstream or downstream locations to ensure no loss in the gene pool of native species. Structure construction and details are located in Appendix E and Map D in Appendix A.

All of the final mitigated streams will be designed to handle their respective drainage areas and will be measured for success by incorporating the principles for a stable stream channel as developed by Dave Rosgen, meeting minimum scores for 4 variables of USEPA RBP[12], and by assessing the functional condition using the Illinois Stream Mitigation Method.

C. FUNCTIONAL REPLACEMENT

The mitigation for the impacts to the streams and wetlands at the Gateway North Mine surface effects project area will be both on-site and off-site with enhanced in-kind replacement. All of the mitigation sites are currently agricultural fields.

The existing agricultural fields will be slightly regraded to construct the natural design channels along with developing forested wetlands. Additional earthwork will be utilized to promote stream and wetland development by capturing surface runoff and upstream drainage. A shallow stream terrace will be constructed on both sides of the stream mitigation to ensure adequate surface water retention, adequate inundation; and will ensure adequate overbank flooding and provide the conditions for hydric soils to develop. Structures will be placed in the streams to promote habitat and stability. Riparian buffers will be planted along each side of the streams with hard mast forest species. The riparian buffer will be relocated around the edge of the wetland boundary at locations where the wetland mitigation will be planted adjacent to the stream construction. The wetland/riparian buffers will be planted with those species listed in the Wetland and Riparian Buffer Seeding and Planting Stock Summary table in Section 3. See the Map D's in Appendix C for typical plan and profile views of each mitigation area.

D. IDENTIFICATION OF POTENTIAL CHALLENGES

There will always be challenges that could pose a challenge to the proposed mitigation. Corrective actions will be actively implemented should any challenge present itself. This will ensure that the success of the mitigation is achieved. A potential challenge for stream mitigation may include bank instability resulting in erosion. The banks may become unstable due to the sparse vegetation present after construction. This erosion causes an increase of sediment into the streams. Headcuts may also start at a nick point where the stream tries to adjust its energy gradient. Potential challenges for the wetland mitigation include the weather (either too much or too little precipitation), wildlife foraging on the newly planted woody species, and vigorous invasive species. Gateway North will also use individuals who are skilled at planting and maintaining trees and monitoring and reconstructing the streams and wetlands to ensure the success at the mitigation sites. Peabody Gateway North Mining, LLC will implement corrective measures as necessary to ensure the success of the mitigated areas. Corrective actions for the stream mitigation will include using engineered structures that redirect the flow away from the banks reducing erosion until the vegetation becomes firmly established along with replanting or overseeding areas where vegetation seems sparse. To control headcutting, grade control structures such as cross vanes or constructed riffles will be utilized to prevent migration of the headcut up the mitigation. Corrective actions for wetland challenges will include replanting vegetation, eradicating invasive species, and minor earthwork to maintain the appropriate hydrologic balance.

A performance period of 5 years for the stream mitigation and 7 years for the wetland mitigation will provide enough time to ensure the success of the mitigation areas.

II. ENVIRONMENTAL GOALS AND OBJECTIVES

Wherever possible, disturbance of jurisdictional wetlands and waters should be avoided. When disturbance is unavoidable, the disturbances should be minimized and adequately mitigated.

Goals

The goal of the mitigation is to provide a no net loss of wetland area while improving hydrologic and habitat functions and to replace stream and riparian buffer functions lost by the proposed project.

Objectives

1. Create approximately 1,800 linear feet of naturally designed ephemeral streams and 2,900 linear feet of naturally designed intermittent streams for the 3,279 linear feet of ephemeral and 2,897 linear feet of intermittent streams that will be impacted by the Gateway North Mine surface effects.
2. Increase wetland area at the mitigation sites by creating a total of 22.07 acres of forested wetlands for the 4.71 acres of PFO, 0.02 acre of PEM, and 3.95 acres of PEM wetland types that will be impacted by the Gateway North Mine surface effects.
3. Improve stream function over the pre-development streams by adding sinuosity, installing a combination riparian/wetland buffer on both sides of the streams, allowing access to a floodplain, as contours allow, developing riffle, run, and pool complexes, and installing structures for habitat and stream stability.
4. Improve wetland functions will include increasing wetland area and flood storage capacity, increasing vegetation cover, and promote hard-mast producing species.

Section 3: Mitigation Work/Implementation Plan

I. SITE PREPARATION

A. PLANS

Specific plans for the stream and wetland mitigation are provided as attachments to this permit application and will be verified in the annual monitoring reports. The following is general information that will be used.

The proposed design parameters for the stream mitigation were developed using regional curve relationships based on the drainage area. The wetland mitigation plan was developed from flown contours, which were supplemented by field survey information and soils map information. The soils at the Mitigation Area 1 site include Marine (517A) and Bunkum-Coulterville (884B2) silt loams, while the Mitigation Area 3 has Marine (517A) and Blair (5C2) silt loams. Mitigation Area 2 includes the following soils: Coulterville-Oconee (909A), Bunkum-Coulterville (884B2), Marine (517A), and Blair (5C2). All of these soils are somewhat poorly-drained soils, but only the Marine soils series is listed as hydric by the Natural Resources Conservation Service (NRCS) because it has inclusions of more poorly-drained depressional areas. By constructing shallow stream terraces on either side of the reconstructed streams, runoff from storm events and above bankfull events will be detained on the wetlands to promote the conversion of the farm fields to wetlands.

To help in the design of "Natural Channel Design" stream restoration, a regional curve was developed which characterizes relationships for bankfull stream dimensions (cross-sectional area, width, and mean depth) as well as discharge and are typically based on drainage area. Stantec Consulting Services, Inc. developed a mini-regional curve for Indiana by identifying appropriate stream reaches with good bankfull indicators, conduction geomorphic assessments, and developing geometric relationships (bankfull cross-section geometry vs. drainage area; inner berm cross-sectional area vs. drainage area). A report entitled *Mini-Regional Curve Development Southern Indiana*[32] was developed for Peabody Energy to help in not only assisting in the correct identification of bankfull, particularly in incised channels, but also in developing stream restoration or creation designs. A mini-regional curve for bankfull discharge was also developed although there is curve lacked a sufficient number of study sites with suitable USGS gaging stations. The mini-regional curves that were developed were similar to regional curves throughout the Midwest and southeastern United States though intercepts varied somewhat as a result of variations in regional rainfall characteristics. Due to the close proximity of the bankfull cross-sectional area mini-regional curve to that produced by the USGS for Region "A" for Ohio[31], Ohio's regional curve for bankfull discharge will be utilized. Even though the streams measured for the mini-regional curves were in southern Indiana, the data would still apply to southern Illinois due to the similarities in topography and rainfall characteristics.

The following table provides information on the design parameters that will be utilized for the stream mitigation for the stream impacts at the Gateway North Mine. These values will be fine-tuned as a more accurate field survey is performed before construction. An inner berm feature may also be employed in the streams to allow for channel adjustments (e.g. minor aggradation/degredation) without threatening the integrity of the project and will enhance low flow ecology.

Gateway North Mine – Stream Mitigation Design Parameters

Mitigation Site	Stream Name	Channel Type	Sinuosity	Stream Length	Drainage Area	Bankfull Cross-Sectional Area	Bankfull Width	Bankfull Mean Depth	*Bankfull Discharge
				(feet)	(acres)	(sq. ft.)	(feet)	(feet)	(CFS)
Area 1	1	C	1.30	450	17.3	2.8	6.4	0.4	9.4
Area 1	2	C	1.30	487	13.4	2.4	5.9	0.4	7.9
Area 1	3	B	1.20	350	4.6	1.2	4.3	0.3	4.0
Area 1	4	C	1.30	113	18.0	2.8	6.5	0.4	9.6
Area 2	5	C	1.30	600	99.8	8.2	10.7	0.8	28.6
Area 2	6	C	1.30	400	15.8	2.6	6.2	0.4	8.8

Area 2	7	C	1.30	1,150	19.8	3.0	6.6	0.5	10.2
Area 2	8	C	1.30	300	4.0	1.1	4.1	0.3	3.7
Area 3	9	C	1.30	550	14.5	2.5	6.1	0.4	8.4
Area 3	10	C	1.30	300	11.7	2.2	5.7	0.4	7.3

*Bankfull Discharge was calculated using USGS Ohio Region "A" Regional Curve[31]

Engineered structures will be added to the mitigated stream to maintain stability. See Appendix E for details of structure installation. A combination of constructed pools, root wads, and log vanes will be used in stream mitigation. Down-cut protection structures, such as constructed rock riffles provide protection from head-cutting until the riparian buffer becomes well established. Root wads will be placed in the outer banks of the stream in the curves as shown in the Map Ds to protect it from erosion as well as helping in pool development. The pools develop adjacent as well as underneath these structures. The log vanes will be placed to decrease the near bank stress by deflecting the stream flow energy back towards the center of the stream particularly in the curve and deflection areas. The engineered root wad revetments, log vanes, or strategically placed rocks located on the outer bank areas of the curves will be placed in the edge of the engineered pools to provide bank stabilization and shading of some of the pool area to provide water temperature control, as well as a safe haven for biological life. Geotextile fabric is keyed in with each stream structure to prevent erosion around and under a structure. The fabric hinders the water from washing away the substrate causing the structure to fail. Correct geotextile fabric placement is essential to in-stream structure success. Willow cuttings or erosion control nets will also be utilized early in stream construction to protect the banks from erosion particularly in the curves as needed. It has been observed that willows, which are not on the approved riparian planting list, form dense stands at the stream water and bank interface. The willows establish along the water's edge providing natural bank stability, shading of the stream, and biological habitat. The engineered structures may need to be modified somewhat as the stream is constructed from the locations shown on Map C and the details shown on the Map Ds in Appendix C. Adjustments to the channel features (i.e. additional riffle structure, channel blockage, bank stability) will be implemented as needed for continued success.

The proposed natural design mitigated channels will achieve a natural dynamic equilibrium. This will ensure to the greatest degree possible, a stable mitigation effort.

Best management practices will be utilized for the reconstruction of stream mitigation to reduce downstream sedimentation. The mitigation will be initiated in the agricultural fields outside of the existing flow paths with construction of the new channel and structure installation. Any existing streams will be cut into the reconstructed channel during low or no-flow periods proceeding in a downstream direction.

A riparian buffer/wetland will be constructed on each side adjacent to the stream mitigation and will include predominately hard-mast species that will provide woody debris and allochthonous material to the channel as the vegetations matures. Ensuring development of the areas adjacent to the stream mitigation to wetland will be accomplished by constructing shallow stream terraces on both sides of the mitigation. These terraces, along with grading the wetland area to a fairly level site, will promote the retention of surface runoff and any above bankfull discharge. This construction activity will introduce the hydrology necessary to complete the transformation of hydric soils.

A summary of the type of aquatic and riparian mitigation is provided in the following table for each mitigation area.

Gateway North Mine Mitigation Area Summaries					
Mitigation Site	Ephemeral Streams	Intermittent Streams	Riparian Buffer	Forested Wetlands	Total Acreage of Mitigation Site
	(feet)	(feet)	(acres)	(acres)	(acres)
Area 1	650	750	3.2	3.1	6.5
Area 2	300	2,150	5.6	15.6	21.6
Area 3	850	0	2.0	3.4	5.5
Totals:	1,800	2,900	10.8	22.1	33.6

Any modifications to the proposed mitigation will be submitted to the St. Louis USACE field office for prior review and approval.

B. SOILS/SUBSTRATE

Wetlands

Both the on-site and off-site wetland mitigation areas will be located in an agricultural field that is currently being farmed. No additional material will be transported to the mitigation sites. No seed bank soils are proposed to be utilized for this mitigation site.

Streams

Both the on-site and off-site stream mitigation areas will be located in an agricultural field that is currently being farmed. No additional soil material will be transported to the mitigation sites. The original site soils that will be excavated will be redistributed across the mitigation site or transported off-site to a disposal facility. Non-toxic/non-toxic rock or commercial riprap will be utilized in the stream substrates for the construction of riffle structures and j-hooks. Riffles will increase substrate diversity providing habitat for macroinvertebrates and small fish. Riffles support the main food base for the fish community while also increasing surface turbulence, thus enhancing dissolved oxygen levels below the riffles.

C. HYDROLOGY

The on-site stream and wetland mitigation (Gateway North Mine - Mitigation Area 1) will be located in the South Fork Mud Creek 12-digit HUC watershed between State Route 13 and the railroad just west of the access road to the utility/rock dust drops and airshafts for the new portal. This mitigation site will be slightly regraded to promote stream and wetland development by capturing surface runoff and upstream drainage.

Both off-site wetland mitigation sites (Gateway North Mine - Mitigation Area 2 and 3) will be located in the Lick Branch-Marys River 12-digit HUC watershed at two locations. Mitigation Area 2 will abut the ILDNR surface effects permit boundary east of the conveyor corridor and Mitigation Area 3 will be located on an area that abuts the Union Pacific Railroad southwest of the permit area. These mitigation sites will be slightly regraded to promote stream and wetland development by capturing surface runoff and upstream drainage, while also reconstructing existing drainages.

D. PLANTING PLAN

The following table is the plantings to be used in the stream riparian buffer and wetland mitigation areas. See Map C in Appendix C for the proposed locations.

Wetland and Riparian Buffer Seeding and Planting Stock Summary[10]			
Scientific Name	**Common Name**	**Seeding or Planting Rate**	**Method of Application**
Agrostis alba	Red Top	2 lb/ac	Drilled or Broadcast
Lolium perenne	Perennial Rye	5 lb/ac	Drilled or Broadcast
Echinochloa spp.	Barnyard Grass	5 lb/ac	Drilled or Broadcast
Carex spp.	Sedges [various]	Label Rate	Drilled or Broadcast
Trifolium hybridum	Alsike Clover	3 lb/ac	Drilled or Broadcast
Echinochloa spp.	Japanese Millet	5 lb/ac	Drilled or Broadcast
Astragalus cicer	Cicer Milk Vetch	3 lb/ac	Drilled or Broadcast
Lolium multiflorum	Annual Rye	4 lb/ac	Drilled or Broadcast
Quercus spp.	Red Oak [Obl, FacW or Fac species][10]	60 container trees or 600 seedlings/ac	Mechanical or Hand
Quercus spp.	White Oak [Obl, FacW or Fac species][10]	60 container trees or 600 seedlings/ac	Mechanical or Hand
Carya spp.	Hickory [Obl, FacW or Fac species][10]	60 container trees or 600 seedlings/ac	Mechanical or Hand

Carya illinoinensis	Pecan [FacW][10]	60 container trees or 600 seedlings/ac	Mechanical or Hand

Note:
1. For herbaceous plantings, a minimum of 5 species shall be selected for initial planting to ensure diversity. At the end of monitoring, 70% of ground cover will be the planted species of that no one species will comprise more than 40% of that final cover.
2. For woody plantings, a minimum of 5 species shall be selected with no one species will make up more than 20% of the initial planting to assure diversity. The woody species will be planted on a per acre basis to the total planting rates listed with no one planted species making up more than 25% of the surviving planted stock.
3. Planting stock for woody plant species will be native species known to occur in southwest Illinois.
4. The herbaceous plantings will provide adequate ground cover to help protect from erosion and will be monitored and maintained on an as-needed basis.
5. Alternate site appropriate species may be substituted dependent on nursery availability and prior USACE approval.
6. The success standard for bare root seedlings will be at least 50% survivability of the initial planting list and rates. The success standard for root production type container trees will be at least 90% survivability of the initial planting list and rates.

E. EXOTIC AND UNDESIRABLE SPECIES CONTROL

Volunteer invasive, undesirable, and exotic species will be eradicated by several means during the monitoring period. Mowing or tilling can be employed to discourage and eradicate undesirable volunteer tree species. Herbicide treatment could be implemented following the manufacturers' instructions. The specific eradication measures will be determined by the specific site conditions. If the some volunteer species provide beneficial support that warrants them to remain in the mitigation site, a request to not remove those species will be submitted to the USACE for approval.

F. CONSTRUCTION SCHEDULE

Wetlands

The proposed timetable for construction of the mitigated wetlands is by the end of the 2nd growing season following permit issuance. The mitigation will be done concurrently with the impacts and be completed before the end of the 2nd growing season after permit approval, offsetting the temporal loss of functions.

Streams

The proposed timetable for construction of the mitigated streams is by the end of the 2nd growing season following permit issuance. The mitigation will be done concurrently with the impacts and be completed before the end of the 2nd growing season after permit approval, offsetting the temporal loss of functions.

G. CONSTRUCTION MONITORING

Wetlands

A performance period of 7 years will be employed to monitor and evaluate success of the wetland mitigation. Appropriate species will be verified by assessing the ground cover type and quality. Woody species will be planted at a rate of 600 trees per acre for seedlings and 60 trees per acre for root production type container trees as listed in the above table titled Wetland Planting and Seeding Stock Summary. Container trees will be cultivated using root pruning methods and shall be 3 gallons in size. The final success standard for bare root seedlings will be at least 50% survivability of the initial planting rate of 600 trees per acre from the approved species list. The final success standard for root production type container trees will be at least 90% survivability of the initial planting rate of 60 trees per acre from the approved species list. The success standard and evaluation period coincides with the ILDNR standards for a forest land use.

Hydrologic conditions will be assessed based upon overbank flooding and/or installing and monitoring groundwater table wells to verify saturation or inundation within the upper 12 inches of the soil horizon for 5% of the growing season on consecutive days. Hydric soil conditions will be evaluated using wetland delineation criteria. The annual monitoring reports will document the status of the vegetation, soils and hydrology by utilizing the data forms provided in the Midwest Regional Supplement[18] and providing information to assess the status of the mitigation project.

Streams

A performance period of 5 years will be employed to monitor and evaluate success of the stream mitigation. The geomorphic features of the streams will be assessed for their Rosgen[6] characteristics to determine if the natural design constructed is functioning. The streams will also have their physical habitat quality assessed utilizing the USEPA RBP[12]. Appropriate species will be verified by assessing the ground cover type and quality. For the natural design mitigation, woody species will be planted at a rate of 600 trees per acre for seedlings and 60 trees per acre for root production type container trees as listed in the above table titled Forest/Wildlife Habitat for Stream Buffer Areas. Container trees will be cultivated using root pruning methods and shall be 3 gallons in size. The final success standard for bare root seedlings will be 80% survivability of the initial planting rate of 600 trees per acre from the approved species list, while the final success standard for root production type container trees will be 90% survivability of the initial planting rate of 60 trees per acre from the approved species list. This success standard and evaluation period coincides with the ILDNR standards for a forest or wildlife habitat land use.

II. AS-BUILT CONDITIONS

As-built plans will be submitted with the annual monitoring report for any wetlands or streams that were completed in the previous year.

III. FINANCIAL ASSURANCES

Additional off-site mitigation will be utilized, if deemed necessary to ensure success. A revised mitigation plan would be proposed and Peabody Gateway North Mining, LLC will work with the USACE to develop a plan for success.

Section 4: Success Criteria

I. MINIMUM SUCCESS CRITERIA

Wetlands

Mitigated forested wetlands will be considered successful if the following conditions are met:

1. The proposed jurisdictional wetland acreage will be met.
2. The final success standard for bare root seedlings will be at least 50% survivability of the initial planting rate of 600 trees per acre from the approved species list. The final success standard for root production type container trees will be at least 90% survivability of the initial planting rate of 60 trees per acre from the approved species list. This will consist of a minimum of 5 native species known to occur in southwestern Illinois to assure diversity.
3. No one species will make up more than 25% of the surviving plant stock.
4. The vegetation present in these areas meets the current federal delineation manual for hydrophytic vegetation.
5. The soils in the mitigated wetlands areas exhibit hydric conditions that must be sufficient to meet the criteria of wetland determination per the 1987 USACE Wetland Delineation Manual[8] and the Midwest Regional Supplement[18].
6. The mitigated wetlands will have flood storage capacity providing sufficient hydrology so the soils are inundated or saturated for 5% of the growing season on consecutive days and allow the accumulation of sediment from surface runoff.
7. The site is self-sustaining after the establishment of the approved permanent vegetation.
8. The site should meet the proposed plantings for the mitigated type. For forested wetlands, expected tree growth will not advance during the 7-year monitoring period to the point where it will qualify as a PFO1A; however, the trees shall be growing, healthy, and indicative of a future PFO1A wetland.

Streams

Mitigated streams will be considered successful if the following conditions are met:

1. The minimum riparian buffer widths are established.
2. The final success standard for woody species is 80% survivability of the initial planting rate of 600 trees per acre from the approved species list for bare root seedlings and 90% survivability of the initial planting rate of 60 trees per acre from the approved species list for root production type container trees of the initial planting lists and rates which will consist of a minimum of 5 native species known to occur in southwestern Illinois to assure diversity.
3. No one species will make up more than 25% of the surviving plant stock.
4. Rosgen level II and III characteristics[6] will be measured to ensure the development of stable channels for the appropriate slope and drainage area within the watershed. See the Rosgen Channel Morphology Matrix table in Section 1 for the parameters.
5. The stream is self-sustaining after the establishment of the approved permanent vegetation.
6. The streams are jurisdictional.
7. Utilizing the USEPA RBP[12], specific natural streams as shown on the mitigation map shall meet the following minimum scores for success and be dependent on the Rosgen channel type constructed. The following tables provide the success scoring for each metric.

Rapid Bioassessment Protocol Low Gradient Streams Habitat Assessment Field Data Sheet Metric Success Goals				
Channel Type	**Pool Substrate Characterization**	**Epifaunal Substrate/ Available Cover**	**Channel Sinuosity**	**Bank Stability (for each bank)**
C	11*	11*	11*	8
E	11*	11*	11*	8

* mitigated stream metrics will be higher than pre-mine metrics with a goal of being in the suboptimal range (11 or higher)

Rapid Bioassessment Protocol High Gradient Streams Habitat Assessment Field Data Sheet Metric Success Goals				
Channel Type	**Embeddedness**	**Epifaunal Substrate/ Available Cover**	**Channel Sinuosity**	**Bank Stability (for each bank)**
A	11*	11*	NA	8
B	11*	11*	NA	8

* mitigated stream metrics will be higher than pre-mine metrics with a goal of being in the suboptimal range (11 or higher)

II. PROJECT SPECIFIC SUCCESS CRITERIA FOR WETLANDS AND STREAMS

Wetlands

The success criteria to track progress of the mitigated wetlands will be based on the 1987 USACE Wetland Delineation Manual[8] along with the Midwest Regional Supplement[18] utilizing the Wetland Determination Form. Wetland success is achieved by developing an area that has wetland hydrology, hydric soils, and hydrophytic vegetation. These features are measurable and achievable for these mitigation sites.

Streams

The measurable performance standards to track progress of the mitigated streams will be based on Rosgen stream assessments as developed by Dave Rosgen and minimum scores for 4 variables of USEPA RBP[12]. The type of stream will be based on Rosgen stream classifications[6] for the appropriate slope and drainage area for a stream. Enhancements to the streams such as adding sinuosity, decreasing entrenchment of the channel, developing riparian buffers, installing riffle, run, and pool complexes, and adding a floodplain as contours allow are all measurable, achievable, and verifiable assessment criteria to obtain success.

The Illinois Stream Mitigation Method[7] will also be used to assess the required mitigation for the direct stream impacts. The stream mitigation activities will involve the creation of 1,800 linear feet of ephemeral streams and 2,900 linear feet of intermittent streams split across three mitigation sites. The mitigation sites currently exist as agricultural fields. Riffle/pool complexes will be installed in the Rosgen "C" channels and step-pool complexes in the Rosgen "B" channels. The new channels will be classified as "Tertiary" streams with "Good" net benefits and will be designed as a Priority 3 stream with in-stream features. Root wads, log vanes, and rock riffle structures will be used as appropriate to reduce erosion, provide habitat, and direct stream flow. The mitigation will be constructed concurrently with impacts and be monitored using Level III components from the Illinois Stream Mitigation Method. The mitigation will be completed before the end of the 2nd growing season after permit approval. This restoration work will generate 12,925 credits per the stream mitigation method. The stream mitigation will also establish a 50-foot wide riparian buffer on each side of the new channel. The riparian buffer will be planted with predominately hard-masted species as shown on the Wetland and Riparian Buffer Seeding and Planting Stock Summary table in Section 2. The proposed buffer work will generate 7,990 credits per the stream mitigation method. **Please note that no extra credit is given for creating wetlands adjacent to the stream mitigation.** The riparian buffer will be constructed concurrent with the mine portal development impacts. Please see Appendix D for the Illinois Stream Mitigation Method worksheets.

III. PERFORMANCE STANDARDS TO TRACK PROGRESS TOWARD ACHIEVING SUCCESS CRITERIA

Wetlands

The measurable performance standards to track progress of the mitigated wetlands will be based on the 1987 Corps of Engineers Wetland Delineation Manual[8] along with the Midwest Regional Supplement[18]. Wetland success is achieved by developing an area that has wetland hydrology, hydric soils, and hydrophytic vegetation.

Streams

The functional assessment tools that will be utilized to track progress of the required mitigation for the direct stream impacts will be the Illinois Stream Mitigation Method[7] along with measuring the development of the natural design streams using the methods developed by Dave Rosgen and based on the Rosgen Channel Morphology Matrix[6] in Section 1. Minimum scores for four variables of the USEPA RBP[12] will also be utilized. Stream success is achieved by developing a natural stream channel that has a stable cross-section, stable meander pattern, and a stable profile such that over time, the channel features and stability are maintained. The Illinois Stream Mitigation Method examines the characteristics of the impacted streams to determine the number of mitigation credits required. These characteristics include stream type, priority area, existing conditions, impact activity and duration, and linear feet of impact. Using this method, it was determined that the proposed impacts would require 20,728 credits for mitigation.

All of these performance standards will be addressed in the annual monitoring reports.

Section 5: Monitoring

I. MONITORING REPORTS

Annual monitoring reports for the mitigated wetlands will be provided for each wetland and be based on information obtained at set monitoring points which will be clearly identified in the field. There will be a minimum of one monitoring point for each wetland or for every 3 acres of a larger wetland. Included in the reports will be wetland delineations utilizing the Midwest Regional Supplement[18], a narrative assessment describing the vegetation, hydrology, and soils present, photographs from each monitoring point, and tree counts. As-built plan drawings of the areas constructed or planted will also be provided in the first report. Tree counts will be conducted using techniques appropriate to the site, i.e. one-fifth acre or twenty-foot or fifty-foot radius circular plot. Once success and acreage requirements have been achieved, final wetland delineation will be performed with a meets and bounds to determine the final acreage and a request to release the mitigated wetland from further monitoring will be submitted.

Annual monitoring reports for the mitigated streams will be provided for each stream and be based on information obtained at set monitoring points which will be clearly identified in the field. Assessment locations will be set every 1,500 linear feet of stream length and will be clearly identified in the field. Included in the reports will be a completed Rosgen Level II and III modified stream assessment along with the USEPA RBP-based Habitat Assessment Field Data Sheet. In addition to these assessments, the report will include a site map, stream cross-sections, stream profiles, a narrative description noting the total lengths and acreages constructed, any areas of instability along with any structures that have been placed or naturally developed in the channel along, and if the mitigation is meeting the mitigation goals, a description of the adjacent riparian buffer including widths and diversity of species, photographs from each assessment points, tree counts in the riparian buffer, and water quality sampling data. SMCRA water quality monitoring as detailed in the Surface Water Sampling Plan for Streams (Section 1.8) will be included in the annual report for the locations described. As-built plans for streams that were constructed the previous year will be submitted. Evaluation of any enhancements will detail the added value over the pre-development conditions (i.e. stable slopes, widened floodplain to dissipate energy and increase the riparian habitat value, etc.)

The success standard for the woody plantings will be verified by the appropriate tree counting technique, i.e. one-fifth acre or twenty-foot or fifty-foot radius circular plot. Tree counting techniques will be conducted for every 1,000 foot of riparian buffer. Once success and linear footage requirements have been achieved, a request to be released from monitoring will be submitted.

Annual monitoring reports will be submitted to the USACE for a period of 5 years for the stream mitigation and 7 years for the wetland mitigation by January 30th for the previous year and include information collected from biannual monitoring inspections. Biannual monitoring will consist of at least one complete inspection at each assessment point and at least one visual maintenance inspection for each stream reach or wetland area. Data collected during the complete inspection includes:

Component	Data Collection
Wetland Monitoring	
Cowardin	Midwest Regional Supplement
	Photographs
Vegetation	Tree Counts
	Photographs
Stream Monitoring	
Geomorphology	Rosgen Level II and III Assessment
	Plan and Profile/Cross-Sections
	Photographs
Habitat	RBP

Vegetation	Tree Counts
	Photographs
Chemical	Stream Water Quality

Data collected during visual maintenance monitoring includes an inspection for any significant changes since the last complete inspection and the need for any repairs that are compromising the mitigation success. Any issues identified by the maintenance monitoring will be documented and corrective measures taken.

Several individuals are responsible for the design, construction, revegetation, and monitoring of the mitigation for Peabody Energy, but the primary designers will be Richard Williams and Ann Nelson, PE.

Richard Williams, Permit Specialist, has over 20 years experience in surveying, stream assessing, and wetland delineating. Mr. Williams responsibilities have involved wetland delineation, stream assessments, construction from grade staking to final structure placement. He is also involved in designing the plan and profile for the stream mitigation utilizing spoil grade topography provided by the mines.

Richard Williams
Education & Training

- A.S. in Surveying, Vincennes University - Vincennes, IN 1990
- Wetland Delineation with Emphasis on Soils and Hydrology, Wetland Training Institute, Inc. - Whitefish, MT 2005
- Stream Geomorphology and Ecology, Ohio State University Technical Seminar - Columbus, OH 2005
- Plant Identification, Wetland Training Institute, Inc.- Indianapolis, IN 2005
- SEDCAD 4 Program Training, Evansville, IN 2007
- Plant Identification, Wetland Training Institute, Inc.- Indianapolis, IN 2007
- Applied Fluvial Geomorphology (Level I), Wildland Hydrology, Inc. - Fayetteville, AR 2007
- River Morphology and Application (Level II), Wildland Hydrology, Inc. - Fayetteville, AR 2007
- River Assessment and Monitoring (Level III), Wildland Hydrology, Inc.- Lubrecht Experimental Forest, MT 2008
- Geomorphic Reclamation and Natural Stream Design at Coal Mine: A Technical Interactive Forum - Bristol, TN 2009
- River Restoration and Natural Channel Design (Level IV), Wildland Hydrology, Inc.- Steamboat Springs, CO 2009
- Regional Supplement Seminar and Field Practicum, Wetland Training Institute, Inc.- Frankfort, KY 2010

Ann Nelson, Environmental Engineer, has 4 years of experience in permitting and design experience and 6 years of additional engineering experience. Ms. Nelson will be the lead in developing the cross-sectional dimension of the stream mitigation

Ann Nelson, PE
Education & Training

- B.S. in Geological Sciences, Indiana University - Bloomington, IN 1995
- B.S. in Civil Engineering Technology, University of Southern Indiana - Evansville, IN 1999
- SEDCAD 4 Program Training, Evansville, IN 2007
- Applied Fluvial Geomorphology (Level I), Wildland Hydrology, Inc. - Fayetteville, AR 2007
- River Morphology and Application (Level II), Wildland Hydrology, Inc. - Fayetteville, AR 2007
- River Assessment and Monitoring (Level III), Wildland Hydrology, Inc. - Dobson, NC 2008
- Regional Supplement Seminar and Field Practicum, Wetland Training Institute, Inc.- Frankfort, KY 2010
- Indiana Registered Professional Engineer - License No. 10606515
- Illinois Registered Professional Engineer - License No. 062-060721

Dan Williamson, Environmental Specialist, has over 26 years of reclamation experience in wetland restoration, managing forests, and planting trees on surface coal mine sites. Mr. Williamson will manage the planting of riparian buffers and wetlands either by consultants or Peabody Energy employees at the mines.

Dan Williamson
Education & Training

- B.S. in Forestry, University of Kentucky - Lexington, KY 1977
- A.S. in Reclamation Technology, Madisonville Community College - Madisonville, KY 1981
- District Forester, Kentucky Division of Forestry, 2001-2006
- Plant Identification, Wetland Training Institute, Inc.- Indianapolis, IN 2007
- Applied Fluvial Geomorphology (Level I), Wildland Hydrology, Inc. - Fayetteville, AR 2008

- River Morphology and Application (Level II), Wildland Hydrology, Inc. - Steamboat Springs, CO 2009

Robert Pendleton, Environmental Specialist, has over 2 years of reclamation experience. Mr. Pendleton will help in the oversight of the stream and wetland mitigation and along with being involved in making repairs.

Robert Pendleton
Education & Training

- B.A. in Business Administration - Finance, Transylvania University - Lexington, KY 2006
- B.S. in Wildlife Management, Eastern Kentucky University, Richmond, KY 2008
- Applied Fluvial Geomorphology (Level I), Wildland Hydrology, Inc. - Shephardstown, WV 2010
- Regional Supplement Seminar and Field Practicum, Wetland Training Institute, Inc.- Frankfort, KY 2010

In addition, to the staff listed above, many other Peabody professionals in engineering and environmental are available, as needed. Several internal and contractor equipment operators have been trained in recent years in the needed techniques for constructing stream and wetland mitigation. These operators will continue to be utilized and build upon each year's experience.

Wetland Services, Inc. is utilized for stream, wetland and biological assessments, stream design and monitoring. Credentials follow:

Michael Sandefur
Education & Training

- B.S. in Natural Resources/Environmental Protection, Ball State University – Muncie, IN 1991
- Wetland Delineation Certification Program, Wetland Training Institute – Frankfort, Ky. 2007
- N.C. State Stream Morphology Assessment, River Course 101 - Asheville, NC 2008
- N.C. State Natural Channel Design Principles, River Course 201 - Asheville, NC 2008
- Stream Morphology Engineering, Pilot View, Inc. –Asheville. NC 2008
- OSM, Mid Continent Region Technology Transfer, Acid Mine Drainage Workshop - Evansville, IN 2010
- Cypress Agricultural Services, LLC. Managing Partner, 2002 - present
- Indiana State Legislature, Environmental Service Council, Wetlands Committee - Indianapolis, IN 2002
- American Gas Association, Environmental Committee 2001
- Big Creek Wildlife Foundation, President, 1998-present
- Indiana Electric Association, Environmental Policy Group, Chairman, 1994 &1999
- ORSANCO Power Industry Advisory Committee 1994-1999
- Clean Cities - Evansville, IN 1995-1998
- Evansville Chamber Environmental Committee Co-Chairman,1995
- 12-yrs professional experience

Tim Sandefur
Education & Training

- B.S. Wetland Ecology, University of Kentucky – Lexington, KY 2001
- Wetland Delineation Training, WTI - Jacksonville, FL 1997
- WRP Seminar, NRCS - Oakland City, IN 1998
- Regulatory Wetland Seminar, UKY - Lexington, KY 1999
- SWS Regional Conference – Little Rock, AR 2000
- Watershed Watch Training – Geneva, KY 2002
- National Wetlands Conference – Indianapolis, IN 2002
- Assn. of State Wetland Managers – Evansville, IN 2003
- Private Lands Management, KDFWR – Madisonville, KY 2004
- Mine Reclamation for Wildlife Summit – Louisville, KY 2005
- USACE Stream Guidance – Newburgh, IN 2005
- Indiana Surface Mine Reclamation Technology Transfer Seminar – Jasper, IN 2006
- USACE "Rapanos" Guidance – Newburgh, IN 2007
- N.C. State Stream Morphology Assessment, River Course 101 - Asheville, NC 2008
- N.C. State Natural Channel Design Principles, River Course 201 - Asheville, NC 2008
- Geomorphic Reclamation & Natural Stream Design on Coal Mines, Presenter – Bristol, VA 2009
- OSM, Mid Continent Region Technology Transfer, Acid Mine Drainage Workshop - Evansville, IN 2010
- Wetland Services President, Henderson, KY 1997-Present
- Pond Creek Watershed Conservancy District, Henderson, KY 2001-present

- Cypress Agricultural Services, LLC. Managing Partner, 2002 – present
- 13-yrs professional experience

Rick Liggett, DC
Education & Training

- B.S. in Human Biology, Logan College - Chesterfield, MO 1999
- Doctorate of Human Biology, Logan College - Chesterfield, MO 2001
- N.C. State Stream Morphology Assessment, River Course 101 - Asheville, NC 2008
- N.C. State Natural Channel Design Principles, River Course 201 - Asheville, NC 2010
- Midwest Interim Regional Supplement for Wetland Delineation - Illinois Soil Classifiers Association - Geneva, IL 2009
- OSM, Mid Continent Region Technology Transfer, Acid Mine Drainage Workshop - Evansville, IN 2010
- Indiana Society of Mining and Reclamation Annual Conference - Jasper, IN 2009
- 3-yrs professional experience

Cody Thayer
Education & Training

- B.S. in Biology, University of Southern Indiana - Evansville, IN 2007
- N.C. State Stream Morphology Assessment, River Course 101 - Asheville, NC 2008
- Indiana Society of Mining and Reclamation Annual Conference - Jasper, IN 2009.
- Regional Supplement Seminar and Field Practicum, Wetland Training Institute, Inc.- Frankfort, KY 2010
- 3-yrs professional experience

Kyle Bretl
Education & Training

- B.S, in General Resource Management, University of Wisconsin - Stevens Point 2009
- Minors include Soil Science, Wildlife Ecology, Natural Science
- Basic Wetland Delineation, UW-La Crosse Continuing Ed. & Ext. - Waupaca, WI 2008
- Adv. Wetland Delineation, UW-La Crosse Continuing Ed. & Ext. - La Crosse, WI 2009
- Basic Wetland Plants, UW-La Crosse Continuing Ed. & Ext. - La Crosse - WI 2009
- Regional Supplement Seminar and Field Practicum, Wetland Training Institute, Inc. - Frankfort, KY 2010
- Currently Working towards certification as a Wetland Professional in Training by Society of Wetland Scientists
- 1-yr professional experience

Other noted stream consultants from experienced consulting companies are utilized as needed to review and provide advice on construction and design techniques.

II. ASSESSMENT OF FUNCTION/VALUE REPLACEMENT

The mitigated wetlands will be enhanced over the existing wetlands by utilizing the ratios as found in Section 2 of this permit narrative. Enhancements over the existing conditions include the species diversity of planting hard-mast desirable species and maintenance to ensure success and self-sustenance.

The mitigated streams are enhanced over the existing conditions and will contain enhanced features such as increasing sinuosity, decreasing entrenchment, establishing riparian buffers, installing riffle, run, and pool complexes, and incorporating adjacent wetlands.

III. RELEASE FROM MONITORING

Monitoring will be completed for a period of 5 years for stream mitigation or 7 years for wetland mitigation or upon success of the mitigation. Once mitigation is deemed successful, Peabody Gateway North Mining, LLC will request release from further monitoring. The final report for the mitigated wetlands will include a final wetland delineation of the site to confirm not only that wetlands are present but also that the acreage requirements are present. The final report for the mitigated streams will include confirmation that the linear footage requirements are present and the riparian buffer widths area established.

Section 6: Contingency Plan

I. REPORTING PROTOCOL

If the minimum success criteria are not met for all or part of the mitigation in any year, Peabody Gateway North Mining, LLC will prepare an analysis listing the potential causes of failure and if determined necessary by the USACE, propose remedial action for pre-approval.

II. RESPONSE TO UNSUCCESSFUL REMEDIATION

An adaptive management plan will be developed, if the mitigation fails to meet the environmental goals and objectives of the mitigation plan. If the stream mitigation and riparian buffers fail to achieve target success criteria in terms of channel stability, riparian buffer vegetation, or biological indicators, reasons for failure will be evaluated and adaptive management actions will be planned, approved, and implemented. Contingency measures may include modification of existing structures, addition of new structures, amending the substrate, supplementing tree plantings, and/or modifying contours. Similarly, if the wetland mitigation fails to meet the goals of hydrological regime or vegetative cover, remedial actions will be considered, such as planting alternative species of trees, introducing additional suitable wetland herbaceous plants, and/or modifying contours. Such measures will be addressed through discussions with the USACE to provide aquatic functions comparable to those described in the mitigation plan objectives.

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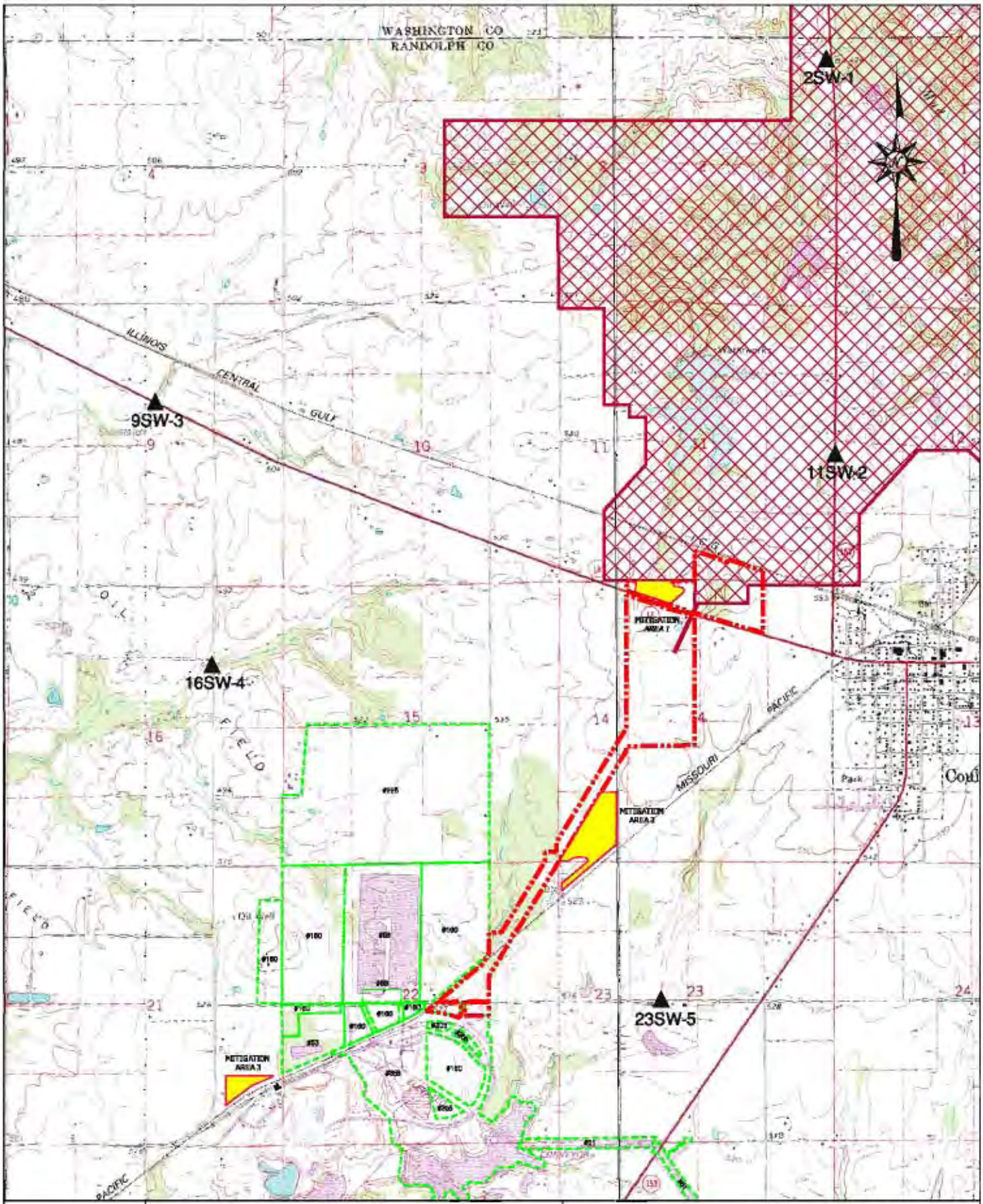

PROJECT LOCATION

LEGEND

- GATEWAY NORTH MINE - SURFACE EFFECTS
- GATEWAY NORTH MINE - SHADOW AREA
- GATEWAY MINE - SURFACE EFFECTS
- WETLAND MITIGATION SITES
- 23SW-5 ▲ STREAM MONITORING POINT

PEABODY GATEWAY NORTH MINING, LLC

Evansville, Indiana

PERMIT NO:	[illegible]	MINE NAME:	GATEWAY NORTH MINE
SCALE:	1" = [illegible]	QUADRANGLE:	TILDEN AND COULTERVILLE, IL 7.5 MIN QUAD
DRAWN BY:	AMN	DESCRIPTION:	SECTIONS 11, 14, 15, 22, AND 23 N
DATE:	DECEMBER 1, [illegible]		T4S, R5E IN RANDOLPH COUNTY, ILLINOIS

GATEWAY NORTH MINE
GENERAL REFERENCE LOCATION MAP

MAP A (SURFACE EFFECTS)