PHASE I APPLICATION
CAMP HOPE RUN LANDFILL
BOGGS TOWNSHIP, CLEARFIELD COUNTY, PENNSYLVANIA

FORM F
ATTACHMENT F-1
Narrative – Soils Information

REVISED JUNE 2019

FORM F – SOIL INFORMATION - PHASE I

SECTION B. SOIL SERIES

PHASE I SOILS/OVERBURDEN INFORMATION

Introduction

This **Form F** is being submitted by Smith Gardner, Inc. (S+G) on behalf of PA Waste, LLC (PA Waste) in support of a Phase I permit application to site a proposed Municipal Solid Waste (MSW) landfill facility referred to as the Camp Hope Run Landfill. PA Waste proposes to construct and operate the landfill in Boggs Township, Clearfield County, Pennsylvania. The proposed facility is situated on an approximate 2,071-acre parcel of property located about 6.5 miles southeast of Clearfield, Pennsylvania along the west side of SR 0153. The proposed landfill facility and supporting features/activities will be generally confined to the southern portion of the property between Camp Hope Run (bordering to the North), Sanbourn Run (bordering to the South), and Clearfield Creek (bordering to the west).

The proposed landfill development will encompass a total of about 850 acres, which includes approximately 217 acres of actual waste disposal (footprint), with the balance of the development being occupied by access roads, parking areas, administrative/maintenance buildings, sedimentation basins, leachate treatment/storage areas, (surplus) soil/rock stockpile areas and undisturbed buffers. The development (excluding the entrance facilities) is divided into three primary areas as a function of their existing conditions and proposed use. The northern third of the facility, referred to as **Area S1** is currently undeveloped with only limited prior surface mining and is intended for permanent soil/rock stockpiling and related support features (sediment basins, channels, etc.). **Area S2**, which comprises the central third of the development, is also currently undeveloped and is planned for waste disposal construction/operation, surplus soil/rock stockpiling, and support facilities including a perimeter berm, sediment basins, etc. **Area S3,** which comprises the southern third of the site development is presently a reclaimed surface coal mine site and is planned for waste disposal construction/operation. It is noted that the permanent stockpiles in Areas S1 and S2 are presented in the Phase II Permit/Design drawings at their maximum storage capacity; about 3.53 million CY in the S1 stockpile and about 0.75 million cubic yards (CY) in the S2 stockpile.

This soils information narrative describes 1) the distribution (mapping), quantity, and general characteristics of the various soil series encountered on the proposed site (based on previously published soil survey mapping and a detailed field confirmation update), 2) subsurface (soil material volume/depth) investigations at the site of the proposed MSW landfill, 3) subsequent laboratory analyses, 4) engineering and soil science evaluations, and 5) a plan for soil sampling during facility construction and operation to ensure compliance and quality. The information in this narrative is based on publications, backhoe test pits, drilling evaluations (borings/wells), discussions with prior landowners, general experience working with sites/soils similar to those encountered on this proposed site, and an independent update and confirmation of site soils mapping completed by a Certified Professional Soil Scientist.

Although the proposed landfill development areas contain a considerable volume of unconsolidated soil material, reclaimed (surface coal) mine spoil (from Area S3) is expected to comprise about half of the material generated by the excavation necessary to develop the landfill cells. Likewise, oversized material is expected to be encountered during both the S2 and S3 Area excavations; processing of oversized materials is expected in both the S2 and S3 Areas. Techniques for processing are covered in more detail below (**Processing Method**). As a result, a large portion of the construction and operational material anticipated for use in the landfill will be the previously, reclaimed mine spoil (overburden) and weathered rock (processed). All usable overburden quantities of soil (non-pod spoil materials) from Area S3 will be used as structural fill, intermediate cover, or daily operational cover. Material usage and application is further discussed in Phase II of the Permit Application. All oversized, non-processed material will be stockpiled.

Soil Information

Topography

The proposed site consists of a series of partially forested, broad, ridge tops with intervening, steep-sided stream valleys. Existing topographic relief at the site within the proposed development ranges from about Elevation 1,400 feet to about Elevation 1,800 feet. The southernmost portion of the area proposed for development covering about 100 acres, was previously surface-mined for coal and reclaimed back to approximate original contour. The only other areas mined include 1) an approximate 27-acre area south of the existing gas pipeline (south of the larger reclaimed area), which is not planned to be excavated, and, 2) an isolated area (about 12 acres in size) at the northwest limit of the development. All surface coal mining operations on the southern portion of the property were terminated sometime around 2003.

Soil Series

Based on information contained in the *Soil Survey of Clearfield County Pennsylvania*, (Sheet 45, dated 1981, and updated in December 2005), the surficial soils present at the site consist of the following within the areas planned to be disturbed by either landfill construction or surplus excavation material stockpiling. Also included is the average soil thickness or depth to bedrock as encountered in (all of) the test pits excavated at the site.

USDA Mapping Symbol	Soil Series	Approximate Area within Waste Footprint, Acres (% of Footprint Area)	Approximate Area within Stockpile Areas, Acres	Average Total Thickness – Depth To Bedrock, Feet
CmC	Clymer	0 (0%)	0	5.8
CoB	Cookport	3 (1%)	9	3.6
CoC				
CxD				
DeC	DeKalb	15 (6%)	32	4.8
DxB				
DxD				
ErB	Ernest	6 (3%)	6	6.7
ErC				
ExD				
GlC	Gilpin	8 (3%)	8	10.0
GmD				
HaD	Hazleton	118 (50%)	165	4.6
HbD				
HbF				
HcB	Hazleton-Clymer			
HcC				
HdB				
RbF	Rayne	8 (3%)	14	7.0
Up	Udorthents	82 (34%)	12	Varies up to about 80 feet

A plan soil series mapping relative to the proposed site development plan limits are presented in **Attachment F-2 (Rev. March 2019)**, which is based on the *Soil Survey of Clearfield County, Pennsylvania*, published in 1988. The soils mapping for this application was completed by an independent Certified Professional Soil Scientist in 2005. It is noted that approximately 82 acres of the proposed waste footprint and perimeter berms are located within the on-site limits of the

previously mined/reclaimed areas (remapped as Udorthents, smoothed). As a result, the above totals reflect the surficial soil series remapped in these areas within the waste footprint. Based on the updated soil mapping, about 34% of the anticipated waste footprint and perimeter berm area is proposed within areas now occupied by reclaimed, mine spoil. As previously mentioned, the proposed landfill development will remove all of this mine spoil. The Udorthents on the Camp Hope Run site are composed of mixed mineral materials generated from surface mining operations. The Udorthents range in depth from less than a few feet to nearly 80 feet and have been reclaimed, smoothed and revegetated.

With regard to the more predominant soil series encountered within proposed footprint, the Hazleton soil series consists of deep, well-drained upland soils formed in weathered residuum from sandstone units. In Clearfield County, these soils are typically located on ridge tops and steep hillsides. The Dekalb series is moderately deep and well-drained, and also formed in weathered residuum from both sandstones and shales. Clymer soils are similar to the Hazleton and Dekalb series but tend to have fewer coarse fragments throughout.

A report on the confirmation and updating of the surficial soils mapping of the proposed landfill disturbance area is presented as **Attachment F-3**.

Bedrock

The proposed permit area is located in the Pittsburgh Low Plateau Section of the Appalachian Plateaus physiographic province. This province extends from the western state boundary to the Alleghany Front, a prominent southeast-facing escarpment of approximately 1,000 feet of relief (Callaghan, et. al. 1998).

The Appalachian Plateau consists almost entirely of sedimentary rocks including shale, sandstone, limestone, coal, underclay, claystone, siltstone, and conglomerate. Strata in the permit area range from Mississippian sandstone at the level of Clearfield Creek, which is approximately 1,000 feet west of the permit area, to Pennsylvanian siltstones and sandstones forming the hilltops (Hawkins, et. al. 1996). Strata are relatively flat lying with northeast-southwest trending folds with decreasing structural relief northwestward of the permit area (Callaghan, et. al. 1998).

In general, the most recently completed test pit program verified that bedrock at the site is relatively shallow, particularly on ridge tops where the average depth to backhoe refusal is about four feet.

As is typical of much of the sedimentary bedrock in the region, the materials beneath much of the proposed lined landfill area contain a significant percentage of material that breaks down in particle-size during mechanical handling and subsequent weathering/exposure. These include thinly-bedded siltstone, claystones, and shales, as well as sandstone interbedded with these thinner beds. Based on past experience at similar facilities, excavation, loading, unloading, and stockpiling of these materials promotes additional, accelerated weathering and breakdown (particle-size reduction). Blasting, anticipated to be necessary in the proposed excavation, further breaks-down and pulverizes the rock materials in these zones. This process is evident in the prior surface-mined area backfill and remnant spoil piles at the site which show significant reduction in material size to less than six inches. Test pits TP-1 through TP-9, TP-32, TP-39, and TP-62 were excavated in the reclaimed areas of the site and provide further visual confirmation of these characteristics. Additional test pits (OBTP-1 through OBTP-13) were excavated in January 2019 within the reclaimed mined limits to further analyze the mine spoil and more clearly define the mine limits. The additional test pit data for OBTP-1 through OBTP-13 is provided in **(Attachment F-7, March 2019)**.

These processes are expected to produce material that ultimately meets the requirements for daily, intermediate, and final soil cover in addition to structural (controlled) fill and unclassified fill. It is also expected that there will be instances where the handled material still contains

unacceptable percentages of over-sized rock, and some processing may be required to remove the larger fraction. Additional information in this regard is presented in the following sections. However, it is noted that as a result of the excavations required for the proposed landfill development, much of the rock is not expected to be needed since there is sufficient soil and previous mine spoil available to meet soil requirements. This less desirable rock material would be stockpiled into one of the two proposed permanent stockpile areas based on the material origin (Area S2 or Area S3) or used in perimeter berm construction, where the larger rock particles are not detrimental.

In the event that blasting is necessary to remove rock that cannot otherwise be economically excavated/removed, a Blasting Plan will be prepared and submitted to the Department of Mining and Reclamation for review and approval prior to blasting at the site. The Blasting Plan will be prepared by a licensed blaster in accordance with 25 PA Code Chapter 211. The Blast Plan will be designed and conducted to achieve either a minimum scaled distance of 90 or meet the maximum allowable peak particle velocity indicated by Figure 1 of PA Code Chapter 211.151 (c) and not exceed the noise levels specified in Table 1 of PA Code Chapter 211.151 (d) at the closest building not owned or leased by the permittee or its customer. These objectives are achieved by limiting the amount of explosives per delay in the blast plan. In addition, the stability of adjacent landfill features will be considered in the preparation of the blast plan. Blasting in accordance with the PA Code Chapter 211 is a highly controlled activity, designed to minimize vibrations (seismic velocity) and noise (air blast), which has been conducted at numerous landfills in Pennsylvania as well as at the Camp Hope Run landfill site during the previous coal mining activities. Each blast is designed to control both seismic velocity and airborne debris (“flyrock”) and to suit rock conditions in the specific blast area. All blasting will be conducted in accordance with the submitted and PADEP-approved blasting plan.

Mine Spoil

An extensive study of site strata, including an evaluation of the potential for these selected lithologic strata to produce acid mine drainage (AMD), was included as part of the prior surface mine permitting. The study included overburden analyses that demonstrated that the site contains sulfur-bearing strata that exhibited the potential to produce AMD. The sulfur-bearing units are generally located in the strata (Lower Kittanning coal rider) located above and below the pit floor of the Lower Kittanning coal in the central and southern portions of the proposed footprint area. Additionally, the study identified excess alkaline bearing strata in the central portion of the permit area.

Special handling procedures to address AMD-producing strata were developed, permitted, and subsequently implemented during the previous site surface coal mining activities. These procedures were developed as a result of the overburden analysis and the resulting criteria to identify strata that will influence AMD. The materials handling procedures that were developed required that excavated material that contained 1% of pyrite or more was to be separated from the other mine spoil so that alkaline material could be added to it, and then surrounded with clayey material to isolate it from the other backfill. Only excavated material with 30 tons/1000 tons of neutralization potential or greater was considered to contribute to the alkalinity of the backfill.

Proposed landfilling operations will result in the excavation of special handled (Pod) material from the previous special handled areas; all Pod material will be disposed of within the constructed lined landfill footprint as waste. Additionally, potentially acid forming intact bedrock materials (>1.0 % Total Sulfur) may be encountered during the excavation of the S2 and S3 Areas. These materials, when encountered will be disposed of within the constructed lined landfill footprint as waste. Further details concerning the prior special handling procedures and proposed material handling methods are provided in **Form 11, Form 14 (Rev. June 2019), and Form J (Rev. June 2019)**.

SAMPLING AND ANALYSES

Overview

Although much of the site property has been extensively investigated in the past with respect to surface coal mining, much less study has been performed to evaluate the near-surface materials at the site for any type of construction and development. Consequently, two consecutive backhoe test pit programs were conducted in 2005 and a third backhoe test pit program was conducted in 2019 to evaluate and augment the current site database, as described below.

2005 Test Pits

A total of 65 test pits were excavated by representatives of Marshall Miller & Associates, Inc. (MMA) during the period between July 5 and July 28, 2005. Test pit observations, logging, and sampling were performed in general accordance with standard soil science practices for test pit and sampling procedures. However, this initial phase of the field study was specifically completed to document material depths above lithic contact primarily for volume calculations of construction and operational soil uses. In general, test pit locations were selected to obtain samples from each of the soil series shown on the previous mapping of soils as presented in the *Soil Survey of Clearfield County, Pennsylvania*. The number of completed test pits within each soil series encountered in the field is tabulated below. The percentage of soil area within the proposed waste footprint is presented in parentheses (the balance, 34%, is currently reclaimed mine area).

Soil Series	No. of Test Pits
Clymer (0%)	1
Cookport (1%)	1
Dekalb (6%)	10
Ernest (3%)	1
Gilpin (3%)	1
Hazleton & Hazleton/Clymer (50%)	38
Rayne (3%)	3
Udorthents (34%)	10

In general, test pits were excavated to equipment refusal, judged to represent bedrock, using a Case 580L backhoe with about a 10 to 12-foot reach. Representative bag samples from selected overburden zones were collected during the work. The test pits were logged using both USDA and USCS classification systems. The complete test pit logs, in the format prescribed by DEP, are included in **Attachment F-3**. A map of the completed test pit locations is included in **Attachment F-2**.

2019 Test Pits

A total of 20 test pits were excavated by representatives from S+G and CMT Laboratories between January 2, 2019 and January 4, 2019. Over-burden Test Pits (OBTPs) were excavated and sampled in the S3 area of the proposed Camp Hope Run landfill. During landfill construction, the mine spoils are planned to be excavated and used in accordance with **Form 14**, **Attachment 14-2 – Material Handling Plan (Rev. June 2019)**, including as fill in areas beneath the lined landfill area. The over-burden test pits were excavated to assist in establishing the extent of mine spoils in the S3 area, to assess the mine spoil material, and to collect samples for laboratory testing to measure physical properties of the material.

Based on the test pits, some minor revisions were made to the locations of the mine spoil and to the areas previously mined. Specifically, mine spoil present on the north east side of S3 led to the conclusion that previous mining operations had extended through three (3) additional cuts

consistent with the mining plan, but approximately 300 feet south of the previously estimated limits of mining.

Samples of test pit material were taken for laboratory testing, which included particle size evaluation, standard and modified Proctor tests, triaxial shear testing and consolidation testing. Because of the particle size limitations of standard ASTM test procedures, the laboratory tests were made on samples that are not completely representative of the mine spoil material. Field samples attempted to exclude particles larger than 3-inches since these materials were too large for laboratory testing, which eliminated up to 60 percent of the mine spoil material. Generally, excluding the large the larger particles leads to underestimating the density and strength properties of the material and overestimating the settlement potential, therefore making the calculations more conservative. This sampling bias is further explained in **Attachment 24-8**.

A more detailed narrative regarding the over-burden test pits and laboratory testing results is included in **Attachment F-7 (March 2019)**.

2005 Test Probes

During the period between December 3 and December 8, 2005, a second phase of soil investigation was conducted through a series of hand-dug probes and seven backhoe-excavated probes to confirm and refine soil mapping within the project area and to document and confirm the topographic sequence of soils along a typical soil Catena on the site. Probes P1 through P7 were examined, characterized, and logged by M.N. Gilbert, CPSSc. This supplemental field investigation was also intended to provide an independent assessment of the accuracy of the previous soil mapping and confirm the depth and horizonation of representative soil profiles on the site and confirm the composition of shallow lithic materials influencing soil genesis in the project area. Refer to **Attachment F-3** which presents a summary of the findings for this investigation.

Based on the results of the test pits and test probes, it is concluded that the original soils mapping of the project area was found to have been remarkably accurate with no significant anomalies encountered. Only minor modifications of the original soils mapping were necessary to show the extent of the surface-mined and subsequently reclaimed areas ("Udorthents" soils) opened and regraded following the original mapping in the early 1980's. Additionally, as a result of this field evaluation and soils mapping update, it is concluded that the volumetric logs of bulk soil materials above the lithic contact are representative and acceptable for use in estimating unconsolidated soil resources available for use in landfill construction and operation.

2005 Laboratory Soil Analyses

Subsequent to the 2005 field work, samples were forwarded to Geotechnics' Pittsburgh laboratory for analyses. All samples were analyzed for grain size, Atterberg limits (by both USCS and USDA soil classification). In addition, loss on ignition (organic content) was conducted on selected samples taken from previously mined/reclaimed areas (TP-1 through TP-9 and TP-32). Soil nutrient testing associated with revegetation of on-site soils was also conducted on a representative number of samples. Finally, remolded (flex-wall) permeability tests were conducted (along with standard proctor testing) to determine the availability of low-permeability soils for use as liner subbase material. The results of all analyses are included and summarized in a table on the first page of **Attachment F-4**.

2019 Laboratory Soil Analyses

Subsequent to the 2019 field work, samples were forwarded to CMT Laboratories, Inc.'s State College laboratory for analyses. All samples were analyzed for grain size and Atterberg limits. In addition, standard and modified proctor, consolidation and direct shear tests were run on composite soil samples. The results of all analyses are included and summarized in **Table F-7.1** within **Attachment F-7**.

MATERIAL QUALITY AND QUANTITIES

Soil Material Quality

The anticipated soil/rock materials needed to construct and operate the proposed landfill will generally include cover soils (daily, intermediate, and final), liner subbase, controlled (structural) fill, and protective cover. All materials used for construction and operations (with the exception of protective cover) will be obtained from the on-site areas which will serve as the only designated borrow areas for this site development. Protective cover is planned to be purchased from one or more off-site commercial sources.

Soil used for daily and intermediate cover will generally fall within the USDA textural classifications that support revegetation and meet the required performance standards. The combustible and/or coal content of on-site soils (including the mine spoil sampled from reclaimed areas of the site) generally do not exceed 6 percent by weight, and therefore are judged to be capable of controlling fires. On-site soil anticipated for use as intermediate cover is generally characterized by the samples obtained from the test pit which exhibit the following approximate grain-size parameters: average percent passing the 2 mm (No. 10) standard sieve: 53%; % sand: average of 52%; % silt: average of 31%; and, % clay: average of 16%, all by weight.

Final cover soils will meet the appropriate USDA classifications (loam, sandy loam, loamy sand, silt loam, sandy clay loam and silty clay loam), as required. At least 40% by weight of the cover soil shall be capable of passing a 2 millimeter, No. 10 mesh sieve. On-site soil anticipated for use as final cover is generally characterized by the samples obtained from the test pits excavated at the site in 2005, which exhibit the following grain-size parameters (arithmetic averages, by weight): percent passing the 2 mm (No. 10) standard sieve: 53%; % sand: 52%; % silt: 31%; and, % clay: 16%. It is proposed, as part of site development, to remove the upper soil horizon from the proposed landfill footprint and stockpile areas (top 12 inches, minimum) and subsequently segregate, conserve and replace this material as the upper layer of final cover (i.e. topsoil) on the completed (closed) final landfill slopes.

The subbase soil needed will generally be fined-grained, on-site soil. The subbase will be a 6-inch-thick layer of soil with a permeability of $1X10^{-5}$ cm/sec or less. The material for the subbase is expected to generally come from the Clymer, Dekalb, Gilpin, Ernest, and Rayne soil groups, as these are the predominant soil types with the colluvial outslope portions of the site. The subbase soils will be placed to be hard, uniform, smooth, and free of debris, rock, plant materials and other foreign material.

The controlled fill (rock and structural fill), will generally be obtained from the on-site soil/weathered rock material excavated from both the S2 and S3 areas. As needed, the technique used for processing the weathered rock is covered in more detail below (**Processing Method**).

The proposed lined landfill area will use geosynthetic liner components (i.e., geosynthetic clay liner, GCL) instead of compacted clay, a geocomposite drainage net for the leachate detection zone (in lieu of a natural aggregate) and a geosynthetic membrane instead of a clay (final cover) cap. Consequently, none of the soil from the site will be used for clay liner, leachate detection media, or clay cap.

Required Soil Material Quantities

The calculations for determining the required soil volumes for the proposed landfill development are included in **Attachment F-5 (Rev. June 2019)**.

In general, the 3-dimensional areas covered by the various soil components were multiplied by their required thicknesses (corrected to account for slopes, as appropriate) to estimate the in-place soil material volumes required. When the proposed Camp Hope Run Landfill is completed, the lined portion of the landfill will cover about 217 acres. The following table summarizes the soil required for constructing the landfill.

SITE FEATURE OR COMPONENT	REQUIRED SOIL MATERIAL (IN-PLACE, CY)
Subbase	176,660
Protective Cover	Purchase off-site
Daily Cover	1,807,652
Intermediate Cover	1,084,591
Final Cover (Subsoil)	545,849
Final Cover (Topsoil)	181,950
Controlled (Structural) Fill (Outside of Liner)	3,245,122
Controlled (Structural) Fill (Inside of Liner)	2,479,751
TOTALS	**9,521,575**

Available Soil Material Quantities

There are essentially four types of soils/rock material available for construction, operation, and closure of the proposed landfill development: near-surface soils above the lithic contact encountered in the test pits, existing mine spoil from mined/reclaimed site areas, bedrock material that breaks down into usable grain sizes, and more resistant rock that is too large for anything other than unclassified bulk fill/stockpiles. The calculations for estimating the amount of these available materials are included in **Attachment F-5** and **Exhibit F-5.1**.

Soils

The areas within the landfill footprint and beneath the planned stockpile areas which are covered by the various (surface) soils (per the verified/confirmed *Soil Survey of Clearfield County, Pennsylvania*) were multiplied by their estimated thicknesses (based on test pit findings) to estimate the in-place ("bank") soil material volumes available. Both the upper **Topsoils** and underlying **Subsoils** were quantified separately in this manner. These soils will first be used in the more select applications including final cover (both topsoil and subsoil), with the remainder being used for the **Subbase** layer, which is the lowest component of the liner system. If there are excessive surpluses of these soils, it is possible that they will either 1) not be stripped from beneath the stockpile areas before surplus (non acid-forming) rock is placed in the stockpiles, or 2) will be used as final cover on the completed, permanent stockpiles.

Mine Spoil

The planned landfill development proposes to remove all of the mine spoil previously placed within the southernmost portion of the development (Area S3), which totals about 6.2 million cubic yards (MCY). A smaller area of reclaimed mine spoil (about 12 acres) is located in the northwest limits of the proposed landfill development (Area S1) and is not planned to be removed. Approximately 6 percent (by volume) of the existing mine spoil material has been estimated to require treatment in the form of a special handling plan (referred to in the mine application as "pods") as it was reclaimed and placed back to approximate original contour in this area of the site in (Area S3). As this material is excavated and removed from its present location, all of the pods will be placed into the lined landfill area as waste. The remainder of the "non-pod" material will be stockpiled on

site permanently, used as structural fill or as operational soils. Refer to **Form J** and **Form 14** for additional details in this regard.

Weathered Bedrock

As discussed above, thinly-bedded siltstone, claystones, and shales, as well as some of the interbedded sandstone at the site have been observed to provide acceptably-sized material for landfill-related construction and operation.

Bedrock

Bedrock will be excavated in the S2 and S3 area to achieve subgrade elevation. Bedrock excavation is expected to encounter high sulfur zones (Total Sulfur > 1.0%). When encountered, this material will be disposed of within the landfill as a "waste". Refer to **Form J and Form 14** for further discussion. Oversized materials that may be a result of this excavation are discussed below.

Following the completion of the 2005 soil laboratory testing, the field and laboratory data were evaluated and the necessary quality/quantity estimates for permitting and design were prepared.

Approximately 278,646 cubic yards (CY) of topsoil were located within the top soil horizon of the lined landfill footprint and S1 and S2 stockpile areas over a total of about 235 acres. Of this topsoil quantity, only **224,244 CY** (from the lined landfill footprint and S2 stockpile area) are planned to be excavated. This topsoil is planned to be used in the top six inches of the proposed final cover for the site. The topsoil from S1 stockpile area is not used in any calculations, but is available if needed. An estimated 42,294 CY surplus of topsoil is expected; this surplus is planned to be utilized as final cover on the stockpiles.

Similarly, about 1,509,960 CY of subsoils were located within the upper soil horizon above the lithic contact within the footprint areas as well as the S1 and S2 stockpile areas. Of this subsoil quantity, only **1,098,035 CY** (from the lined landfill footprint) are planned to be excavated. This material is planned to make up the (approximate) 18-inch-thick layer directly underlying the topsoil of the final landfill cover. The subsoils from the S1 and S2 stockpile areas are not used in any calculations, but are available if needed. A surplus of about **552,186 CY** is anticipated with portions of this material planned to be used as select, low-permeability subbase. Refer to **Attachment F-5** for a detailed summary and supporting calculations of these soil material quantity estimates.

Subbase material was located in several of the on-site test pits in layers that varied in thickness from about 1.5 to 4.5 feet and was located about 4 feet deep (below the topsoil layer). The subbase material was generally identified as silty clay, clayey silts, and clays (CL, CL-ML, and CH), of which approximately **48,755 CY** of material meeting the requirements for subbase soil are available within the footprint area and S1 and S2 stockpile areas. The sieve analyses conducted on the test pit samples for subbase material indicate an average fine fraction of about 80% with average Atterberg limits (liquid, plastic, and plasticity index) of 36, 21, and 15 percent, respectively. It is noted that there is expected to be a significantly greater quantity of soil suitable for use as subbase (i.e. low permeability) than the above volume due to the amount of fines observed in many of the test pits. In this regard, Rayne soils cover over 120 acres within the facility limits and at an average thickness of 1.5 feet, this will generate approximately **290,400 CY** of additional subsoils that can be used for final cover and/or subbase. Refer to **Attachment F-5** for a detailed summary and supporting calculations of these soil material quantity estimates.

Approximately **5.7 MCY** of material will be used as Structural Fill and approximately **2.9 MCY** will be used as daily and intermediate cover. These materials will be obtained from within the S2 and S3 excavations, where non-oversized, non-processed, non-pod/non-acidic (high sulfur) material will be used first. However; as shown within **Table 5-1** of **Attachment F-5**, processed oversized

rock will eventually be needed, since the usable material without oversized rock (**7.0 MCY**) is less than the total required material quantity (**8.6 MCY**). Refer to **Attachment F-5** for a detailed summary and supporting calculations of these soil material quantity estimates.

It is noted that the estimates presented in **Attachment F-5** assume about 40% of both the S2 and S3 area excavations will be oversized material that cannot be used for landfill construction or operations, without processing. Material processing methods are covered in more detail below (Processing Method). The remainder of non-processed and/or unused materials will be permanently stockpiled in S1 or S2 stockpile areas, depending on its origination. About **3.1 MCY** and **41,344CY** are currently estimated for Stockpiles S1 and S2 respectively. These estimates are dependent on the timing of material use; however they are less than the stockpile capacity. Refer to **Attachment F-5** for a detailed summary and supporting calculations of these soil material quantity estimates.

Processing Method

Additional material handling and processing may be implemented to generate additional, acceptable material for landfill construction and/or operation through reduction of particle size. In this regard, the primary method planned to be used is the "Rake Method", which has been used at other operating Pennsylvania MSW landfills to successfully utilize as much on-site material as practical. In this procedure, a tracked loader equipped with rock rakes makes four passes over the material. The loader has rake tines spaced about 5 inches apart. If needed, the material is passed through a 6-inch bar screen. All fragments larger than 6 inches are raked out of the material by this method. The following sections outline the current rake method, which is anticipated to be used to manage over-sized material in the proposed landfill area operation.

As an as-needed basis, more significant size reduction is planned to be accomplished through the crushing of oversized material (i.e. material greater than 12 inches in size) for use in structural fill. This is planned to be accomplished through the use of a "jaw"-type crusher, or similar, which are mobile, adjustable, productive and are well suited for this type of application. Reportedly, jaw crushers were used extensively at this site during the former mining operation to reduce materials to more suitable sizes, according to former AHCC employees (Mr. Ken Maney). The jaw crushers will also be used to reduce particle sizes to accelerate weather of the material placed in stockpiles. These materials would then be planned to be used as operational cover, if they meet the regulatory criteria for this use.

The proposed processing method will take place within the excavation area, which is at a lower elevation than the surrounding areas. Any ponded water that collects will be checked for pH and either pumped into an onsite stormwater basin or will be pumped for AMD treatment.

Rake Method

Equipment

One tracked loader with rock rakes:

Tracked Loader 1:	Blade width --	10 feet (minimum)
	Rake tine --	5 inches apart
Dump truck:	Capable of hauling 18 to 20 cubic yards of material.	
Caterpillar Bulldozers:	Two operating in the excavation as required.	

Placement of Material

Backfill material will be placed by a dump truck and spread in lifts not to exceed two feet (loosely placed) depth.

Processing of Material

The tracked loader will make four passes on the in-place material by making two passes at the limit of excavation and then proceed across the placement area, overlapping each pass by one-half a blade width, thereby assuring four passes on the placed material.

When backing to make the second pass, the tracked loader will also move out of the original tracks and onto the raked area, thereby causing additional breaking of the coarse material.

Additional passes by the dozer will be made if deemed necessary by the on-site soils technician or engineer. Similarly, if during the course of the work, it becomes apparent that the end result can be accomplished with fewer passes, the number of passes may be reduced after reviewing the results with the engineer and landfill personnel.

As needed, the material will be passed through a 6-inch bar screen to further exclude unacceptably large material.

Coarse material raked from the soil will either be pushed out of the placement area or stockpiled separately.

Crushing

Equipment

Jaw Crusher – see attached Telsmith specification (Example Only). Other similar equipment may be substituted.

PHASE I APPLICATION
CAMP HOPE RUN LANDFILL
BOGGS TOWNSHIP, CLEARFIELD COUNTY, PENNSYLVANIA

FORM F
ATTACHMENT F-5
Required and Available
Soil Material Calculations

REVISED JUNE 2019

SUMMARY
REQUIRED AND AVAILABLE SOIL MATERIAL ESTIMATE

REVISED JUNE 2019

SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.1

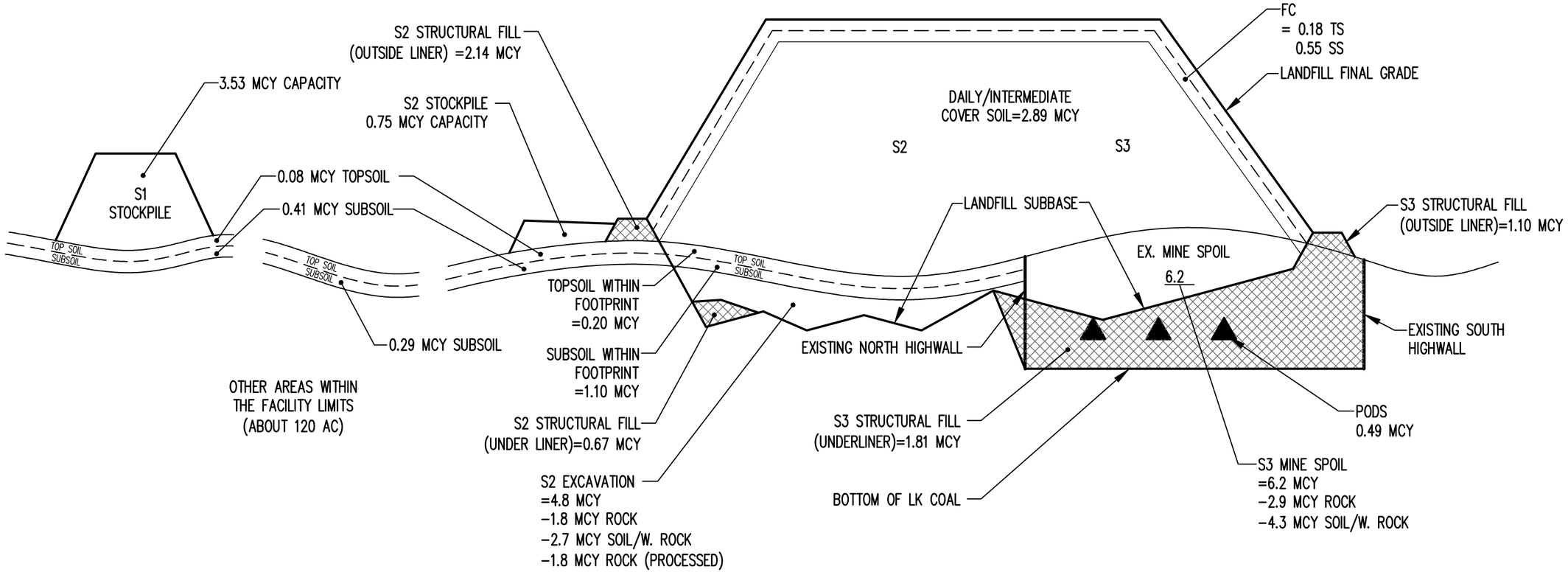
REQUIRED & AVAILABLE SUMMARY

Date: 6/26/2019
By: WMB
Checked By: JMG

SOIL TYPE/USE	REQUIRED QUANTITY	AVAILABLE QUANTITY, BANK, CY								SURPLUS QUANTITY	USAGE OR DISPOSITION OF SURPLUS	FINAL S1 STOCKPILE QUANTITIES	FINAL S2 STOCKPILE QUANTITIES
		SOURCE AREA	EXCAVATION QUANTITY[1]	MINE SPOIL & PODS QUANTITY: PODS	MINE SPOIL & PODS QUANTITY: NON-POD SPOIL	MINE SPOIL & PODS QUANTITY: INTACT ROCK (Sulfur>1%)	OVERSIZED ROCK QUANTITY[2]	USABLE QUANTITY FROM EXCAVATION[3]	REQUIRED QUANTITY[4]	REQUIRED PROCESSED ROCK QUANTITY				
S2 Structural Fill (Outside of Liner)	2,136,144	S2 Area	4,600,146	0	0	41,207	1,823,575	2,735,363	4,517,594	1,782,231	**0**	Usable S2 Quantity Exhausted	0	**41,344**
S2 Structural Fill (Under Liner)	670,053													
S2 Daily Cover	1,069,623													
S2 Intermediate Cover	641,774													
S3 Structural Fill (Outside of Liner)	1,108,978	S3 Area	7,694,226	490,990	5,716,663	20,993	2,872,897	4,309,346	4,099,522	0	**209,823**	Use in S2 Construction or Operation or Stockpile within S1 Stockpile	**3,082,720**	**0**
S3 Structural Fill (Under Liner)	1,809,698													
S3 Daily Cover	738,029													
S3 Intermediate Cover	442,817													
Final Cover Topsoil	181,950	Within Footprint	195,536	*N/A*			*N/A*	195,536			**13,586**[7]	Final Cover on Stockpiles	0	0
		S1 Stockpile Area	*54,402*	*Soils quantities from this area are not used in calculations, but are provided as quantities that are available if needed.*							*N/A*		*N/A*	
		S2 Stockpile Area	28,708	*N/A*			*N/A*	28,708			**28,708**[7]	Final Cover on Stockpiles	0	0
Final Cover Subsoil	545,849	Within Footprint	1,098,035	*N/A*			*N/A*	1,098,035			**552,186**[8]	Only 48,755 CY is usable as Subbase Soil. The remaining 503,431 CY will be used as Final Cover on Stockpiles	0	0
		S1 Stockpile Area	*281,171*	*Soils quantities from this area are not used in calculations, but are provided as quantities that are available if needed.*							*N/A*		*N/A*	
		S2 Stockpile Area	*130,754*	*Soils quantities from this area are not used in calculations, but are provided as quantities that are available if needed.*							*N/A*		*N/A*	
Subbase	176,660	Within Footprint	**48,755**	*N/A*			*N/A*	48,755			**0**	*NONE*	0	0
		areas within facility limits	**290,400**	*N/A*			*N/A*	290,400			**113,740**[9]	This quantity will not be excavated	0	0
	TOTAL REQUIRED QUANTITY												**TOTAL S1 STOCKPILE QUANTITY**	**TOTAL S2 STOCKPILE QUANTITY**
	9,521,575												**3,082,720**	**41,344**

NOTES:

1 This quantity represents S2/S3 Area excavation minus the topsoil and subsoil layers (shown in this table). *See Figure F-5.4*
2 Oversized materials of the excavated S2 and S3 areas are both estimated at 40%.
3 The usable material is the S2/S3 excavation reduced by the pods/high sulfur material and oversized rock.
4 The required quantity is the sum of the S2/S3 required structural fill and operational cover.
5 **Bold Red Numbers** = Surplus soil quantities used for required quantities elsewhere.
6 **Bold Black Numbers = Stockpiled Materials**
7 Topsoil stockpiled separately inside the landfill footprint for future capping.
8 Subsoil stockpiled separately inside the landfill footprint for future liner construction.
9 Rayne soils cover over 120 acres within the facility limits and at an average thickness of 1.5 feet, this will generate approximately 290,400 CY of additional subsoils that can be used for final cover and/or subbase. The surplus calculated (113,740 CY) is not planned to be excavated.



PREPARED FOR:

FIGURE F-5.1
CAMP HOPE RUN LANDFILL
FORM F - SOILS
SCHEMATIC FOR OVERALL SOIL BALANCE

PREPARED BY:

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

DRAWN:	C.T.J.
APPROVED:	J.M.G.
DATE:	MAY 2018
SCALE:	NOT TO SCALE
PROJECT NO:	PAWASTE 11-1
FIGURE NO.	F-5.1
FILENAME:	PAWASTE-B0059

REQUIRED SOIL MATERIAL ESTIMATES

REVISED JUNE 2019

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Date: 6/26/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.2

SOIL VOLUMES - REQUIRED

Required Volumes of Soils for Construction

Calculate Volumes by Material Type

		Acres	Thickness (ft)	Volume (CY)
A. Subbase				
1. Floor *see Figure F-5.5*		184.4	0.5	148,749
2. Sideslope (corrected for 3:1 slopes) *see Figure F-5.5*		34.6	0.5	27,911
	Total Subbase	219	-	**176,660**
B. Clay Liner				
None - geosynthetic clay liner will be used instead of clay liner.		0	0	0
C. Leachate Detection Zone				
None - geocomposite drainage layer will be used instead of granular material.		0	0	0
D. Protective Cover				
Granular material will be purchased from off-site source(s).				
1. Floor *see Figure F-5.5*		184.4	1.5	446,248
2. Sideslope (corrected for 3:1 slopes) *see Figure F-5.5*		34.6	1.5	83,732
	Total Protective Cover	219	-	**529,980**
E. Clay Cap				
None - geomembrane will be used instead of clay cap.		0	0	0
F. Final Cover				
1. Subsoil - 1.5 ft over 217.3 acres (includes slope factor of 1.038 for an overall 3.6:1 slope) *see Figure F-5.5*		225.6	1.5	545,849
2. Topsoil - 0.5 feet over 217.3 acres (includes slope factor of 1.038 for an overall 3.6:1 slope) *see Figure F-5.5*		225.6	0.5	181,950
	Total Final Cover			**727,799**
G. Final Cover Drainage Layer				
None - geocomposite drainage layer will be used instead of granular material				
H. Attenuating Soil Base				
None - there is no attenuating soil base layer included in this project.				
I. Other				
Outside of Liner				
1. Structural fill for S2 Area perimeter				2,136,144
2. Structural fill for S3 Area perimeter				1,108,978
Under Liner				
3. Structural fill for area S2 subgrade under liner				670,053
4. Structural fill for area S3 subgrade under liner				1,809,698
	Total Other			**5,724,873**

Required Volumes of Soils for Operation

A. Daily/Intermediate Cover	
1. Net Airspace: Waste, Intermediate Cover, Daily Cover *See Figure F-5.5*	36,153,037
2. Intermediate Cover Volume (Assume 3% of Net Airspace)	1,084,591
3. Daily Cover Volume (Assume 5% of Net Airspace)	1,807,652
Total Operational Cover	**2,892,243**
Total Material Required for Construction and Operations (Excluding Protective Cover)	**9,521,575**
Total Material Available for Construction and Operations	**12,645,639**
Material to Stockpile	**3,124,065**

TABLE F-5.3
Cell Sequence and Site Life Summary
Camp Hope Run Landfill
Boggs Township, Clearfield County Pennsylvania

AREA	CELL	LINED LANDFILL AREA (ACRES)	CUMULATIVE LINED CELL AREA (ACRES)	GROSS AIRSPACE (CY)[1]	FINAL COVER AREA (ACRES)	CORRECTED FINAL COVER AREA (ACRES)[2]	FINAL COVER AREA IN PLACE WHEN CELL OPENS (ACRES)	FINAL COVER VOLUME (CY)	NET AIRSPACE (WASTE + DAILY & INTERIM COVER) (CY)[3]	INCREMENTAL CELL LIFE (YEARS)[4]	CUMULATIVE CELL LIFE (YEARS)
AREA S-2	S2-1	20.1	20.1	2,623,938	13.7	14.3	0.0	46,019	2,577,919	**3.2**	**3.2**
	S2-2	25.7	45.8	3,462,779	24.8	25.8	14.3	83,196	3,379,583	**2.1**	**5.3**
	S2-3	11.6	57.4	1,221,947	8.5	8.8	40.0	28,502	1,193,445	**0.6**	**5.9**
	S2-4	18.1	75.5	1,821,133	13.6	14.1	48.9	45,617	1,775,516	**0.9**	**6.9**
	S2-5	41.7	117.2	9,048,712	39.4	40.9	63.0	131,962	8,916,750	**4.7**	**11.5**
	S2-6	14.2	131.3	3,611,747	18.7	19.4	103.9	62,498	3,549,250	**1.9**	**13.4**
S2 Subtotals		**131.3**		**21,790,256**	**118.8**	**123.3**		**397,794**	**21,392,462**	**13.4**	
AREA S-3	S3-1	15.4	146.7	1,364,287	11.0	11.4	123.3	36,809	1,327,478	**0.7**	**14.1**
	S3-2	19.9	166.6	3,259,159	17.8	18.5	134.7	59,584	3,199,576	**1.7**	**15.8**
	S3-3	15.9	182.6	2,533,432	19.2	19.9	153.2	64,239	2,469,193	**1.3**	**17.1**
	S3-4	34.7	217.3	7,933,700.9	50.6	52.5	173.1	169,373	7,764,328	**4.1**	**21.2**
S3 Subtotals		**86.0**		**15,090,579**	**98.5**	**102.3**		**330,005**	**14,760,575**	**7.7**	
SITE TOTALS		**217.3**	**217.3**	**36,880,835**	**217.3**	**225.6**		**727,799**	**36,153,037**	**21.2**	**21.2**

Notes:
1. Gross Airspace in this table represents the volume between the top of Final Cover and the Top of Protective Cover.
2. Corrected Final Cover area represents the 3-D area and was generated using a 1.038 slope factor for an overall 3.6:1 slope.
3. Net Airspace is the volume occupied by waste and operational cover soils (Daily & Intermediate).
4. Estimated Incremental Cell Life is based on the assumptions noted below.

Assumptions:	
Final Cover Thickness (ft)	2.0
Waste Density (Tons/CY)	0.75
Year 1: Average Daily Tonnage (TPD)	1,000
Year 2: Average Daily Tonnage (TPD)	2,000
Year 3: Average Daily Tonnage (TPD)	3,000
Year 4: Average Daily Tonnage (TPD)	4,000
Year 5 Plus: Average Daily Tonnage (TPD)	5,000
Operating Days per week	5.5
Operating Weeks per year	52
Operating Days Year	286

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Date: 6/26/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.4

SOIL VOLUMES - AVAILABLE

I. TOPSOIL AND SUBSOIL ESTIMATE

A. S1 Stockpile Area

Footprint of stockpile:	64 acres	See attached plan
Previously mined/reclaimed area:	12 acres	See attached plan
Hazelton Soils Cover: 64 - 4.8[1] - 12[1] = 47.2ac - 12[2] =	35.2 acres	
• Available Hazelton:	35.2 acres	
Average Hazelton soil thickness:	4.0 feet	See attached Table F-5.2
Available soil beneath future stockpile (Hazelton) = 35.2 ac @ 4.0 feet thick:	227,157 CY	
Of this, Hazelton topsoil thickness (avg.):	7 inches (0.6 ft)	See attached Table F-5.1
So topsoil volume: = 35.2 ac @ 0.6 feet	34,074 CY	Topsoil
So subsoil volume: = 227,157 CY - 34,074 CY:	193,083 CY	Subsoil
• Available DeKalb soil:	16.8 acres	
Average DeKalb soil thickness:	49" say 48"	See attached Table F-5.2
Available soil beneath future stockpile (DeKalb) = 16.8 ac @ 4.0 feet thick:	108,416 CY	
Of this, DeKalb topsoil thickness (avg.):	9" (0.75")	See attached Table F-5.1
So topsoil volume: = 16.8 ac @ 0.75 feet	20,328 CY	Topsoil
So subsoil volumes: = 108,416 CY - 20,328 CY:	88,088 CY	Subsoil

S1 Stockpile Area Summary

ALL IN BANK CY	Available topsoil:	54,402 CY	Topsoil
	Available subsoil:	281,171 CY	Subsoil
	Total (Bank) Available Soil:	335,573 CY	Total S1 Stockpile

NOTES:

1. DeKalb Soil Areas
2. Mined/Reclaimed Areas

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Date: 6/26/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.5

SOIL VOLUMES - AVAILABLE

I. TOPSOIL AND SUBSOIL ESTIMATE (continued)

B. S2 Stockpile Area

• Available Cookport:	5.8 acres	See attached plan
Average Cookport soil thickness:	33"	See attached Table F-5.2
= 5.8 ac @ 33" (2.8')	26,201 CY (bank)	
of this, Cookport topsoil thickness (avg.):	10"	See attached Table F-5.1
= 5.8 ac @ 0.83'	7,767 CY	
• Available Hazelton:	11.8 acres	See attached plan
Average Hazelton soil thickness:	48"	See attached Table F-5.2
= 11.8 ac @ 4'	76,149 CY (bank)	
of this, Cookport topsoil thickness (avg.):	7"	See attached Table F-5.1
= 11.8 ac @ 0.6'	11,422 CY	
• Available Rayne:	5.9 acres	See attached plan
Average Rayne soil thickness:	72"	See attached Table F-5.2
= 5.9 ac @ 6'	57,112 CY	
of this, Rayne topsoil thickness (avg.):	12"	See attached Table F-5.1
= 5.9 ac @ 1'	9,519 CY	

S2 Stockpile Area Summary

ALL IN BANK CY	Available topsoil:	28,708 CY	Topsoil
	Available subsoil:	130, 754 CY	Subsoil
	Total (Bank) Available Soil:	159,462 CY	Total S2 Stockpile

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Date: 6/26/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.6

SOIL THICKNESSES BY SOIL SERIES
I. TOPSOIL AND SUBSOIL ESTIMATE (continued)
Topsoil Thickness (IN) - Table F-5.1

Soil Series	Count	Minimum	Maximum	Average
Clymer	1	6	6	6
Cookport	1	10	10	10
DeKalb	10	3	16	9
Ernest	1	24	24	24
Gilpin	1	15	15	15
Hazelton	46	2	18	7
Rayne	4	12	12	12

Total Soil Thickness (IN) - Table F-5.2

Soil Series	Count	Minimum	Maximum	Average
Clymer	1	64	64	64
Cookport	1	33	33	33
DeKalb	10	32	72	49
Ernest	1	56	56	56
Gilpin	1	96	96	96
Hazelton	46	15	118	48
Rayne	4	48	104	72

NOTE:
1. These soil zone thicknesses were determined from the 65 test pits excavated, logged and sampled/tested by Marshall Miller & Associates, Inc., 2005

Low-Permeability (Clayey) Soils - For Subbase Use - From Subsoils

Clayey soils were encountered in the following test pits:

Test Pit #	Clayey Zone (IN) - FT.	Soil Series	Estimated Arial Extent
TP-16	50"-72"-1.8'	Rayne (RbF)	5.4 acres
TP-36	60"-96"-3.0'	Hazelton (HdB)	1.0 acres
TP-51	51"-104"-4.4'	Rayne (RbF)	same as TP-16
TP-65	18"-60"-3.5'	Hazelton (HdB)	5 acres

Estimated quantity of low-permeability soils:

Area (ac)	Ave. Depth (ft)		
5.4	1.8	15,682	CY
1	3	4,840	CY
5	3.5	28,233	CY
	Total	**48,755**	**CY (BANK)**

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Date: 7/1/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.7

SOIL VOLUMES - AVAILABLE

I. TOPSOIL AND SUBSOIL ESTIMATE (continued)

C. Within the Disposal Area Footprint (including perimeter berm)

USDA Mapping Symbol	Soil Series	Approximate Area within Waste Footprint, Acres (% of Footprint Area)	Subsoil/ Topsoil Thickness (feet)	Topsoil Volume Bank CY	Subsoil Volume Bank CY	Total Soil Bank (CY)
CmC	Clymer	0 0%	5.3 0.5	0	0	0
CoB CoC CxD	Cookport	3 1%	2.8 0.8	3,872	13,552	17,424
DeC DxB DxD	DeKalb	15 6%	4 0.8	19,360	96,800	116,160
ErB ErC ExD	Ernest	6 3%	4.7 2.0	19,360	45,496	64,856
GIC GmD	Gilpin	8 3%	8 2.0	25,813	103,253	129,067
HaD HbD HbF HcB HcC HdB	Hazelton Hazelton-Clymer	118 50%	4.0 0.6	114,224	761,493	875,717
RbF	Rayne	8 3%	6.0 1.0	12,907	77,440	90,347
Up	Udorthents	82 34%	Varies up to 80	---	---	--

Adding Soils Beneath Future Stockpiles - ALL BANK CY

	Topsoil	Subsoil	Total
S1 Area	54,402	281,171	335,573
S2 Area	28,708	130,754	159,462
Subtotals	**83,110**	**411,925**	**495,035**

available if needed

Totals Within Facility Limits - ALL BANK CY

It is assumed that additional on-site soils (Rayne Series) will be available within the facility limits wherein Rayne series covers over 120 acres. It is assumed that additional clayey material is available in these areas - estimated at:

120 ac @ 1.5' thick = **290,400** **CY (Rayne Soil Only)** available if needed

Totals Within Footprint - ALL BANK CY

Soil Type	Topsoil	Subsoil	Total
Clymer	0	0	0
Cookport	3,872	13,552	17,424
DeKalb	19,360	96,800	116,160
Ernest	19,360	45,496	64,856
Gilpin	25,813	103,253	129,067
Hazelton	114,224	761,493	875,717
Rayne	12,907	77,440	90,347
Subtotals	**195,536**	**1,098,035**	**1,293,571**

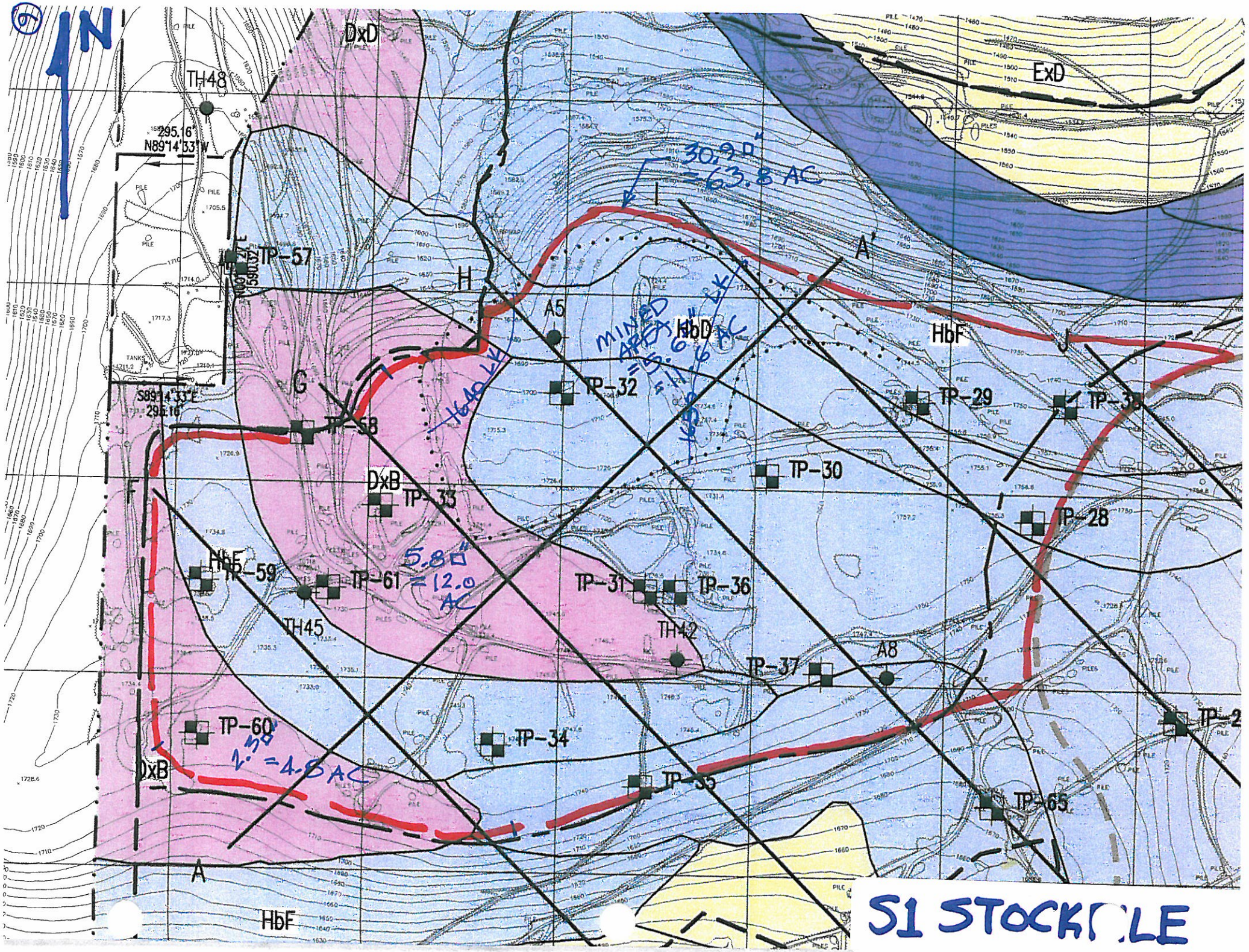
Grand Totals - All Stockpiles and Footprint - ALL BANK CY

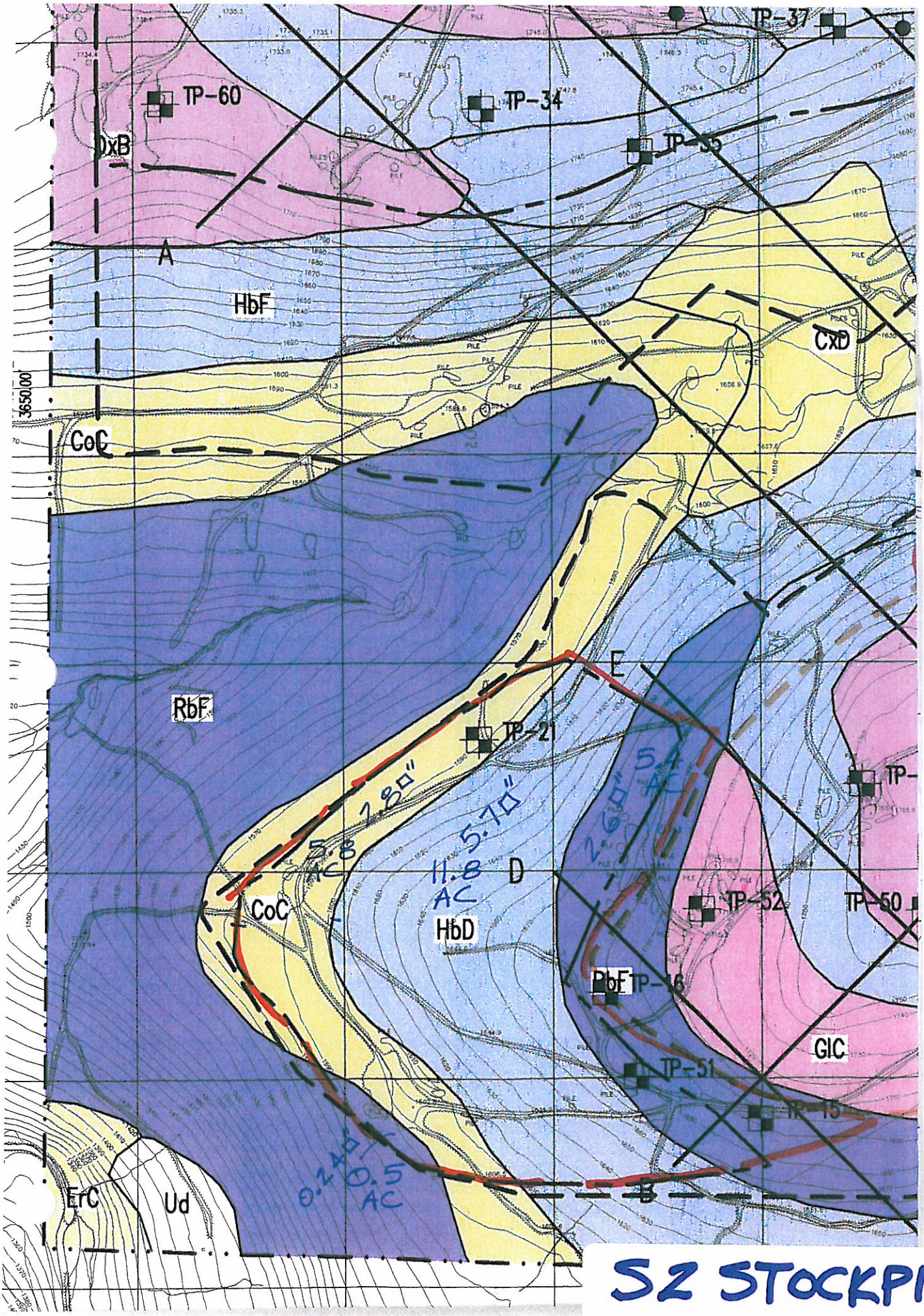
Topsoil	Subsoil	Total
278,646	**1,800,360**	**2,079,006**

AVAILABLE SOIL MATERIAL ESTIMATES

TOPSOILS & SUBSOILS

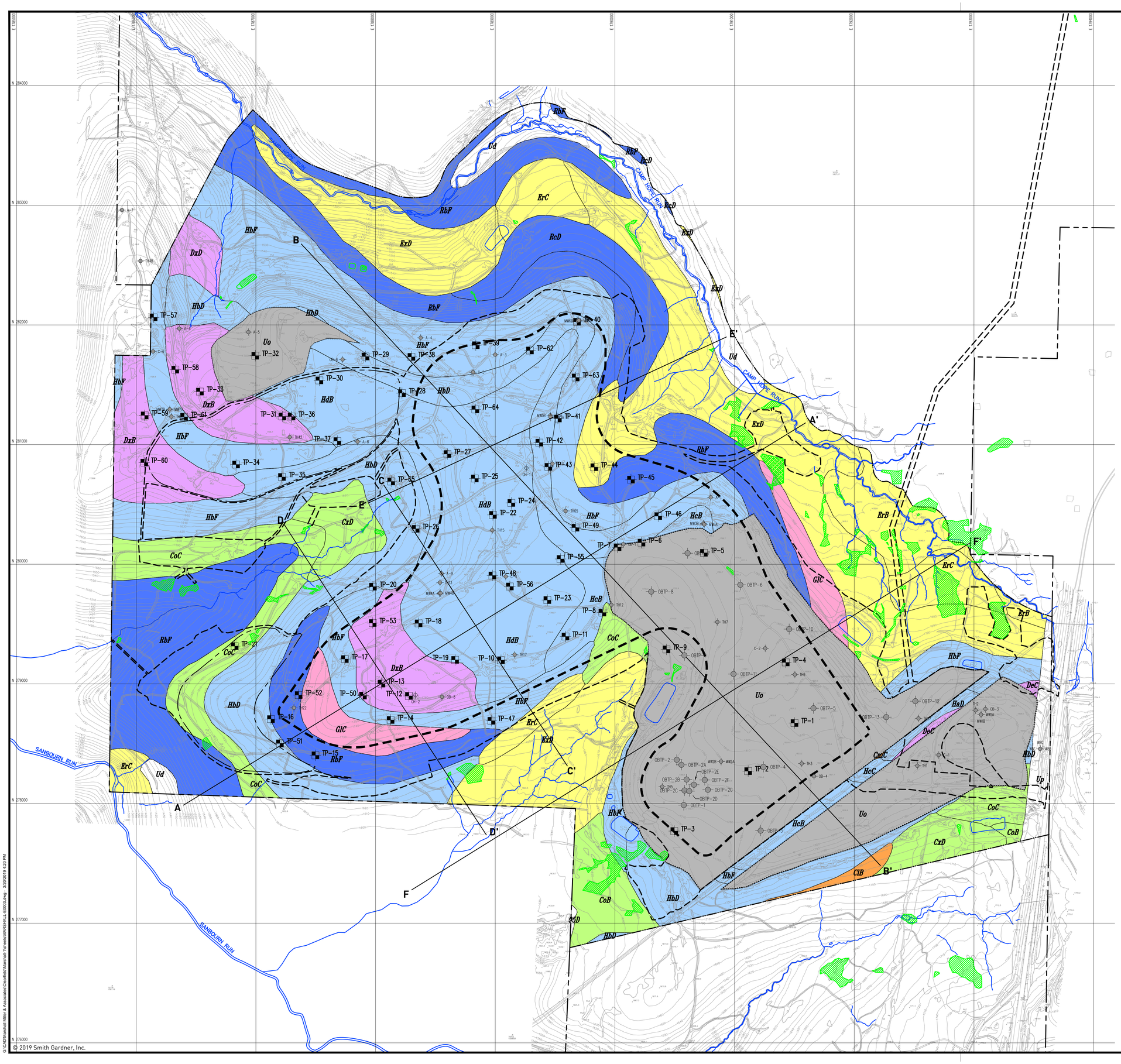
REVISED JUNE 2019


N
DxD
TH48
295.16'
N89°14'33"W
TP-57
H
A5
HbD
HbF
A
MINED AREA = 63.8 AC
TP-32
TP-29
TP-38
G
TP-58
S89°14'33"E
295.16'
TP-30
DxB
TP-33
TP-28
F
HbF
TP-59
TP-61
5.8 = 12.0 AC
TP-31
TP-36
TH45
TH42
A8
TP-37
TP-60
TP-34
DxB
TP-35
TP-65
TP-2
A
HbF
ExD
S1 STOCKPILE



S2 STOCKPILE

APPROX. SCALE 1" = 300'



LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- PROPERTY LINE
- FACILITY BOUNDARY
- LIMIT OF LINED (WASTE) AREA (SEE NOTE 8)
- APPROXIMATE LIMITS OF DISTURBANCE
- APPROXIMATE LIMITS OF STOCKPILE
- STREAMS
- AREA OF FORMER STRIP MINE
- WETLANDS
- TP-57 TEST PIT LOCATION (SEE REFERENCE 4)
- TH7 FORMER BOREHOLE LOCATION
- CH-2 COREHOLE LOCATION
- OBTP-7 OVERBURDEN TEST PIT LOCATION (SEE REFERENCE 5)
- A — A' SECTION LINE
- SOIL BOUNDARY

SOIL DESCRIPTIONS

- OlB – CLYMER CHANNERY LOAM (3–8% SLOPES)
  CmC – CLYMER VERY STONY LOAM (8–15% SLOPES)
  AVERAGE THICKNESS: 5.3' (SEE NOTE 9)
- CoB – COOKPORT CHANNERY LOAM (3–8% SLOPES)
  CoC – COOKPORT CHANNERY LOAM (8–15% SLOPES)
  CxD – COOKPORT VERY STONY LOAM (8–25% SLOPES)
  AVERAGE THICKNESS: 2.8' (SEE NOTE 9)
- DeC – DEKALB CHANNERY LOAM (8–15% SLOPES)
  DxB – DEKALB VERY STONY LOAM (0–8% SLOPES)
  DxD – DEKALB VERY STONY LOAM (8–25% SLOPES)
  AVERAGE THICKNESS: 4.0' (SEE NOTE 9)
- ErB – ERNEST SILT LOAM (3–8% SLOPES)
  ErC – ERNEST SILT LOAM (8–15% SLOPES)
  ExD – ERNEST VERY STONY SILT LOAM (8–25% SLOPES)
  AVERAGE THICKNESS: 4.7' (SEE NOTE 9)
- GlC – GILPIN CHANNERY SILT LOAM (8–15% SLOPES)
  GmD – GILPIN VERY STONY SILT LOAM (8–25% SLOPES)
  AVERAGE THICKNESS: 8.0' (SEE NOTE 9)
- HaD – HAZELTON CHANERY LOAM (15–25% SLOPES)
  HbD – HAZELTON VERY STONY LOAM (8–25% SLOPES)
  HbF – HAZELTON VERY STONY LOAM (25–80% SLOPES)
  HcB – HAZELTON–CLYMER CHANNERY LOAMS (3–8% SLOPES)
  HcC – HAZELTON–CLYMER CHANNERY LOAMS (8–15% SLOPES)
  HdB – HAZELTON–CLYMER VERY STONY LOAMS (0–8% SLOPES)
  AVERAGE THICKNESS: 4.0' (SEE NOTE 9)
- RbF – RAYNE CHANNERY SILT LOAM (25–65% SLOPES)
  RcD – RAYNE – GILPIN COMPLEX (15–25% SLOPES)
  AVERAGE THICKNESS: 6.0' (SEE NOTE 9)
- Ud – UDIFLUENTS
- Uo – UDORTHENTS
  THICKNESS UP TO 80'

NOTES

1. SOIL DESCRIPTIONS WERE DIGITIZED FROM REFERENCE NO. 3.
2. COORDINATES SHOWN REFERENCE PENNSYLVANIA STATE PLANE SYSTEM.
3. ELEVATIONS REFERENCE USGS MSL DATUM.
4. SOIL TYPES/ LIMITS WERE DIGITIZED FROM REFERENCE NO. 3 AND ARE CONSIDERED APPROXIMATE ONLY, DUE TO MAP SCALE DIFFERENCES AND TOPOGRAPHIC ACCURACY.
5. SOIL TYPES REPRESENT THOSE EXISTING AT THE TIME OF MAPPING FIELD WORK PER REFERENCE NO. 3.
6. REFER TO EXHIBITS 6–1,2 TO 6–1.8 FOR SOIL/ROCK CROSS SECTIONS.
7. THIS MAP WAS UPDATED BY M.N. GILBERT ENVIRONMENTAL FROM THE SOIL MAP REFERENCING THE SOIL SURVEY OF CLEARFIELD COUNTY PENNSYLVANIA.
8. ALL BORROW AREAS WILL BE WITHIN FUTURE LANDFILL PHASES WITHIN THE PROPOSED LIMITS OF DISTURBANCE.
9. AVERAGE SOIL THICKNESS AS ENCOUNTERED IN TEST PITS EXCAVATED AT SITE DURING JULY 5, 2005 AND JULY 28, 2005.

REFERENCES

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS VERMONT.
2. TOPOGRAPHY AUGMENTED WITH TOPOGRAPHIC AND CULTURAL INFORMATION FROM U.S.G.S. 7.5 MINUTE GLEN RICHEY (1993) AND WALLACETON (1993) PA QUADRANGLE MAPS.
3. SOIL SURVEY OF CLEARFIELD COUNTY, PENNSYLVANIA, 1981 AS PUBLISHED BY THE US DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE.
4. TEST PITS PERFORMED BY MARSHALL MILLER & ASSOCIATES, INC.
5. OBTP LOCATIONS ARE BASED ON STAKE–OUT POINTS BY GEOTECHNICAL ENGINEERING INC. OF MORRISDALE, PA PRIOR TO EXCAVATING THE TEST PITS, EXCEPT FOR OTB–2A THROUGH 2G, OBTP–12 AND OBTP–13 WHICH WERE BASED ON FIELD MEASUREMENTS FROM KNOWN POINTS.

0 300' 600' 900'

PREPARED FOR:

PA WASTE, LLC
CLEARFIELD COUNTY, PA

PREPARED BY:

SMITH+ GARDNER
ENGINEERS
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

SEAL

SEAL

REV.	DATE	DESCRIPTION
1	5/18	RESPONSE TO 5/9/18
		PADEP COMMENTS
2	3/19	RESPONSE TO 11/26/18
		PADEP COMMENTS

PROJECT TITLE:

PA WASTE, LLC
CAMP HOPE RUN LANDFILL
CLEARFIELD COUNTY, PA
PHASE I APPLICATION

DRAWING TITLE:

MAP OF SOIL TYPES

DESIGNED: J.M.G.	PROJECT NO: PAWASTE 16-1
DRAWN: C.T.J.	SCALE: AS SHOWN
APPROVED:	DATE: JUNE 2017
FILENAME: MARSHALL-E0003	
SHEET NUMBER:	DRAWING NUMBER: F-2

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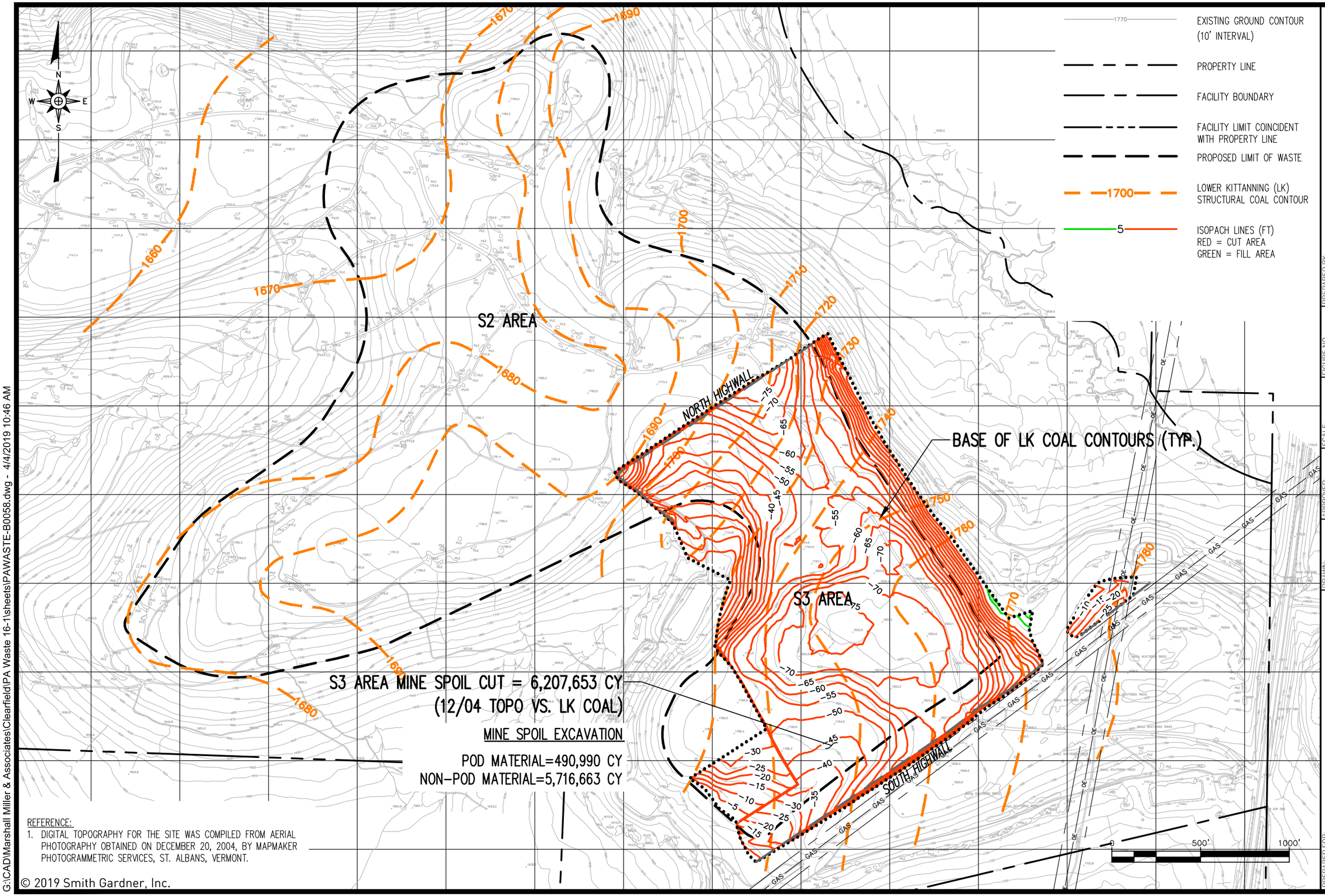
AVAILABLE SOIL MATERIAL ESTIMATES

EXCAVATION (CUT) & EMBANKMENT (FILL)

REVISED JUNE 2019



REFERENCE:

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS, VERMONT.

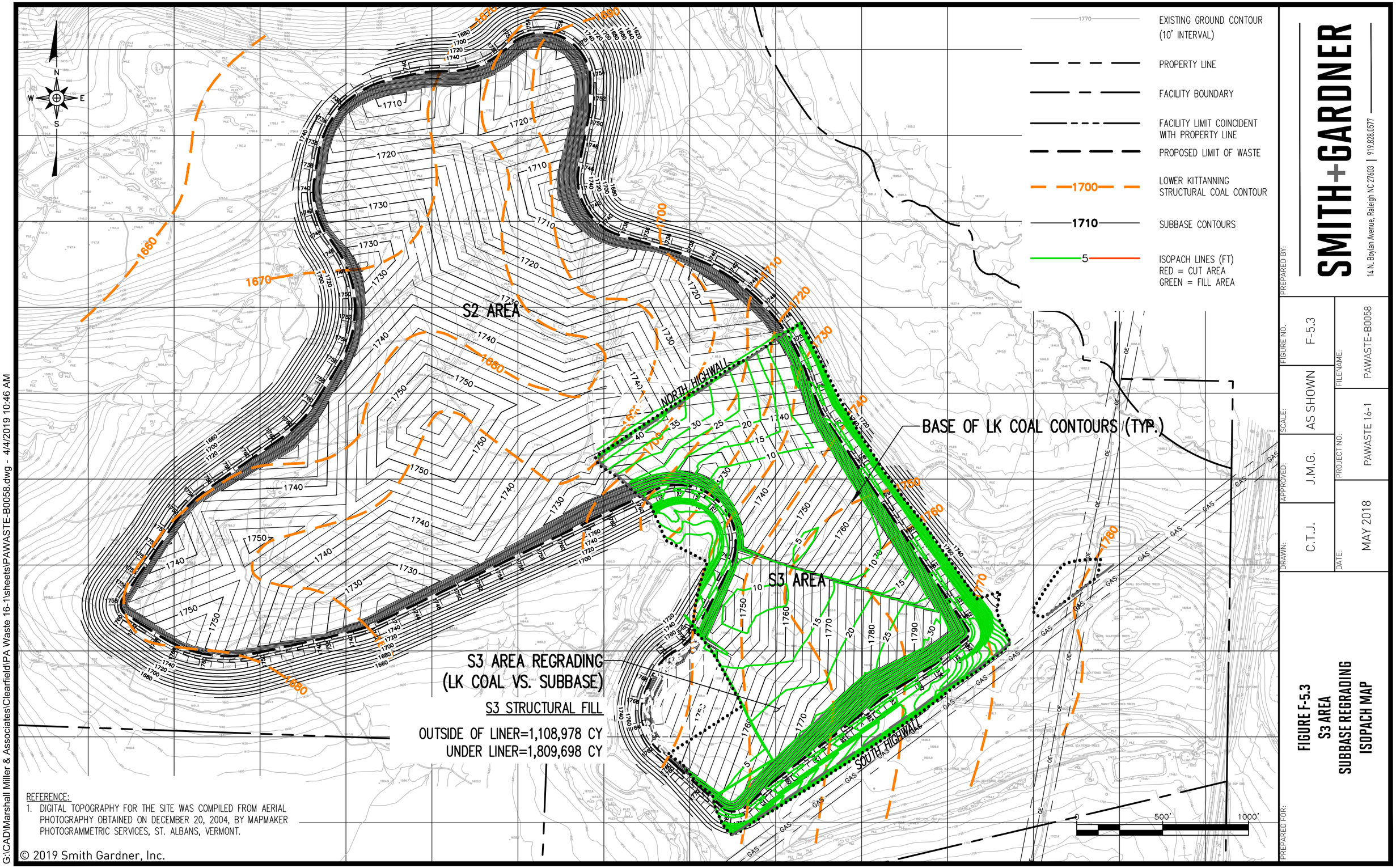
PREPARED BY:

SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

FIGURE NO.	F-5.2
FILENAME:	PAWASTE-B0058
SCALE:	AS SHOWN
PROJECT NO:	PAWASTE 16-1
APPROVED:	J.M.G.
DRAWN:	C.T.J.
DATE:	MAY 2018

PREPARED FOR:

FIGURE F-5.2
S3 AREA
MINE SPOIL EXCAVATION ISOPACH MAP



REFERENCE:

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS, VERMONT.

PREPARED BY:

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PREPARED FOR:

FIGURE F-5.3
S3 AREA
SUBBASE REGRADING
ISOPACH MAP

FIGURE NO.	F-5.3
FILENAME:	PAWASTE-B0058
SCALE:	AS SHOWN
PROJECT NO:	PAWASTE 16-1
APPROVED:	J.M.G.
DRAWN:	C.T.J.
DATE:	MAY 2018

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S2 AREA (12/04 TOPO VS. SUBBASE)

S2 AREA STRUCTURAL FILL

OUTSIDE OF WASTE LIMITS	2,136,144 CY
UNDER LINER	670,053 CY
	2,806,197 CY

S2 AREA EXCAVATION

EXCAVATION	4,594,338 CY
TOPSOIL & SUBSOIL	1,299,379 CY
	5,893,717 CY

1770 — EXISTING GROUND CONTOUR (10' INTERVAL)

PROPERTY LINE

FACILITY BOUNDARY

FACILITY LIMIT COINCIDENT WITH PROPERTY LINE

PROPOSED LIMIT OF WASTE

1710 — SUBBASE CONTOURS

5 — ISOPACH LINES (FT)
RED = CUT AREA
GREEN = FILL AREA

S2 AREA

S3 AREA

NORTH HIGHWALL

SOUTH HIGHWALL

GAS

0 500' 1000'

REFERENCE:

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS, VERMONT.

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PREPARED BY:

FIGURE NO. F-5.4

FILENAME: PAWASTE-B0058

SCALE: AS SHOWN

PROJECT NO: PAWASTE 16-1

APPROVED: J.M.G.

DRAWN: C.T.J.

DATE: MAY 2018

PREPARED FOR:

FIGURE F-5.4
S2 AREA
SUBBASE CUT/FILL
ISOPACH MAP

S2/S3 AREA (SUBBASE VS. FINAL COVER)

S2/S3 AREA AIRSPACE

GROSS AIRSPACE:	37,410,816 CY
FINAL COVER:	727,799 CY
LINER/LCS	529,980 CY
	36,153,037 CY

TOTAL LINED AREA – SUBBASE AREAS

FLOOR	184.4 AC
SIDESLOPE (CORRECTED FOR 3:1)	34.6 AC

- EXISTING GROUND CONTOUR (10' INTERVAL)
- PROPERTY LINE
- FACILITY BOUNDARY
- FACILITY LIMIT COINCIDENT WITH PROPERTY LINE
- PROPOSED LIMIT OF WASTE
- 1710 FINAL COVER CONTOURS
- 5 ISOPACH LINES (FT) RED = CUT AREA GREEN = FILL AREA

S2 AREA

S3 AREA

NORTH HIGHWALL

SOUTH HIGHWALL

0 500' 1000'

REFERENCE:

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS, VERMONT.

PREPARED BY: SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PREPARED FOR:

FIGURE F-5.5
S2 / S3 AREA
FINAL COVER FILL
ISOPACH MAP

DRAWN:	C.T.J.	APPROVED:	J.M.G.
DATE:	MAY 2018	PROJECT NO:	PAWASTE 16-1
SCALE:	AS SHOWN	FILENAME:	PAWASTE-B0058
FIGURE NO.	F-5.5		

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SOIL/ROCK STOCKPILE CAPACITY ESTIMATES

REVISED JUNE 2019

S1 STOCKPILE AIRSPACE = 3,524,907 CY
(12/04 TOPO VS. S1 STOCKPILE)

S2 AREA

S3 AREA

S2 STOCKPILE AIRSPACE = 746,315 CY
(12/04 TOPO VS. S2 STOCKPILE)

1770 EXISTING GROUND CONTOUR (10' INTERVAL)

PROPERTY LINE

FACILITY BOUNDARY

FACILITY LIMIT COINCIDENT WITH PROPERTY LINE

PROPOSED LIMIT OF WASTE

1710 PROPOSED CONTOURS

5 ISOPACH LINES (FT)
RED = CUT AREA
GREEN = FILL AREA

GAS

0 500' 1000'

REFERENCE:

1. DIGITAL TOPOGRAPHY FOR THE SITE WAS COMPILED FROM AERIAL PHOTOGRAPHY OBTAINED ON DECEMBER 20, 2004, BY MAPMAKER PHOTOGRAMMETRIC SERVICES, ST. ALBANS, VERMONT.

FIGURE F-5.6
S2 / S3 AREA
SOIL STOCKPILE
ISOPACH MAP

PREPARED FOR:

SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

PREPARED BY:

FIGURE NO.	F-5.6
FILENAME:	PAWASTE-B0058
SCALE:	AS SHOWN
PROJECT NO:	PAWASTE 16-1
APPROVED:	J.M.G.
DRAWN:	C.T.J.
DATE:	MAY 2018

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PHASE I APPLICATION
CAMP HOPE RUN LANDFILL
BOGGS TOWNSHIP, CLEARFIELD COUNTY, PENNSYLVANIA

FORM F
EXHIBIT F-5.1
Calculations Supporting
Special Handled Materials (PODS)
Estimates

REVISED JUNE 2019

SMITH+GARDNER
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

S3 Area - Volume of Material in Constructed Pods

Date: 3/30/2019
By: WMB

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, PA

TABLE F-5.8

Purpose:

Determine the volume of material placed in the constructed pods located within the Phase VI area of the surface mine permit, which coincides with the proposed S3 area of the landfill. This estimated volume of special handled material will be removed as part of the excavation of the S3 area and placed in the lined areas of the landfill.

Assumptions:

1. Each Pod consists of the following layers from Top to Bottom:

- 2-foot-thick soil layer
- 2-foot-thick acid rock layer
- 8-inch-thick alkaline layer
- 2-foot-thick acid rock layer
- 8-inch-thick alkaline layer
- 2-foot-thick acid rock layer
- 8-inch-thick alkaline layer
- 2-foot-thick soil layer

2. The volume of special handled material (SHM) in Phase VI area is 203,603 cubic yards (cy) based on overburden analysis. Assuming a swell factor of 20 percent for this material when placed in pods the special handled material is estimated to have a volume of approximately 244,324 cy.

3. Constructed pod size is 75 ft x 200 ft or 15,000 square feet (sf).

Total Estimated SHM: 244,324 cy

Number of Pods Based on SHM Volume:

75 ft x 200 ft x 6 ft of special handled material =						90,000	cubic feet (cf) per pod
						3,333	cubic yards(cy) per pod
244,324 cy SHM/	3,333	cy	=			74	pods

Alkaline Material in Pods:

3 (8-inch-lifts) x	74 (pods)	x	15000	sf	=	2,220,000	cf
						82,222	cy

Soil in Pods:

2 (2-foot-lifts) x	74 (pods)	x	15000	sf	=	4,440,000	cf
						164,444	cy

Total Volume in Pods

Special Handled Material (SHM)	=	244,324	cy
Alkaline Material	=	82,222	cy
Soil	=	164,444	cy
Total Pod Volume =		**490,990**	**cy**

SMITH+GARDNER

14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

Date: 6/26/2019
By: WMB
Checked By: JMG

Camp Hope Run Landfill
PA Waste LLC
Boggs Township, Clearfield County, Pennsylvania

TABLE F-5.9
Area S3 "Special Handled Material" (POD) Volumes

Former Area Designation	Acres within S3	Thickness (ft) of "Special Handled Material"	Volume (cubic feet) of "Special Handled Material" within pods	Volume (cubic yards) of "Special Handled Material" within pods
OB4***a***	30.29	3.67	4,842,317	179,345
OB4***b***	38.29	0.33	550,411	20,386
OB4***c***	38.29			
Subtotal		*4.00*	*5,392,728*	*199,731*
C2***d***	40.92			
Subtotal		*0.00*	*0*	*0*
C1***e***				
OB3***f***				
OB1.1	1.20	2.00	104,544	3,872
Subtotal		*2.00*	*104,544*	*3,872*
A1	0.47	0.00	0	0
Subtotal		*0.00*	*0*	*0*
Total (Material in Pods)		**6.00**	**5,497,272**	**203,603**

Notes:

OB4***a*** - acreage of OB4 reduced by 8 acres due to the lack of overburden above the LK rider zone as per PADEP letter of October 1995.

OB4***b*** - includes the clay binder above the LK top split that was special handled in OB4.

OB4***c*** - includes the clay binder above the LK bottom split and the LK bottom split over the entire OB4 area.

C2***d*** - includes the clay binder above and below LK bottom split and the LK bottom split over the entire C2 area.

C1e - no "Special Handled Material" identified and the area is outside the footprint of the proposed landfill.

OB3f - LK was not split at this location and the only "Special Handled Material" was beneath the LK. The area is outside the footprint of the proposed landfill.

Total Special Handled Material in Pods (less C2) - does not include the lingula bearing zone as the PADEP noted it was not practicable to special handle.