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# Foundation Mine Refuse Disposal Area site Selection Study Alternatives Analysis Report

## Volume 1

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*Prepared for:*
Foundation Mining, LLC

*Prepared by:*
Michael Baker Jr., Inc.
Beaver, Pennsylvania

Baker

and

WPI
WALLACE & PANCHER, INC.

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**Michael Baker, Jr., Inc.**
*A Unit of Michael Baker Corporation*

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# EXECUTIVE SUMMARY

Presently, approximately 48 percent of all electricity consumed by homes and business comes from coal. The Energy Information Administration forecasts that coal will remain the dominant fuel used for electricity generation into the foreseeable future. With American's demand for electricity expected to grow 30 percent by 2035, meeting the nation's growing demand for reliable, affordable electricity will require the continued growth and utilization of all domestic energy resources.

In response to this expected growth in demand for electricity, Foundation Mining, LLC (FMLLC) plans to develop a new underground mine with longwall operations into the Pittsburgh coal seam. The mine will be located primarily in Greene County, Pennsylvania. Its portal for coal transport, and new preparation plant facility for processing coal that is mined, will be located north of Holbrook within the area west of Hoge Run Road and north-west of SR 18 in Center Township, Greene County.

The new mine is projected to produce approximately *6.5* million tons of clean coal per year (at full production) for a presently estimated mine life period of 20 years. The proposed new mine is expected to create or retain 500 direct jobs and approximately 5000 indirect jobs. The coal cleaning facilities proposed for this mine are expected to produce approximately 25.23 million cubic yards of coal refuse (coarse refuse including breaker rock and fine refuse) during the first 10 years of mine operation. Over the 20-year mine life, refuse production is estimated to be 58.23 million cubic yards of which coarse refuse is estimated to be 38.45 million cubic yards and fine refuse for slurry impoundment disposal is estimated to be 19.78 million cubic yards. Coal refuse generation is an inherent part of the coal mining process and cannot be eliminated. Accordingly, proper and environmentally sound disposal of coal refuse is a fundamental mining element.

FMLLC intends to develop two new disposal facilities for coal refuse to be generated by the Foundation Mine operation – a slurry impoundment for receipt of both fine coal refuse slurry and coarse coal refuse, and a separate coarse coal refuse disposal area that may receive combined coal refuse during initial mine operations. The second disposal area is proposed to extend the life of the slurry impoundment and thereby reduce the number of higher-hazard slurry impoundments built during the total mine life. It will receive coarse coal refuse that otherwise would be disposed within the slurry impoundment pool area needed for fine coal refuse slurry. This application for site approval is for both the slurry impoundment and the separate coarse/combined coal refuse disposal area. Results of the slurry impoundment siting study/alternatives analysis are summarized in the main body of this report under Sections 1.0 through 7.0, and Appendices A, B, and 'WPI'. A separate study/analysis was performed for the coarse coal refuse disposal area and is presented in Appendix C of this report.

The coal refuse disposal facility siting study was initiated originally by identifying possible slurry impoundment sites within a 25-square mile search area surrounding the proposed preparation plant location, in accordance with requirements of Subchapter E Site Selection, 25 Pa Code § 90.201 through 90.207 and following the Pennsylvania Department of Environmental

Protection's (PADEP's) Technical Guidance Document (TGD) entitled "Coal Refuse Disposal - Site Selection", No. 563-2113-660, dated February 8, 1999. Twenty-one (21) possible sites were initially identified. All of these possible sites within the search area boundary are within a high quality (HQ) watershed; therefore at the suggestion of PADEP, ten additional sites located in a non-HQ watershed also were identified and evaluated. The ten additional sites are either totally or partially outside the 25-square mile search area. Locations of all the sites are shown on Exhibit 1.

The evaluation of coal refuse disposal site options included a search for suitable "preferred sites" as defined in the above referenced Subchapter E Site Selection, 25 Pa. Code § 90.201. A "Preferred Site", according to Pa. Code § 90.201, is defined as "a watershed polluted by acid mine drainage; a watershed containing an unreclaimed surface mine but which has no mining discharge; a watershed containing an unreclaimed surface mine with discharges that could be improved by the proposed coal refuse disposal operation; unreclaimed coal refuse disposal piles that could be improved by the proposed coal refuse disposal operation; or other unreclaimed areas previously affected by mining activities." No such preferred sites were identified within the study area i.e., the 25 square-mile search area and the non-HQ watershed outside the search area.

Coal refuse disposal in underground mine workings (abandoned, inactive, or active underground mines) as an alternative to surface disposal was considered; however, it was determined that underground disposal was not technologically or economically feasible in this case, since no active or abandoned underground mines exist within the study area.

Coal refuse disposal facilities that service large mining operations have historically been, and continue to be, located in valleys. In the past this was done strictly because a larger volume of refuse could be disposed in a valley rather than on a hillside. Today, valley fills still provide the large capacity necessary for efficient disposal, but the very nature of a valley allows mine operators to provide better environmental control of the disposal process by minimizing the extent affected by the disposal, utilizing natural barriers created by the valley (sidewalls and head of hollow), and minimizing the number of hydrologic systems that are contacted.

The thirty-one (31) possible disposal sites identified for slurry impoundment development were subjected to an initial assessment to eliminate all sites without the desired storage capacity, or with fatal flaws such as location within an area where such disposal activities are prohibited. Ten (10) possible disposal sites (seven within the 25 square-mile search area and three within the non-HQ watershed) emerged for further consideration during a second round of assessment in which environmental and other factors were investigated for each site for comparison. The factors included estimated refuse storage volume and facility life, potential impacts to existing streams, wetlands, historic and archaeological sites, endangered species and others. Based on results of the second assessment, four sites were selected for further evaluation based on cost. The cost analysis provided justification for identifying Site R3 as most favorable for coal refuse disposal facility development.

Thirty-one (31) possible disposal sites also were identified for development of the separate coarse/combined coal refuse disposal area. The 31 sites are located within the same search area

screened for the slurry impoundment analysis, but are outside exclusion areas (e.g., State Game Land areas, Exceptional Value watersheds, etc.). Each site was subjected to an initial assessment to eliminate those having insufficient storage capacity. Three sites were eliminated as a result of the first site assessment. The remaining 28 sites were evaluated and compared during a second site assessment based largely on environmental factors. The factors included estimated refuse storage volume and facility life, potential impacts to existing streams, wetlands, historic and archaeological sites, endangered species, and others. Off site transport to coal refuse disposal areas outside the HQ watershed also was evaluated and determined to be not feasible. After the second assessment, ten of the 28 sites were selected for further evaluation based on cost. Results of the third site assessment indicate that no site is better for coarse/combined coal refuse disposal than Site CR-1B.

Based on results of the siting studies summarized in this document, Site R3 is the area recommended for development as the Foundation Mine slurry impoundment, and Site CR-1B is the area recommended for development as a separate coarse/combined coal refuse disposal area.

# SECTION 1.0

# INTRODUCTION

Foundation Mining, LLC (FMLLC) plans to develop a new underground longwall mine in the Pittsburgh Coal Seam with its surface facilities proposed to be located near the village of Holbrook in west central Greene County, Pennsylvania. Surface facilities needed to support the new underground longwall mine; i.e., the facilities to be constructed as a part of this mining project, include a new portal, slope, shaft, coal preparation facility, and two coal refuse disposal areas. The portal and slope, as well as the coal preparation facility, will be located southwest of Hoge Run Road. A shaft and shaft pad area will be located west of S.R. 18 and south of S.R. 3020. The location of the coal preparation facility is shown on Exhibit 1.

Raw coal removed from the mine must be cleaned in a coal preparation plant to remove impurities such as rock, clay, and various other mineral impurities before it is suitable for market. The resultant coarse and fine material is commonly referred to as coal refuse. Coal refuse has no market value and therefore must be disposed in an environmentally safe manner. A standard industry method of disposal of fine coal refuse slurry is pumping it via a pipeline into a valley upstream of an impounding structure typically constructed of coarse coal refuse.

Mine development by FMLLC includes development of new coal refuse disposal areas for receipt of coal refuse generated by the Foundation Mine coal preparation plant. Both coarse coal refuse and fine coal refuse (slurry) will be generated for disposal. It is FMLLC's intent to dispose of the refuse in a slurry impoundment similar to existing disposal operations of the Emerald and Cumberland Mines. FMLLC also proposes to develop a separate disposal area for receipt of combined coarse and fine coal refuse generated during development mining, before the slurry impoundment is on-line. This additional disposal area would be available to receive coarse coal refuse not needed for slurry impoundment dam or cap construction; i.e., for coarse coal refuse that otherwise would be disposed within the slurry impoundment pool area. As a result, development of the separate coarse/combined coal refuse disposal area will extend the life of the slurry impoundment considerably and thereby reduce the overall number of high-hazard slurry impoundments needed during the total mine life. For example, Foundation Mine, during its 20-year life, will generate (as discussed later in this report) approximately 58.23 million cubic yards of total refuse; i.e., 38.45 million cubic yards of coarse coal refuse and 19.78 million cubic yards of fine coal refuse disposable as slurry. Proposed slurry impoundment disposal site R3 has a maximum fine coal refuse refuse (slurry) storage capacity of 24.63 million cubic yards which is more than needed and has a coarse coal refuse storage capacity (for dam and cap construction) of 7.37 million cubic yards. Therefore, use of separate disposal area(s) for coarse coal refuse will eliminate the need for another slurry impoundment during the 20-year mine life. It is to be noted that slurry impoundment site R3 and a separate coarse/combined coal refuse disposal site CR-1B will provide Foundation Mine with the following coal refuse storage capacity: approximately 14 years of coarse coal refuse disposal and 20 years of fine coal refuse (slurry) disposal.

Slurry impoundment development will duplicate that of other slurry impoundments where: 1) coarse coal refuse is used to construct the impounding structure; 2) the pool is filled with both fine coal refuse slurry and, if required, coarse coal refuse not needed for dam construction; and 3) the cap is constructed in stages concurrent with fine coal refuse placement. FMLLC plans to obtain soil cover materials needed for capping from within the disposal facility site – additional borrow areas are not expected to be required.

FMLLC has contracted with Michael Baker Jr., Inc. (Baker) to assist in selecting appropriate and feasible coal refuse disposal options whereby coal refuse from the Foundation Mine can be disposed economically and in an environmentally safe manner.

This report describes work performed by Baker in conducting site selection studies/alternatives analyses for the slurry impoundment and separate coarse/combined coal refuse disposal area that will be needed to serve the proposed Foundation Mine. It has been prepared to document potential environmental impacts versus the public benefits of: 1) continued development of an existing energy resource; 2) creation and prolongation of significant employment; and 3) provision of coal to generate electricity (a public utility service). It is the intent of this report to present for each of the two disposal facilities (slurry impoundment and separate coarse/combined coal refuse disposal area) the alternatives considered, findings of the site selection process, and to identify and address environmental impacts and public benefits, both social and economic, that might occur as a result of construction of the coal refuse disposal facilities.

The alternatives analysis was initiated by identifying and evaluating the search area and potential disposal alternatives for the slurry impoundment. Results of the slurry impoundment alternatives analysis are summarized in the main body of this report under this section, Sections 2.0 through 8.0, and Appendices A, B, and 'WPI'. A separate analysis was performed for the coarse/combined coal refuse disposal area using information developed for the slurry impoundment siting study to the extent possible. The alternatives analysis performed for the coarse/combined coal refuse disposal area is presented as Appendix C of this report.

## SITE SELECTION STUDY FOR SLURRY IMPOUNDMENT

### 1.1 Search Area Considerations

The proposed shaft, slope and surface facilities for the Foundation Mine are located in west-central Greene County about three miles south west of Rogersville. Significant thought and planning went into the decision to locate the primary access point to this coal reserve. Consideration was given to a number of factors, including environmental, physical, geographic, transportation, economic and social constraints.

First, the proposed site offers the best location to access FMLLC's Pittsburgh Coal reserves in Greene County. These reserves are located to the south and west of the Holbrook area and are bounded on the north, south and west by CONSOL Energy operations. Cumberland and Emerald Mines are located to the east of the proposed Foundation Mine. An evaluation was performed and a conceptual mine plan was developed to maximize recovery of these remaining reserves. That evaluation determined that the Holbrook area provided the most advantageous location to recover those resources in the most efficient fashion. Hence optimizing access to the un-mined reserves was a key factor in siting the new facility.

Second, access to the Norfolk Southern Rail for transporting coal from Foundation Mine to market played a key role in selection of the mine and preparation plant site. During 2001, consultations were initiated with railroad officials to determine the best conceptual approach to handling and loading coal from a mine producing 6.5 million tons per year of clean coal. That effort resulted in a conceptual plan to locate the preparation plant about 1 mile west of the current location and build an extensive rail loop up Hoge Run and back down House Run to optimize throughput and minimize rail delays. That rail loop would have crossed Exceptional Value (EV) watersheds and would have required excavation of approximately 800,000 cubic

yards of material to facilitate construction of the rail grade. The majority of that material would have to be placed in stream valleys since the topography of the area does not lend itself to fill sites outside of stream channels. After considering this alternative, it was determined that costs and impacts to the aquatic and terrestrial resources were not justified. Consequently, the shaft, slope, and preparation plant sites were moved closer to the rail line that runs parallel to McCourtney Run. The goal was to minimize the "footprint" of the surface activities consequent to the deep mining, which generally results in fewer impacts to terrestrial and aquatic resources as well as reduced social impacts to the surrounding community. By locating the surface facilities close to the rail line, the number and length of overland conveyors, access roads, and power line corridors associated with the new complex will be minimized.

Thirdly, surface acreage had to be acquired to allow permitting of the shaft, slope, and preparation plant areas. Several parcels were sought via good-faith private transactions with private landowners. Some were successful, some were not. To the extent some acquisitions were successful; those acquired tracts facilitated selection of the proposed shaft, slope, and preparation plant site.

Consequent to the factors described above, it became impossible to avoid placing the proposed coal refuse disposal facilities within the watershed boundary of the South Fork Ten Mile Creek. Since that watershed west of Waynesburg contains 44,427 acres and is currently designated as Warm Water Fishery– High Quality watershed, it was decided that an additional degree of evaluation was appropriate in this case.

## 1.2 Shape of the Search Area

The Coal Refuse Disposal Technical Guidance Document (TGD) specifies that for new disposal sites associated with new coal mining activity, the search area is 25 square miles around the site where the coal refuse will be generated. Although the TGD does not specify a particular shape of a search zone, it has been past practice to configure the 25 square mile search area as a circle with the preparation plant in the center. Regardless of the shape of the search area, the fact remains that most of the search area to the north and east of the preparation plant site would be composed of disposal sites within the South Fork Ten Mile Creek watershed. Therefore, it was decided that our analysis for the slurry impoundment site not only would continue to embrace past practice with regard to the shape of the search area, but also would include non-HQ watershed disposal sites that are totally or partially outside the search area boundary. Potential sites within the non-HQ watershed are to the west and south of the South Fork Ten Mile Creek watershed and include tributaries of the North Fork Dunkard Fork (to the west) and Tom's Run of Dunkard Creek (to the south).

# SECTION 2.0

# METHODOLOGY

The site selection process was initiated by defining the type and quantity of coal refuse to be disposed of and identifying the search area. Methodologies used in this report are in accordance with Subchapter E. Site Selection, 25 Pa. Code § 90.201 through Code § 90.207 and satisfy criteria established in PADEP's Technical Guidance Document (TGD Number 563-3113-660) on the coal refuse disposal site selection process. They also satisfy good engineering practices.

After the search area was identified, reasonably available data were collected and reviewed to characterize the search area and identify possible disposal areas, including any area location meeting 25 Pa. Code § 90.201, definitions for "preferred sites". Thirty-one possible disposal sites were identified; 21 sites located within the circular search area (Sites R1 thru R21), and 10 additional sites located outside or partially outside the circular search area and within the non-HQ watershed (Areas #1 through #10). Refer to Exhibit 1 for the locations of these sites. All of the sites were initially screened for an obvious lack of easy accessibility/desired storage capacity and/or fatal flaws. Sites having such flaws were eliminated from further consideration.

Fourteen (14) sites from the HQ watershed and seven (7) sites from the non-HQ watershed were eliminated by initial screening. The remaining seven (7) potential sites from the HQ watershed and three (3) potential sites from the non-HQ watershed were subjected to a second assessment and comparison based on refuse storage capacity & environmental criteria. The second assessment eliminated all but four potential sites from further consideration. The remaining sites were subjected to a third assessment/evaluation based on cost. One site was identified as most favorable after the third assessment. This site emerged as the selected site.

The search area and candidate disposal areas were characterized using available published information, information available from State and Federal agencies, and results of limited field reconnaissance and investigation. Data collection efforts focused on gathering the following type of information: 1) topographic mapping with planimetric type surface features (e.g., roads, buildings, streams, etc.); 2) utilities; 3) surface and underground mining activity in the area; 4) geology and water quality; 5) inventoried wetlands; 6) wildlife and aquatic resource data; and 7) inventoried cultural resources. Since the majority of the potential disposal areas are located in privately owned properties, a detailed site investigation could not be conducted in those sites where access was not granted. Therefore, readily available information and the limited field reconnaissance were used on these sites to compare the potential disposal sites.

Data sources used for this study include:

1. USGS 7.5 Minute Series Topographic Maps: Rogersville, PA; Holbrook, PA
2. Topographic mapping available from FMLLC.
3. Topographic mapping available from: PAMAP Program LiDAR Processing/Contour Enhancement Lines of Pennsylvania. PA Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey. Publication Date 2006.

4. Pennsylvania Code Title 25, Chapter 90, Subchapter E (§ 90.201 through § 90.207) Site selection
5. PADEP Technical Guidance Document No. 563-2113-660, Coal Refuse Disposal- Site Selection, February 8,1999
6. Pennsylvania Code Title 25 Chapter 93. Water Quality Standards
7. USDA Soil Conservation Service Soil Survey of Greene and Washington Counties of Pennsylvania
8. USDA Natural Resources Conservation Service, Greene County – for land use (prime farmland soil) information
9. US Fish and Wildlife Service National Wetlands Inventory Maps
10. US Environmental Protection Agency – Region 3 Solid Waste Group (CERCLIS) list of Hazardous Waste Site
11. PADEP, California – Bureau of Mining and Reclamation; Underground Mining
12. PADEP, Ebensburg – Abandoned Mine Reclamation; Maps of Recorded Problem Sites
13. PADEP, Greensburg – Bureau of Mining and Reclamation; Recent Active Surface Mine Information
14. PADEP, Uniontown – Bureau of Water Supply and Community Health; Public Water Supply Information
15. PA Game Commission; List of Endangered and Threatened Species of Pennsylvania
16. Wild Resource Conservation Fund – Endangered and Threatened Species of Pennsylvania
17. PA Historical and Museum Commission – Bureau of Historic Preservation; Registered Historic and Archaeological Sites
18. PADEP Sitefinder – Brownfields Inventory Listing
19. Greene County Planning Commission – State Game Lands and State Park Locations, Zoning Maps, FEMA Maps
20. Geologic Map of Greene County, Pennsylvania
21. PA One Call; List of Utilities in the Study Area
22. Frias and Rose, Department of Mineral Economics, The Pennsylvania State University, *The Impact of Coal on the US Economy*, 1994

# SECTION 3.0

## COAL REFUSE QUANTITY REQUIRING DISPOSAL

FMLLC is seeking approval for not only a slurry impoundment disposal site as discussed below, but also a separate coarse/combined coal refuse disposal site so as to reduce the overall number of slurry impoundments to be built during the total mine life. As indicated previously, the siting study for the coarse coal refuse disposal area is presented in Appendix C of this report.

The total volume of coal refuse that will be generated by Foundation Mine over its presently estimated 20-year mine life is projected to be 58.23 million cubic yards; 38.45 million cubic yards of coarse coal refuse and 19.78 million cubic yards of fine coal refuse. Annual coal production rates and corresponding coarse and fine coal refuse generation rates at Foundation Mine will vary over the life of the mine (20-years) as indicated on Table 3-1.

Any coal refuse disposal site(s) to be selected must have a capacity large enough to store, if not the entire coal refuse generated over the life of the mine, at least all coal refuse generated from the processing of coal to be extracted from the initial 9438-acre underground mine plan area that currently is under permit review. Mining within the initial 9438-acre area will occur over a period of approximately 10 years. It is also desirable to minimize the overall number of slurry impoundments needed for fine coal refuse disposal during the mine life since impoundment disposal maintains the refuse in a wet state during facility operation and generally requires development of a high hazard dam. This is possible when coarse coal refuse not needed for slurry impoundment dam or cap construction is disposed separately.

To reduce the overall number of slurry impoundments needed for the Foundation Mine, FMLLC intends to dispose the coal refuse initially as combined coal refuse consisting of coarse coal refuse mixed with dewatered fine coal refuse. After an initial period, the slurry impoundment site will be developed and operated as an impoundment using coarse coal refuse to form the impounding structure. The total quantity of coal refuse to be disposed over the 10-year period is estimated to be 25.23 million cubic yards, and during the total mine life (20-years) it is estimated to be 58.23 million cubic yards. Coal refuse volumes have been estimated based on an assumed coarse coal refuse unit weight of 125 pcf and a fine coal refuse unit weight of 80 pcf or on a combined coal refuse unit weight of 110 pcf or 1.485 tons per cubic yard. The coarse and fine coal refuse split is assumed to be 75% and 25% by weight and approximately 66% and 34% by volume.

Coal refuse disposal areas proposed for the Foundation Mine in this report are Site R3 for development as a slurry impoundment and Site CR-1B for development as a separate coarse/combined coal refuse disposal area. As indicated on Table 3-2, Site R3 has a storage capacity of approximately 24.63 million cubic yards of fine coal refuse (slurry), 4.23 million cubic yards of coarse coal refuse for construction of the impoundment dam, and 3.14 million cubic yards of coarse coal refuse for the construction of a 10-foot thick cap. The separate coarse coal refuse disposal Site CR-1B has a storage capacity of 12.90 million cubic yards. Thus the total coarse coal refuse disposal capacity of Site CR-1B and of Site R3 (excluding the volume of

coarse refuse required for cap construction) is 17.13 million cubic yards which is more than that generated (16.65 million cubic yards) during the first 10 years. Fine coal refuse generated during the first 10 years is expected to be 8.58 million cubic yards which is approximately one third of the fine coal refuse storage capacity of Site R3. Therefore no additional disposal site will be needed during the first 10 years of mine operation. During the 20-year mine life, as indicated in Table 3-1, total coal refuse generation is expected to be 58.23 million cubic yards and the Site R3 and Site CR-1B will jointly provide a storage capacity of 44.9 million cubic yards. Therefore, after the initial 10-year period, a second coarse/combined coal refuse site of similar capacity as CR-1B will be sufficient to store the total volume of refuse generated during the 20-year life of Foundation Mine.

**Table 3-1. Foundation Mine Coal Refuse Generation Rate (for Approximate 20 Years Life of Mine)**

| Year | Raw Coal Million Tons | Clean Coal (dry) Million Tons | Coal Refuse Million CY | Cumulative Coal Refuse Million CY | Cumulative Coarse Refuse Million CY (66%) | Cumulative Fine Refuse Million CY (34%) |
|---|---|---|---|---|---|---|
| 1 | 0.39 | 0.25 | 0.10 | 0.10 | 0.07 | 0.03 |
| 2 | 1.45 | 0.86 | 0.40 | 0.50 | 0.33 | 0.17 |
| 3 | 6.27 | 3.21 | 2.06 | 2.56 | 1.69 | 0.87 |
| 4 | 11.67 | 6.51 | 3.47 | 6.03 | 3.98 | 2.05 |
| 5 | 11.03 | 6.06 | 3.35 | 9.38 | 6.19 | 3.19 |
| 6 | 11.47 | 6.18 | 3.56 | 12.94 | 8.54 | 4.40 |
| 7 | 11.05 | 6.07 | 3.35 | 16.30 | 10.76 | 5.54 |
| 8 | 10.76 | 6.16 | 3.10 | 19.40 | 12.80 | 6.59 |
| 9 | 10.77 | 6.51 | 2.87 | 22.26 | 14.69 | 7.57 |
| 10 | 10.82 | 6.42 | 2.97 | 25.23 | 16.65 | 8.58 |
| 11 | 11.40 | 6.50 | 3.30 | 28.53 | 18.83 | 9.70 |
| 12 | 11.40 | 6.50 | 3.30 | 31.83 | 21.01 | 10.82 |
| 13 | 11.40 | 6.50 | 3.30 | 35.13 | 23.18 | 11.94 |
| 14 | 11.40 | 6.50 | 3.30 | 38.43 | 25.36 | 13.07 |
| 15 | 11.40 | 6.50 | 3.30 | 41.73 | 27.54 | 14.19 |
| 16 | 11.40 | 6.50 | 3.30 | 45.03 | 29.72 | 15.31 |
| 17 | 11.40 | 6.50 | 3.30 | 48.33 | 31.90 | 16.43 |
| 18 | 11.40 | 6.50 | 3.30 | 51.63 | 34.07 | 17.55 |
| 19 | 11.40 | 6.50 | 3.30 | 54.93 | 36.25 | 18.68 |
| 20 | 11.40 | 6.50 | 3.30 | 58.23 | 38.43 | 19.80 |

## Table 3-2. Foundation Mine Refuse Site R3 Storage Capacity

### 3:1 Inside Slope
### 3:1 Overall Outside Slope (2.6:1 w/20' benches every 50 vertical feet)

| | | |
|---|---|---|
| **Saddle Dam 1 (closest to main dam)**<br>3:1 Outslope<br>2:1 Inslope | 208,533 | CY |
| **Saddle Dam 2 (western most dam)**<br>3:1 Outslope<br>2:1 Inslope | 438,120 | CY |
| **Main Dam**<br>3:1 Outslope (2.6:1 with 20' Benches every 50 vertical feet)<br>3:1 Inslope | 3,786,606 | CY |
| **Starter Dam of Soil (1/3 height of dam - Elevation 1193')**<br>3:1 Outslope (2.8:1 with 20' Benches every 50 vertical feet)<br>3:1 Inslope<br>50' crest width | 201,803 | CY |
| **Slurry Volume (to Elevation 1340')** | 27,774,043 | CY |
| **Slurry Volume (to Elevation 1335')** | 26,180,751 | CY |
| **Slurry Volume (to Elevation 1330')** | 24,634,416 | CY |
| **Total Coarse Volume - Not considering cap** | 4,231,456 | CY |
| **Total Coarse Volume - 5' Cap of Coarse Material** | 5,824,748 | CY |
| **Total Coarse Volume - 10' Cap of Coarse Material** | 7,371,083 | CY |
| **Total Storage** | 32,207,302 | CY |
| **Total Storage excluding starter dam** | 32,005,499 | CY |

# SECTION 4.0

# DEFINING SEARCH AREA

## 4.1 Introduction

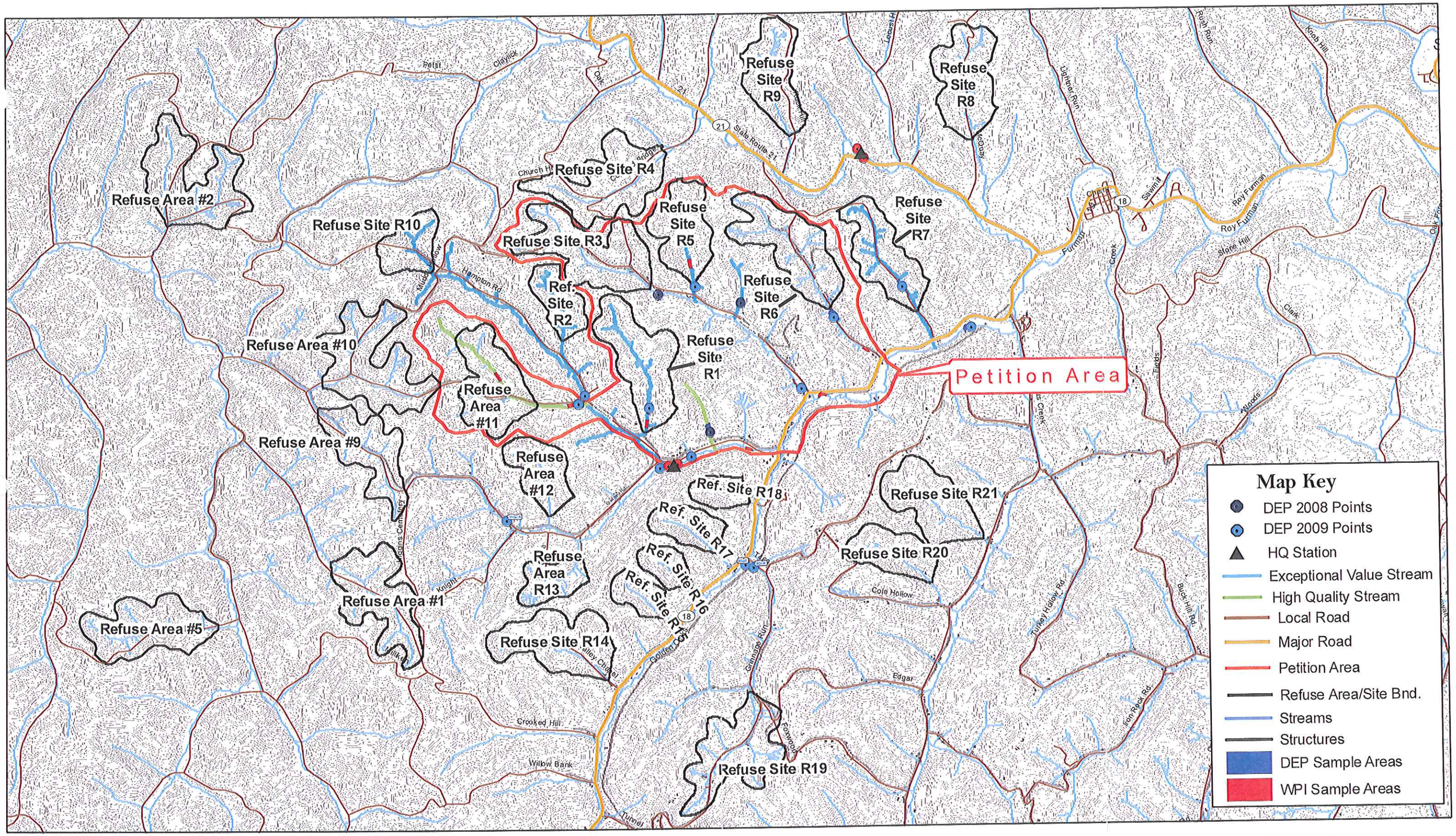
FMLLC recently filed a petition with the Commonwealth of Pennsylvania Environmental Quality Board (EQB) requesting redesignation of 10.60 stream miles within the South Fork Tenmile Creek Watershed. Specifically, FMLLC requested that Hoge Run, portions of McCourtney Run, and portions of House Run (and their tributaries) be redesignated from High Quality Warm Water Fishery (“HQ-WWF”) to Warm Water Fishery ("WWF"). The petition area is shown on Figure 4-1**.** Preliminary estimates are that action on a proposed rulemaking could be taken by the EQB as early as mid-2010. However, as of June 22, 2009 some of the streams within the petition area have been preliminarily redesignated as EV (Exceptional Value) streams on the Pennsylvania Statewide Existing Use Classification list. While FMLLC does not agree with this recent reclassification, FMLLC has revised this analysis to remove former proposed Refuse Area R1 as the selected site (as per the March 2009 edition), and re-evaluate the remaining sites for purposes of this analysis (See Figure 4-1).

## 4.2 The Site Search Area

The coal refuse disposal site search area is a 25-square mile area around FMLLC 's proposed coal preparation facility location as shown on Exhibit 1. The search area is contained on the Rogersville and Holbrook USGS 7.5-Minute Topographic Quadrangles. The search area lies in Greene County. Communities within the search area include Rutan, Rogersville, and Holbrook of Center Township; and Woodruff and White Cottage of Jackson Township.

The 25-square mile search area shown on Exhibit 1 is located within the South Fork Tenmile Creek watershed and includes several named tributaries (Hargus Creek, McCourtney Run, Hoge Run, House Run, Garner Run, and Grinage Run) as well as unnamed tributaries to South Fork Tenmile Creek. South Fork Ten Mile Creek and all its named and unnamed tributaries are currently designated as a High Quality Warm Water Fishery (HQ-WWF) according to Pennsylvania Code Title 25 Chapter 93. The largest part of the 25-square mile search area (central and western part of the search area) is drained by House Run, Hoge Run and their tributaries to the South Fork Tenmile Creek through McCourtney Run and Hargus Creek. The western most part of the search area is drained by Webster Run. The south-west part of the search area is drained by Garner Run and Grinage Run to the South Fork Tenmile Creek through McCourtney Run and Hargus Creek. The south-east part of the search area drains into Hargus Creek, which in turn drains into the South Fork Tenmile Creek. The northern part of the search area which contains two potential coal refuse disposal areas drains into the South Fork Tenmile Creek through two unnamed tributaries.

All possible disposal sites within the 25-square mile search area are within the HQ watersheds, therefore at the suggestion of PADEP, additional sites located outside the search




P:\Projects\10453 Foundation Refuse Site Selection\GIS\July 2009\7-31-2009_HQ_MAP_Fig4-1.mxd

| | | | | | |
|---|---|---|---|---|---|
| DATE: 6/2/2009<br>REVISIONS: 7/30/2009<br>DRAWN: DJT<br>CHECKED:<br>REVIEWED:<br>PROJ. #: 10453 | FIGURE<br>4-1 | PROJECT:<br>PROJECT LOCATION MAP<br>FOUNDATION HQ SAMPLING<br>GREENE COUNTY, PENNSYLVANIA | PREPARED FOR:<br>FOUNDATION MINING, LLC<br>PO BOX 1020<br>WAYNESBURG, PA 15370<br>FOUNDATION COAL HOLDINGS, INC. | N W E S<br>1 INCH = 3,125 FEET<br>0 1,562.5 3,125 Feet | WALLACE & PANCHER, INC.<br>1085 S. HERMITAGE RD.<br>HERMITAGE, PA 16148<br>PHONE: (724) 981-0155 FAX: (724) 981-0156<br>ENGINEERING AND ENVIRONMENTAL CONSULTING<br>WPI WALLACE & PANCHER, INC. |

area and within the non-HQ watershed also have been evaluated. The additional, non-HQ watershed area sites touch or are slightly within the search area boundary, or are located slightly outside the search area. These additional sites are to the west and south of the 25-square mile search area boundary and include the North Fork Dunkard Fork watershed (to the west) and the Tom's Run and Blockhouse Run of Dunkard Creek watershed (to the south). Areas within the North Fork Dunkard Fork watershed include headwater areas of Webster Run, Falling Timber Run, and their unnamed tributaries, and unnamed tributaries to Dunkard Fork and Job Creek. Areas within the Dunkard Creek watershed include headwater areas of unnamed tributaries to Blockhouse Run and Tom's Run.

Thus the final search area for this study includes the 25-square mile search area primarily within the HQ-WWF watershed (except few EV sub-watershed)of South Fork Ten Mile Creek and a few surrounding additional sites (Area #1 through #10) within the non-HQ watershed as discussed previously. References to 'search area' in this report generally refer to this final search area consisting of both HQ (including EV), and non-HQ watershed areas.

Gas wells, gas transmission lines, powerlines and power transmission lines are present within the search area. Although there are no state forests, there are state game lands within the search area at the south-west corner that extend into a few possible coal refuse disposal areas. There are no known active or inactive surface or underground coal mining sites within the search area.

According to the Washington and Greene County Soil Surveys, predominant soil units within the search area being studied are: Dormont silt loam, Dormont-Culleoka silt loams, and loamy Fluvaquents. These soil units are present in almost all the possible disposal sites identified within the search area. Refer to Appendix A for maps showing soil units within each of the areas. Other minor soil units present only in limited areas include Weikert-Culleoka complex, Culleoka silt loam, Culleoka-Upshur complex, Dekalb channery loam, Guernsey silt loam, Newark silt loam and Library soils. Culleoka soils are moderately deep, well drained residual soils which occur mostly on the ridges and hilltops but some areas are on hillsides. Dormont soils are located dominantly on hillsides and benches that commonly have slips in them. Dormont soils are formed in residium of weathered shale, siltstone, and limestone, and in adjacent colluvium. They are characterized as deep and moderately well drained. The Dormont-Culleoka soil type contains up to 55 percent Dormont soil, up to 40 percent Culleoka soil, and about 5 percent other soils. Dormont and Culleoka soils are so intermingled that it is not practical to map them separately. Fluvaquents soils consist of nearly level, moderately deep or deep poorly drained soils on flood plains. Most areas of these soils are in pasture and brushland. Frequent flooding and the high water table make these soils poorly suited to cultivated crops. The Guernsey soils are on hillsides and hilltops that commonly have slips on them. Guernsey soils are deep, moderately well drained and are formed in residuum of weathered clayshale, siltstone, and limestone. The Weikert series consist of shallow, well drained soils on uplands. Weikert soils have been formed in residuum of weathered shale, siltstone, and sandstone. Weikert soils are associated on the landscape with well drained, moderately deep Culleoka soils. In the Weikert-Culleoka complex, Weikert soils make up 50 to 60 percent of the unit, Culleoka soils about 30 to 40 percent, and other soils about 5 to 10 percent. These Weikert and Culleoka soils are so intermingled that it was not practical to map them separately. Newark soils are deep, somewhat poorly drained, alluvial soils which occur

on the floodplain area of the streams. Library soils occur on the upland areas and are formed in both residuum and alluvium.

Prominent geologic structural features of the search area are the Amity Anticline and Nineveh Syncline which run northeast to southwest, approximately paralleling each other. As shown on Exhibit 1, the Amity Anticline is within the search area near the eastern edge. The Nineveh Syncline is not within the search area but is close to the northwestern edge. The distance between the axes of these two features is approximately 5.2 miles. Coal seams within the search area that reportedly have mineable thickness include the Pittsburgh and Sewickley coal seams. Within the search area, the Pittsburgh coal seam occurs at elevations (base of Pittsburgh Seam) ranging from 110 to 360 feet above MSL. The high point occurs near the confluence of South Fork Tenmile Creek and Hargus Creek. Northwest of the Amity Anticline, the Pittsburgh Coal Seam dips to the northwest at a slope of approximately 1.33% and southeast of the Amity Anticline the coal seam dips to the east at a slope of approximately 1.0%.

## SECTION 5.0

## FIRST ASSESSMENT SITE ELIMINATION
## SEARCH AREA SCREENING & INITIAL SITE SELECTION

The search area was evaluated and screened to identify the most feasible disposal site(s)/options for the coal refuse to be generated by the proposed Foundation Mine of FMLLC. Underground as well as surface disposal options were evaluated; however, underground disposal was determined to be not feasible since no underground workings exist within the search area. The search area also was screened for potential disposal sites meeting 25 Pa. Code §90.201 and PADEP requirements for "Preferred Sites". No "Preferred Sites" were identified within the search area. A total of thirty-one (31) non-preferred sites – twenty-one (21) from the HQ watershed and ten (10) from the non-HQ watershed, were identified and subsequently evaluated as possible disposal sites based on available disposal capacity and fatal flaw criteria. These non-preferred sites are: R1 through R21 within the HQ watershed, and Areas #1 through #10 within the non-HQ watershed.

### 5.1 Underground Disposal Options

The potential for underground disposal of coal refuse in active or inactive/abandoned underground mines within the search area was considered but was determined not to be feasible for this project. Underground mine workings currently are not present within the search area; therefore, no underground disposal sites will be available within the search area surrounding the proposed Foundation Mine coal preparation plant when plant operations begin. Development mine workings (Foundation Mine proposed workings) to be created within the search area prior to preparation plant operation will be needed for access and coal transfer, and will not be available for disposal. The infeasibility of disposal within future mine workings to be made within the search area is demonstrated in the following discussions:

The potential for underground disposal of coal refuse within future workings of the proposed Foundation Mine was considered but was determined to be infeasible because of adverse technical and economic factors. Foundation Mine is planned for longwall mining. In longwall mining, usually upon completion of a longwall panel, the panel experiences complete subsidence, filling the void space created by removal of coal. There will remain some void spaces within the active section of the mine for main headings, development entries, and bleeder entries, etc., however, significant portions of these areas are needed for ventilation and transport/conveyance of mine personnel, mined coal, supplies, etc., and must be kept open. The remaining portions that do not need to be kept open offer very little disposal capacity. Therefore, the underground mine workings will not provide sufficient capacity for coal refuse disposal.

Backstowing within the mine void created by longwall mining before roof collapse is a possible option, and was used in the past in Europe and Russia, particularly as a measure to minimize subsidence but not as a measure to dispose coal refuse generated at the mine. Backstowing involves transporting refuse/stowing materials to the stowage area and placing the materials in

the void spaces using appropriate equipment (mechanical or pneumatic stower, or placing hydraulically) to ensure proper packing of the voids. Dr. Christopher Bise of the Pennsylvania State University Department of Mineral Engineering has concluded that underground stowing technology can not keep pace with the production potential of U.S. longwall mining systems, and such practices decrease coal production while significantly increasing costs (Bise, et al. 1993). It is not a proven technology for a fast moving longwall face (as is the practice in U.S.A), and would increase risks to worker safety.

Hydraulic backstowing would require additional surface support facilities and injection boreholes. Transport of coal refuse would require extensive, costly conveyor systems to bring both coarse and fine coal refuse from the preparation plant to an injection borehole and additional conveyance facilities to transport and place the coal refuse underground within the mine void. Throughout the life of the mine a large number of injection boreholes, injection point facilities, and supporting access roads would be needed to facilitate coal refuse disposal throughout the entire mine area, especially since the coal seam dip is gentle, at roughly 1.5 % or less. Conveyance systems would have to be moved and/or extended as new injection boreholes are activated. These systems also would require surface disturbances for conveyor and injection point facilities and supporting access roads. The major drawback of hydraulic back stowing is the introduction of a large volume of water into the mine which would expose workers to increased flooding hazards and increase the volume of water requiring conveyance (pumping) and treatment.

Mechanical and/or pneumatic placement of coal refuse underground would increase risks to the health and safety of mine workers. Pneumatic conveyance systems used to transport coarse refuse underground can generate a significant amount of dust, especially if the material is dry. Also, pneumatic machinery is very noisy, adding noise to an already noisy work environment. Sparks produced at the discharge end of a pneumatic pipe could create a fire or explosion hazard. Fine coal refuse would have to be transported to the backstowing area hydraulically with the resultant problems discussed in the previous paragraph.

## 5.2 Preferred Sites

The search area has no preferred sites available for development of the new coal refuse disposal area. Inquiries to the PADEP Bureau of Mining and Reclamation and the PADEP California District Mining Office revealed no inactive, abandoned, or un-reclaimed mine sites within the search area. Similarly, an inquiry to the CERCLIS listings available from the U.S. EPA revealed no hazardous waste sites within the search area. A search of the Pennsylvania Brownfields Directory revealed no brownfields within the search area. Results and correspondences from the searches are provided in Appendix B.

## 5.3 Search Area Screening & Identification of Possible Disposal Sites

Initially thirty-one (31) possible surface sites for coal refuse disposal were identified within the search area (HQ, EV, and non-HQ watersheds). Because the disposal facility must include an impoundment to accommodate fine coal refuse slurry, and must provide a sizeable amount of storage capacity, the search focused on valley fill type sites. All of these possible sites are shown on Exhibit 1.

As part of the first assessment, the thirty-one (31) possible disposal sites were screened relative to capacity and obvious fatal flaws to eliminate sites not suitable for development of a coal refuse slurry impoundment. Twenty-one (21) sites were eliminated as a result of this initial screening. The remaining ten (10) sites were considered potential disposal sites to be screened further relative to environmental criteria during the second assessment site elimination process.

### 5.3.1. Screening for Fatal Flaws

Possible disposal sites within the search area were screened to identify flaws considered fatal per Subchapter E of the regulation 25 Pa. Code § 90.202 and per PADEP's TGD for coal refuse disposal site selection. The 'fatal flaws' include:

- Prime farmlands.
- An exceptional value watershed as defined under Chapter 93 (relating to water quality standards).
- Sites known to contain threatened or endangered species listed exclusively under the Commonwealth's protection program.
- An area that is hydrologically connected to and contributes at least 5% of the drainage to wetlands designated as exceptional value under Chapter 105 (relating to dam safety and waterway management) unless a larger percentage contribution is authorized by the Department after consultation with the Fish and Boat Commission.
- A watershed less than 4 square miles in area upstream of the intake of a public water supply.
- A watershed less than 4 square miles in area upstream of the upstream limit of a public recreational impoundment.
- Sites known to contain federally listed threatened or endangered plants or animals.

The following areas where mining is prohibited or limited per 25 Pa. Code § 86.102 also were considered fatal flaws:

- Within boundaries of the National Park System, Wildlife Refuse System, System of Trails, Wilderness Preservation System, or Wild and Scenic Rivers.
- Areas on Federal Lands within a National Forest.
- Within publicly owned parks or locations included on the National Register of Historic Places.
- Within the Commonwealth's park system.
- Within the Commonwealth's forest picnic areas.
- Within the game land system of the Commonwealth.
- Within the boundaries of Pennsylvania Scenic River Systems.
- Within 300 feet of a public building or public park.

Initial screening identified the presence of State Game Lands, but no parks, Federal lands, or State or Federal forest areas. Initial screening also identified Exceptional Value (EV) watersheds within the search area (as per the June 22, 2009 communication). Those possible disposal sites within EV watersheds were eliminated from further considerations. No Pennsylvania Scenic River Systems are present, and no area was eliminated because of its location relative to a public water supply or public recreational impoundment. The potential for prime farmland areas and threatened or endangered species to be present also were investigated.

5.3.1.1 Prime Farmland Areas

As specified in 25 Pa. Code § 90.22(b), land will not be considered prime farmland when one or more of the following can be demonstrated:

(1) The land has not been historically used as cropland.

(2) Other factors exist, such as a very rocky surface, or the land is flooded during the growing season more than once in 2 years and the flooding has reduced crop yields.

(3) The slope of the land is 10% or greater.

(4) The land is not irrigated or naturally subirrigated.

(5) There are no soil map units that have been designated prime farmland by the United States Soil Conservation Service, on the basis of a soil survey of the lands proposed to be affected by coal refuse disposal activities.

The potential for prime farmlands to exist at any one of the thirty-one (31) possible disposal sites was established by first reviewing soil survey maps developed by the Natural Resources Conservation Service to identify the presence of prime farmland soil units within and adjacent to the site. Based on information provided by the USDA Soil Conservation Service, the following soils identified as occurring within areas sloping 8% or less are considered prime farmland soil in Greene County: Allegheny silt loam (AgB), Brooke silty clay loam (BoB), Culleoka silt loam (CaB), Chagrin silt loam (Cg), Culleoka-Upshur complex (CkB), Dormont Silt loam (DoB), Glenford silt loam (GdA and GdB), Guernsey silt loam (GeB), and Huntington silt loam (Hu). Available aerial mapping then was reviewed to determine which, if any, of the prime farmland soil areas is wooded which indicates the area has not been used historically as cropland. As a result, prime farmland soil areas identified as wooded were not considered prime farmland. Prime farmland soil areas occurring on slopes 10% or steeper also were not considered prime farmland. Remaining prime farmland soil areas were identified as having potential to be considered prime farmland and were treated as such in this report. Field investigations beyond the scope of the TGD may be required to definitely determine if prime farmlands are present within a particular site.

Presented in Appendix A are maps for each site showing soil survey information. Prime farmland soil areas are noted along with designation of their potential for being considered prime farmlands. Prime farmland soil areas also are shown on Exhibit 1. Those areas having potential to be considered prime farmland are noted.

5.3.1.2 Threatened or Endangered Species Investigation

Field investigations beyond the scope of the TGD are required to definitely determine if threatened or endangered species are present at a particular site. Therefore, the sites were not evaluated for threatened or endangered species as part of the first site assessment. No sites were eliminated from consideration based on this criterion. Sites identified as potential disposal sites after the first assessment site elimination were evaluated relative to threatened or endangered species as part of the second site assessment.

### 5.3.2. Site Disposal Capacity

Conceptual grading plans for each of the 31 sites were developed using available site topographic mapping as well as results of the prime farmland investigation. These grading plans then were evaluated to estimate available capacity for coal refuse storage.

Since disposal on prime farmland area is prohibited, the site layouts avoided encroachment on areas identified as having potential to be considered prime farmland. The grading plans assumed a simplified embankment configuration with 3H:1V outslopes, in general, constructed between ridge tops at or near the downstream end of the valleys. Each site layout shown on the exhibits encompass the disposal area only, allowing sufficient downstream area for construction of a sedimentation control pond(s). Each layout also incorporates a flat/gently sloping top surface at approximately the same elevation of the surrounding ridge tops. Conceptual site layouts are shown on Exhibit 1.

Potential storage volumes then were calculated for each of the sites. Sites providing less than 25.23 million cubic yards of storage capacity were eliminated from further consideration. Since the proposed disposal facility will be developed as a slurry impoundment, combining adjacent valley sites to obtain the required capacity is not feasible. Calculated storage volumes for each of the 31 sites are presented with the first assessment screening results on Table 5-1.

## 5.4 Results of First Assessment Site Elimination

Results of the first assessment screening are summarized on Table 5-1. As indicated on this summary table, twenty-one (21) of the thirty-one (31) possible disposal sites have been eliminated from further consideration. Most of the sites were eliminated because of insufficient disposal capacity. A few were eliminated because they are located in Exceptional Value (EV) watersheds and a few were also eliminated because their development would encroach on the State Game Lands. One site in non-HQ watershed , Area #10, was eliminated because its development to the target disposal capacity would require encroachment on a church and cemetery.

The ten (10) sites not eliminated by the first assessment are: Sites R3, R4, R6, R8, R11, R19, R21, and Areas #1 through #3. These potential disposal sites will be evaluated and compared based on environmental criteria during a second assessment site elimination process.

Surface water quality of the potential disposal sites was determined by sampling and testing where access was available. Where access was not available streams through the potential sites were sampled at the pulic road ROW nearest to the sites. Results of the water quality assessments are discussed in the following subsections and a detailed water quality assessment report is presented in Appendix' WPI' of this report.

### 5.4.1. Surface Water Quality

In order to determine the surface water quality and the status of stream ecology, based on macro-invertebrate sampling and other quantitative measurements, detailed site assessments were conducted by Wallace & Pancher, Inc. (WPI) during the period between November 2006 and June 2008 for each of the potential disposal areas where access was available, in accordance with Pennsylvania Fish and Boat Commission (PFBC) Standards. In areas where access was not available (outside FMLLC's property), information was gathered using secondary source data and/or collecting stream samples at the public road right-of-way nearest to the possible disposal sites. Surface water investigations on the streams within each study site (potential refuse disposal site) consisted of physiochemical measurements (sampling) on the primary watercourse flowing through each study site at a location farthest downstream in the sub-watershed based on the premise that sampling at the lowest point in each of the sub-watershed would be reflective of the entire watercourse flowing through each valley for the purposes of this investigation. Accessibility of the stream based on topography and landowner permission was also considered in the placement of the sample stations. All water (stream) sampling locations are shown in the

**Table 5-1. Results of First Assessment Site Elimination**

| Sites | Disposal Volume (CY) | Disposal Life (Yrs.) | Disposal Area (Acres) | Comments |
|---|---|---|---|---|
| R1 | 28,744,502 | 11.1 | 176.6 | Eliminated - Exceptional Value (EV) watershed |
| R2 | 9,343,182 | 5.0 | 74.6 | Eliminated - insufficient disposal capacity, EV watershed |
| R3 | 32,005,499 | 12.1 | 210.3 | |
| R4 | 25,929,004 | 10.2 | 195.6 | |
| R5 | 20,448,027 | 8.3 | 133.5 | Eliminated - insufficient disposal capacity, EV watershed |
| R6 | 26,214,027 | 10.3 | 185.1 | |
| R7 | 22,800,783 | 9.2 | 146.2 | Eliminated - insufficient disposal capacity, EV watershed |
| R8 | 26,036,000 | 10.3 | 161.6 | |
| R9 | 22,570,783 | 9.1 | 137.6 | Eliminated - insufficient disposal capacity |
| R10 | 12,195,528 | 5.8 | 83.2 | Eliminated - insufficient disposal capacity, EV watershed |
| R11 | 27,764,971 | 10.9 | 164.2 | |
| R12 | 15,211,012 | 6.6 | 97.5 | Eliminated - insufficient disposal capacity |
| R13 | 8,794,536 | 4.8 | 69.9 | Eliminated - Insuff. capacity; encroaches on State Game Land |
| R14 | 17,848,950 | 7.5 | 176.5 | Eliminated - Insuff. capacity; encroaches on State Game Land |
| R15 | 6,390,890 | 4.1 | 52.7 | Eliminated - insufficient disposal capacity |
| R16 | 6,302,691 | 6.7 | 48.7 | Eliminated - insufficient disposal capacity |
| R17 | 10,306,590 | 5.3 | 74.4 | Eliminated - insufficient disposal capacity |
| R18 | 6,136,337 | 4.0 | 48.7 | Eliminated - insufficient disposal capacity |
| R19 | 26,562,164 | 10.4 | 191.1 | |
| R20 | 16,535,621 | 7.1 | 100.9 | Eliminated - insufficient disposal capacity |
| R21 | 30,261,311 | 11.5 | 156.0 | |
| Area #1 | 25,854,116 | 10.2 | 179.1 | |
| Area #2 | 29,292,000 | 11.2 | 208.7 | Not Eliminated, but undesirable do to split pool |
| Area #3 | 29,183,308 | 11.2 | 198.2 | |
| Area #4 | 17,795,797 | 7.4 | 124.4 | Eliminated - insufficient disposal capacity |
| Area #5 | 33,058,022 | 12.4 | 176.5 | Eliminated - encroaches on State Game Land |
| Area #6 | 11,697,874 | 5.7 | 101.7 | Eliminated - insufficient disposal capacity results when State Game Lands and power lines are avoided. |
| Area #7 | 15,050,915 | 6.6 | 112.0 | Eliminated - Insuff. capacity; encroaches on State Game Land |
| Area #8 | 19,988,818 | 8.2 | 129.6 | Eliminated - Insuff. capacity; encroaches on State Game Land |
| Area #9 | 10,005,680 | 5.2 | 120.5 | Eliminated - insufficient disposal capacity. Reported capacity limited by potential prime farmland. |
| Area #10 | 30,869,333 | 11.7 | 218.4 | Eliminated - site includes a church and cemetery |

Note: Highlighted sites were selected for further evaluation.

Appendix'WPI' (see Figure 2 of Appendix A and Figures 2, 3, and 4 of Appendix E) of this report.

Surface water investigations conducted by WPI consisted of *in situ* measurements of temperature, dissolved oxygen, specific conductance, pH and flow at each sampling station (except where access was denied by the landowner) in conjunction with the benthic macroinvertebrate sampling and stream habitat characterizations. In sites where access was denied, stream water quality was determined by laboratory analysis of grab samples taken from the stream flowing through each site at location of the public road ROW nearest to the site. Stream water quality data of grab samples are presented in Table 5-2.

**Table 5-2. Stream Water Quality Data for No Permission Sites**

| Sampling Date | pH | Alkalinity | Acidity (Hot) | Total Suspend. Solids | Specific Conduct. @ 25°C | Sulfate | Iron | Mn | Al |
|---|---|---|---|---|---|---|---|---|---|
| | **Chapter 93 Standards** | | | | | | | | |
| | 6.0-9.0 (S.U.) | 20 mg/l minimum (mg CaCO3/L) | N/A (mg CaCO3/L) | N/A (mg/L) | N/A (micromhos/cm) | Maximum 250 mg/l | 1.5 mg/l 30 day average | Maximum 1.0 mg/l | Maximum 0.750 mg/L |
| **Refuse Area #3 (RA 3) – Grab Sample** | | | | | | | | | |
| **July 10, 2009** | **8.36** | **199.99** | **-174.25** | **<1.0** | **729.0** | **111.0** | **0.08** | **<0.03** | **0.13** |
| **Refuse Site 4 (R 4) – Grab Sample** | | | | | | | | | |
| **July 30, 2009** | **8.05** | **109.95** | **-92.65** | **3.00** | **261.00** | **20.00** | **0.21** | **0.05** | **0.15** |
| **Refuse Site 21 (R 21) – Grab Sample** | | | | | | | | | |
| **July 10, 2009** | **7.38** | **98.68** | **-70.49** | **15.0** | **236.0** | **23.0** | **0.07** | **0.04** | **0.10** |

Benthic macroinvertebrate sampling following Appendix A Sampling procedures to designate stream use category (Diverse, Variable, or First Use) and benthic macroinvertebrate sampling following Appendix B Sampling Procedures to assess aquatic life biological scores of "biologically diverse" stream segments, were performed based on criteria set in the Pennsylvania Department of Environmental Protection – Bureau of Mining and Reclamation's Surface Water Protection Guidance Document Number 563-2000-655 of October 8, 2005. Detailed site assessment in HQ, EV, and non-HQ watersheds including surface water (stream) investigations were conducted for this study by WPI and the results of investigations are presented in WPI's "Stream Quality and Wetlands Assessment Report" provided as Appendix 'WPI' of this report. WPI's report presents data pertaining to 21 possible disposal sites (R1 through R21) initially identified within the 25-square mile search area, and also presents data pertaining to 4 additional coal refuse disposal sites within the nearby non-HQ watersheds. These four non-HQ watershed sites are: RefuseArea #1, Refuse Area #2, Refuse Area #3, and Refuse Area #5. Discussions in the following paragraphs relate only to 7 potential disposal sites ( R3, R4, R6, R8, R11, R19, and R21) of the HQ watershed and Refuse Area #1 Refuse Area #2, and Refuse Area #3 of the non-HQ watersheds selected after initial screening.

Physiochemical characteristics of streams within the 7 potential disposal sites in HQ watershed (following initial screening) that were measured during Appendix A ( and grab sampling where access was denied) sampling, as shown in Table 5-2A, indicate that pH values ranged from 7.13 at site R8 T3D DIV to a high of 8.14 at R19 GRR T2 DIV, with an average of 7.43. Water temperatures ranged from 3.3 $^0$C at R11 HOU T2B DIV to 12.2 $^0$C at site R6 T5 DIV, with an average of 9.*23* $^0$*C*. The dissolved oxygen (DO) ranged from 3.54 ppm at R6 DIV to 12.90 ppm at site R8 DIV, with an average of 9.54 ppm. The conductivity ranged from 43.8 µS at R19 T16 DIV to 370 µS at R6 T4B DIV, with an average of 217.3 µS.

**Table 5-2A. Physiochemical and Stream Habitat Data of Diverse Sampling Points Collected During Appendix A Sampling for Potential Foundation Mine Refuse Areas Proposed in 2nd Assessment. 11/8/2006 – 1/7/2008**

| | pH (Standard Units) | Temperature (Degree Celcius) | Diss. Oxygen (Parts per Million) | Conductance (Micro Siemens) | Habitat Score ( % ) |
|---|---|---|---|---|---|
| **R3** | | | | | |
| HOG T8 DIV | 7.32 | 7.2 | 10.59 | 149.7 | 54 |
| | | | | | |
| **R4 ( No Permission)** | | | | | |
| Grab Sample (taken on10/7/10) | 7.55 | 10.0 | 10.0 | 280 | 39 |
| | | | | | |
| **R6** | | | | | |
| R6 Div | 7.20 | 9.5 | 3.54 | 336.0 | 51 |
| R6 T2 DIV | 7.49 | 10.2 | 7.81 | 268.0 | 48 |
| R6 T2D DIV | 7.48 | 10.0 | 6.20 | 233.;0 | 46 |
| R6 T4 DIV | 7.47 | 11.0 | 5.87 | 362.0 | 42 |
| R6 T4B DIV | 7.82 | 11.0 | 6.60 | 370.0 | 48 |
| R6 T5 DIV | 7.54 | 12.2 | 7.01 | 181.6 | 35 |
| R6 T8 DIV | 7.50 | 11.3 | 9.07 | 325.0 | 59 |
| R6 T9 DIV | 7.54 | 11.4 | 7.19 | 308.0 | 43 |
| | | | | | |
| **R8** | | | | | |
| R8 DIV | 7.55 | 9.9 | 12.90 | 219.0 | 73 |
| R8 T3D DIV | 7.13 | 9.3 | 12.00 | 217.0 | 50 |
| R8 T6 DIV | 7.21 | 9.8 | 9.74 | NA | 71 |
| R8 T7 DIV | 7.76 | 9.7 | 9.70 | 366.0 | 63 |
| R8 T10 DIV | 7.55 | 9.7 | 10.86 | 325.0 | 62 |
| | | | | | |
| **R11** | | | | | |
| R11 HOU T2A DIV | 7.59 | 6.5 | 10.41 | 182.0 | 61 |
| R11 HOU T2B Div | 7.69 | 3.3 | 12.72 | 188.0 | 68 |
| R11 HOU T2B11 DIV | 7.35 | 7.8 | 9.59 | 174.0 | 66 |
| | | | | | |
| **R19** | | | | | |
| R19 DIV | 7.13 | 7.8 | 12.15 | 0.0 | 85 |
| R19 GRR T2 DIV | 8.14 | 11.8 | 10.43 | 159.0 | 66 |
| R19 T13 DIV | 7.28 | 8.5 | 11.67 | 0.0 | 43 |

**Table 5-2A. (Cont'd). Physiochemical and Stream Habitat Data of Diverse Sampling Points Collected During Appendix A Sampling for Potential Foundation Mine Refuse Areas Proposed in 2nd Assessment. 11/8/2006 – 1/7/2008**

| | pH (Standard Units) | Temperature (Degree Celcius) | Diss. Oxygen (Parts per Million) | Conductance (Micro Siemens) | Habitat Score ( % ) |
|---|---|---|---|---|---|
| R19 T13D DIV | 7.16 | 8.7 | 12.03 | 149.1 | 44 |
| R19 T16 DIV | 7.63 | 7.7 | 6.8 | 43.8 | 78 |
| R19 T16E DIV | 7.73 | 7.8 | 12.06 | 278.0 | 57 |
| R19 T16F DIV | 7.51 | 8.1 | 11.33 | 124.8 | 71 |
| R19 T16F2 DIV | 7.76 | 9.9 | 11.76 | 119.0 | 57 |
| | | | | | |
| **R21 ( NoPermission)** | | | | | |
| Grab Sample (taken on 10/7/10) | 7.23 | 12.0 | 7.6 | 293 | 58 |
| | | | | | |
| **Refuse Area #1** | | | | | |
| FT T3 DIV | 8.50 | 9.0 | 11.67 | 140.0 | 54 |
| FT T6 DIV | 7.40 | 10.8 | 8.00 | 153 | 46 |
| FT T9 DIV | 7.71 | 11.4 | 9.55 | 173.0 | 68 |
| FT T10 DIV | 7.81 | 4.7 | 13.90 | 133.0 | 64 |
| FT T10g DIV | 8.07 | 6.5 | 11.68 | 191 | 62 |
| FT T10h DIV | 7.71 | 6.3 | 11.59 | 175.1 | 66 |
| FT T10i DIV | 7.52 | 7.6 | 11.75 | 179.7 | 67 |
| FT T12 DIV | 7.50 | 7.3 | 11.75 | 174.6 | 76 |
| FT T12c DIV | 7.66 | 6.4 | 13.3 | 135 | 59 |
| | | | | | |
| **Refuse Area #2** | | | | | |
| RA7 T1 DIV | 7.07 | 12.9 | 13.30 | 207 | 62 |
| RA7 T1g DIV | 6.69 | 10.9 | 12.80 | 197 | 65 |
| RA7 T2 DIV | 7.71 | 11.8 | 12.10 | 279 | 64 |
| RA7 T2a DIV | 8.07 | 13.7 | 10.50 | 327 | 56 |
| RA7 T2b DIV | 8.14 | 13.3 | 13.70 | 294 | 56 |
| RA7 T2d DIV | 6.79 | 11.8 | 10.50 | 213 | 65 |
| RA7 T2f DIV | 7.37 | 12.7 | 14.00 | 201 | 64 |
| RA7 T3b DIV | 7.94 | 14.7 | 16.00 | 271 | 62 |
| RA7 T4 DIV | 7.91 | 16.1 | 6.20 | 214 | 59 |
| | | | | | |
| **Refuse Area #3 (No Permisssion, Grab Sample)** | 8.36 | NA | NA | 729 | NA |
| **(Attempt on 10/7/10)** | DRY | DRY | DRY | DRY | DRY |

The physiochemical characteristics measured during Appendix B sampling at seven original sites, as shown in Table 5-3 indicate that the pH value ranged from 6.55 at site R3 HOG3 to 7.87 at site R11 HOU12, with an average of 7.29. Water temperatures ranged from 5.4 $^0$C at site R11 HOU12 to 11.1$^0$C at site R6 B1, with an average of 10.34 $^0$C. The dissolved oxygen ranged from 0.35 ppm at R6 B1 to 19.40 ppm at Area #1 FTR 6, with an average of 10.61 ppm. The conductivity ranged from 192.93µS at R3 HOG 3 to 259 µS at R19 GRR1, with an average of 233 µS.

The physiochemical characteristics of the streams within the potential refuse disposal sites as measured during Appendix A and Appendix B samplings indicate that generally, all potential refuse site streams have physiochemical conditions that lie within acceptable ranges to support aquatic life, except the R6 site due to low concentrations of dissolved oxygen (B1 and B2 sample locations).

Physiochemical characteristics of streams within the additional 3 possible disposal sites within non-HQ watersheds were measured during Appendix A sampling, as shown in Table 5-2A. The data indicate the pH values ranged from 6.69 at RA7T1g DIV of Refuse Area #2 to a high of 8.36 at Refuse Area #3 grab sample, with an average of 7.41. Water temperature ranged from $4.7^0$C at FT T10 DIV of Refuse Area #1 to $16.1^0$C at RA7 T4 DIV of Area #2, with an average of $10.4^0$C. The Dissolved Oxygen (DO) ranged from 6.2 ppm at RA7 T4 DIV of Refuse Area #2 to 16.0 ppm at RA7 T3b DIV of Refuse Area #2, with an average of 11.79 ppm. The conductivity ranged from 135.0 µS at FT T12c Div to 729.0 µS at Refuse Area #3 grab sample, with an average of 231 µS.

The physiochemical characteristics of streams within the three possible disposal sites in non-HQ watershed measured during Appendix B sampling, as shown in Table 5 -3 (also in Tables 9, 10, and 11 of Appendix 'WPI' of this report), indicate pH values ranged from 6.27 at Refuse Area #1 FT R7 to 8.52 at Refuse Area #1 FT R6, with an average of 7 20. Water temperatures ranged from $5.8^0$C at Refuse Area #1 FT R6 to $29^0$C at Refuse Area #1 FT R7, with an average of $14.2^0$C. The dissolved oxygen (DO) ranged from 1.33 ppm at Refuse Area #1 FT R7 to 19.4 ppm at Refuse Area #1 FT R6, with an average of 10.82 ppm. The conductivity ranged from 105.4 µS at Refuse Area #1 FT R7 to 257.0 µS at Refuse Area #1 FT R6, with an average of180.6 µS.

The physiochemical characteristics of the streams within the three potential disposal areas in non-HQ watersheds as measured during Appendix A and Appendix B samplings similarly indicate that these streams have capacities within acceptable ranges to support aquatic life, except at FT R7 sampling location in Refuse Area #1 (in Falling Timber Run) due to low concentrations of dissolved oxygen.

Stream habitats scores observed during Appendix A Sampling (Table 5-2A) for the seven potential disposal sites in HQ watershed ranged from a low of 35% at R6 T5 DIV to a high of 85% at R19 DIV. Of the 27 diverse Appendix A sites, 2 merited optimum (100-76%), 15 earned sub-optimal (75-51%), and the remaining 10 received marginal habitat classifications in accordance with USEPA Classification System using numerical scores. The average habitat score throughout all the seven sites was 57.0%.

The habitat score observed during Appendix B sampling (Table 5-3) for the proposed seven sites in HQ watershed ranged from a low of 43% at R19 B1 to a high of 73% at R8 B2. Of the 11 sampling events at Appendix B sites, 9 merited sub-optimal, and 2 earned marginal habitat classifications. The average habitat score throughout all proposed refuse areas Appendix B sites was 58.0%. Thus the average habitat score both at Appendix A and Appendix B sites fall into the sub-optimal habitat classification.

**Table 5-3. Summary of Appendix B Sampling Results of Diverse Sampling Points for Potential Foundation Mine Refuse Areas Proposed in 2nd Assessment. 11/2007 to 1/2008.**

| | **pH** (Stand. Units() | **Temperature** (Degree Celcius) | **Diss. Oxygen** (Parts per million) | **Conductance** (Micro Siemens) | **Habitat Score** ( % ) | **Biological Score** | **Average Pollution Tolerance** |
|---|---|---|---|---|---|---|---|
| **R3** | | | | | 45 (Avg) | 37.5 (Avg) | 4.82 (Avg) |
| HOG 3 | 6.55 | 7.8 | 14.02 | 192.9 | 45 | 37.5 | 4.82 |
| | | | | | | | |
| **R4(No Permission)** | NA | NA | NA | NA | NA | NA | NA |
| | | | | | | | |
| **R6** | | | | | 57 (Avg) | 40.0 (Avg) | 4.31 (Avg) |
| B1 | 7.42 | 11.1 | 0.35 | 240 | 52 | 17.1 | 6.00 |
| B2 | 7.50 | 10.1 | 1.4 | 221 | 54 | 43.6 | 3.30 |
| B3 | 7.64 | 9.8 | 11.24 | 221 | 64 | 59.3 | 3.65 |
| | | | | | | | |
| **R8** | | | | | 73 (Avg) | 39.5 (Avg) | 5.18 (Avg) |
| B2 | 7.55 | 9.9 | 12.9 | 219 | 73 | 39.5 | 5.18 |
| | | | | | | | |
| **R11** | | | | | 59 (Avg) | 59.7 (Avg) | 4.27 (Avg) |
| Hou 12 | 7.87 | 5.4 | 14.9 | 281 | 54 | 36.9 | 4.71 |
| HOU !3 | 7.81 | 7.2 | 13.3 | 228 | 59 | 65.7 | 4.16 |
| HOU 15 | 7.76 | 5.9 | 13.2 | 220 | 66 | 76.4 | 3.96 |
| | | | | | | | |
| **R19** | | | | | 57 (Avg) | 47.0 (Avg) | 3.81 (Avg) |
| GRR 1 | 7.66 | 8.1 | 10.86 | 259 | 64 | 64 | 3.84 |
| GRR 2 | 7.65 | 7.8 | 9.45 | 245 | `64 | 38.9 | 3.13 |
| B 1 | 7.13 | 7.6 | 12.15 | 0 | 43 | 38.1 | 4.45 |
| | | | | | | | |
| **R21(No Permiss.)** | NA | NA | NA | NA | NA | NA | NA |
| | | | | | | | |
| **Refuse Area #1** | | | | | 57 (Avg) | 41.0 (Avg) | 3.77 (Avg) |
| FTR 6 | | | | | | | |
| Spring 2007 Rnd. 1 | 8.52 | 6.9 | 14.95 | 184.3 | 44 | | |
| Spring 2007 Rnd. 2 | 7.63 | 26.2 | 7.30 | 185.0 | 56 | | |
| Fall 2007 | 7.79 | 5.8 | 12.97 | 257.0 | 49 | | |
| Spring 2008 | 8.21 | 12.8 | 19.40 | NA | 43 | | |
| FTR 7 | | | | | | | |
| Spring 2007 Rnd. 1 | 7.97 | 6.5 | 10.59 | 153.8 | 42 | | |
| Spring 2007 Rnd. 2 | 7.37 | 29.0 | 2.30 | 178.0 | 45 | | |
| Fall 2007 | 6.27 | 6.1 | 1.33 | 105.4 | 54 | | |
| Spring2008 | 8.10 | 16.0 | 15.10 | 182.6 | 46 | | |
| | | | | | | | |
| **Refuse Area #2** | | | | | 66 (Avg) | 45.5 (Avg) | 2.31 (Avg) |
| **RA 7 1** | 8.02 | 15.6 | 11.90 | 216.0 | 68 | | |
| **RA 7 T1** | 7.72 | 16.6 | 11.00 | 173.0 | 65 | | |
| **RA 7 T2** | 7.82 | 14.7 | 12.20 | 171.0 | 65 | | |
| | | | | | | | |
| **Refuse Area #3 ( No permission)** | NA | NA | NA | NA | NA | NA | NA |

The habitats scores observed during Appendix A sampling for the additional possible coal refuse disposal sites in non-HQ watersheds, as shown in Table 5-2A (also in Tables2a, and2b of Appendix "WPI' of this report) ranged from a low of 46% at Refuse Area #1 FT T6 DIV to a high of 76% at Refuse Area #1 FT T12 DIV. Of the 18 Appendix A sampling sites, one merited optimum (100-76%), and the remaining 17 received sub-optimal (75 – 51%) habitat classifications in accordance with USEPA Classification System using numerical scores. The average habitat score throughout all the proposed 3 additional refuse sites in non-HQ watersheds was 62%.

The habitat score observed during Appendix B sampling as shown in Table 5-3 (also in Tables 6, 7, and 8 of Appendix 'WPI' of this report) for the proposed additional refuse sites in non-HQ watersheds ranged from a low of 42% at Refuse Area #1 FT R7 to a high of 68% at Refuse Area #2 RA 7 1. Of the 11 Appendix B sites, 5 merited sub-optimal (75-51%), and the remaining 6 earned marginal habitat classifications. The average habitat score throughout the additional refuse areas Appendix B sites was 52%. Thus the average habitat score both at Appendix A and Appendix B sites fall into the sub-optimal habitat classification.

Benthic macroinvertebrate samples were collected by WPI at the stream sampling stations concurrently with the water quality (physiochemical characteristics) samples. The sample stations were located at the most optimal riffle habitat observed within each sample area. Initially benthic macroinvertebrate sampling was performed by Appendix A Sampling Methodology prescribed in PADEP Surface Water Protection Guidance Document Number 563-2000-655 of October 8, 2005. Appendix A Sampling (between November 8, 2006 and January 7, 2008) involved collecting representative macroinvertebrate samples from diverse, variable, and point of first use sections of each stream. The number and type of benthic macroinvertebrates found were used to designate the stream use category (Diverse, Variable, or First Use). Results of Appendix A sampling indicate that most main stems are diverse while the unnamed tributaries are classified as variable/ and or first use as shown on Figures 2 and 3 of Appendix A and Figures 2, 3, and 4 WPI's Report presented in Appendix 'WPI'of this report. Summaries of species collected during Appendix A sampling are presented in Table 1 through Table 18 in Appendix B (for HQ watershed) and Tables 1 through 9 in Appendix F (for non-HQ watersheds)of the WPI's Report presented as Appendix 'WPI' of this report. Upon completion of Appendix A stream segment classifications, Appendix B sampling points were established in the diverse segments of each main stem stream and/or large tributary to the main stem. Benthic samples collected at the sample stations were examined for identification and enumeration to the genus taxonomic level. Taxonomic composition, number of taxa, individual counts, and other metrics for the benthic macroinvertebrate assessment were derived directly from identification and enumeration of macroinvertebrates collected in the samples from each station. The metrics used to analyze the benthic macroinvertebrate data for this study included: (1) richness measures, such as the total number of taxa, number of Trichoptera taxa, (2) composition measures, such as percent of EPT taxa, (3) tolerance/intolerance measures, including number of intolerant taxa, and (4) feeding measures, such as the number of filterer/collector taxa and the number of predator taxa. Details of the benthic macroinvertebrate assessment for this study are provided in WPI's "Stream Quality and Wetlands Assessment Report" in Appendix 'WPI' of this report.

Summarized results of Appendix B sampling within the potential refuse disposal sites are presented in Table 5-3.

As shown in Tables 1 through 18 in Appendix B of the WPI's Rport presented as Appendix "WPI' of this report, the benthic samples indicate that the streams within the proposed disposal areas support benthic macroinvertebrate assemblies typical of somewhat impaired watersheds. The total number of benthic taxa range from 11 to 19; 11 being at potential refuse disposal areas R3 and R8 and 19 being at potential disposal area R11. The streams support a relatively low to moderate percentages of EPT taxas (16.6-52.3%) and moderate number of pollution intolerant taxa (5-11) indicating moderately impacted watersheds. The taxa collected (Table 18 in Appendix B of the WPI's Report) averaged a Pollution Tolerance Value of 3.85. The lowest average pollution tolerance value observed was 3.81 at R19. This indicates a population heavily comprised of pollution intolerant organisms, and therefore favorable water quality. The highest average pollution tolerance value was 5.18 at R8 and the second highest tolerance value was 4.82 at R3. These indicate that the population shifted towards pollution tolerant organisms, and therefore poor water quality in comparison to the water quality at R19.

Benthic macroinvertebrate samples also were collected by WPI at stream sampling locations in the three additional areas in the non-HQ watersheds: Refuse Area #1 (RA6),Refuse Area #2 (RA7), andRefuse Area #5 (RA8).Refuse Area #3 could not be sampledfor benthic macroinvertebrate assessment because permission was denied by the landowner. Details of benthic macroinvertebrate assessment for the additional 3 disposal sites are presented in WPI's Report provided as Appendix 'WPI' of this report. Initially benthic macroinvertebrate sampling was performed by Appendix A Sampling Methodology. Results of Appendix A sampling efforts (from November 28, 2008 to June 10, 2008) indicate the majority of mainstems within the three (3) refuse areas sampled are diverse while the Unnamed Tributaries (UNTs) are variable and/or first use. See Figures 2, 3, and 4 of Appendix E of the WPI's Report in Appendix 'WPI'of this report. Summaries of species collected during Appendix A Sampling are presented in Table 1 through Table3 of Appendix F of the WPI's Report in Appendix 'WPI' of this report. Upon completion of Appendix A stream segment classifications, Appendix B sampling points were established and benthic samples were collected. The summarized results of Appendix B stream station macroinvertebrates collected within the three refuse disposal sites and the average Pollution Tolerance Value of the taxa are provided in Table 4 through Table 9 of Appendix F of the WPI's Report.. The summarized results of benthic macroinvertebrate metrics and biological scores of Appendix B samples are provided in Table13 through Table 18 of Appendix "WPI' of this report. A summary of biological data collected during Appendix B sampling for all the potential refuse disposal sites (both within HQ and non HQ watersheds) is presented in Table 5-3 of this report. The average pollution tolerance value at the three (3) sites in the non-HQ watershed varies from as low as 2.31 (at UNT North Fork Dunkard Fork in refuse Area #2 (RA7) to a value of 3.77 (at Falling Timber Run in refuse Area #1 (R6). The low average pollution tolerance value score observed at each of the three sites indicates a population of the macroinvertebrate community mainly comprised of pollution intolerant organisms, which in turn indicates favorable water quality compared to the water quality at the HQ watershed sites R3, R6, R8, R11, and R19.

A biological score was generated using the method described in Appendix B of PADEP's Surface Water Protection Technical Guidance Document Number 563-2000-655. The highest average biological score observed within the eleven potential disposal sites was 59.7 at R11. The

lowest was at R3 with a score of 37.5. The highest average biological score observed within the three (3) additional disposal sites in the non-HQ watershed was 44.5 at refuse Area #2 (RA7). The lowest was at refuse Area #1 (R6) with a score of 41.

The historic and present land uses within the initial study areas (within 25 square-mile search area originally selected in HQ watershed) have likely contributed to an overall decrease in water quality, when compared with similar sized streams in neighboring physiographic provinces. Agricultural, residential, and the presence of roadways, utility lines, and other impervious surfaces are also contributing to some pollution and sedimentation within each site of the 25 square-mile search area initially selected.

Stream habitat characteristics, as discussed in the "Stream Quality and Wetlands Assessment Report" in Appendix 'WPI' of this report, were numerically scored using the USEPA's stream habitat assessment field data sheets. These data were used to evaluate the benthic community structure at each of the sampling stations. The stream habitat assessment scores observed during Appendix B sampling for the potential refuse disposal sites (within the 25 square-mile search area) ranged from a low of 45% - within the "marginal" score range (50%-26%) at R3 to a high of 73% - within the sub-optimal score range(75%-51%) at R8.All other potential disposal areas [R6 (57%), R11 (59%), and R19 (57%)] earned sub-optimal habitat classifications. Stream habitat assessment scores observed in the three additional refuse disposal sites in the non-HQ watersheds ranged from a low of 57% - within the sub-optimal score range (75%-51%) at Refuse Area #1- Falling Timber Run to a high of 66% - sub-optimal score range (75%-51%) at Refuse Area #2 (RA7 – UNT to North Fork Dunkard Creek).

### 5.4.2 Comparison of Potential Refuse Area Surface Water Quality Relative to HQ & Non-HQ Watershed Locations

As shown in Table 5-3, although the average biological scores for both HQ and non-HQ watersheds are similar, the areas identified as Area #1 (Falling Timber Run), and Area #2 (UNT to North Fork of Dunkard Fork), all within a non-HQ watershed, have a lower average pollution tolerance value (3.04) than the average pollution tolerance value (4.48) of the five potential refuse sites (where sampling could be performed)within the HQ watershed. A value of 3.04 indicates no apparent organic pollution present; while an average pollution tolerance value of 4.48 in the HQ watersheds may indicate the presence of organic pollution. The higher level of organic pollutants in the original sampling area (HQ watershed) is to be expected due to the large amount of land used for agricultural/ animal husbandry purposes within the original 25 square-mile search area.

The total average habitat scores for potential refuse sites in the HQ and non-HQ watersheds are very similar, averaging 58% and 61%, respectively. These scores fall within the sub-optimal habitat classification range. Individually, the habitat scores for the refuse sites in non-HQ watershed [Falling Timber Run (Refuse Area #1), and UNT to North Fork Dunkard Fork (Refuse Area #2) are higher than some of the refuse sites of the original 25 square-mile search area in HQ watershed such as: R3, R6, R11, and R19. These sites share common characteristics including predominantly forested land use or forested habitat fragmented to varying degrees by agricultural

and residential activities. Potential refuse sites in the non-HQ watershed contain more forested area than the originally evaluated refuse sites (in HQ watershed) and provide more intact wildlife corridors and habitat. The refuse sites in Falling Timber Run (Area #1), and UNT to North Fork Dunkard Fork (Area #2) are within a non-HQ watershed identified as Trout-Stocking Fishery. Based on the observations made, the non-HQ areas are of equal or in some cases, healthier conditions (habitat scores and/or biological scores, and pollution tolerance value) than some of the sites within the HQ watershed. Water quality is not substantially different between the HQ and non-HQ sites.

# SECTION 6.0

# SECOND ASSESSMENT SITE ELIMINATION

## 6.1 SITE EVALUATION

For the second assessment, the ten (10) potential disposal sites shown on Exhibit 2 were evaluated and compared relative to their potential environmental impacts, public benefits, and other relevant parameters. The parameters/factors chosen for evaluation were derived from the Subchapter E, Site Selection in 25 Pa. Code § 90.202 and from the PADEP TGD for coal refuse disposal site selection. They are:

Technical Factors
- Storage Volume Efficiency
- Length of Conveyor Corridor

Environmental Factors
- Stream Impacts
  - Disposal Area Impacts
  - Conveyor Stream Crossings
- Wetland Impacts
- Public Water Supplies
- Area Previously Disturbed/Present Land Use
- Historic and Archaeological Sites
- Residences
- Adjacent Potential Prime Farmland Area
- Threatened and Endangered Species
- Wildlife

Social Factors
- Public Road Impacts
  - Disposal Area Impacts
  - Impacts from Coal Refuse Transport
- Utilities and Gas Wells
- Dust and Noise from Coal Refuse Transport
- Aesthetics

Table 6-1 summarizes and compares impacts associated with each of the ten (10) potential disposal sites. The sites were evaluated relative to each parameter described above by ranking them with numerical score according to the magnitude of the impact. Consequently, each site has been ranked for each parameter/factor with a numerical score. Because ten (10) sites are being evaluated the least possible ranking score is 1 and the maximum possible ranking score is 10; 1 being least impact and 10 being maximum impact. More than one site may have same ranking score for a given parameter when the impact for the parameter is of similar magnitude. When more than one site exhibited the same impact and given the same ranking score, the maximum

possible ranking score was reduced accordingly. For this evaluation, each of the parameters/factors considered were assumed to have equal weights. More detailed discussion of site impacts relative to each parameter are presented in the following subsections.

### 6.1.1 Storage Volume & Storage Volume Efficiency

The storage volume (disposal life) provided by each of the ten (10) disposal sites varies from approximately 25.9 million cubic yards (10.2 years) to as high as 32.0 million cubic yards (12.1 years) .One requirement of the TGD 563-2113-600 (Coal Refuse Disposal – Site selection) is "to minimize the number of new coal refuse disposal sites by building a few large ones instead of many small ones". Therefore larger the storage volume of a disposal site (i.e., more disposal life) the more preferable the site is for disposal of refuse. Sites are ranked as shown on Table 6-1 from 1 (largest) through 10 (lowest) with regard to storage volume (disposal life). Site R3 has the largest storage volume (disposal life) and is therefore ranked 1 compared to the other disposal sites. Site R21 has the second largest storage volume and is ranked 2.

A fair comparison of the sites relative to disposal volume and site area is only possible by evaluating and comparing the disposal volume provided per acre of disposal area. The highest value of disposal volume per acre indicates optimal use of the proposed facility development and thus would be rated the highest for disposal efficiency. The estimated volume per acre for each site and its ranking score is shown on Table 6-1. Disposal Site R21 exhibits the highest storage volume efficiency at 193,983 cubic yards per acre (CY/acre) and it is ranked 1, whereas Site R4 exhibits lowest storage volume efficiency at 132,561 cubic yards per acre (CY/acre) and is therefore ranked 10. Note the areas shown are disposal areas only. Actual facility areas will be larger than the disposal areas shown on the exhibits to accommodate other features such as access roads, drainage channels, soil stockpiles, sedimentation ponds, and conveyors, etc.

### 6.1.2 Length of Conveyor Corridor

Coarse coal refuse will be transported to the disposal site by belt conveyor; fine coal refuse by slurry pipeline. Construction and operation of coal refuse transport facilities will cause significant earth disturbance and the potential for uncontrolled release of coal refuse to the environment. Environmental impacts associated with coal refuse transport by these facilities, like transport costs and energy usage, are directly proportional to the length of the transport route. That is, more energy will be required, more cost will be incurred, and more environmental impacts will be sustained to transport coal refuse to remote sites as compared to sites nearer the preparation plant.

Comparison of the conveyance distance associated with each of the ten (10) sites was accomplished by estimating, for each disposal facility, the location and length of conveyor corridor necessary to deliver coal refuse from the preparation plant. Refer to Exhibit 2 for the horizontal conveyor alignments conceptualized for each disposal facility. Conveyance lengths are presented on Table 6-1.

**Table 6-1. Summary of Second Assessment Site Elimination**

| | PARAMETERS | R3 | SCORE | R4 | SCORE | R6 | SCORE | R8 | SCORE | R11 | SCORE | R19 | SCORE | R21 | SCORE | Area #1 | SCORE | Area #2 | SCORE | Area #3 | SCORE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TECHNICAL FACTORS | **Total Storage Volume (CY)** | 32,005,499 | 1 | 25,929,004 | 9 | 26,214,027 | 7 | 26,036,000 | 8 | 27,764,971 | 5 | 26,562,164 | 6 | 30,261,311 | 2 | 25,854,116 | 10 | 29,292,000 | 3 | 29,183,308 | 4 |
| | Disposal Surface Area (Acre) | 210.3 | | 195.6 | | 185.1 | | 161.6 | | 164.2 | | 191.1 | | 156.0 | | 179.1 | | 208.7 | | 198.2 | |
| | **Storage Vol. Efficiency (Volume/Acre)** | 152,226 | 4 | 132,561 | 10 | 141,621 | 7 | 161,114 | 3 | 169,092 | 2 | 138,996 | 9 | 193,983 | 1 | 144,356 | 6 | 140,355 | 8 | 147,242 | 5 |
| | **Length of Conveyor Corridor, LF** (conveyor length is directly proportional to cost, disturbed area, and potential for env impacts) | 5,211 | 2 | 7,090 | 3 | 3,394 | 1 | 12,018 | 6 | 11,175 | 5 | 13,309 | 7 | 10,550 | 4 | 18,845 | 8 | 21,597 | 9 | 29,276 | 10 |
| | **Total Technical Factor Score** | | 7 | | 22 | | 15 | | 17 | | 12 | | 22 | | 7 | | 24 | | 20 | | 19 |
| ENVIRONMENTAL FACTORS | **Estimated Stream Impacts** | | | | | | | | | | | | | | | | | | | | |
| | Estimated Stream Length Impacted (LF) | 9,783 | 3 | 11,489 | 6 | 16,607 | 7 | 8,265 | 1 | 10,514 | 5 | 17,336 | 9 | 9,403 | 2 | 9,796 | 4 | 16,778 | 8 | 10,519 | 5 |
| | Disposal Volume/LF of Stream | 3,272 | 1 | 2,257 | 6 | 1,578 | 8 | 3,150 | 3 | 2,641 | 5 | 1,532 | 9 | 3,218 | 2 | 2,639 | 5 | 1,746 | 7 | 2,774 | 4 |
| | Refuse Transport - Stream Crossings (Nos.) | 0 | 1 | 1 | 2 | 1 | 2 | 5 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 2 | 3 | 2 | 3 | 5 | 5 |
| | **Wetland Area Impacted (Acre)** | 0.17 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0.10 | 2 |
| | **Presence of Archaeological Sites** | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | | Have Potential | |
| | **Residences Impacted**[2] | | | | | | | | | | | | | | | | | | | | |
| | Residences Within Site Boundary (Nos.) | 1 | 2 | 1 | 2 | 3 | 4 | 1 | 2 | 0 | 1 | 2 | 3 | 0 | 1 | 6 | 7 | 3 | 4 | 5 | 5 |
| | Residences Within 1000' of Boundary (Nos.) | 2 | 3 | 3 | 4 | 3 | 4 | 0 | 1 | 1 | 2 | 7 | 7 | 10 | 8 | 5 | 6 | 4 | 5 | 3 | 4 |
| | **Potential Prime Farmland Area Impacted by Support Facilities (acres)** | 0.32 | 3 | 0 | 1 | 3.79 | 8 | 3.61 | 7 | 0 | 1 | 1.46 | 5 | 0.47 | 4 | 0.18 | 2 | 2.19 | 6 | 1.47 | 5 |
| | **Threatened and Endangered Species** | Listed Species: 1<br>FW Mussels | 2 | Listed Species: 1<br>FW Mussels | 2 | Listed Species: 1<br>FW Mussels | 2 | Listed Species: 1<br>FW Mussels | 2 | Listed Species: 1<br>Nuttali's Hedge-Nettle | 2 | Listed Species: 0 | 1 | Listed Species: 0 | 1 | Listed Species: 2<br>Nuttali's Hedge-Nettle<br>Leaf-Cup | 3 | Listed Species: 2<br>Nuttali's Hedge-Nettle<br>Leaf-Cup | 3 | Listed Species: 3<br>Leaf Cup<br>Carolina Willow<br>S. Wild Senna | 4 |
| | | Others of Concern: 1<br>C. Roadside Skipper<br>(Voluntary Action) | 2 | Others of Concern: 0 | 1 | Others of Concern: 0 | 1 | Others of Concern: 0 | 1 | Others of Concern: 1<br>C. Roadside Skipper | 2 | Others of Concern: 1<br>C. Roadside Skipper<br>(Voluntary Action) | 2 | Others of Concern: 0 | 1 | Others of Concern: 3<br>C. Roadside Skipper<br>S.Wood Sunflower<br>Beard-Tongue | 4 | Others of Concern: 3<br>C. Roadside Skipper<br>S.Wood Sunflower<br>Beard-Tongue | 4 | Others of Concern: 2<br>C. Roadside Skipper<br>Silvery Checkerspot | 3 |
| | **Wildlife Impacts** | 73% Forested<br>26% Agricultural<br>1 % Unclassified | 2 | 75 % Forested<br>25% Agricultural | 3 | 75 % Forested<br>25% Agricultural | 3 | 56 % Forested<br>44% Agricultural | 1 | 76 % Forested<br>24% Agricultural | 4 | 86 % Forested<br>14% Agricultural | 7 | 92 % Forested<br>8% Agricultural | 8 | 81 % Forested<br>18% Agricultural<br>1 % Unclassified | 5 | 85 % Forested<br>15% Agricultural | 6 | 95 % Forested<br>5% Agricultural | 9 |
| | **Total Environmental Factor Score** | | 22 | | 28 | | 40 | | 24 | | 25 | | 48 | | 30 | | 40 | | 47 | | 46 |
| SOCIAL FACTORS | **Road Impacts** | | | | | | | | | | | | | | | | | | | | |
| | Disposal Area Footprint - Twp Roads Impacted (LF) | 1,992[3] | 2 | 7,350 | 9 | 7,130 | 8 | 4,790 | 6 | 4,220 | 4 | 8,480 | 10 | 1,460 | 1 | 5,560 | 7 | 2,820 | 3 | 4,730 | 5 |
| | Disposal Area Footprint - State Roads Impacted (LF) | None | 1 | None | 1 | None | 1 | None | 1 | None | 1 | None | 1 | None | 1 | None | 1 | 3,985 | 2 | None | 1 |
| | Rock Truck Haul on Public Roads (LF of road) | 0 | 1 | 7,830 | 2 | 0 | 1 | 19,500 | 6 | 9,410 | 3 | 10,270 | 4 | 20,770 | 7 | 18,070 | 5 | 30,370 | 8 | 41,680 | 9 |
| | Refuse Transport - Road Crossings (Nos.) | 0 | 1 | 1 | 2 | 1 | 2 | 5 | 5 | 1 | 2 | 3 | 4 | 2 | 3 | 3 | 4 | 3 | 4 | 8 | 6 |
| | **Utilities Impacted Within Site Boundaries** | | | | | | | | | | | | | | | | | | | | |
| | Gas Transmission Lines Impacted (LF) | 0 | 1 | 0 | 1 | 1,403 L.F. (16" Ø) [1]<br>1,220 L.F.(6" Ø)<br>609 L.F. (4"Ø)<br>2,825 L.F. (10"Ø) | 7 | 1,427 L.F. (4" Ø) | 2 | 0 | 1 | 3,525 L.F. (6"Ø) | 5 | 2,580 L.F. (10" ø) | 3 | 1,444 L.F. (16"Ø) [1]<br>1,551 L.F. (10"Ø) | 4 | 0 | 1 | 3,257 L.F. (6" Ø)<br>3,790 L.F. (24" Ø) | 6 |
| | Power Transmission Line Impacted (LF) | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| | Electric & Telephone Lines Impacted (LF) | 7,850 | 8 | 7,350 | 7 | 7,130 | 6 | 4,790 | 3 | 4,220 | 2 | 8,480 | 9 | 1,460 | 1 | 5,560 | 4 | 6,805 | 5 | 4,730 | 3 |
| | Gas Wells to be Impacted (Nos.) | 1 | 2 | 0 | 1 | 7 | 6 | 0 | 1 | 1 | 2 | 6 | 5 | 5 | 4 | 4 | 3 | 1 | 2 | 12 | 7 |
| | **Dust & Noise from Refuse Transport** [2] | | | | | | | | | | | | | | | | | | | | |
| | Dwellings within 1000' conveyor route | 0 | 1 | 1 | 2 | 0 | 1 | 10 | 6 | 0 | 1 | 6 | 4 | 5 | 3 | 6 | 4 | 7 | 5 | 10 | 7 |
| | Dwellings within 1000' rock truck route | 0 | 1 | 1 | 2 | 0 | 1 | 24 | 6 | 1 | 2 | 6 | 3 | 23 | 5 | 15 | 4 | 31 | 7 | 41 | 8 |
| | **Aesthetics (Visibility of disposal area)** | | | | | | | | | | | | | | | | | | | | |
| | Relative to Roads | Hoge Run Rd. | | S.R. 21 | | Tower Rd. | | McQuay Rd. | | Macedonia Rd. | | Grinnage Run Rd. | | Hargus Creek Rd. | | Falling Timber Run Rd. | | Clay Lick Rd. | | Toms Run Rd. | |
| | | Covered Bridge Rd. | | Covered Bridge Rd. | | Norman Hollow Rd. | | | | | | Foxwood Rd. | | Center Highlands Rd. | | Higgins Cemetary Rd. | | Pettit Rd. | | Mt. Zion Rd. | |
| | | Church Hill Rd. | | Church Hill Rd. | | | | | | | | Edgar Rd. | | | | Milliken Rd. | | Wise Rd. | | Jones Rd. | |
| | | | | | | | | | | | | | | | | Crooked Hill Rd. | | Shelby Rd. | | | |
| | Relative to Dwellings [2] | 1 | 2 | 4 | 4 | 1 | 2 | 0 | 1 | 0 | 1 | 4 | 4 | 7 | 6 | 4 | 4 | 6 | 5 | 3 | 3 |
| | **Total Social Factor Score** | | 21 | | 32 | | 36 | | 38 | | 20 | | 50 | | 35 | | 41 | | 43 | | 56 |
| | **TOTAL SECOND ASSESSMENT SCORE** | 50 | | 82 | | 91 | | 79 | | 57 | | 120 | | 72 | | 105 | | 110 | | 121 | |

[1] Pipeline is Dead - Abandoned in place

[2] Residences owned by Foundation not included

[3] This is length of the Covered Bridge Road impact.

The site with the shortest conveyor length and therefore the most favorable (ranking score of 1) with respect to this parameter is Site R6 which has an estimated length of approximately 3,394 LF. But to get to this site the conveyor has to cross a stream which might have adverse environmental consequence. The second most favorable (ranking score of 2) is Site R3 for which the approximate conveyor length is 5,211 LF, but the conveyor does not cross any stream. Furthermore, surface disturbances required to install the conveyor for site R3 is likely to be much less than site R6, since the conveyor for site R3 will be installed in already developed surface area for Foundation Mine Surface Facilities. Based on the length of conveyor corridor, the ranking score for other remaining sites varied from 3 to 10.

### 6.1.3 Stream Impacts

#### 6.1.3.1 Disposal Area Impacts

Stream impacts were assessed by first determining the lengths of stream encroachment that would result from disposal within each of the ten (10) potential sites. For each of the sites, the individual site footprints shown on Exhibit 2 were assumed to be impacted. Stream lengths at each site were established using the best available data. For most of the sites this included use of field delineated stream data, much of which were developed for other studies. Stream data developed from rigorous field investigation provides a level of detail and accuracy greater than that required by the TGD and often are not available for site alternatives analyses.

Stream delineation/classification data developed by WPI are available for all the sites except R4, R21, Refuse Area #3, and part of sites R11 and Refuse Area #2. WPI was denied access to these sites. Stream lengths are depicted on Exhibit 2. Field delineated stream length data for the sites are summarized on Table 6-2. As indicated on Table 6-2, stream segments classified as diverse or variable are perennial per the Department's definition of perennial stream. Stream segments identified as First Use are primarily intermittent streams but may include reaches of ephemeral stream. Note that the lateral extent of Site R3 was increased to maximize disposal capacity after WPI's study; therefore the stream length presented in Appendix 'WPI' for Site R3 is less than the length reported on Table 6-2. The additional length was determined from WPI's stream study map.

For Sites R4, R21, Area #3, and part of Area #2, stream lengths were established using USGS topographic mapping and increasing the USGS stream length by a factor developed from comparison of field/ USGS stream lengths determined for the other sites. Within the section of Site R11 where access was denied by the landowner, the stream length was determined based on Foundation Mine planimetric mapping developed from aerial photography. USGS stream lengths and the length from Foundation Mine mapping for these sites are depicted on Exhibit 2. Table 6-2 presents USGS determined stream length impacts for each site. Those lengths also are expressed as a percentage of the field delineated lengths. As indicated on Table 6-2, USGS determined stream lengths are, on average, approximately 45.0% of the field delineated stream length. Predicted total stream lengths for Sites R4, R21, and Refuse Area #3 were estimated by dividing the USGS determined length by 45%. The predicted total stream length for Site R11

was estimated by adding the field delineated length to the length established from Foundation Mine Planimetric mapping.

Table 6-1 includes the total impacted stream length estimated for each potential disposal site as discussed above, along with the disposal volume provided per linear foot of stream impacted and the number of likely stream crossing(s) for refuse transport. With regard to the parameter- stream impact, sites were ranked based on total impacted stream length at each site. The site with shortest stream length impact (Site R8) was assigned a ranking score of 1 and site with longest stream length impact (Site R19) was assigned a ranking score of 9. Other sites were assigned ranking score between 2 and 8 depending on the impacted stream length. Sites R11 and Area #3 were assigned same ranking score of 5 since both the sites have similar impacted stream length. Since the disposal life provided by each of the sites varies, a fair comparison of the sites relative to stream length impacts is possible by evaluating and comparing the disposal volume provided per foot of stream impacted. The site with highest value of disposal volume per linear foot (ranking score of 1) indicates optimal use of the stream length that will be taken and thus the most favorable site. Site R3(ranking score of 1) exhibits the highest value, 3,272 cubic yards per linear foot, of stream and is considered most favorable relative to stream impacts. Site 19 with ranking score of 9 exhibits the lowest value, 1532 cubic yards per linear foot, of stream and consequently is least favorable relative to stream impacts. Sites R11 and Area #1with similar value of disposal volume per linear foot stream were assigned same ranking score of 5.

Apart from the low concentrations of dissolved oxygen noted for R6, all streams within the study area have physiochemical characteristics capable of supporting aquatic life. Sites at the HQ watersheds exhibited slightly but not substantially better water quality than the Non-HQ watersheds. When comparing specific watersheds and the physiochemical data collected at Appendix B sample locations, the watershed containing R3 has a slightly lower pH than overall average (6.55 vs. 7.24), a lower temperature (7.8$^{o}$C vs. 11.2$^{o}$C), slightly higher dissolved oxygen (14.02 ppm vs. 10.58 ppm), and lower conductivity (192.9 µS vs. 206.8 µS). None of these departures from average are substantial enough on their own to clearly show that R3 has diminished water quality than surrounding watersheds. However, none of the watersheds (HQ or non-HQ) have water quality parameters that deviate substantially from the average. R3's habitat score of 45 (marginal) is slightly lower than the overall average of 55.2 (sub-optimal), while its Appendix B biological score of 37.5 is lower than the overall average of 44.6 and lower still over the Non-HQ average of 43.3. The data support the assertion that water quality alone cannot be a deciding factor in the selection of the site for the proposed refuse area, and that there is some but not significant qualitative or quantitative difference between the HQ and non-HQ watersheds. Because of this relative equality between water quality parameters and macro-invertebrate communities across the entire study area, no single site presents itself as a uniquely preferable watershed. Conversely though, none of the water quality issues eliminate any site from consideration, and none of the water quality parameters support the distinction between HQ and non-HQ watersheds. However, comparing all the sites with regard to their macro-invertebrate biological score, habitat score, and average pollution tolerance value, site R3 ranks higher than other sites with regard to these parameters.

#### 6.1.3.2 Conveyor Stream Crossings

As discussed under Section 6.1.2 of this report, coarse and fine coal refuse will be transported to the disposal sites by belt conveyor and slurry pipeline, respectively. Often, the most logical

corridor between the preparation plant and disposal site for conveyor construction involves stream crossings. Associated with each crossing is a potential for adverse stream impacts during construction when the area is disturbed, as well as during operation if an uncontrolled release of coal refuse occurs. The greater the number of crossings, the greater the potential for stream impacts to occur.

Construction of the conveyor to nine of the ten disposal sites are being evaluated for this study, are expected to require at least one stream crossing. Based on the number of required stream crossing(s) nine disposal sites are assigned ranking score of 2 through 5. Conceptual conveyor alignment to Site R3 is not expected to require crossings therefore this site is assigned a ranking score of 1 and is considered most favorable relative to this parameter.

### 6.1.4 Wetland Impacts

Results of field studies performed by WPI to delineate/evaluate wetland areas were available for most of the sites and this data was used to evaluate disposal site wetland impacts for this study. As indicated above for the stream length evaluation, wetland data developed from rigorous field investigation provides a level of detail and accuracy greater than that required by the TGD and often are not available for site alternatives analyses. Secondary source information which typically is used for disposal site alternatives analyses (e.g., County Soil Surveys, National Wetlands Inventory Maps, and available aerial and USGS 7.5 Minute Series Topographic mapping), also was used for this analysis, especially for Sites R4, R21, and Area #3 where field data were not available.

Based on the field reconnaissance and secondary source information regarding wetlands, it has been determined that there are two wetlands present in the potential disposal sites. Site R3 contains 0.17 acres of wetland and Site Area #3 contains 0.10 acres of wetland. No other potential disposal site contains any wetland. All potential disposal sites except Site R3 and Site Area #3 were assigned a ranking score of 1, Site Area #3 was assigned a ranking score of 2 and site R3 was assigned a ranking score of 3.

The topography of the project area is comprised of steep and narrow valleys, with streams typically flowing along the flat valley bottoms. Additional streams flow off the steep hillsides to the valley bottoms. The historical use of these narrow valleys for agricultural purposes has altered the flow patterns of many of the streams, as they have been relocated to either side of the valley to accommodate roads and other human land use. Therefore, the streams tend to flow straight, and are slightly incised, removing a major source of hydrology for wetlands from the surrounding ground. Additionally, since there are few flat areas within the project area, there is little opportunity for water to collect for sufficient duration to form hydric soils or support hydrophytic vegetation.

It is therefore concluded that none of the potential disposal sites except sites R3 and Area #3 will impact wetlands. Based on ranking score Area #3 is better than R3 relative to this category as shown on Table 6-1.

## Table 6-2. Summary of Stream Lengths

| Potential Disposal Area | Stream Lengths Based on Field Delineation | | | | TOTAL Delineated (LF) | USGS Stream Length | | TOTAL with Predicted lengths[3] |
|---|---|---|---|---|---|---|---|---|
| | Perennial | | Intermittent[1] | No Permission (stream length per USGS topo, LF) | | Stream Length per USGS Topo (ft) | Expressed as % of total delineated length | |
| | Diverse (LF) | Variable (LF) | First Use (LF) | | | | | |
| **R3** | 1,948.3 | 6,834.7 | 1,000.0 | 0.0 | **9,783.0** | 5,518.0 | 56.4% | |
| **R4[2]** | | | | 5,170.1 | | 5,170.1 | | **11,489** |
| **R6** | 11,438.2 | 2,489.3 | 2,679.5 | 0.0 | **16,607.0** | 5,211.0 | 31.4% | |
| **R8** | 6,016.9 | 1,474.0 | 773.6 | 0.0 | **8,264.5** | 3,065.0 | 37.1% | |
| **R11** | 6,128.0 | 1,003.5 | 1,270.6 | 2111.6^ | 8,402.1 | 4,110.0 | 48.9% | **10,514** |
| **R19** | 7,718.7 | 3,817.1 | 5,800.3 | 0.0 | 17336.12 | 5,554.0 | 32.0% | |
| **R21[2]** | | | | 4,231.3 | | 4,231.3 | | **9,403** |
| **Area 1** | 584.3 | 5,344.7 | 3,867.1 | 0.0 | **9,796.1** | 4,404.0 | 45.0% | |
| **Area 2[2]** | 8,886.0 | 514.4 | 1,324.2 | 2,723.9 | 10,724.6 | 7,128.0 | 66.5% | **16,778** |
| **Area 3[2]** | | | | 4,733.5 | | 4,733.5 | | **10,519** |
| | | | | | | | | |
| | | | | | | **Average** | **45%** | |
| | | | | | | | | |

1. *Includes a minor amount of fringe ephemeral sections*
2. *All or portion of stream length calculated from 1:2000 Scale U.S.G.S. Quadrangles.*
3. *TOTAL with predicted lengths = [TOTAL delineated + (no permission length per USGS stream length)/0.45]*
   and in R11 = [Total delinated + no permission length based on Foundation Planimetric mapping]

^ Data not collected. Stream length based on Foundation Planimetric mapping

*Note: Total Stream length values in bold are those used for site assessment/comparison*

### 6.1.5 Public Water Supplies

PADEP Bureau of Water Standards and Facility Regulation have no record of any public water systems that have a surface water intake within ten (10) miles downstream of the search area or subsurface ground water sources (springs or wells) within one half mile of the search area. It is therefore concluded that none of the sites will impact community drinking water supplies. All ten potential disposal sites have been ranked 'most favorable' relative to public water supplies. See Appendix B for correspondence from the PADEP Bureau of Water Standards and Facility Regulation.

### 6.1.6 Present Land Use/Area Previously Disturbed

There are no national or state parks, national wildlife refuges, wild or scenic rivers, national or state forests, or state game land within the potential disposal sites. The sites are rural areas that are sparsely populated. They include primarily forested areas and pasturelands. Land cover for all the sites was determined by using the PAMAP Landcover 2005 dataset obtained from Penn State University. There are relatively minor disturbances at each of the sites consisting of those associated with houses, roadways, gas transmission lines and/or gas wells. Residences located within the potential refuse disposal sites may not be an important consideration since a site with the residences within will be owned by Foundation Coal once the site is selected for refuse disposal. Descriptions of each site follow:

Site R3

The land use of Site R3 is primarily forested but also is influenced by many agricultural activities, many of which are located near the streams within the site. Cattle have unlimited access to the stream channel in most areas. This practice has led to sediment and nutrient loading within the stream. Several structures, generally single family dwellings and structures associated with agriculture are located on this site. Small forested areas occurring on the hillsides within the watershed consist of red maple, sugar maple, red oak, hickory, and American beech. The extent of each type of area has been estimated as follows: 73 % forested, 26 % fields/pasture, and 1% barren or unclassified land.

Site R4

The land use of Site R4 is primarily forested but also is influenced by many agricultural activities. Cattle and horses have unlimited access to the stream channel of the unnamed tributary to the South Fork of Ten Mile Creek. This practice has likely lead to sediment and nutrient loading within the stream. Several single family dwellings and structures associated with agriculture are located on the site. Typical species include multi-flora rose, thistle, goldenrod and various upland grasses. Forested areas occurring on the hillsides within the watershed consist of black walnut, sugar maple, beech, and black cherry. The extent of each type of area has been estimated as follows: 75% forested, and 25% fields/pasture.

Site R6

Site R6 is mostly forested with small residential areas. Several single family dwellings and structures associated with agriculture are located within this site. Hay production is

found in close proximity to the headwaters of this area. Forested areas within the site consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. The extent of each type of area has been estimated as follows: 75% forested and 25% fields/pasture.

Site R8

The land use of Site R8 has similar proportions of forest and pastures/fields. The majority of the land near the streams consists of active pastures. Several single family dwellings and structures associated with agriculture are located on the site. Active cattle and sheep pasture cover a large portion of the site. New road construction exists in the northern portion of the site. Forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. The extent of each type of area has been estimated as follows: 56% forested and 44% fields/pasture.

Site R11

The land use of Site R4 is primarily forested on the hillsides and contains active pastures near many of the streams. Forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. Typical old pasture species include multi-flora rose, thistle, golden rod, and various upland grasses. The extent of each type of area has been estimated as follows: 76% forested and 24% fields/pasture.

Site R19

Site R19 is mostly forested habitat with isolated single family residential areas. Select-cut logging has occurred in the southern extent of the site. Access road construction in association with this logging was observed in this area. Forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, and American beech. The extent of each type of area has been estimated as follows: 86% forested and 14% fields/pasture.

Site R21

Refuse site R21 is dominated by old pasture and forested habitat. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses. Forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. The extent of each type of area has been estimated as follows: 92% forested and 8% fields/pasture.

Area #1This potential disposal site consists predominantly of upland deciduous forest habitat fragmented by residential and agricultural portions. The majority of residential and agriculture land uses occur near the headwaters of Falling Timber Run. Typical species observed include Christmas fern, wingstem, white oak, tulip poplar, red maple, and red oak. The extent of each type of area has been estimated as follows: 81% forested, 18% fields/pasture, and <1% as barren or unclassified land.

Area #2

Area #2 consists predominantly of upland deciduous forest habitat with small portions of residential and agricultural land. Typical species observed include false nettle, wood nettle, Christmas fern, wingstem, white oak, tulip poplar, red maple, and red oak. The

extent of each type of area has been estimated as follows: 85% forested and 15% fields/pasture.

Area #3

Area #3 is dominated by forest and old pasture habitat and also includes small portions of residential land. The fields and/or pastures are present near the headwaters of this sub watershed. Many gas wells along with their associated access roads are present. The extent of each type of area has been estimated as follows: 95% forested and 5% fields/pasture.

Disposal site land use is the basis for evaluation of facility impacts to residences and wildlife. Therefore, additional evaluation of the disposal sites based on a factor entitled 'Present Land Use/Area Previously Disturbed' is redundant and will not be performed. Site land use areas, percentage forested area, percentage of agricultural area, etc., are presented on Table 6-1 under the wildlife category.

### 6.1.7 Historic and Archaeological Sites

The Pennsylvania Historical and Museum Commission (PHMC) has been contacted regarding the potential for historic or archaeological sites to be present within any of the ten (10) potential disposal sites. Responses have been obtained for all ten (10) sites, R3, R4, R6, R8, R11, R19, R21, Refuse Areas #1, #2, and #3.

PHMC has not specifically identified archaeological sites within any of the seven (7) sites for which responses are available. Their field investigations did indicate the presence of historic 19$^{th}$ century farmsteads in valleys of most of the sites that could potentially be significant historic archaeological resources. Also, according to PHMC all locations could have supported prehistoric sites. Refer to relevant correspondence included in Appendix B.

Because no specific historic or archaeological sites could be identified in any of the seven potential refuse disposal sites, but all of the sites have potential to contain significant archaeological resources, all of the seven sites are considered equal with respect to this parameter. That is, no one site is being considered more favorable. It is expected that, at the very least, PHMC will indicate the remaining three sites also have potential to contain significant archaeological resources, so these sites were conservatively assumed equal to the other eight sites relative to this parameter. PHMC responses for Refuse Areas #1 through #3 received in May, 2009 are provided in Appendix B.

Appropriate archaeological investigations will be conducted on the selected disposal site as part of the facility permitting process.

### 6.1.8 Residences Impacted by the Disposal Area

Information obtained from USGS Quadrangles and available aerial photography was used to estimate the number of residences located within or in the immediate vicinity (within 1,000 feet)

of each potential disposal site. Estimated numbers of residences in each category, at each disposal site, are shown on Table 6-1. Note that residences owned by Foundation Coal were not included in the totals presented on the table.

Except in site R21 all the sites have residences varying from 1 to 6 within their site footprints, and except in site R8 all the sites have residence within 1,000 feet of the site footprints. As discussed in Section 6.1.6 residences within the site will have minimal environmental impact (but may be an economic impact) since the disposal site will be owned by Foundation Coal. Therefore site R8 have been identified as most favorable on Table 6-1 with respect to residences within 1,000 feet of the site footprint and is assigned a ranking score of 1.

### 6.1.9 Adjacent Potential Prime Farmland Area

Development and operation of the disposal site will require support facilities (i.e., roads, channels, ponds, stockpiles, etc.) downstream of the disposal area and on the ridges bordering the site. At many of the sites, potential prime farmland soil areas identified during the 1st assessment are adjacent to the disposal area and would be affected by the support facilities. The total acreage surrounding each site that could be affected by support facilities was determined and tabulated on Table 6-1. As indicated on the table, sites R4, and R11 have no surrounding potential prime farmland soil areas that could be affected, therefore, these sites were considered most favorable for this site evaluation parameter. For support facilities, however, prime farmland soil areas must be greater than or equal to 5 acres to be considered prime farmland. Since the potential prime farmland soil acreages presented on Table 6-1 for the eight remaining sites are less than 5 acres, the impacts of potential prime farmland soil on these sites are ignored. However for overall evaluation, sites are assigned ranking score 1 through 8 based on prime farmland soil acreages.

### 6.1.10 Threatened or Endangered Species

Inquiries into the possible presence of threatened or endangered species were performed. A PNDI request was submitted for all of the ten (10) potential disposal sites, followed by correspondence with the Pennsylvania Department of Conservation and Natural Resources (DCNR) Bureau of Forestry, Pennsylvania Fish & Boat Commission (PFBC), and Pennsylvania Game Commission. Searches with agency follow-up were conducted for all ten (10) sites in August 2008. Included in Appendix B are copies of the 2008 PNDI results and follow-up agency correspondence along with a September 9, 2008 letter documenting US Fish & Wildlife Service correspondence. Refer to Table 6-1 for results of the threatened and endangered (T&E) species investigation conducted for each site.

As indicated on Table 6-1, there is potential that listed threatened or endangered species may be present at eight of the ten sites. One potential impact was reported for the fresh water mussel species in sites R3, R4, R6, and R8. Site R11 has potential to impact one listed species, Nuttali's Hedge-Nettle, *Stachys nuttallii*, a PA Endangered Plant. Refuse Areas #1 and #2 each have potential to impact two species consisting of Nuttali's Hedge-Nettle and Leaf-cup, *Polymnia uvedalia*, a PA Threatened Plant. Area #3 has potential to impact three species: Leaf-

cup and two PA Endangered Plants: Carolina Willow, *Salix caroliniana*, and Southern Wild Senna *Senna marilandica*,.

Investigation results indicated no potential for threatened or endangered species to be impacted by disposal site development at Site R19, or R21. The DCNR suggested voluntary implementation of conservation measures for the imperiled *Ablyscirtes vialis*, Common Roadside Skipper Butterfly, at sites R19, and R21 because of the potential for impacts. DCNR clearly noted that no impacts were anticipated so site ratings do not consider voluntary action requests. DCNR requested investigation for the Skipper Butterfly at sites R3, R11, Refuse Area #1, Refuse Area #2, and Refuse Area #3.

FMLLC understands the Department cannot approve disposal activities that would affect the continued existence of endangered or threatened species or result in the destruction or adverse modification of their critical habitats. However, Chapter 86.37(a)(15) indicates site approval/disapproval based on threatened or endangered species should occur as part of the permitting phase, not the site approval phase. Chapter 86.37(a)(15) states the Department cannot approve a permit application unless the application demonstrates the proposed activities would not affect threatened or endangered species. It does not reference the site approval phase. The TGD for coal refuse disposal site selection clearly indicates the site alternatives analysis should be made on readily available information which would not include a rigorous survey(s) to establish the presence/absence of threatened or endangered species. Therefore, FMLLC contends mist-net surveying can and shall be a part of facility permitting and that approval of the selected site can be conditioned, as it has in the past, on the premise that threatened or endangered species will not be impacted. That said, FMLLC got completed a mist net survey for the Foundation Mine Complex including coal refuse disposal areas which was performed August 4 through August 11, 2010 by a qualified and approved Bat Surveyor with Civil & Environmental Consultants, Inc. (CEC) in accordance with USFWS standards. Results of the survey provided in the Indiana Bat Survey Report prepared by CEC, dated September 13, 2010, indicate that no Indiana Bat, or any other Threatened or endangered species were captured during the survey.

### 6.1.11 Wildlife Impacts

WPI performed a qualitative wildlife assessment for several potential disposal sites including the ten potential disposal sites subjected to Second Assessment. Refer to pages 74 through 77, Section 8.0 Qualitative Habitat Summary of WPI's "Stream Quality and Wetlands Assessment Report" in Appendix'WPI' of this report. Based upon field observations, aerial photographs, and the PAMAP Landcover dataset published by Penn State University (2005), land use types and percentages for each of the potential disposal sites were categorized as predominantly forest or a combination of forest and agriculture. See Table 6-1 for land use types and percentages associated within each refuse area.

The potential wildlife impact associated with development of a coal refuse disposal area is a function of the type and amount of habitat that would be lost and the number and type of wild life species that potentially use each habitat type. Forested areas contain species of trees that provide resting, nesting, and feeding sites for non-migratory birds and resting and feeding sties

for neo-tropical migrant birds. The trees also provide habitat and food source for small mammals such as squirrels, chipmunks, foxes and raccoons and larger animals as well.

Land uses in nine of the ten sites ( R3, R4, R6, R11, R19, R21, Refuse Area #1, Refuse Area #2, and Refuse Area #3) were categorized as predominantly forested which consists of one or more of the following habitats: all dense forest, all sparse forest, or mostly forest with small portions of agricultural or residential land use. Refuse Area #3 contains the largest amount of forested land, approximately 188 acres or 95 % of the total area of the potential disposal area footprint. Trees in the forested areas provide resting/ nesting/feeding sites for birds as well as habitat and food source for the small mammals described above. Several observations of whitetail deer trails and territorial markings were noted by WPI during field investigations.

Site R8 contains a combination of forest and agricultural land uses of similar proportions (56 % forested and 44 % agricultural). This site has the smallest area of forested land, approximately 90.5 acres, and the largest area of agricultural land, approximately 71.1 acres, as compared to the other nine sites evaluated above. Birds, small mammals and larger animals such as whitetail deer utilize these forested areas. Red-tail hawks were observed in the area during field investigations. The old fields and transition zones between forested land and pastures or crop fields contained multiflora rose, thistle, golden rod, and upland grasses as the dominant vegetation which provides suitable hunting grounds for raptors.

In summary, none of the refuse areas contain unique or rare habitat. Steep side slopes and narrow stream valleys associated with the refuse areas limit usage by wildlife species. The site setting (topography, vegetative cover) and present and historic land uses have all contributed to a lack of prime wildlife habitat in all of the proposed refuse areas. However, in order to compare the potential areas, sites are assigned ranking score (1 to 9) based on the amount of forested land cover area. Site R8 which contains the smallest amount of forested land cover and most altered landscapes which has resulted from agricultural activities (both present and historic), residential land use, etc. is assigned a ranking score of 1. Site R3 is second most favorable site with ranking score of 2.

### 6.1.12 Road Impacts

Public roads will be impacted by disposal operations if the road crosses the proposed disposal site and must be abandoned or replaced as part of the facility development. Transport facilities used to deliver coal refuse to the disposal site also will have an impact on public roads. Trucks used to haul breaker rock to the disposal site may have to use public roads where construction of a haul road is not feasible. Belt conveyors and slurry pipelines also may have to cross roads. Evaluation and comparison of each potential disposal site relative to these four road impact parameters are discussed below.

> Disposal Site Impacts to Public Roads. As indicated on Table 6-1, none of the disposal sites are crossed by State roads indicating that state roads will not be impacted by disposal site development. All sites were assumed equal relative to this parameter.
>
> Abandonment or relocation of township roads will be required for development of all of the potential disposal sites. Impacted lengths vary from 1,460 LF at Site R21 to as much

as 8,480 LF at Site R19. Since development of Site R21 would impact the shortest length of township road, Site R21 has been identified as most favorable (with a ranking score of 1) relative to township road impacts. With regard to Hoge Run Road, Center Township has agreed to condemn it for the operation of Foundation Mine slope area with the understanding that the Foundation Mining, LLC will upgrade the alternate routes to the satisfaction of Center Township. Therefore the Hoge Run road will not be impacted by the refuse disposal Site R3. Site R3 will impact only 1,992 LF of Covered Bridge Road. Site R3 is assigned a ranking score of 2 based on the impacted roadway length.

Rock Truck Haul on Public Roads. Breaker rock (generally composed of large rock pieces, cribs, bolts and other extraneous materials) is usually hauled to the disposal site by truck in order to minimize wear and tear of the conveyors. Considering that breaker rock typically is 4 to 5 percent of the total coal refuse volume, approximately 650 tons per day of breaker rock is expected to require transport during daytime hours from Foundation Mine preparation plant to the disposal site when the mine is producing at full capacity. Generally transport is accomplished on mine access roads using off road vehicles. Eight of the potential disposal sites are located a significant distance from the preparation plant and would require construction of long costly haul roads to areas that are remote relative to the mine site. The feasibility of constructing dedicated haul roads for this limited use requires evaluation beyond the required scope for this alternatives analysis. An alternate transport method, and one that was assumed for this analysis, is that smaller on-road trucks *(25-ton weight limit)* would be used to carry the breaker rock over public roads to the remote sites resulting in 26 such truckloads per day. Environmental impacts associated with hauling on public roads would include increased safety concerns, increased fugitive emissions, increased public nuisance, increase road maintenance requirements and shortened roadway pavement life. Note that township or state roads proposed for hauling could require widening and re-paving to accommodate the increased truck traffic.

Likely haul routes for the eight sites are shown on Exhibit 2. Where breaker rock transport on public roads would be required, the length of road involved varies from 7,830 LF with R4 to 41,680 LF with Refuse Area #3. Refer to Table 6-1 for impacted road lengths. Note that each haul route starts from one of two mine access roads to the preparation plant.

Sites R3 and R6 will not require hauling on public roads for breaker rock disposal. The truck haulage route for Site R3 will be along the refuse conveyor route; so will be for Site R6. These two sites are considered most favorable (with a ranking score of 1) relative to this parameter as indicated on Table 6-1.

Refuse Transport – Road Crossings. The coarse coal refuse conveyor corridor for many of the sites cross state or township roads. Construction of these crossings would be costly and would impact road traffic during the construction period. Design of state road crossings would have to be in accordance with PennDOT requirements and would require PennDOT's approval. Belt conveyors would have to be designed to contain the refuse and minimize spillage to the road traffic below.

All of the sites except R3 will require at least one road crossing by the refuse conveyors. As a result, site R3 is assigned a ranking score of 1 and considered most favorable relative to this parameter.

### 6.1.13 Utility Impacts

USGS Rogersville and Holbrook Quadrangle Maps and a map prepared by FMLLC from aerial photography were reviewed, and the PA One Call System was contacted to locate gas and power transmission lines as well as other utilities that may be impacted by the ten potential disposal sites. Based on this available information it appears that gas wells and transmission lines and/or electric, gas, and telephone service lines may be impacted by one or more of the disposal sites. No site will impact power transmission lines. Gas transmission lines as well as a 500 kV overhead power transmission line avoided by the site footprints are shown on Exhibit 2. Electric, gas and telephone lines for residential use are generally located along all of the public roadways and are not shown on Exhibit 2. Refer to Table 6-1 for the estimated length and corresponding pipe sizes for the gas transmission lines that would be impacted by each disposal site.

Only six of the ten sites, R6, R8, R19, R21, Refuse Area #1 and Refuse Area #3 contain gas transmission lines that would have to be relocated for disposal site development. Relocation of these lines would result in additional earth disturbance and associated environmental impacts. Sites are assigned ranking score of 1 through 7 depending on the length of gas transmission line. Sites R3, R4, R11, and Refuse Area #2 contain no gas and/or power transmission lines and therefore are assigned a ranking score of 1. Refer to Table 6-1. Since these sites will not have impacts on the gas and/or power transmission lines, these sites are considered most favorable sites relative to utility impact. Electric/telephone lines could be easily relocated without much impact on the environment; and may not need to be replaced if dwellings within the area are abandoned. However, to compare the sites ranking score of 1 through 9 are assigned to the sites based on the length of electric and/telephone lines impacted.

The number of gas wells present at each site were estimated from available data and presented on Table 6-1 for comparison purposes. No gas wells were identified for sites R4 and R8, therefore these sites are assigned a ranking score of 1 and are considered as most favorable relative to gas wells.

### 6.1.14 Dust and Noise from Refuse Transport

Construction and operation of the refuse belt conveyor and traffic on the rock truck route will increase dust and noise for those living in close proximity. Lights on the conveyor also may be viewed as a nuisance. Information obtained from USGS Quadrangles and available aerial photography was used to estimate the number of residences located within 1,000 feet of each conveyor route for each potential disposal site. Estimated numbers of residences are shown on Table 6-1 for each route and each disposal site. With regard to the evaluation of this parameter, sites are assigned ranking scores of 1 through 8 based on the number of dwellings within 1000' of conveyor routes and within 1000' of rock truck route. Note that residences owned by Foundation Coal were not included in the totals presented on the table.

No residences are located within 1,000 feet of the truck transport route for sites R3 and R6, therefore, these sites are assigned a ranking score of 1 with regard to this parameter as shown on Table 6-1. Sites R3, R6 and R11 have no residences in the vicinity of the conceptual conveyor route and are therefore assigned a ranking score of 1with regard to this parameter.

### 6.1.15 Aesthetics

The visibility of each disposal site to area roads and dwellings was evaluated. This was accomplished by reviewing the site locations relative to these exiting structures considering site topography indicated by the USGS topographic map. Results of the evaluation are presented on Table 6-1 for comparison purposes.

All of the sites will be visible from at least one road, but only two sites, R8, and R11 will be visible from only one road. All of the sites except R8 and R11 will be visible from one or more residences. Sites are assigned ranking scores 1 through 6 based on the visibility of disposal area from the number of dwellings. Sites R8 and R11 have a ranking score of 1 and are therefore considered most favorable with respect to aesthetics.

## 6.2 SUMMARY OF SECOND ASSESSMENT

Evaluation and comparison of impacts associated with each potential disposal sites relative to the parameters of the technical, environmental, and social factors can best be summarized, as shown on Table 6-1, by adding separately the ranking scores of each site relative to the parameters/factors evaluated. Site(s) with lowest total score relative to the parameters/factors being evaluated will generally have least impact compared to the sites with higher total score. For example the Total Technical Factor Score for ten sites subjected to second assessment varies from 7 to as high as 24; 7 being lowest for both Site R3 and R21 and 24 being highest for Site Area #1. Sites R3 and R21 are therefore expected to have least overall impact with regard to the parameters of the Technical Factors evaluated. It is to be noted however that though Site R3 is ranked 1, and Site R21 is ranked 2 with regard to the 'total storage volume', Site 21 is ranked 1 and site R3 is ranked 4 with regard to the 'storage volume efficiency'. Sites R11 and R8 are ranked 2 and 3 with regard to this parameter. Considering Total Technical Factor Score, Sites R3 and R21 stand out as most favorable sites and Site R11 stands out as 2$^{nd}$ best favorable site.

Considering environmental factors, Total Environmental Factor Score for ten sites subjected to second assessment varies from a lowest of 22 for Site R3 to as high as 48 for Site R19. Site R3 is therefore expected to have least impact and therefore most favorable with regard to the parameters of Environmental Factors. Total Environmental Factor Scores for Sites R8 and R11 are 24 and 25 respectively, which are close to the value for Site R3. Sites R8 and R11 can therefore be rated as 2$^{nd}$ best favorable sites.

Total Social Factor Score for ten sites subjected to second assessment varies from a lowest of 20 for Site R11 to as high as 56 for Site Area #3. Site R3 has a score of 21 which is similar to that for Site R11. Thus Site R11 stands out to be most favorable and site R3 stands out 2$^{nd}$ best favorable site with regard to Social Factors.

Total Second Assessment Score for the ten sites evaluated, as shown on Table 6-1, varies from a lowest of 50 for Site R3 to as high as 121 for Site Area #3. Thus Site R3 stands out to be most favorable compared to other sites. However, sites R8, R11, and R21 are also favorable since each of these sites have ranking score of some parameters equal or better compared to the Site R3, as shown on Table 6-2, and discussed previously. As a result all these four sites (R3, R8, R11, and R21) are treated equally relative to the Second Assessment Site Elimination parameters and are subjected to the 3rd Site Assessment Site Elimination that will consider cost.

# SECTION 7.0

## THIRD ASSESSMENT SITE ELIMINATION

A third and final assessment based on cost has been conducted to further evaluate and compare the four potential disposal sites (R3, R8, R11, & R21) remaining after the Second Assessment Site Elimination.

A conceptual construction cost is prepared for each of the four (4) potential disposal areas for comparison. Each estimate only considers significant costs and costs that would vary considerably among the disposal sites. They are land acquisition, disposal facility site preparation and construction, conveyor and slurry pipeline installation, conveyor and slurry pipeline operation and maintenance, gas line relocation, and mitigation of stream and wetland impacts. The costs for township road relocation and/or upgrading of state roadways that may be necessary for development and operation of Sites R8, R11, and R21 have not been included. Table 7-1 presents and compares cost estimates that are developed for each of the four (4) potential disposal areas.

Site development and construction for each disposal area will consist of drain, ditches, sedimentation pond and liner installation as part of the site preparation and construction and installation of low permeability vegetated cap when the facility is closed. It is assumed that a synthetic cap will be required during the facility permitting stage. Development of any of the four alternate disposal facilities will require construction of a belt conveyor for transport of coarse refuse and slurry pipe line for transport of fine refuse from the preparation plant to the disposal site. As indicated on Table 7-1, the conveyor cost would include a) basic site preparation costs; b) overland belt conveyor costs; c) elevated &enclosed conveyor costs; d) transfer station costs; and e) conveyor operation and maintenance costs. Slurry pipe line costs would include a) Pump and slurry pipeline and their installation costs; b) return pipe line and pump costs for fresh water system operation; c) slurry pipe line and freshwater system operation and maintenance costs.

Unit costs used in this evaluation are based on Alpha Natural Resources' experience at other mine sites. Land acquisition costs at the project site vary widely. However, the average cost used by Alpha in their planning and budgeting was selected for this evaluation.

As shown on Table 7-1, Site R3 would be the least costly disposal site to develop and operate. The cost per cubic yard of coal refuse disposal at this site has been estimated to be $1.73/CY compared to the next lowest cost of $2.49/CY for Site R21. The primary cost differentials among the four potential disposal areas are associated with land acquisition that would be needed to construct the proposed facilities, disposal site preparation and construction, and with refuse conveyance system (conveyor & slurry pipe line) installation and operation.

## TABLE 7-1. THIRD SITE ASSESSMENT COST COMPARISON

| PARAMETERS | UNITS | UNIT COST | DISPOSAL SITES | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | R3 | | R8 | | R-11 | | R-21 | |
| | | | Qty. | Cost | Qty. | Cost | Qty. | Cost | Qty. | Cost |
| **TECHNICAL** | | | | | | | | | | |
| **Total Storage Volume (Million CY)** | | | 32.0 | | 26.0 | | 27.8 | | 30.3 | |
| Disposal Life (Years) | | | 12.1 | | 10.3 | | 10.9 | | 11.5 | |
| Disposal Surface Area (Acre) | | | 210.3 | | 161.6 | | 164.2 | | 156.0 | |
| Efficiency, Vol/Ac (to compare site prep $) | | | 152,226 | | 161,114 | | 169,092 | | 193,983 | |
| **Conveyor Corridor** | | | | | | | | | | |
| Length at grade | | | 2,574 | | 2,164 | | 7,757 | | 5,872 | |
| Length on truss | | | 2,637 | | 9,854 | | 3,418 | | 4,678 | |
| *Total* | | | *5,211* | | *12,018* | | *11,175* | | *10,550* | |
| **Stream/Wetland Impacts** | | | | | | | | | | |
| Stream Length Impacted (LF) | | | 9,783 | | 8,265 | | 10,514 | | 9,403 | |
| Disposal Volume/LF of Stream (CY/LF) | | | 3,272 | | 3,150 | | 2,641 | | 3,218 | |
| Wetlands Impacted (Acre) | | | 0.17 | | 0 | | 0 | | 0 | |
| **COST** | | | | | | | | | | |
| **LAND ACQUISITION** | | | | | | | | | | |
| **Disposal Area** | Acre | $12,000 | 27.0 | $324,000 | 161.6 | $1,939,200 | 164.2 | $1,970,400 | 156.0 | $1,872,000 |
| **Conveyor Corridor** | Acre | $12,000 | 0 | $0 | 25 | $300,000 | 0 | $0 | 69 | $828,000 |
| **GAS WELL ABANDONMENT** | Ea | $300,000 | 1 | $300,000 | 0 | $0 | 1 | $300,000 | 4 | $1,200,000 |
| **DISPOSAL AREA CONSTRUCTION** | CY | $0.87 | 32,005,499 | $27,971,409 | 26,036,000 | $22,754,327 | 27,764,971 | $24,265,372 | 30,261,311 | $26,447,064 |
| **CONVEYOR SYSTEM** | | | | | | | | | | |
| **Conveyor Site Development** | LF | $256 | 5,211 | $1,332,688 | 12,018 | $3,073,545 | 11,175 | $2,857,952 | 10,550 | $2,698,111 |
| **Belt Conveyor Construction*** | | | | | | | | | | |
| Overland Belt Conveyor | LF | $1,200 | 2,574 | $3,088,800 | 2,164 | $2,596,800 | 7,757 | $9,308,400 | 5,872 | $7,046,400 |
| Belt Conveyor Elevated & Enclosed | LF | $2,700 | 2,637 | $7,119,900 | 9,854 | $26,605,800 | 3,418 | $9,228,600 | 4,678 | $12,630,600 |
| Transfer Station/Bin | EA | $300,000 | 5 | $1,500,000 | 5 | $1,500,000 | 7 | $2,100,000 | 5 | $1,500,000 |
| **Slurry Pipeline Construction** | LF | $200 | 5,211 | $1,042,200 | 12,018 | $2,403,600 | 11,175 | $2,235,000 | 10,550 | $2,110,000 |
| **Freshwater Return System Construction** | LF | $85 | 6,211 | $527,935 | 13,018 | $1,106,530 | 15,955 | $1,356,175 | 5,400 | $459,000 |
| **Operation & Mainenance*** | | | | | | | | | | |
| Belt Operation @ 5% of Belt Cost annually | Yr. | 5% belt $ | 12.1 | $6,176,264 | 10.3 | $15,039,339 | 10.9 | $10,102,665 | 11.5 | $11,314,275 |
| Slurry Pipeline Operation | Yr. | $203,580 | 12.1 | $2,463,318 | 10.3 | $2,096,874 | 10.9 | $2,219,022 | 11.5 | $2,341,170 |
| Freshwater System Operation | Yr. | $57,945 | 12.1 | $701,135 | 10.3 | $596,834 | 10.9 | $631,601 | 11.5 | $666,368 |
| **UTILITY RELOCATION** | | | | | | | | | | |
| **4- to 6-inch High Pressure Gas Line** | LF | $400 | 0 | $0 | 1,427 | $570,800 | 0 | $0 | 0 | $0 |
| **10-inch High Pressure Gas Line** | LF | $560 | 0 | $0 | 0 | $0 | 0 | $0 | 2580 | $1,444,800 |
| **Power Line** | LF | | | $0 | | $0 | | $0 | | $0 |
| **MITIGATION** | | | | | | | | | | |
| **Stream** | LF | $300 | 9,783 | $2,934,900 | 8,265 | $2,479,500 | 10,514 | $3,154,200 | 9,403 | $2,820,900 |
| **Wetland** | Acre | $10,000 | 0.17 | $1,700 | 0 | $0 | 0 | $0 | 0 | $0 |
| | | | | | | | | | | |
| **TOTAL COST** | | | | $55,484,247 | | $83,063,148 | | $69,729,386 | | $75,378,688 |
| **TOTAL COST PER CUBIC YARD OF STORAGE** | $ / CY | | | $1.73 | | $3.19 | | $2.51 | | $2.49 |

* The belt length shown for each site is the total length of conveyor from the preparation plant to the site. Since no site exhibits a disposal life greater than 15 years, the belt conveyor operating cost does not include belt replacement costs. The yearly cost basis is based on Alpha Natural Resources experience at other sites.

** A zero value indicates the property already is owned by Alpha

# SECTION 8.0

# CONCLUSIONS

Removal and processing coal extracted from the Foundation Mine area currently under permit review by the Department will produce approximately 25.23 million cubic yards of coal refuse during approximately the first 10 years of mine life. A disposal site large enough to store at least this quantity of coal refuse will be needed to support proposed mine operations. The disposal site will need to be operated as a slurry impoundment; therefore, the selected disposal site must support development of a single pool/reservoir area. Based on the preceding analysis, the best method for achieving coal refuse disposal is by developing a coal refuse disposal area within Site R3. No other site was identified as more favorable for coal refuse disposal based on results of the alternatives analysis outlined in this report.

Analysis of a search area greater than 25-square miles surrounding the proposed Foundation Mine coal preparation plant initially identified 31 possible disposal sites for coal refuse generated by the plant. No preferred sites were identified and underground disposal was considered but determined to be not feasible. Possible disposal sites were identified within the HQ watershed area surrounding the proposed preparation plant as well as sites within the non-HQ watershed beyond the 25-square mile search area. None of the HQ watersheds exhibited substantially better water quality than the Non-HQ watersheds. Because of this relative equality between water quality parameters and macro-invertebrate communities across the entire study area, no single site presents itself as a preferable water shed. None of the water quality parameters support the distinction between HQ and Non-HQ watersheds. Only ten of the 31 sites have sufficient capacity for the target coal refuse production volume and are free of other fatal flaws prohibiting disposal. The site alternatives analysis concluded that Site R3 is the best site for disposal facility development when considering environmental impacts, particularly impacts to streams, aquatic resources, and impacts to local residents, as well as cost.

As indicated in Section 6.0 of this report, development of a disposal area at R3 will impact approximately 9,783 LF of stream and approximately 0.17 acres of wetland which will be mitigated in accordance with a plan approved by the regulatory agencies. This stream length is only 18 percent higher than the site exhibiting the least stream length impact, Site R8. Considering the accuracy of the data used to establish stream length, the difference is not very significant. Sine the R3 Disposal Facility will be located close to the preparation plant it will not impact utilities, and will not require coal refuse transport near residences or on public roads. Development within R3 has potential to impact freshwater mussels; however, a field survey will be conducted as part of the permitting process to investigate its presence. FMLLC has recently completed a mist net survey for Foundation Mine complex including coal refuse disposal area R3 to confirm the absence of potential impacts to the Indiana Bat. Site R3 has potential to include significant archaeological resources. As part of the facility permitting process FMLLC will have the site investigated and cleared by PHMC.

Cost analysis indicates Site R3 will be the most economic site to develop and operate. A disposal cost of $1.73 is estimated for Site R3. The next lowest cost of $2.49 is estimated for Site R21, which is 43.9 percent higher than the cost at Site R3.

As indicated above, FMLLC proposes Site R3 as a slurry impoundment for disposal of a substantial part of coal refuse to be generated by the proposed Foundation Mine Preparation Plant. No other site is considered more favorable, and construction of the coal refuse disposal facility is necessary for coal production by the mine.

Public benefits associated with development of a disposal site at R3 will clearly outweigh the potential environmental impacts discussed above. Development of the disposal facility will facilitate operation of the Foundation Mine which in turn will benefit the public by creating/retaining hundreds of direct jobs in Greene County and thousands of indirect jobs without causing substantial impacts to the environment. Based on a study by Adam Rose and Oscar Frias (The Impact of Coal on the U.S. Economy; a report to the National Coal Association, 1994), the "ripple" or "multiplier" effects of mine operations on production, income, and employment in other sections of the economy will be several times the magnitude of the production, income, and employment in the mine itself. For example, Rose and Frias report that for every $1 billion of coal produced, there is a demand by the coal industry for $5.4 million of transportation and $12.8 million of business services in the United States. As a result, effects of Foundation Mine operation will not just be limited to production and sales but also the direct jobs it will create. The benefits of mine operation also will extend to indirect income, employment, and tax revenues. Tax receipts of federal, state, and local governments will be used to fund public expenditures such as roads, schools, and hospitals.