1299 HARRISBURG PIKE | PO BOX 4425 | LANCASTER, PA 17604
PHONE: 717-397-9968 | FAX: 717-397-9973
www.lcswma.org

August 19, 2016

Mr. John Oren. P.E.
Permits Chief
Waste Management Program
Pennsylvania Department of Environmental Protection
909 Elmerton Avenue
Harrisburg, PA 17110-8200

RE: Lancaster County Solid Waste Management Authority response to the Department of Environmental Protection's Request for Additional Information related to the Environmental Assessment of Frey Farm Landfill Vertical Expansion letter dated August 8, 2016.

Dear Mr. Oren:

The Lancaster County Solid Waste Management Authority (LCSWMA) is responding to the Department of Environmental Protection's "Request for Additional Information" related to the Environmental Assessment of Frey Farm Landfill Vertical Expansion letter dated August 8, 2016. The following responses parallel the numbered comments in DEP's letter as follows:

Response to Comment #1:

The corrected ARM response (Attachment 6 -ARM Responses to PADEP 2nd EA letter page #9) Soil Test Boring MSEB-12 soil test boring is denoted as *north* instead of *south,* accompanies this letter as Attachment #1.

Response to Comment #2:

The ARM Geotechnical Engineering Report for the Proposed Frey Farm Landfill Wind Energy Project dated April 2010 documenting shear wave velocity accompanies this letter as Attachment #2.

Response to Comment #3:

The overweight vehicle penalties outlined in LCSWMA's Transportation Compliance Plan apply to every violation, including repeated infractions. Should a particular waste hauler demonstrate a pattern of violations, LCSWMA will work with the responsible party to correct the pattern of infractions. Additionally, LCSWMA may notify the Pennsylvania State Police of repeat offenders should the

1299 HARRISBURG PIKE | PO BOX 4425 | LANCASTER, PA 17604
PHONE: 717-397-9968 | FAX: 717-397-9973
www.lcswma.org

overweight infractions continue without any resolve and/or the hauler refuses to work with LCSWMA on the issue. LCSWMA will provide information to the Pennsylvania State Police, in order for them to enforce compliance with restrictions placed on state roads.

Response to Comment #4:

Waste haulers will be made aware of school bus stop locations on the remainder of the haul routes beyond what PADEP requested in the initial response letter by including additional maps within the Transportation Compliance Plan that shows the school bus stops located on the haul routes. An updated LCSWMA Hauler Packet accompanies this letter as Attachment #3.

Please do not hesitate in contacting me if you have any questions or concerns related to our responses to your letter or any other issue related to the Frey Farm Landfill.

Respectfully submitted,

Mark D Reider CPSS/SC
Director of Environmental Compliance

Attachments1-3

cc: Manor Township
Lancaster County Planning Commission
ARM Group

Attachment #1

ARM correction page #9

of the Frey Farm Landfill site. Note: additional information pertaining to these reports is included in subsequent comments.

Responses to the reports submitted by Walter M. Leis, Charles K. Scharnberger, and Craig H. Benson are addressed in subsequent comments.

10. **Appendix A – ARM Comprehensive Technical Response #7.a.4)b) – Page 10**

a. ARM indicates:

(1) Well FFMP016W has been pumped dry.

(2) *"This is not saturated and 'normally-consolidated' soil that would experience 'new stress' upon removal of buoyancy from the water table dropping and, thus, there is no concern related to dewatering-induced settlement."*

b. PADEP Response:

To PADEP's knowledge, Well FFMP016 has not been pumped dry. Did ARM intend to indicate Well FFMP025W (Total Depth = 39 Feet) and not Well FFMP016W (Total Depth = 150 Feet)? PADEP's concern is the affect the current/future pumping and/or nonpumping of Well FFMP016W could have on the shallow groundwater in the vicinity of the proposed MSE Berm near Soil Test Boring MSEB-12 and former Spring SP-01 (e.g. FFVE Permit Application Phase II Sheet 14, Critical Cross Section 33) and in the vicinity of Well FFMP025W (e.g. Phase II Sheet 14, Critical Cross Sections 38 and 40 and Phase II Sheet 22, Cross Section 39).

FFMP016W has been used to supply water for dust control since May 2011, but ARM is not aware of any documentation that shows that FFMP016W has ever been pumped dry. The fact that the groundwater elevation at FFMP025W was below the well's bottom elevation during the May 2015 groundwater sampling event does not affect ARM's conclusion that the soil in this vicinity is not saturated and therefore not subject to dewatering-induced settlement. The groundwater elevations observed in these wells have never risen higher than the top of bedrock according to LCSWMA's historical quarterly monitoring records. Additionally, groundwater was not encountered during the drilling of Soil Test Boring MSEB-8, which is located directly adjacent to these monitoring wells and was completed approximately 5 feet into competent bedrock. Soil saturation is not a concern if pumping is discontinued in FFMP016W, as the historical groundwater elevation observations include 20 years of pre-pumping records.

Soil Test Boring MSEB-12 is located approximately 700 feet north of the aforementioned location, as measured along the axis of the proposed MSE Berm. The groundwater conditions in the vicinity of MSEB-12 have been thoroughly documented

Attachment #2

ARM Geotechnical Engineering Report for the Proposed Frey Farm Landfill Wind Energy Project dated April 2010

Geotechnical Engineering Report

For the Proposed

Frey Farm Landfill Wind Energy Project
Manor Township, Lancaster County, Pennsylvania

Prepared For:

PPL Renewable Energy LLC
Two North Ninth Street (GEN-PL2)
Allentown, PA 18101-1179

April 2010

ARM Project 10153

ARM ENERGY SOLUTIONS

Resourceful Solutions to Energy Challenges

CORPORATE HEADQUARTERS

1129 W. Governor Road, P.O. Box 797 - Hershey, PA 17033-0797
Voice: (717) 533-8600 Fax: (717) 533-8605
E-mail: info@armgroup.net

Geotechnical Engineering Report
For the Proposed
Frey Farm Landfill Wind Energy Project
Manor Township, Pennsylvania

Prepared for:

PPL Renewable Energy LLC
2 North 9th Street (GENPL8)
Allentown, PA 18101

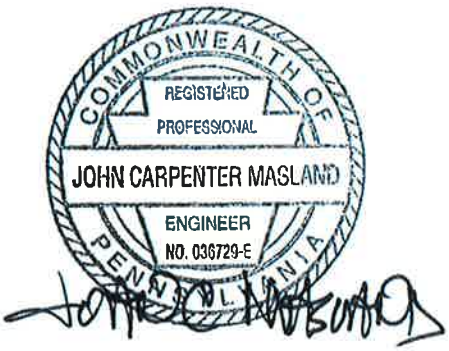
By

ARM Group Inc.
1129 West Governor Road
P.O. Box 797
Hershey, Pennsylvania 17033-0797

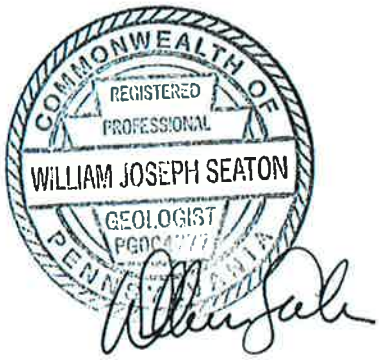
ARM Project 10153-2-1

April 30, 2010

Respectfully submitted:



John C. Masland, PE
Vice President - Geotechnical Services



William J. Seaton, PhD, PG
Senior Geophysicist

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 BACKGROUND

1.1 General

This report presents the results of subsurface investigations and testing performed at the site of the Frey Farm Landfill Wind Energy Project, and offers recommendations pertaining to geotechnical aspects of the turbine foundation design. Subsurface investigations were also performed in areas to be used for staging and assembly during construction of the turbines. Recommendations regarding subgrade preparation and installation of temporary access roads and staging areas are also presented herein.

1.2 Site Location and Description

As shown in Appendix A, Figure 1 – Site Location Map, the Frey Farm Landfill Wind Energy Project site is located immediately to the north of Frey Farm Landfill and to the east of the Susquehanna River. The site is bordered by the Susquehanna River to the west, woodland to the north, a large soil stockpile to the east, and Frey Farm Landfill to the south. Existing grade across the project site varies from approximately 580 to 615 feet in elevation, and the ground surface generally slopes from the west to the east. The site is primarily grass covered, with the exception of several existing access roads leading to soil stockpiles located east of the site.

1.3 Proposed Construction

The proposed construction will consist of two wind turbine generators. The turbines will be approximately 262 feet tall to the hub with an expected rotor diameter of 270 feet. The site will also include three crane pads, access roads, and crane crawl paths which will be utilized during the construction of the turbines. The locations of the proposed turbines are shown in Appendix A, Figure 2 – Boring Location Plan. The turbine foundations will consist of approximately 45-foot diameter octagonal reinforced concrete mats. Maximum bearing pressures generated by the turbine foundations are expected to range from approximately 3,000 pounds per square foot (psf) at the center of the foundation to approximately 4,000 psf at their edges. Bearing pressures generated by the crane on the crane pads and crawl paths are expected to be as high as 8,000 psf.

1.4 Geologic Setting

According to Physiographic Provinces of Pennsylvania (W. D. Sevon, Pennsylvania Geologic Survey, Map 13), the site is located in the Piedmont Upland Section of Piedmont Physiographic Province. The topography of this section is generally described as broad gently rolling hills and valleys. Local relief is generally less than 300 feet but can be as great as 600 feet in some locations. The topography of the section was formed by fluvial erosion of the underlying bedrock.

According to the Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania – Safe Harbor Quadrangle, A. A. Socolow and A.R. Geyer, 1975-1978, Pennsylvania Topographic and Geologic Survey, Map 61, the site is underlain by the Wissahickon Formation, albrite-chlorite schist (see Appendix A, Figure 3 – Site Geology Map). According to the Engineering Characteristics of the Rocks of Pennsylvania, Pennsylvania Geological Survey, Geyer and Wilshusen, 1982, EG-1, the Wissahickon Formation, albrite-chlorite schist typically consists of phyllite composed of quartz, feldspar, muscovite and chlorite. The formation is generally thinly bedded with highly abundant, regular, very closely spaced, open, and steeply dipping fractures. The Wissahickon Formation, albrite-chlorite schist is moderately resistant to weathering and highly weathered to a moderate depth.

1.5 Karst-Related Features

According to the Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania – Safe Harbor Quadrangle, A. A. Socolow and A.R. Geyer, 1975-1978, Pennsylvania Topographic and Geologic Survey, Map 61, the area of the site is not underlain by karst bedrock. This is consistent with the results of the drilling investigation presented below, and it is therefore concluded that karst-related features are not a consideration at the project site.

2.0 SUBSURFACE CONDITIONS

2.1 Test Boring Program

ARM conducted an exploratory boring program consisting of 11 borings at the site from March 5, 2010 through March 9, 2010. D.E. Nelson Drilling, of Joilet, Pennsylvania, an ARM subcontractor, provided drilling services for this project using a C50 R track drill rig. The boring locations for the proposed structures are shown in Appendix A, Figure 2 – Boring Location Plan. The borings are designated as B1 through B10a. Borings B1, B2, B6, and B7 were located within the footprint of the proposed crane pads; B3 through B5 were located around the proposed perimeter of Turbine A (the west turbine); B8 through B10a were located around the proposed perimeter of Turbine B (the east turbine). Borings located within the proposed crane pads were extended approximately 10 feet below existing grade or until auger refusal, whichever occurred first. One boring at each of the turbine locations (B3 at Turbine A and B10a at Turbine B) was extended a minimum of 15 to 30 feet into competent bedrock. The remaining borings at the turbine locations extended to auger refusal on bedrock. Boring B10a was performed immediately adjacent to Boring B10, which had to be abandoned after misalignment of the borehole prevented the insertion and retrieval of the core barrel.

Standard American Society for Testing and Materials (ASTM) methods were followed for split-spoon sampling (ASTM D1586) and rock coring (ASTM D2113). An ARM field representative

classified soil and rock samples and completed the field boring logs attached in Appendix B. The existing ground surface elevations shown on the boring logs were estimated from previously prepared site topographic mapping.

2.2 Geophysical Testing Program

A geophysical investigation was conducted for this project in order to better characterize the seismic properties of the materials underlying the turbine foundations. Geophysical work included performance of a multichannel analysis of surface waves (MASW) survey, and an electrical resistivity (ER) survey. Results from the geophysical investigation were delivered to Renewable Resource Consultants LLC (structural designer of the turbine foundations) and to Kupper Engineering, Inc. (electrical designer).

The multichannel analysis of surface waves (MASW) method utilizes the dispersive characteristics of surface waves to evaluate subsurface shear wave (S-wave) velocity and produces a series of shear velocity versus depth profiles across a site. MASW data is usually correlated with soil boring information to produce two or three dimensional models of ground stiffness. MASW is routinely used in subsurface characterization studies of wind turbine sites to assess the rotational and translational stiffness of site soils.

The primary purpose of performing an earth resistivity (ER) investigation is to guide the design of the electrical grounding system at the base of the wind turbines. An ER investigation produces two or three dimensional electrical resistivity models of the subsurface materials. Used in conjunction with geotechnical boring logs, ER surveys are valuable for:

a) Determining the variations in electrical resistivity within subsurface materials (unconsolidated soil, weathered rock and bedrock);
b) Determining the depth and thickness of subsurface materials (unconsolidated soil, weathered rock and bedrock); and
c) Identifying presence of groundwater, subsurface voids, or other zones of structural weakness.

2.3 Site Soils

Soils encountered at the site generally consisted of a thin topsoil cover underlain by residual soils and bedrock. Topsoil thickness at the boring locations varied from 0.0 feet to 0.5 feet and averaged approximately 0.2 feet. The soil encountered below the topsoil consisted primarily of clayey silt containing varying amounts of sand and gravel. It is likely that these soils are residual soils, that is, soils formed by the in-place weathering of the underlying parent bedrock. The residual soils extended to an average depth of approximately 12 feet below grade. Standard Penetration Test (SPT) N-values, also referred to as "blow counts" (the number of blows required to advance the spoon sampler 1 foot), ranged from 4 to more than 50 blows per foot and

averaged approximately 26 blows per foot, indicating a "very stiff" average consistency in accordance with commonly used correlations between blow count and soil consistency for fine-grained soils.

It should be noted that while no apparent fill material (i.e., soils containing construction debris, organics, or some other foreign material) was encountered during the course of the investigation, it is possible at least some grading has been performed across the site in conjunction with previous construction activities. It is therefore possible that fill and/or backfill material may be encountered in some of the excavations across the site.

2.4 Bedrock

Bedrock, as inferred from auger refusal (the inability of the drilling rig to advance the augers due to the resistance offered by the material being penetrated) was encountered at 8 of the 11 boring locations (B3, B4, B5, B6, B8, B9, B10, B10a) at depths ranging from 4.2 to 25 feet below existing ground surface. The corresponding top-of-rock elevations ranged from approximately 564 feet (at B10a) to 609.8 feet (at B5).

Bedrock was cored at 6 of the 8 borings locations (B3, B5, B8, B9, B10 and B10a) where bedrock was encountered. The recovered bedrock was field-classified as schist, which is consistent with the geologic mapping of the site (see Figure 3 – Site Geology Map). The schist was generally logged as very hard, fresh to moderately weathered, and very intensely to thinly bedded with very close to medium spaced fractures. Core recovery ranged from 0 to 100 percent and averaged approximately 72 percent. Rock Quality Designation (RQD) values ranged from 0 to 88 percent and averaged approximately 33 percent.

The thickness of weathered schist at the top of the bedrock profile differed from the borings performed at Turbine A to the borings performed at Turbine B. Whereas the borings at Turbine A encountered only several feet of weathered schist, the borings at Turbine B encountered 5 to 15 feet of weathered schist, as characterized by material that could be augered through with some effort but which was not competent enough to be successfully cored.

2.5 Groundwater

Groundwater was encountered in only one (B10a) of the eleven borings at a depth of approximately 35.5 feet below existing grade. The corresponding elevation is approximately 553.5 feet. It should be noted however, that groundwater levels can fluctuate with time and may be higher or lower during or following construction than were observed during performance of the borings.

2.6 Laboratory Testing

Physical Properties Testing

Five soil samples obtained from the borings were tested for moisture content, sieve analysis, and Atterberg limits. One sample was tested from each of the turbine and crane pad locations. All tests were performed in accordance with the applicable ASTM standards. The laboratory test reports are attached following the boring logs, and the test results are summarized in the table below.

Laboratory Test Results

Test Boring	Location	Depth (ft.)	Percent Gravel	Percent Sand	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index	Moisture Content
B1	Crane Pad A	2 - 6	3.8	37.7	58.5	NP	NP	NP	26.2
B3	Turbine A	6 - 8.4	13.5	49.9	36.5	NP	NP	NP	9.6
B6	Crane Pad B	2 – 6	30.1	49.4	20.5	NP	NP	NP	8.2
B7	Crane Pad C	2 – 6	12.4	44.1	43.5	NP	NP	NP	12.1
B10a	Turbine B	10 – 13.7	14.8	43.8	41.5	NP	NP	NP	10.4

Chemical Testing

Two samples (one from each of the turbine locations) were tested for sulfate/chloride content and pH in accordance with United States Environmental Protection Agency (USEPA) Standard 0300 and ASTM Standard D4972, respectively. The soil samples selected were from the upper soil profile which will be in contact with the turbine foundation concrete. None of the soil samples tested exhibited chemical properties that would warrant the use of sulfate or chloride resistant concrete. The laboratory test reports are attached following the boring logs and the test results are summarized in the table below.

Laboratory Test Results

Test Boring	Location	Depth (ft)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
B4	Turbine A	2 - 6	7.5	<9	<11
B8	Turbine B	6 – 9.3	7.6	18	<15

2.7 Geophysical Survey Results

Multichannel Analysis of Surface Waves

Two MASW profiles were collected at the site. The MASW profile collected over the site for Turbine A (see Appendix A - Figure 4) indicates subsurface shear wave velocities that vary from 450 feet per second (f/s) to 3,750 f/s. The soil zone is estimated to extend from the ground surface to depths of 3 to 6 feet below existing grade. Weathered rock occurs below the soil zone to depths of 16 to 18 feet below grade. Competent bedrock occurs below the weathered rock zone, as characterized by shear wave velocities ranging from approximately 2,000 to 3,750 f/s. The MASW profile collected over the site of Turbine B (Figure 5) indicates that the soil zone extends from the ground surface to depths of 22 to 28 feet below ground surface (bgs). Weathered rock occurs below the soil zone to depths of 34 to 37 feet bgs. Competent bedrock occurs below the weathered rock zone, and exhibits shear wave velocities ranging from approximately 2,000 to 3,600 f/s. Average shear wave velocity and shear modulus values for both wind turbines are shown in the table below.

Summary of Multichannel Analysis of Surface Waves (MASW) Results

Turbine A		
Depth Range (ft)	Average shear wave velocity (ft/s)	Average shear modulus* (psi)
0 - 20	1,511	55,926
20 - 50	2,537	156,221
Turbine B		
Depth Range (ft)	Average shear wave velocity (ft/s)	Average shear modulus* (psi)
0 - 20	1,199	34,365
20 - 50	1,662	69,002

*Average shear modulus calculated assuming a density of 110 pounds per cubic foot

Electrical Resistivity Survey

Two ER profiles were collected in an "X" pattern at each proposed wind turbine site with the base of the turbine located near the center of the profiles (see Appendix A -Figures 6 and 7). The ER profiles were positioned approximately 60 to 70 feet south of the base of the wind turbines due to ongoing construction activities at the site that limited the location and placement of the ER field equipment. All four ER profiles indicated relatively homogeneous soil and rock conditions in the vicinity of the two wind turbine sites, as expected for this general area. Average resistivity values for the soils at each turbine site are shown in the table below.

Summary of Earth Resistivity (ER) Results

Turbine A Resistivity Averages	Resistivity (ohm-m)			
Depth Below Ground Surface (ft)	Average	Standard Deviation	Minimum	Maximum
<3	860	833	190	5,831
3	522	347	128	2,490
6	333	124	73	797
9	275	89	67	456
12	337	143	104	646
Turbine B Resistivity Averages	Resistivity (ohm-m)			
Depth Below Ground Surface (ft)	Average	Standard Deviation	Minimum	Maximum
<3	873	207	461	1,649
3	633	146	283	1,089
6	509	132	209	855
9	475	154	227	828
12	523	202	274	1,019

3.0 RECOMMENDATIONS

3.1 General

Subsurface conditions at the site are generally favorable, and suitable for direct support of mat foundations. Recommendations regarding allowable loading, subgrade preparation and inspection, and foundation drainage for each structure are offered below. Total settlement of foundations designed and constructed in accordance with these recommendations should not exceed 1 inch. Differential settlement across any particular foundation should not exceed 1 inch.

In the event that the proposed construction changes with respect to that described herein, or in the event that conditions encountered during construction are different from those described herein, ARM should be notified so supplementary recommendations can be provided, if warranted.

3.2 Structure Foundations

Turbine A

It is recommended that the mat foundation supporting Turbine A bear at Elevation 606.0, at a depth of about 7 feet below existing grade. Reasonably competent bedrock was encountered at elevations ranging from 610 feet to 603 feet in borings B5 and B4, beneath very stiff clayey silt

with varying amounts of sand and gravel. At the recommended foundation elevation of 606.0 feet, it is expected that the mat supporting Turbine A will bear either on a thin layer of highly-weathered bedrock underlain by competent bedrock, or on reasonably competent rock. It is noted that competent bedrock was encountered as high as Elevation 610 in Boring B5, and therefore it is likely that some bedrock excavation will be required to reach foundation subgrade elevation. A mat foundation bearing on weathered bedrock or more competent bedrock at Elevation 606.0 may be sized for a maximum allowable bearing pressure of 6,000 psf.

Turbine B

It is recommended that the mat foundation supporting Turbine B bear at Elevation 583.0, at a depth of about 7 feet below existing grade. Competent bedrock was encountered at elevations ranging from 579.0 feet to 564.0 feet at Borings B8 and B10a, beneath highly weathered bedrock. It is therefore expected that the mat or raft foundation supporting Turbine B will bear on primarily highly-weathered bedrock. A mat foundation bearing on highly-weathered rock at Elevation 583.0 may be sized for an allowable bearing pressure of 6,000 psf.

Crane Pads and Crawl Paths

The crane pads and crawl paths will be constructed at approximately existing grade on very stiff clayey silt containing varying amounts of sand and gravel or general fill. It is recommended that the crane pads consist of a minimum of 2 feet of compacted Pennsylvania Department of Transportation (PennDOT) No. 2A coarse aggregate. The compacted aggregate will serve two purposes; it will help protect the moisture-sensitive subgrade soils from surface runoff, and will also help distribute the relatively high bearing pressures generated by the crane. Provided the minimum thickness of structural fill is used to construct the crane pads and crawl paths, it is expected that the site soils will provide adequate support for construction equipment.

It is recommended that the drawings and specifications clearly note that the contractor(s) performing work associated with turbine construction are responsible for reviewing site conditions and making their own determinations regarding the adequacy of the minimum measures recommended above. The contactor utilizing the crane pads and crawl paths is responsible for their adequacy and performance, and if the contractor believes that measures more extensive than the minimum measures recommended above are required to accommodate his operations or equipment, then such measures should be provided.

Access Roads

The access roads utilized during construction will be at approximately existing grade, or in cuts and fills of no more than several feet. It is recommended that access roads be constructed on a minimum of 12 inches of compacted PennDOT No. 2A coarse aggregate. As at the crane pads and crawl paths, the compacted aggregate will help protect subgrade soils from surface runoff, and will distribute the loads generated by construction equipment. Provided the minimum

thickness of aggregate is used to construct the access roads, it is expected that the underlying structural fill or native soil will provide adequate support for the proposed crane pads.

3.3 Subgrade Preparation and Inspection

As noted previously, both turbines will bear on subgrades that will consist partially or largely of highly-weathered bedrock. It is expected that the large majority of this material will be suitably stable for direct support of the proposed foundation. It is possible, however, that some isolated areas of soft, loose or otherwise unsuitable material will be encountered, particularly if the material is exposed to significant rainfall and/or construction traffic. All subgrades should be inspected by qualified personnel prior to foundation construction or placement of structural fill. Unsuitable soils should be removed to stable material, and the area backfilled with compacted PennDOT No. 2A coarse aggregate.

In order to help protect the subgrades from disturbance, it is recommended that a minimum of 2 inches of lean concrete be placed on the entire foundation subgrades of Turbines A and B as soon as possible after reaching foundation subgrade elevation. The lean concrete mats will provide a uniform surface upon which to set reinforcing steel for the turbine foundation as well as help protect the subgrade from deterioration due to exposure to precipitation.

3.4 Structural Fill and Backfill

Structural fill and backfill placed beneath crane pads, crawl paths, and access roads should be free of ice, snow, roots, sod, or other organic matter, rubbish, slag, or other deleterious materials. Existing site soils that meet these criteria should be acceptable for use as structural fill. Rock fragments mixed in structural fill should not have any one dimension greater than 6 inches, and the proportion of particles greater than 2 inches in maximum dimension should not exceed 25 percent.

Imported structural fill material, if needed, should be approved prior to use. It should consist of clean, non-organic soil classifying as GW, GM, SW, SM, CL, or ML under the Unified Soil Classification System (USCS). The maximum dry density, as determined by the modified Proctor compaction test (ASTM D-1557), should be at least 100 pounds per cubic foot (pcf). Any rock contained in the fill should have no dimension greater than 6 inches, and the proportion of particles greater than 2 inches in maximum dimension should not exceed 25 percent. PennDOT No. 2A coarse aggregate may also be used as structural fill and backfill.

Structural fill and backfill should be placed in horizontal lifts, not exceeding 8 inches in loose thickness. Lifts should be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor test (ASTM D-1557). Where hand-operated equipment is used, a maximum loose lift thickness of 4 inches is recommended.

Field density testing of structural fill and backfill should be performed to help confirm that the in-place density of compacted fill and backfill is adequate. A minimum frequency of one test per 5,000 square feet of lift surface, once every 25 lineal feet of foundation fill or backfill, and a minimum of 3 tests per lift, is recommended. A greater frequency should be used if warranted by adverse field conditions or visual observations of potentially inadequate compaction. If field testing is performed using nuclear methods (ASTM D-2922), all tests should extend to the bottom of the lift being tested (i.e., backscatter testing methods should not be used).

3.5 Rock Excavation

As noted previously, it is expected that some portion of the Turbine A foundation excavation will involve rock excavation. Bedrock excavation by mechanical means (e.g., ripping or hoe ramming) will likely be feasible, but may be difficult, particularly in the more confined and/or deeper excavations. Unless otherwise stated by PPL Renewable Energy LLC, bidders should assume that blasting will not be permitted.

It should also be noted that weathered bedrock through which the drill rig was able to advance the augers, but which may be difficult to excavate by mechanical means, will be encountered in both foundation excavations. It is possible that such material could require bedrock excavation techniques (e.g., ripping, hoe ramming, blasting, etc.) to advance the excavation.

Regardless of how rock is excavated, the finished subgrade will be somewhat irregular. Depressions may be filled to finished subgrade elevation with compacted No. 2A aggregate, or backfill concrete. At the contractor's option the thickness of the lean concrete mat may be increased as need be to fill subgrade irregularities at the time the mat is poured.

It is recommended that this Geotechnical Engineering Report be made available to prospective bidders in the interest of providing as much information as possible for their use in evaluating excavation costs.

3.6 Construction Dewatering

Groundwater was encountered at approximately Elevation 553.5 at Boring B10a. This elevation is significantly below the deepest excavation at the site, and it is not expected that significant quantities of groundwater will not be encountered during foundation excavation. Nonetheless it is recommended that the construction specifications include a requirement to collect and remove any water entering foundation excavations. Grading around the open foundation excavations should be such that surface runoff is directed away from the excavations. Any precipitation or groundwater that enters the foundation excavations should be removed as quickly as possible.

It is also possible that lenses of perched groundwater will be encountered. Given the moisture-sensitive nature of the site soils, the importance of proper dewatering of soil subgrades cannot be overemphasized.

3.7 Geotechnical Design Parameters

The following parameters were established based on the test boring results and upon past experience, and are recommended for design purposes:

Parameter	Value
Maximum Allowable Bearing Pressure (psf)	6,000
Angle of Internal Friction for Soil, Ø(degrees)	30
Moist Unit Weight of Soil, γ (pcf)	120
Active Lateral Earth Pressure Coefficient, K_a	0.33
Passive Lateral Earth Pressure Coefficient, K_p	3.0
At-rest Lateral Earth Pressure Coefficient, K_o	0.5
Coefficient of Friction (soil to concrete)	0.40
Minimum Frost Depth (inches)	36
Seismic Site Class (per AWWA D100-05)	C
Modulus of Subgrade Reaction , Ks, Beneath Turbines (kcf)	600
Modulus of Subgrade Reaction, Ks, for Soil (kcf)	250

If local codes or other applicable design standards dictate more conservative values for any of the above properties, it is recommended that the more conservative value be utilized.

4.0 LIMITATIONS

All conclusions and recommendations presented in this report are based on the assumption that subsurface conditions across the site do not deviate appreciably from those disclosed by the test borings, and are also based upon the premise of competent field engineering and inspection during construction.

ARM did not conduct an Environmental Site Assessment at this site. Issuance of this report does not constitute an environmental characterization of this site in any way.

Appendix A

Figures

Base map from Safe Harbor USGS 7½ minute quadrangle dated 1995.

LEGEND

- LCSWMA Property Boundary (Frey Farm/Creswell Landfill)
- Frey Farm Landfill (FFLF) Permitted Waste Limit

N

0 1,500 3,000 4,500

SCALE IN FEET

Site Location Map

FFLF Wind Energy Project
Manor Township
Lancaster County, PA

April 2010	Scale: 1" = 1,500'	10153-2-1

ARM Energy Solutions
Resourceful Solutions to Energy Challenges
www.armenergysolutions.net

Figure 1

P:\2010\10153 FFLF Wind Energy Project - PPLRE_Drwg\Phase 2\Task 1\Fig 1_Site Location_Wind Turbines.dwg

LEGEND:

- PROPERTY LINE
- TREE LINE
- EXISTING DRAINAGE DITCH
- 580 — EXISTING CONTOUR LINES
- LIMIT OF HEAVY DUTY ACCESS ROAD
- LIMIT OF CRANE PAD
- LIMIT OF CRANE WALK (CRAWL PATH)
- ▲ B-4 — BORING LOCATION AND DESIGNATION

TURBINE BLADE LAYDOWN AND ASSEMBLY AREA

PROPOSED TURBINE "B"

TEMPORARY ACCESS ROAD

B-10

B-8

B-9

B-6

CRANE PAD B

TEMPORARY CRANE CRAWL PATH

B-2

CRANE PAD C

PROPOSED TURBINE "A"

B-4

B-5

B-3

B-1

TURBINE BLADE LAYDOWN AND ASSEMBLY AREA

EXISTING CONSTRUCTION ROAD

CRANE PAD A

N

Boring Location Plan

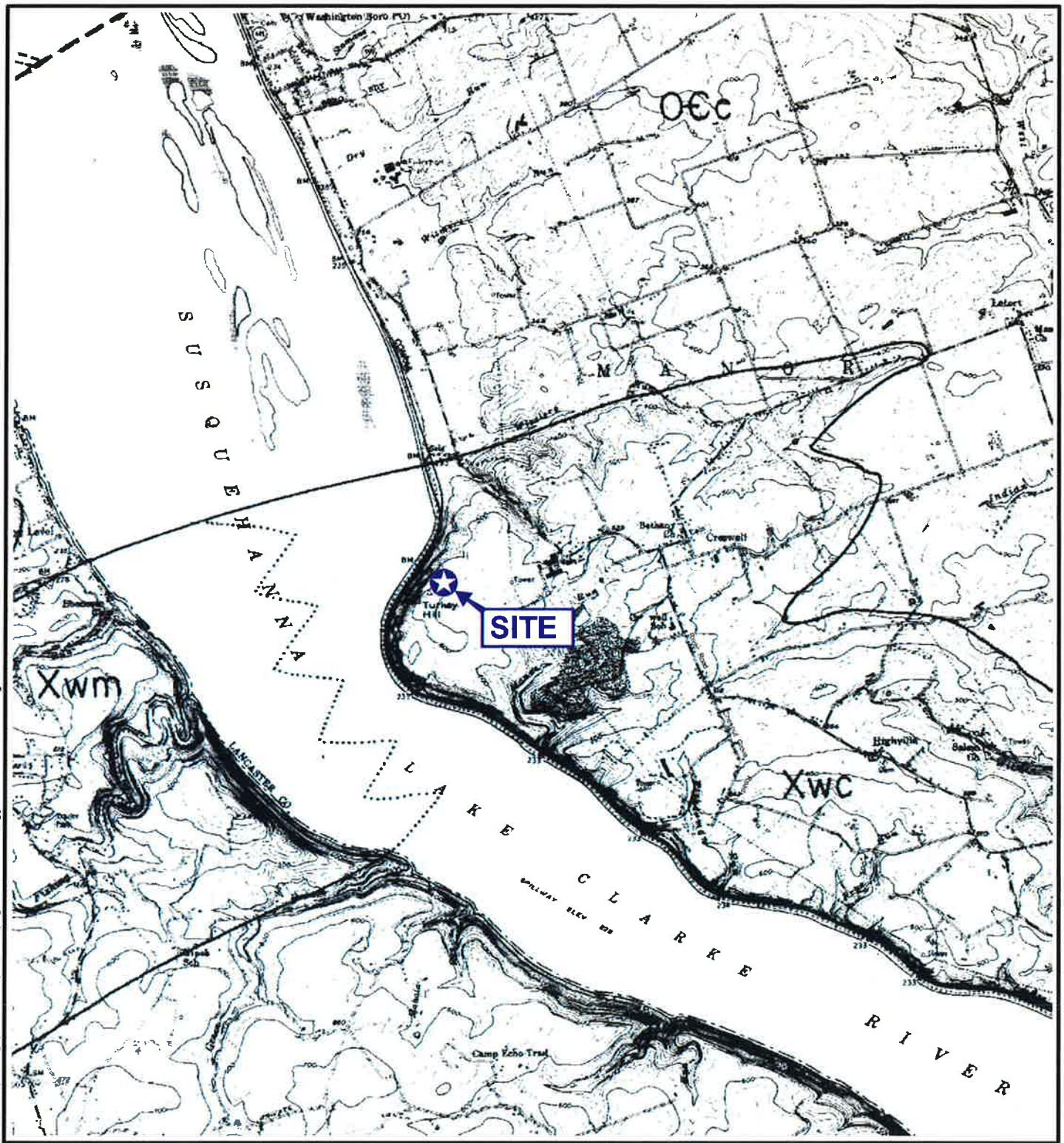
FFLF Wind Energy Project
Manor Township
Lancaster County, PA

April 2010	Scale: 1" = 100'	10153-2-1

ARM Energy Solutions
Resourceful Solutions to Energy Challenges
www.armenergysolutions.net

Figure 2

P:\2010\10153 FFLF Wind Energy Project - PPLRE_Drwg\Phase 2\Task 1\Fig 2_Boring location Plan.dwg



Base map from Safe Harbor USGS 7½ minute quadrangle dated 1995.

LEGEND

Xwc – Wissahickon Formation, albite–chlorite schist

N

0 3,000 6,000 9,000

SCALE IN FEET

Site Geology Map

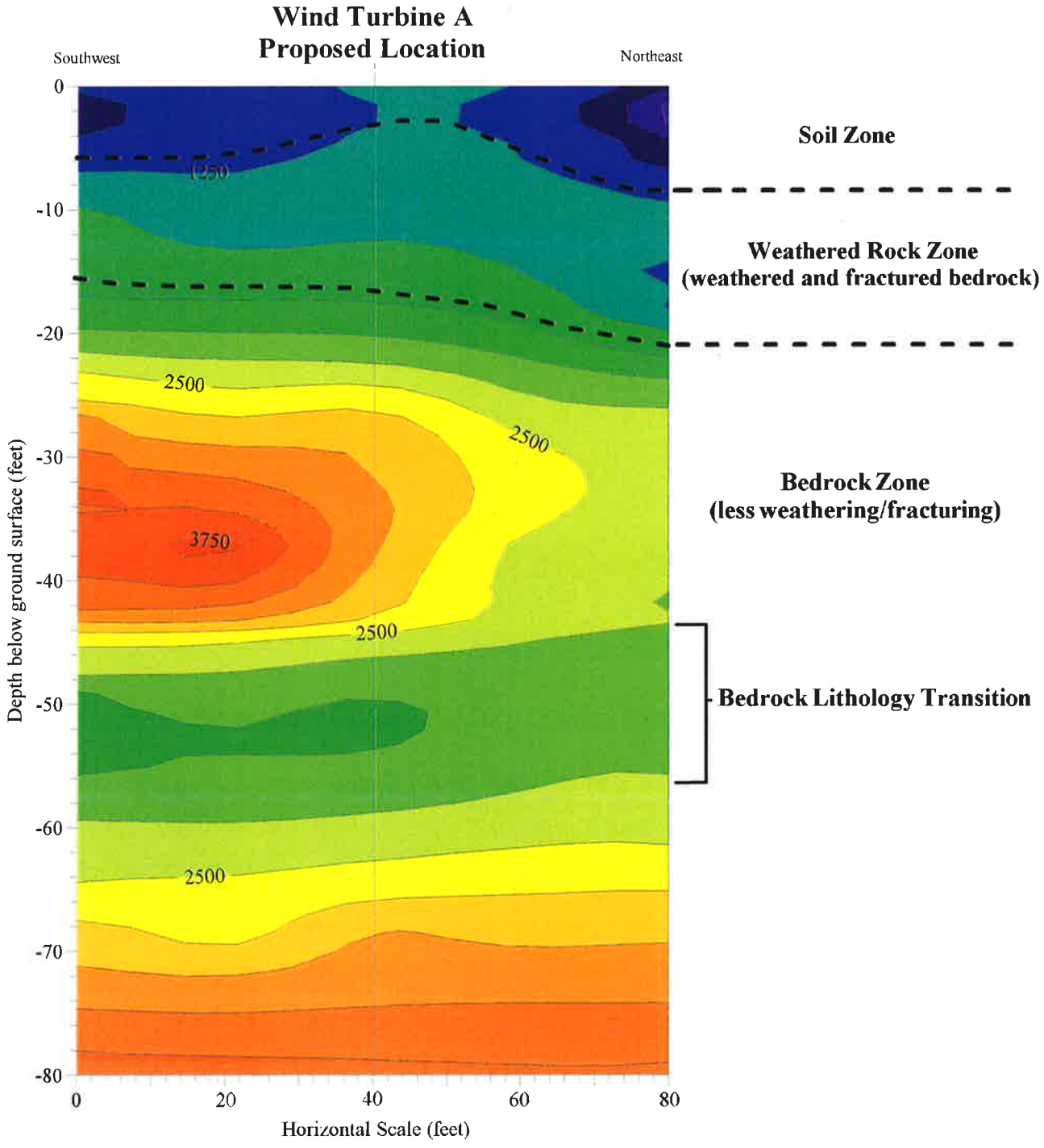
FFLF Wind Energy Project
Manor Township
Lancaster County, PA

April 2010	Scale: 1" = 3,000'	10153-2-1

ARM Energy Solutions
Resourceful Solutions to Energy Challenges
www.armenergysolutions.net

Figure 3

P:\2010\10153 FFLF Wind Energy Project – PPLRE_Drwg\Phase 2\Task 1\Fig 3_Site Geology_Wind Turbines.dwg



Color Scale for Shear Wave Velocity Contours

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000

Shear Wave Velocity (feet per second)

MASW Profile - Wind Turbine A

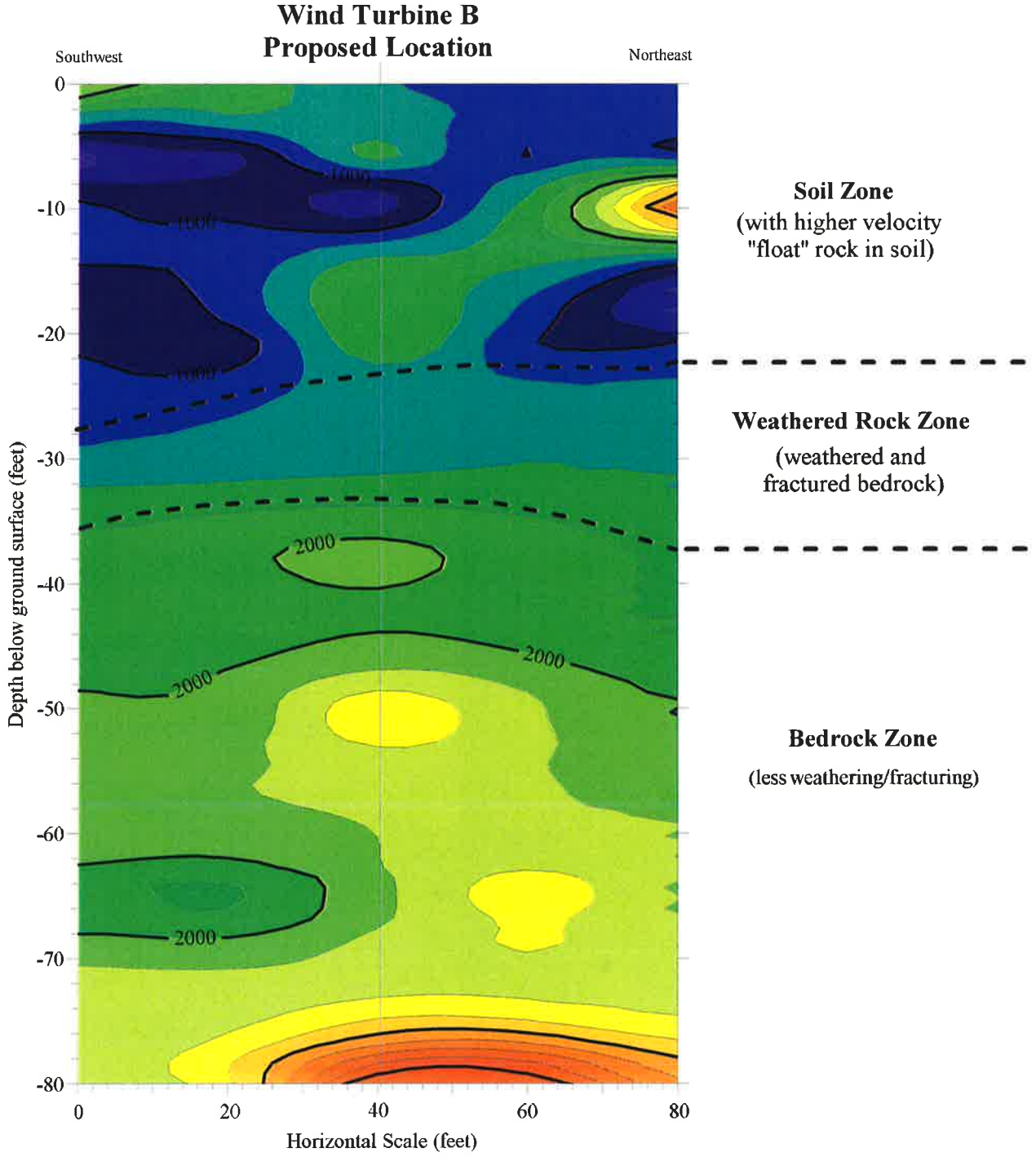
FFLF Wind Energy Project

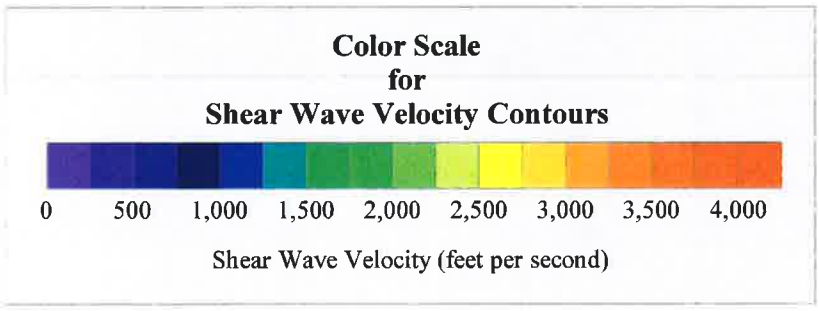
Manor Township
Lancaster County, PA

April 2010 | | 10153-4

ARM Energy Solutions
Resourceful Solutions to Energy Challenges
www.armenergysolutions.net

Figure 4





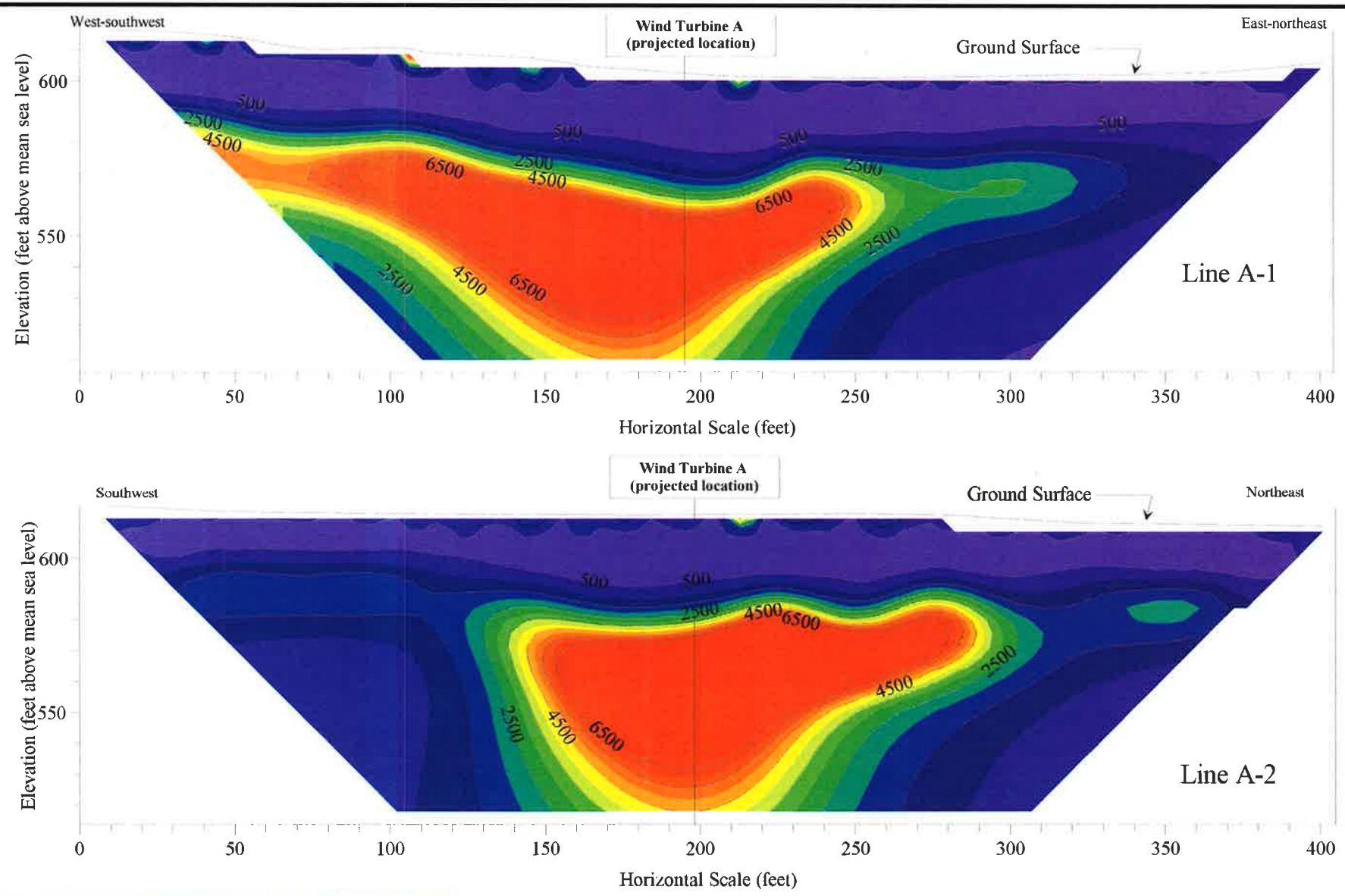
MASW Profile - Wind Turbine B

FFLF Wind Energy Project
Manor Township
Lancaster County, PA

April 2010		10153-4

ARM Energy Solutions
Resourceful Solutions to Energy Challenges
www.armenergysolutions.net

Figure 5



The proposed Wind Turbine A location is approximately 60 feet northwest of ER Line 1A and 1B.

Elevations are estimated from the Safe Harbor USGS 7.5 minute quadrangle

ARM Energy Solutions

Resourceful Solutions to Energy Challenges

www.armenergysolutions.net

ER Profiles - Wind Turbine A

FFLF Wind Energy Project

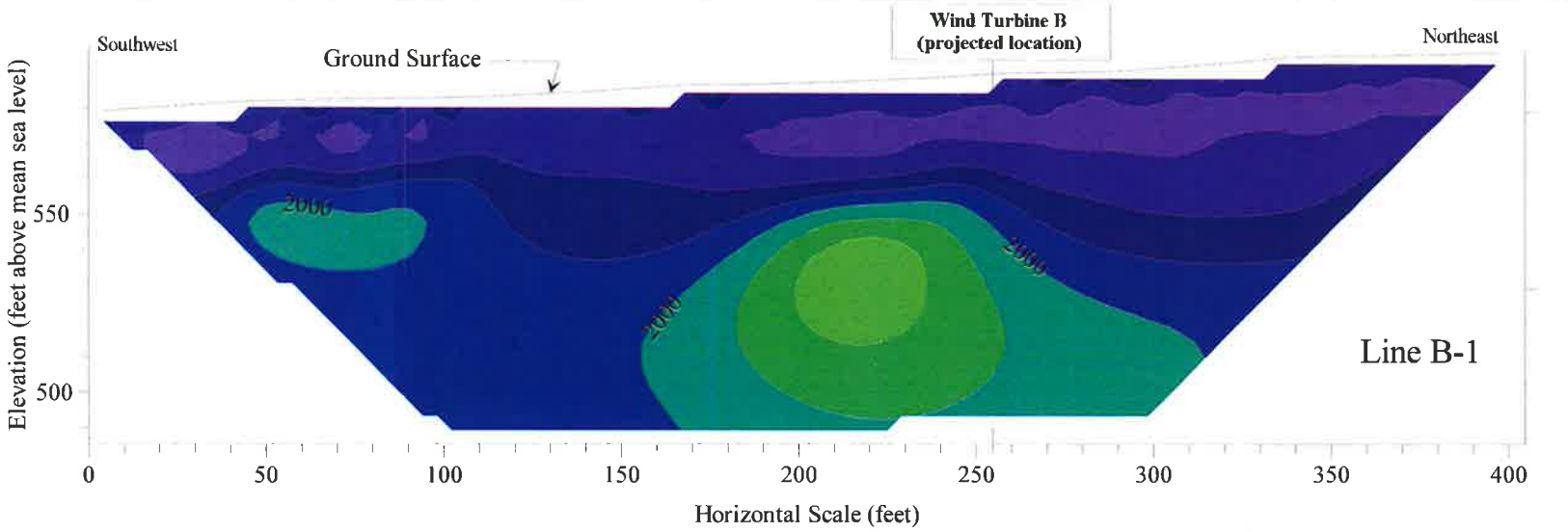
Manor Township

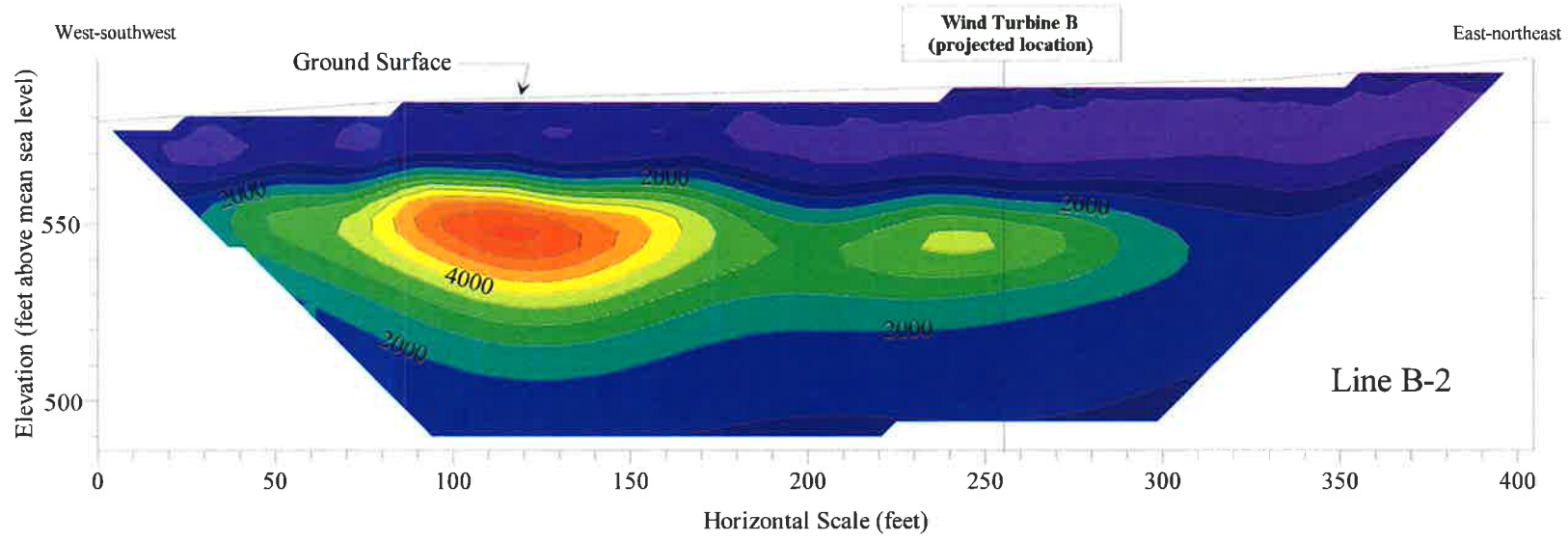
Lancaster County, PA

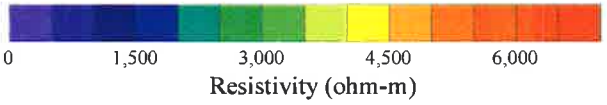
April 2010

ARM Project 10153-4

Figure 6







The proposed Wind Turbine B location is approximately 70 feet northwest of ER Line 2A and 2B.

Elevations are estimated from the Safe Harbor USGS 7.5 minute quadrangle

ARM Energy Solutions

Resourceful Solutions to Energy Challenges

www.armenergysolutions.net

ER Profiles - Wind Turbine B

FFLF Wind Energy Project

Manor Township

Lancaster County, PA

April 2010

ARM Project 10153-4

Figure 7

Appendix B

Boring Logs and laboratory Testing

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-1

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA
Date Started	3/8/2010
Date Completed	3/8/2010
Weather	Sunny, 40's
0 hr Depth to GW	Dry
hr Depth to GW	Backfilled

Depth (ft.)	Surface Elev. (ft.) 611	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	611									
1	610	SS	1	3 4 5 6	9	2.0	90		0 - 0.5' Topsoil 0.5' - 1.0' Light orange brown Clayey SILT, little Fine Sand, trace Coarse to Medium Sand, trace Fine Gravel, moist	Grass at surface Roots through S1
2	609									
3	608	SS	2	6 7 5 7	12	0.75	75			Saprolitic schist Medium to fine sand lenses/seams through S2, S3 S4 - Layer of pink-white quartz-2"
4	607									
5	606	SS	3	5 5 6 9	11	1.0	100			
6	605									
7	604	SS	4	10 20 25 29	45	C	70		1.0' - 10.0' Orange to pink brown Clayey SILT, some Coarse to Fine Sand, little Coarse to Fine Gravel, dry to moist	Angular medium to fine gravel and coarse to fine sand approximately 7.1' - 7.5'
8	603									
9	602	SS	5	10 20 40 26	60	C	85			S5 - 2 layers of angular quartz coarse to fine gravel and coarse to fine sand in size at depths 8.8'-9.0' and 9.3'-9.6'
10	601								END OF BORING AT 10.0'	
11	600									
12	599									
13	598									
14	597									
15	596									
16	595									
17	594									
18	593									
19	592									
20	591									
21	590									
22	589									
23	588									
24	587									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-2

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA
Date Started	3/8/2010
Date Completed	3/8/2010
Weather	Sunny, 40 - 50's
0 hr Depth to GW	Dry
hr Depth to GW	Backfilled

Depth (ft.)	Surface Elev. (ft.) 604	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	604									
1	603	SS	1	2 3 3 7	6	1.75	75		0 - 0.3' Topsoil 0.3' - 1.8' Brown Clayey SILT, little Fine Gravel, trace Coarse to Fine Sand, moist	
2	602									
3	601	SS	2	6 8 9 8	17	C	35			
4	600									
5	599	SS	3	6 4 8 12	12	C	75		1.8' - 10.0' Pink orange brown SILT, some Fine Gravel, trace Medium Gravel, moist	Soil has floury texture S3, S4 Micaceous
6	598									
7	597	SS	4	12 16 26 30	42	1.5	70			
8	596									
9	595	SS	5	17 33 34 34	67	C	75			
10	594								END OF BORING AT 10.0'	
11	593									
12	592									
13	591									
14	590									
15	589									
16	588									
17	587									
18	586									
19	585									
20	584									
21	583									
22	582									
23	581									
24	580									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-3

(1 of 2)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/5/2010
Date Completed	3/5/2010
Weather	Sunny, 30 - 40's
0 hr Depth to GW	Dry
3/8/10 Depth to GW	Dry
3/9/10 Depth to GW	Dry

Depth (ft.)	Surface Elev.(ft.) 613	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	613									
1	612	SS	1	3 3 5 7	8	1.0	85		0 - 0.2' Brown Clayey SILT, little Coarse Sand, trace Fine Gravel, trace Medium to Fine Sand, moist	Roots in S-1 0-0.2'
2	611			4					0.2' - 4.5' Orange brown Clayey SILT, little Fine Sand, trace Coarse to Medium Sand, trace Fine Gravel, moist	S1 and S2- graphitic and micaceous
3	610	SS	2	9 8 11	17	C	45			
4	609			8						S3 becoming friable, shaley saprolite
5	608	SS	3	13 18 18	31	C	85		4.5' - 5.7' Pink brown Coarse to Fine Gravel, some Coarse to Fine Sand, little Clayey SILT, dry to moist	
6	607			28						
7	606	SS	4	37 50/.2	37	C	50		5.7' - 6.0' White gray brown Clayey SILT, little Fine Sand, dry to moist	
8	605	SS	5	50/.4		C	20		6.0' - 7.0' Orange brown Coarse to Fine Gravel, little Coarse to Fine Sand, trace Clayey SILT, dry to moist	Augered 7.2' - 8.0'
9	604									
10	603	R	1				90	0	7.0' - 9.0' Gray tan Clayey SILT, little Fine Sand, dry to moist	Auger refusal at 9.0' and began coring
11	602									Coring water returned to surface R1, R2
12	601									
13	600	R	2				84	48		
14	599									
15	598									
16	597									
17	596									
18	595	R	3				96	61	9.0' - 39.0' SCHIST, orange brown with green, very hard, fresh to moderately weathered, very intensely to very thinly bedded (RD: 45°), very closely to medium spaced fractures (RD:0-45°)	Near vertical bedding pattern
19	594									Feldspar inclusions R1-R3
20	593									
21	592									
22	591									
23	590	R	4				92	48		
24	589									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-3

(2 of 2)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/5/2010
Date Completed	3/5/2010
Weather	Sunny, 30 - 40's
0 hr Depth to GW	Dry
3/8/10 Depth to GW	Dry
3/9/10 Depth to GW	Dry

Depth (ft.)	Surface Elev. (ft.) 613	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
25	588	R	4				92	48	9.0' - 39.0' SCHIST, orange brown with green, very hard, fresh to moderately weathered, very intensely to very thinly bedded (RD: 45°), very closely to medium spaced fractures (RD: 0-45°)	Core from 25.0' - 26.0' in box 2
26	587									
27	586									Pitted feldspar R5
28	585	R	5				90	10		
29	584									Foliated chlorite schist
30	583									Core water did not return to surface
31	582									
32	581									
33	580	R	6				100	43		R6 - Pyritic laminations and flakes through the core
34	579									
35	578									
36	577									
37	576	R	7				90	72		
38	575									
39	574								END OF BORING AT 39.0'	
40	573									
41	572									
42	571									
43	570									
44	569									
45	568									
46	567									
47	566									
48	565									
49	564									
50										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-4

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA
Date Started	3/8/2010
Date Completed	3/8/2010
Weather	Sunny, 40's
0 hr Depth to GW	Dry
24hr Depth to GW	Backfilled

Depth (ft.)	Surface Elev. (ft.) 613	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	613									
1	612	SS	1	7 8 12	20	1.25	80		0 - 0.4' Light brown SILT and CLAY, little Coarse to Fine Sand, trace Coarse to Fine Gravel, moist	Roots in S-1
2	611			11						Pyritic 1.0' - 3.0'
3	610	SS	2	10 15 16	31	0.75	70			
4	609			33						
5	608	SS	3	20 20 26	46	C	65		0.4' - 10.0' Light orange brown Clayey SILT, some Coarse to Fine Gravel, little Coarse to Fine Sand, dry to moist	
6	607	SS	4	27 50/.4		C	20			
7	606									
8	605	SS	5	50/.4		C	25			
9	604									
10	603									Auger refusal at 10.0'
11	602								END OF BORING AT 10.0'	
12	601									
13	600									
14	599									
15	598									
16	597									
17	596									
18	595									
19	594									
20	593									
21	592									
22	591									
23	590									
24	589									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-5

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/8/2010
Date Completed	3/8/2010
Weather	Sunny, 30's
0 hr Depth to GW	Dry
24hr Depth to GW	Dry

Depth (ft.)	Surface Elev. (ft.) 614	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	614									
1	613	SS	1	10 20 38	58	1.5	85		0 - 0.6' Orange brown Clayey SILT, little Fine Sand, trace Fine Gravel, trace Coarse to Medium Sand, moist	Roots in S-1
2	612	SS	2	25 40 20	20	C	70		0.6' - 4.2' Gray green Coarse to Fine GRAVEL, some Coarse to Fine Sand, little Clayey SILT, dry to moist	
3	611			50/.2						
4	610	SS	3	50/.1			5			Spoon sample 3 from 4.0'-4.1' Auger refusal at 4.2' Began coring at 4.2'
5	609	R	1				100	50		
6	608									
7	607									
8	606								4.2' - 11.5' SCHIST, greenish brown, hard to very hard, fresh to slightly weathered, intensely bedded (RD: 0-45%), closely to very closely spaced fractures (RD: 0 - 55°)	
9	605	R	2				88	36		
10	604									
11	603									
12	602								END OF BORING AT 11.5'	
13	601									
14	600									
15	599									
16	598									
17	597									
18	596									
19	595									
20	594									
21	593									
22	592									
23	591									
24	590									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-6

(1 of 1)

Site Description	: Wind Energy
Site Location	: FFLF
ARM Project No	: 10153
Client	: LCSWMA
ARM Representative	: C. Iozza
Checked By	:
Drilling Company	: D.E. Nelson Drilling
Driller	: Mike Gilbert

Drilling Equipment	: C50R Cathead Track Drill
Casing Diameter	: 3.50" ID
Casing Type	: HSA
Date Started	: 3/8/2010
Date Completed	: 3/8/2010
Weather	: Sunny, 40's
0 hr Depth to GW	: Dry-backfilled
hr Depth to GW	:

Depth (ft.)	Surface Elev. (ft.) 594	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	594									
1	593	SS	1	4 3 3	6	0.75	90		0 - 2.5' Light orange brown Clayey SILT, some Fine Gravel, little Coarse to Fine Sand, trace Coarse to Medium Gravel, moist	S1-S2 Micaceous
2	592			4						
3	591	SS	2	8 14 11	25	1.25	80			S2- Pyritic
4	590			16					2.5' - 6.5' Golden brown SILT, some Coarse to Fine Sand, little Fine Gravel, trace Coarse to Medium Gravel, moist	
5	589	SS	3	7 13 24	37	C	80			
6	588	SS	4	37 50/.4		C	20			Auger refusal at 6.5'
7	587								END OF BORING AT 6.5'	
8	586									
9	585									
10	584									
11	583									
12	582									
13	581									
14	580									
15	579									
16	578									
17	577									
18	576									
19	575									
20	574									
21	573									
22	572									
23	571									
24	570									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-7

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA
Date Started	3/8/2010
Date Completed	3/8/2010
Weather	Sunny, 40's
0 hr Depth to GW	Dry-backfilled
hr Depth to GW	

Depth (ft.)	Surface Elev. (ft.) 602	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	602									
1	601	SS	1	7 8 8 9	16	2.25	1.7		0 - 0.4' Topsoil 0.4' - 2.5' Orange brown Clayey SILT, some Fine Gravel, little Coarse to Fine Sand, trace Medium Gravel, dry to moist	Platy, fissle schist fragments in S1
2	600									
3	599	SS	2	8 7 10 11	17	0.75	1.6			Fine sand layers througout S2
4	598									3" layer of fine feldspar gravel approximately 4.1'-4.4'
5	597	SS	3	8 10 12 16	22	1.0	1.4			
6	596								2.5' - 10.0' Orange brown SILT, some Fine Sand, little Coarse to Fine Gravel, trace Coarse to Medium Sand, dry to moist	
7	595	SS	4	14 19 21 23	40	C	1.6			Noncohesive soils S2-S5
8	594									
9	593	SS	5	15 22 22 18	44	C	1.7			
10	592								END OF BORING AT 10.0'	
11	591									
12	590									
13	589									
14	588									
15	587									
16	586									
17	585									
18	584									
19	583									
20	582									
21	581									
22	580									
23	579									
24	578									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-8

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/9/2010
Date Completed	3/9/2010
Weather	Sunny, 50's
0 hr Depth to GW	Dry prior to coring

Depth (ft.)	Surface Elev.(ft.) 591	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	591									
1	590	SS	1	WOH 1 3 4	4	1.5	70		0 - 1.5' Brown SILT and CLAY, little Fine Sand, trace Coarse to Medium Sand, trace Fine Gravel, moist	
2	589			4						
3	588	SS	2	4 7 7	11	0.5	65			
4	587			7						
5	586	SS	3	8 11 15	19	C	75			Feldspar fragments in S3
6	585			29						
7	584	SS	4	32 41 32	73	C	75		1.5' - 12.0' Pinkish yellow brown Clayey SILT, some Fine Gravel, little Coarse to Fine Sand, trace Coarse to Medium Gravel, moist	S2-S5 Micaceous Schist fragments in S3-S4
8	583			14						
9	582	SS	5	35 50/.3	35	C	65			
10	581									
11	580									
12	579									Auger refusal at 12.0' Began coring at 12.0'
13	578									
14	577	R	1				30	0	12.0' - 17.7' Pink brown SCHIST, soft, very intensely bedded (RD:45°-75°), very closely spaced fractures	Coring water returned to surface in R1
15	576									
16	575									Moderate to fast coring rate
17	574	SS	6	48 50/.2		C	35			Drillers used 18" spoon to discreet sample through core barrel from 17.0'-17.7'
18	573								END OF BORING AT 17.7'	
19	572									
20	571									
21	570									
22	569									
23	568									
24	567									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-9

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/9/2010
Date Completed	3/9/2010
Weather	Sunny, 50's
0 hr Depth to GW	Dry prior to coring

Depth (ft.)	Surface Elev. (ft.) 590	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	590									
1	589	SS	1	1 2 3	5	1.5	80		0 - 1.5' Brown SILT and CLAY, little Coarse to Fine Sand, trace Coarse to Fine Gravel, moist	Roots in S1
2	588			7 5						
3	587	SS	2	6 8	14	1.0	70			Feldspar fragments in S2
4	586			8 6						Schist fragments in S2,S3
5	585	SS	3	7 10	17	C	85			
6	584	SS	4	17 17 50/.3		C	30			
7	583									Loose, non-plastic material in S2-S5
8	582	SS	5	30 50/.4		C	45			
9	581									
10	580									
11	579								1.5' - 19.5' Yellow brown Clayey SILT, some Coarse to Fine Gravel, little Coarse to Fine Sand, moist	
12	578									
13	577	SS	6	50/.3		C	15	0		
14	576									
15	575									
16	574									
17	573									
18	572	SS	7	50/.2		C	10			
19	571									Auger refusal at 19.5'
20	570									
21	569	R	1				86	34	19.5' - 24.5' SCHIST, greenish brown, soft to very hard, fresh to moderately weathered, thinly to very intensely bedded (RD: 25°-75°), very closely to medium spaced fractures (RD:0-75°)	Coring water did not return to surface in R1
22	568									
23	567	R	2				100	88		
24	566									
25									END OF BORING AT 24.5'	

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-10

(1 of 1)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/9/2010
Date Completed	3/9/2010
Weather	Sunny, 50's
0 hr Depth to GW	Dry prior to coring

Depth (ft.)	Surface Elev. (ft.) 589	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	589									
1	588	SS	1	2 3 7 8	10	1.25	95		0 - 0.4' Topsoil	
2	587								0.4' - 4.0' Orange brown SILT, some Fine Sand, little Coarse to Fine Gravel, moist	S!, S2 Floury texture
3	586	SS	2	6 7 7 11	14	0.5	85			
4	585									
5	584	SS	3	8 17 15 40	32	C	100			Decomposed rock in S3
6	583	SS	4	37 50/.4		C	35		4.0' - 10.0' Yellow brown Coarse to Fine GRAVEL, some Coarse to Fine Sand, little SILT, dry to moist	
7	582									
8	581	SS	5	50/.4		C	20			
9	580									
10	579									Auger refusal at 10.0' Began coring at 10.0' No core recovery 10.0'-15.0' Driller was sure he was in rock
11	578									
12	577	R	1				0	0		
13	576									Coring water returned to surface at R1 only
14	575									
15	574									15.0' - 16.5' Core recovery only 0.5'=33%
16	573	R	2				33	0	10.0' - 21.5' Yellow brown Coarse to Fine GRAVEL and Clayey SILT, some Coarse to Fine Sand, wet	
17	572									
18	571									
19	570	R	3				8	0		Terminated boring at 21.5' Will offset approximately 5.0' to the NE and advance auger to 10.0' and begin sampling Offset boring will be B-10a
20	569									
21	568									
22	567								END OF BORING AT 21.5'	
23	566									
24	565									
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-10a

(1 of 2)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/9/2010
Date Completed	3/9/2010
Weather	Sunny, 40's
0 hr Depth to GW	Dry prior to coring
3/10/10 Depth to GW	35.5' 10:25am

Depth (ft.)	Surface Elev. (ft.) 589	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
0	589									
1	588									
2	587									
3	586									OFFSET FROM B-10 6.0' TO THE NE DIRECTION
4	585									
5	584									Auger probe 0-10 0'
6	583									
7	582									
8	581									
9	580									
10	579			20						
11	578	SS	1	35 50/.4	35	1.25	75		10.0' - 12.0' Yellow brown Clayey SILT, little Fine Sand, trace Fine Gravel, dry to moist	
12	577									
13	576	SS	2	37 50/.2		C	30			S2 and S3 consist of floury material
14	575									
15	574								12.0' - 20.0' Yellow to orange brown SILT, some Fine Gravel, little Coarse to Fine Sand, trace Coarse to Medium Gravel, dry to moist	
16	573									
17	572									
18	571	SS	3	50/.4		C	20			
19	570									
20	569	SS	4	21 50/.2		1.75	60			Black schist fragments in S4
21	568									
22	567									
23	566	SS	5	40 50/.3		0.25	40		20.0' - 25.0' Orange brown Clayey SILT, some Fine Sand, little Coarse to Medium Sand, trace Fine Gravel, dry to moist	
24	565									Auger refusal at 25.0'
25										

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797
(717) 533-8600 fax: (717) 533-8605

Boring ID: B-10a

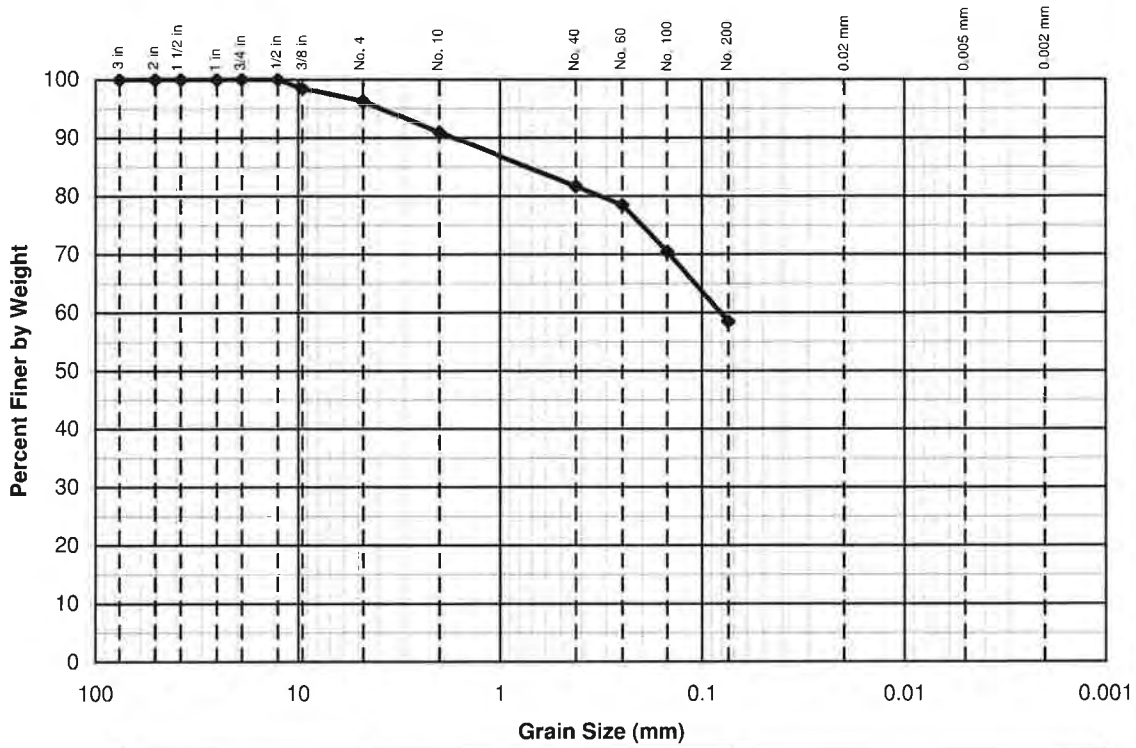
(2 of 2)

Site Description	Wind Energy
Site Location	FFLF
ARM Project No.	10153
Client	LCSWMA
ARM Representative	C. Iozza
Checked By	
Drilling Company	D.E. Nelson Drilling
Driller	Mike Gilbert

Drilling Equipment	C50R Cathead Track Drill
Casing Diameter	3.50" ID
Casing Type	HSA/NQ
Date Started	3/9/2010
Date Completed	3/9/2010
Weather	Sunny, 40's
0 hr Depth to GW	Dry prior to coring
3/10/10 Depth to GW	35.5' 10:25am

Depth (ft.)	Surface Elev. (ft.) 589	Sample Type	Sample No.	Blows per 0.5 ft.	N-Value	Pocket Penetrometer Reading (tsf)	Recovery (%)	RQD (%)	DESCRIPTION	REMARKS
25	564	R	1				66	0	25.0' - 41.0' SCHIST, brownish green, hard to soft, slightly to highly weathered, very intensely bedded (RD: 0-90°), medium to very closely spaced fractures (RD: 0-90°)	Began coring at 25.0'
26	563									
27	562	R	2				65	0		
28	561									
29	560	R	3				96	0		
30	559									
31	558									
32	557	R	4				96	67		Soft, decomposed rock 34.0'-36.0'
33	556									
34	555									Coring water returned to surface R1-R4
35	554									
36	553									
37	552	R	5				55	13		Poor recover in R5 due to wash out from coring water
38	551									
39	550									
40	549									
41	548								END OF BORING AT 41.0'	
42	547									
43	546									
44	545									
45	544									
46	543									
47	542									
48	541									
49	540									
50										

Grain Size Distribution Curve



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
3.8 %		37.7 %			58.5 %	
0.0 %	3.8 %	5.2 %	9.3 %	23.2 %	–	–

USCS

Project: FFLF Wind Energy - Geotech
Boring No.: B-1
Location: Crane Pad A
Sample No.: S-2 to S-3
Depth: 2.0 - 6.0 ft

Atterberg Limits:
LL = NP PL = NP
PI = NP
Moisture Content: w = 26.2 %

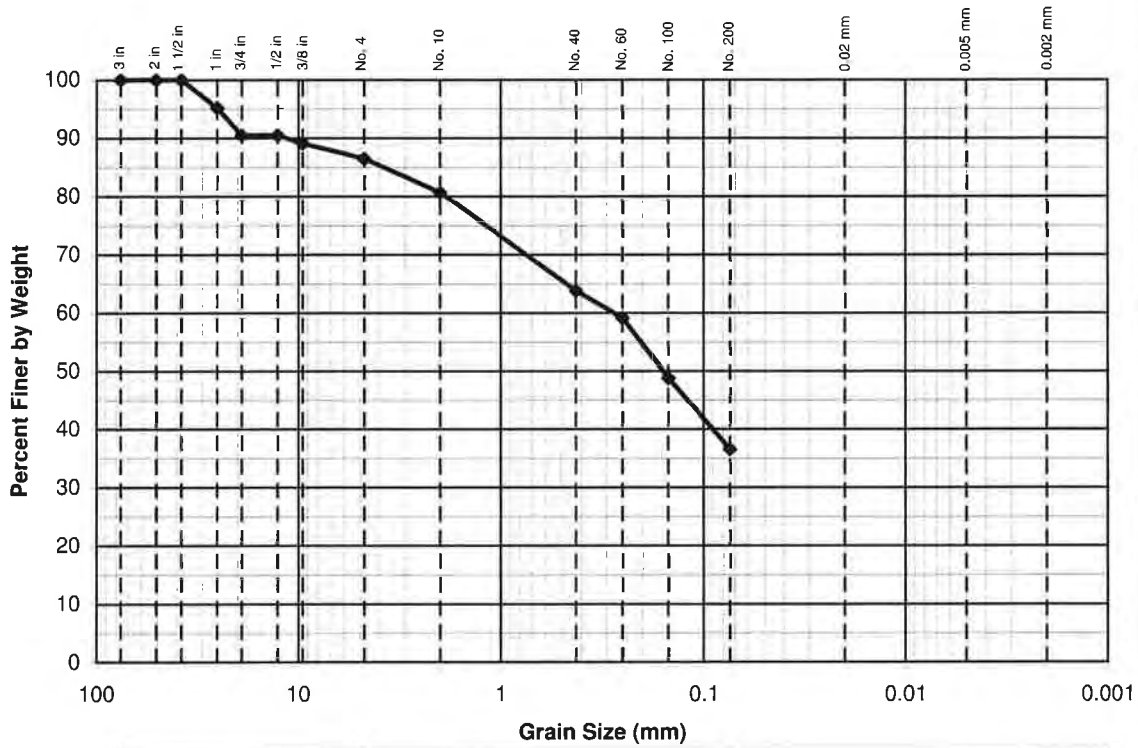
GTS TECHNOLOGIES

GRADATION TEST RESULTS
AASHTO T-88
or ASTM 422
4/8/2010

GTS No. 10001-08 By: DFS/KJE Ckd: RRN

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Grain Size Distribution Curve



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
13.5 %		49.9 %			36.5 %	
9.5 %	4.0 %	5.8 %	16.8 %	27.3 %	--	--

USCS

Project: FFLF Wind Energy - Geotech
Boring No.: B-3
Location: Turbine A
Sample No.: S-4 to S-5
Depth: 6.0 - 8.4 ft

Atterberg Limits:
LL = NP PL = NP
PI = NP
Moisture Content: w = 9.6 %

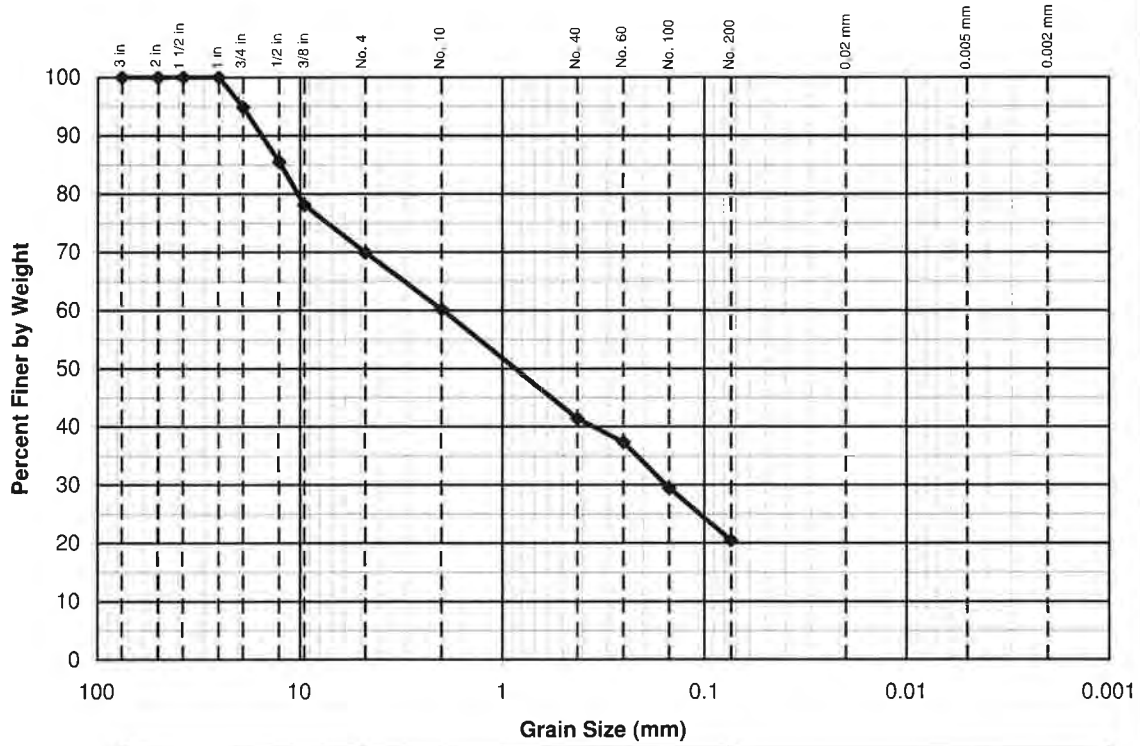
GTS TECHNOLOGIES

GRADATION TEST RESULTS
AASHTO T-88
or ASTM 422
4/8/2010

GTS No. 10001-08 By: DFS/KJE Ckd: RRN

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Grain Size Distribution Curve



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
30.1 %		49.4 %			20.5 %	
5.2 %	24.9 %	9.7 %	18.7 %	20.9 %	–	–

USCS

Project: FFLF Wind Energy - Geotech
Boring No.: B-6
Location: Crane Pad B

Sample No.: S-2 to S-3
Depth: 2.0 - 6.0 ft

Atterberg Limits:
LL = NP PL = NP
PI = NP
Moisture Content: w = 8.2 %

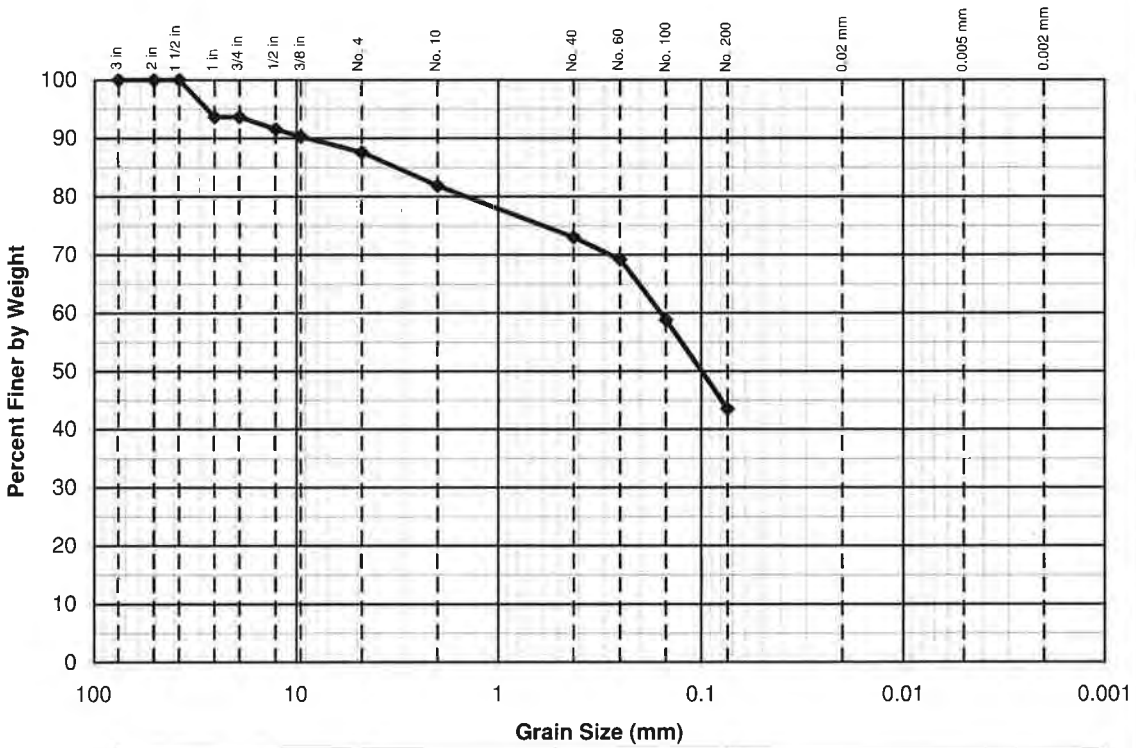
GTS TECHNOLOGIES

GRADATION TEST RESULTS
AASHTO T-88
or ASTM 422
4/8/2010

GTS No. 10001-08 By: DFS/KJE Ckd: RRN

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Grain Size Distribution Curve



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
12.4 %		44.1 %			43.5 %	
6.4 %	6.0 %	5.7 %	8.9 %	29.5 %	--	--

USCS

Project: FFLF Wind Energy - Geotech
Boring No.: B-7
Location: Crane Pad C
Sample No.: S-2 to S-3
Depth: 2.0 - 6.0 ft

Atterberg Limits:
LL = NP PL = NP
PI = NP
Moisture Content: w = 12.1 %

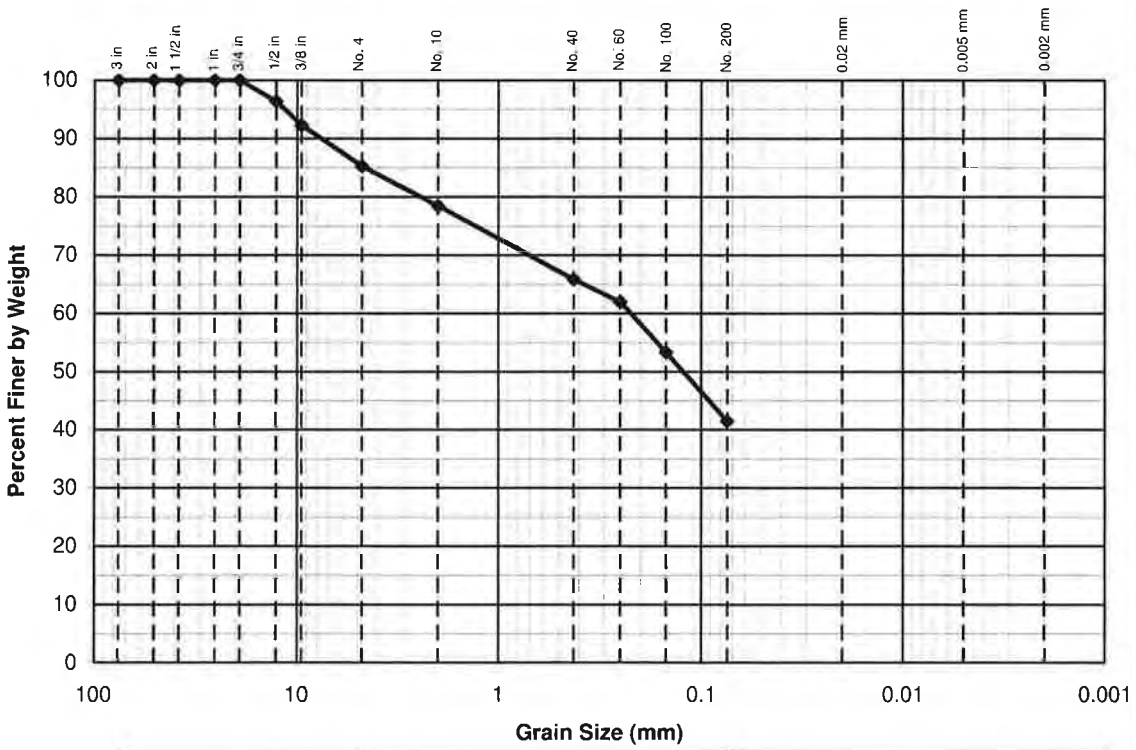
GTS TECHNOLOGIES

GRADATION TEST RESULTS
AASHTO T-88
or ASTM 422
4/8/2010

GTS No. 10001-08 By: DFS/KJE Ckd: RRN

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Grain Size Distribution Curve



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
14.8 %		43.8 %			41.5 %	
0.0 %	14.8 %	6.8 %	12.6 %	24.4 %	–	–

USCS

Project: FFLF Wind Energy - Geotech
Boring No.: B-10a
Location: Turbine B
Sample No.: S-1 to S-2
Depth: 10.0 - 13.7 ft

Atterberg Limits:
LL = NP PL = NP
PI = NP
Moisture Content: w = 10.4 %

GTS TECHNOLOGIES

GRADATION TEST RESULTS
AASHTO T-88
or ASTM 422
4/8/2010

GTS No. 10001-08 By: DFS/KJE Ckd: RRN

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Boring No.	Sample No.	Sample Depth (ft)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Minimum Resistivity (kohms x cm)	Soil Type
B-4	S-2 to S-3	2.0 - 6.0	7.5	<9	<11		light brownish orange silty sand or sandy silt
B-8	S-4 to S-5	6.0 - 9.3	7.6	18	<15		light brownish orange silty sand or sandy silt

Project: FFLF Wind Energy - Geotech
Project #: 10001-08
Test Date: 04/08/10
Tested By: DFS
Checked By: RRN

GTS TECHNOLOGIES

CHEMICAL TESTING SUMMARY

pH - ASTM D 4972, Resistivity - AASHTO T288
Chloride & Sulfate - EPA 300.0

4/9/2010

441 Friendship Road . Harrisburg, PA 17111 . Ph: 717/236-3006 . Fax: 717/233-0994 . www.gtstech.com

Attachment #3

LCSWMA Transportation Compliance Plan Driver Packet

LCSWMA Driver Packet

Speeding

1. First speeding infraction along haul routes written notice of any provided to the owner and operator of the vehicle.

2. Second speeding offense by the same vehicle operator will result in a thirty (30) minute delay time penalty, and forwarding of information to the Manor Township police.

3. Third speeding offense will result in a one (1) week ban of the vehicle operator from the landfill.

4. Fourth speeding offense will result in a one (1) year ban of the vehicle operator from the landfill.

Violation of haul routes

1. First designated haul route violation notification will be provided to the vehicle owner.

2. Second designated haul route violation by the same vehicle operator will result in a thirty (30) minute delay time penalty and forwarding of information to the Manor Township Police.

3. Third designated haul route violation will result in a one (1) week ban of the vehicle operator from the landfill.

4. A fourth designated haul route violation offense will result in a one (1) year ban of the vehicle operator from the landfill.

TRANSFER STATION
TIPPING FLOOR SAFETY and OPERATING RULES

1. Drivers must maintain 8 ft. of space between unloading vehicles.

2. All Waste Hauler employees must wear a fluorescent colored garment (shirt, vest, or jacket) when on the Tipping Floor.

3. Driver / Helper: DO NOT cross beyond the yellow line marked on the side walls.

4. Driver / Helper: Stay within 6 ft. of your vehicle at all times.

5. Be aware of heavy equipment and truck traffic at all times.

6. Driver: Please unload and exit the tipping floor as quickly as possible.

7. Smoking is prohibited on LCSWMA property.

8. No scavenging of material on the Tipping Floor.

9. Children and pets must remain in vehicles at all times.

10. Fluorescent colored clothing is required at ALL times on the Tipping Floor.

STOP NO.	ADDRESS	BUS STOP TIMES
1	1916 MILLERSVILLE PIKE	7:00 - 7:15 AM / 2:59 - 3:06 PM
		8:15 - 8:30 AM / 3:35 - 3:40 PM
2	2016 MILLERSVILLE PIKE	7:00 - 7:15 AM / 2:59 - 3:06 PM
3	316 MANOR AVENUE	7:05 - 7:15 AM / 2:45 - 3:00 PM
4	225 MANOR AVENUE	7:05 - 7:15 AM / 2:45 - 3:00 PM
5	109 MANOR AVENUE	7:05 - 7:15 AM / 2:45 - 3:00 PM
6	38 BLUE ROCK ROAD	8:30 - 8:40 AM / 3:40 - 3:45 PM
7	162 BLUE ROCK ROAD	8:30 - 8:40 AM / 3:40 - 3:45 PM

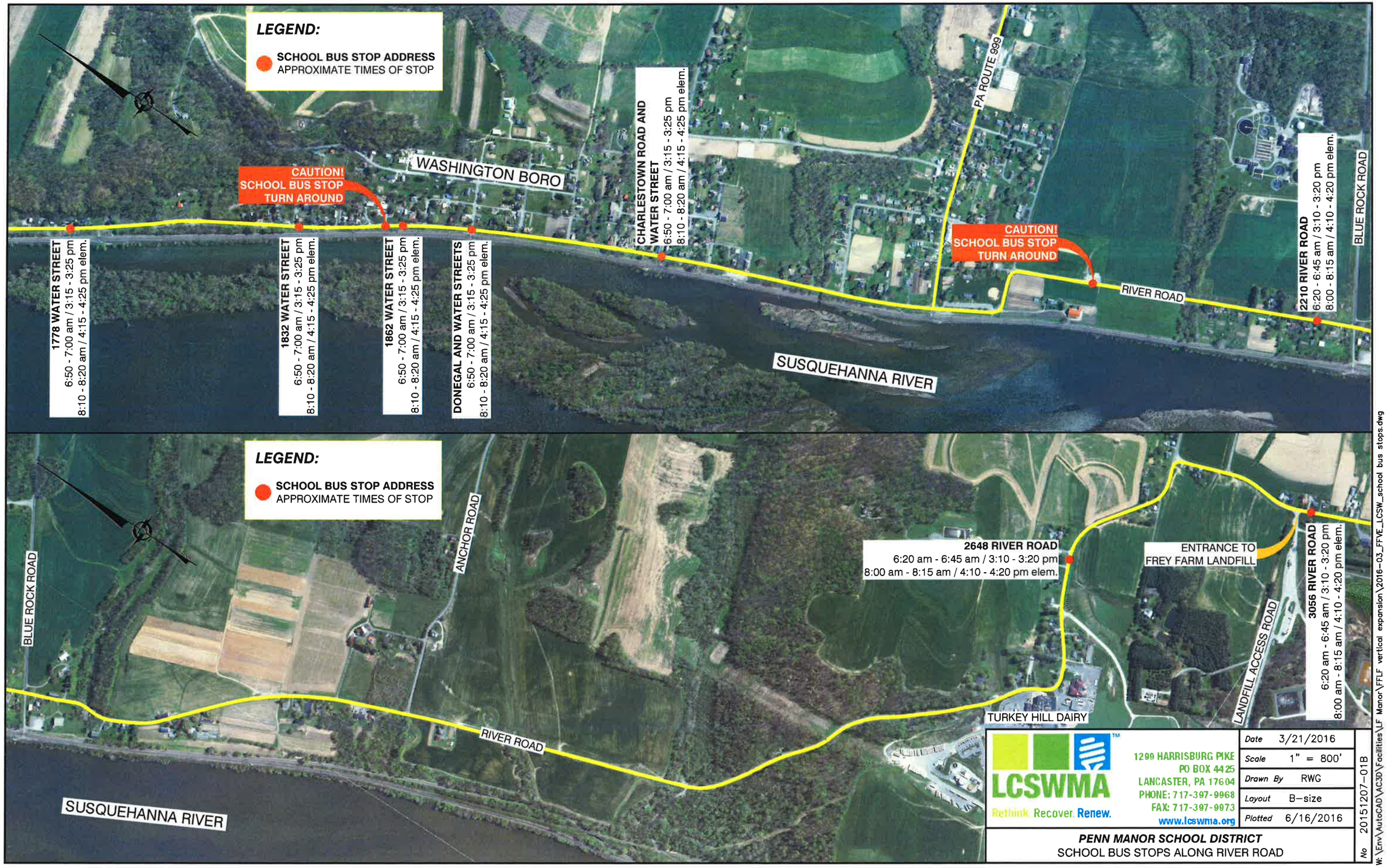
LCSWMA
Rethink Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-8073
www.lcswma.org

Date	5/11/2016
Scale	1" = 1200'
Drawn By	RWG
Layout	B-size 999
Plotted	5/11/2016

PENN MANOR SCHOOL DISTRICT
SCHOOL BUS STOPS ALONG PA ROUTE 999

No 20151207-02B

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FLF vertical expansion\2016-03_FFVE_LCSW_school bus stops.dwg



LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	3/21/2016
Scale	1" = 800'
Drawn By	RWG
Layout	B-size
Plotted	6/16/2016

PENN MANOR SCHOOL DISTRICT
SCHOOL BUS STOPS ALONG RIVER ROAD

No 20151207-01B

W:\Env\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-03_FFVE_LCSW_school bus stops.dwg

ENTRANCE TO
LANCASTER COUNTY
WASTE-TO-ENERGY FACILITY

PA ROUTE 441

RIVER ROAD

VINEGAR FERRY ROAD

MATCH LINE A

SUSQUEHANNA RIVER

DONEGAL SCHOOL DISTRICT BUS STOPS

NO.	*ADDRESS*	*BUS STOP TIMES*
1	1724 RIVER ROAD	8:07 AM / 4:08 PM
2	1718 RIVER ROAD	7:08 & 8:26 AM / 3:01 & 4:03 PM

MATCH LINE A

PA ROUTE 743

PA ROUTE 441

RIVER ROAD

DONEGAL
INTERMEDIATE
SCHOOL

MARIETTA

DONEGAL SCHOOL DISTRICT BUS STOPS

NO.	*ADDRESS*	*BUS STOP TIMES*
3	1211 RIVER ROAD	7:13 & 8:20 AM / 3:00 & 3:45 PM
4	1177 RIVER ROAD (DONEGAL INTERMEDIATE)	8:30 AM

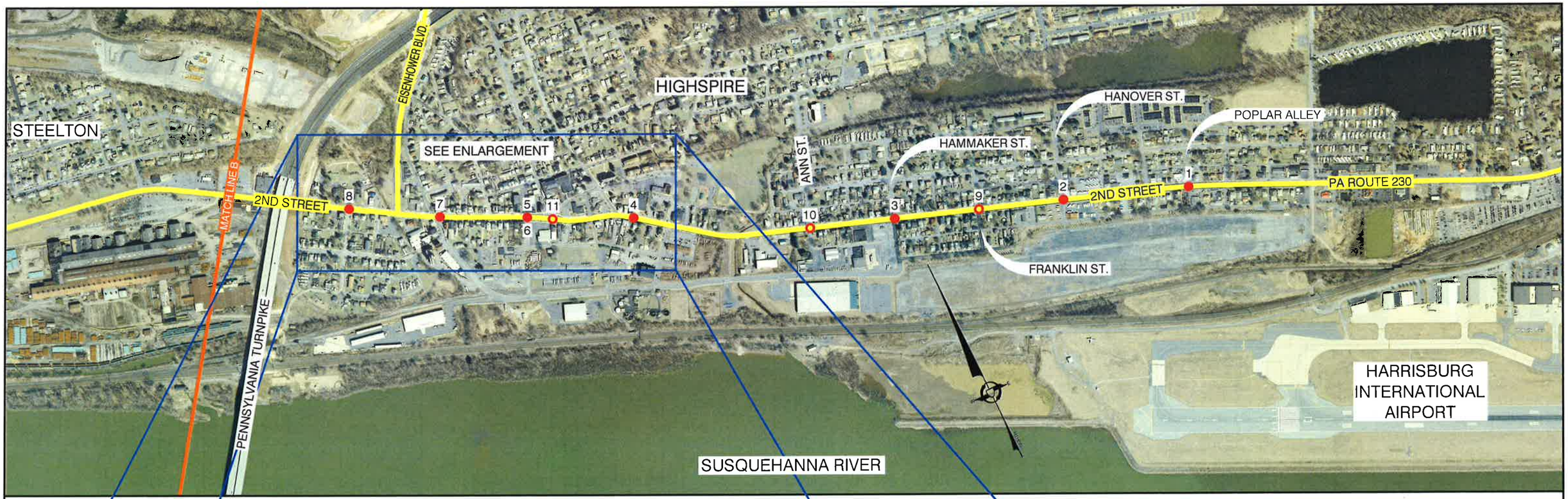
LCSWMA™
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

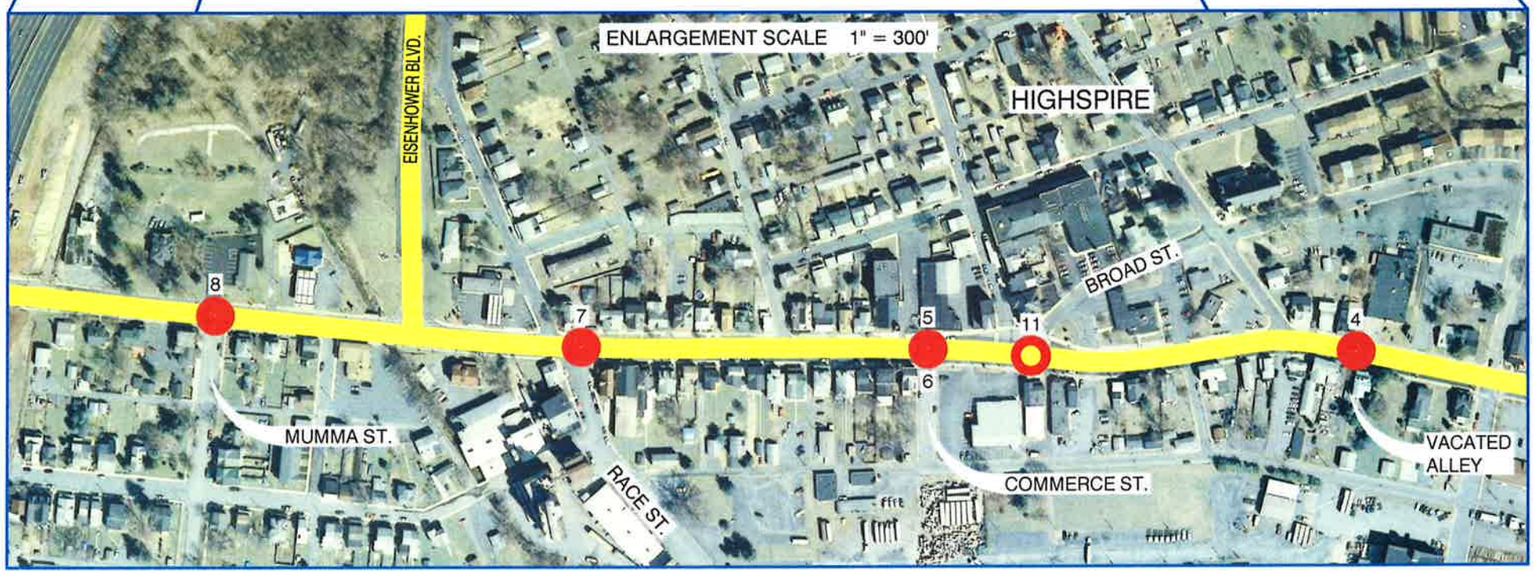
Date	8/16/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B_DON-1
Plotted	8/16/2016

DONEGAL SCHOOL DISTRICT
SCHOOL BUS STOPS ON LCSWMA TRUCK ROUTES

No 20160815-02-1

W:\Env\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-08_FFVE_LCSW_school bus stops.dwg





STEELTON-HIGHSPIRE SCHOOL DISTRICT BUS STOPS ●

NO.	ADDRESS	BUS STOP TIMES
1	SECOND ST. AND POPLAR ALLEY	6:55 & 7:54 AM / ??? PM
2	SECOND ST. AND HANOVER ST.	6:54 & 7:53 AM / ??? PM
3	SECOND ST. AND HAMMAKER ST.	6:53 & 7:52 AM / ??? PM
4	SECOND ST. AND VACATED ALLEY	6:52 & 7:51 AM / ??? PM
5	SECOND ST. AND COMMERCE ST. (north side)	7:09 & 8:05 AM / ??? PM
6	SECOND ST. AND COMMERCE ST. (south side)	6:51 & 7:50 AM / ??? PM
7	SECOND ST. AND RACE ST.	7:10 & 8:06 AM / ??? PM
8	SECOND ST. AND MUMMA ST.	6:50 & 7:49 AM / ??? PM

DAUPHIN COUNTY TECH / BISHOP McDEVITT BUS STOPS ○

NO.	ADDRESS	BUS STOP TIMES
9	SECOND ST. AND FRANKLIN ST.	6:58 AM / 3:45 PM
10	SECOND ST. AND ANN ST.	6:59 AM / 3:43 PM
11	SECOND ST. AND BROAD ST.	7:00 AM / 3:42 PM

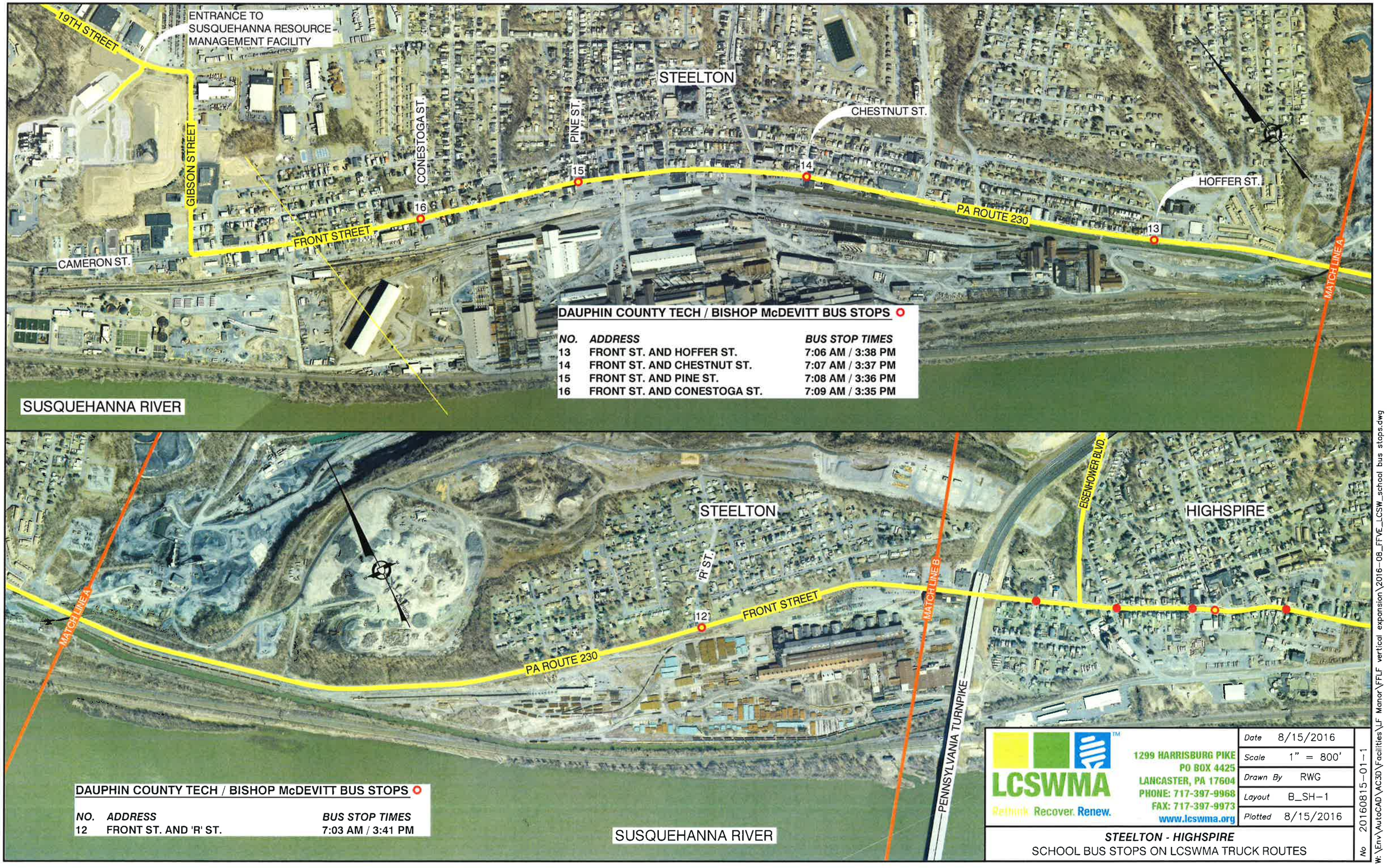
LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	8/15/2016
Scale	1" = 800'
Drawn By	RWG
Layout	B_SH-2
Plotted	8/15/2016

STEELTON - HIGHSPIRE
SCHOOL BUS STOPS ON LCSWMA TRUCK ROUTES

No 20160815-01-2

W:\Env\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-08_FFVE_LCSW_school bus stops.dwg



LCSWMA
Rethink. Recover. Renew.

1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	8/15/2016
Scale	1" = 800'
Drawn By	RWG
Layout	B_SH-1
Plotted	8/15/2016

STEELTON - HIGHSPIRE
SCHOOL BUS STOPS ON LCSWMA TRUCK ROUTES

No. 20160815-01-1

W:\Env\AutoCAD\AC30\Facilities\LF Manor\FFLF vertical expansion\2016-08_FFVE_LCSW_school bus stops.dwg

LCSWMA
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-0973
www.lcswma.org
Rethink. Recover. Renew.

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size1
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-1

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg

SPEED LIMITS:
45 MPH
55 MPH

PA ROUTE 743
PA ROUTE 772
PA ROUTE 441
PA ROUTE 23
55 MPH
45 MPH
45 MPH
55 MPH
MATCH LINE D
MARIETTA
MATCH LINE C
SUSQUEHANNA RIVER

SPEED LIMITS:
25 MPH
35 MPH
40 MPH
55 MPH

PA ROUTE 441
55 MPH
35 MPH
40 MPH
25 MPH
MATCH LINE C
HIDDEN ENTRANCE TO TRAIL PARKING
SUSQUEHANNA RIVER
US ROUTE 30
COLUMBIA
PA ROUTE 462
25 MPH
35 MPH
PA ROUTE 441
MATCH LINE B

LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size2
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

20160524-01-2

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg

LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size3
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-3

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg

LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size4
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-4

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg

SPEED LIMITS:
35 MPH
45 MPH

45 MPH
EISENHOWER BLVD
HIGHSPIRE
35 MPH
PA ROUTE 230
35 MPH
45 MPH
MATCH LINE J
MATCH LINE J
PA TURNPIKE
SUSQUEHANNA RIVER
HARRISBURG INTERNATIONAL AIRPORT

SPEED LIMITS:
25 MPH
35 MPH
45 MPH

PA ROUTE 230
ANN STREET
PA ROUTE 441
ROYALTON
35 MPH
45 MPH
MIDDLETOWN
25 MPH
45 MPH
PA ROUTE 230
MATCH LINE H
MATCH LINE H
SUSQUEHANNA RIVER
45 MPH
HARRISBURG INTERNATIONAL AIRPORT

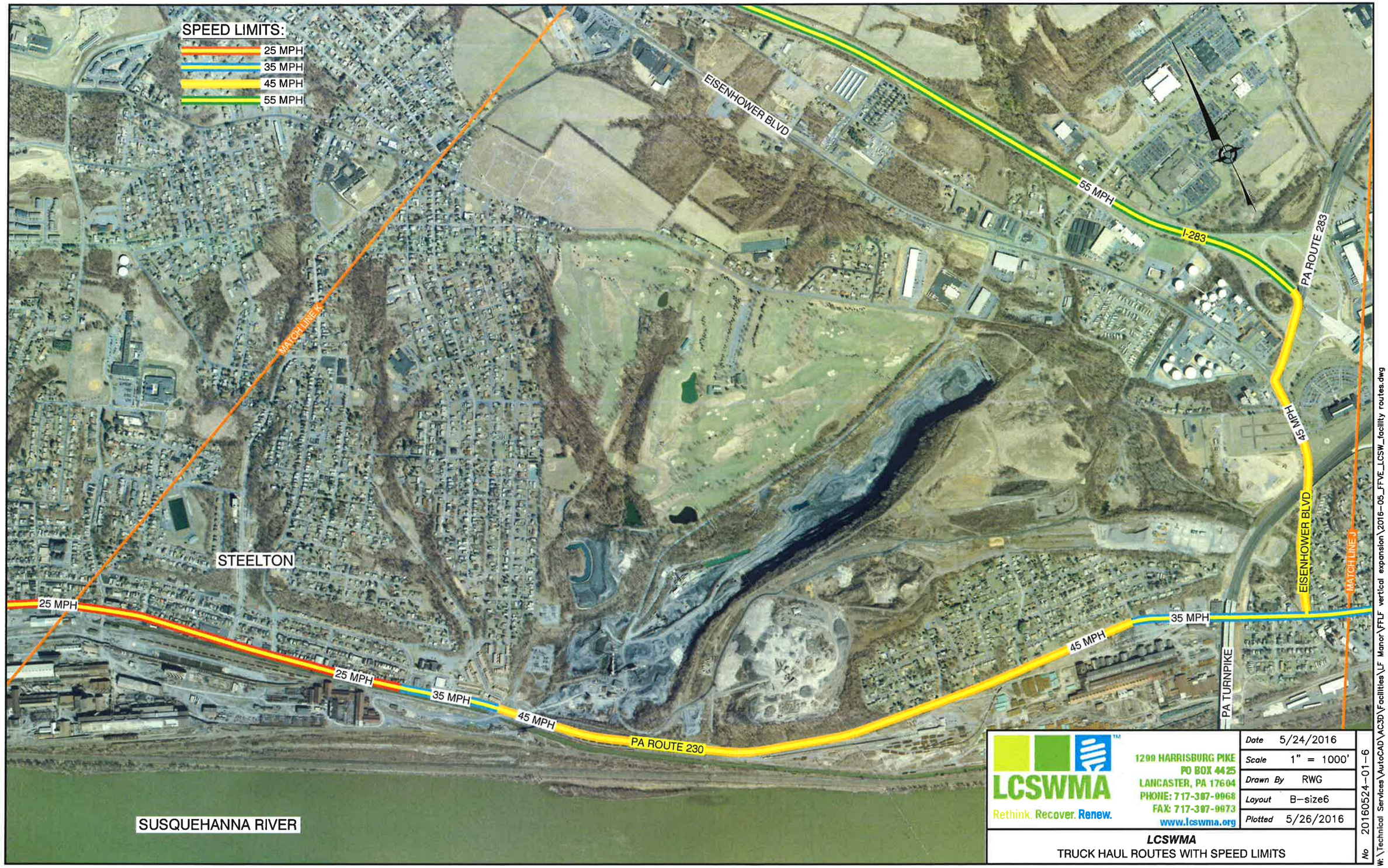
LCSWMA
Rethink. Recover. Renew.
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-0973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size5
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-5

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg



LCSWMA
Rethink. Recover. Renew.

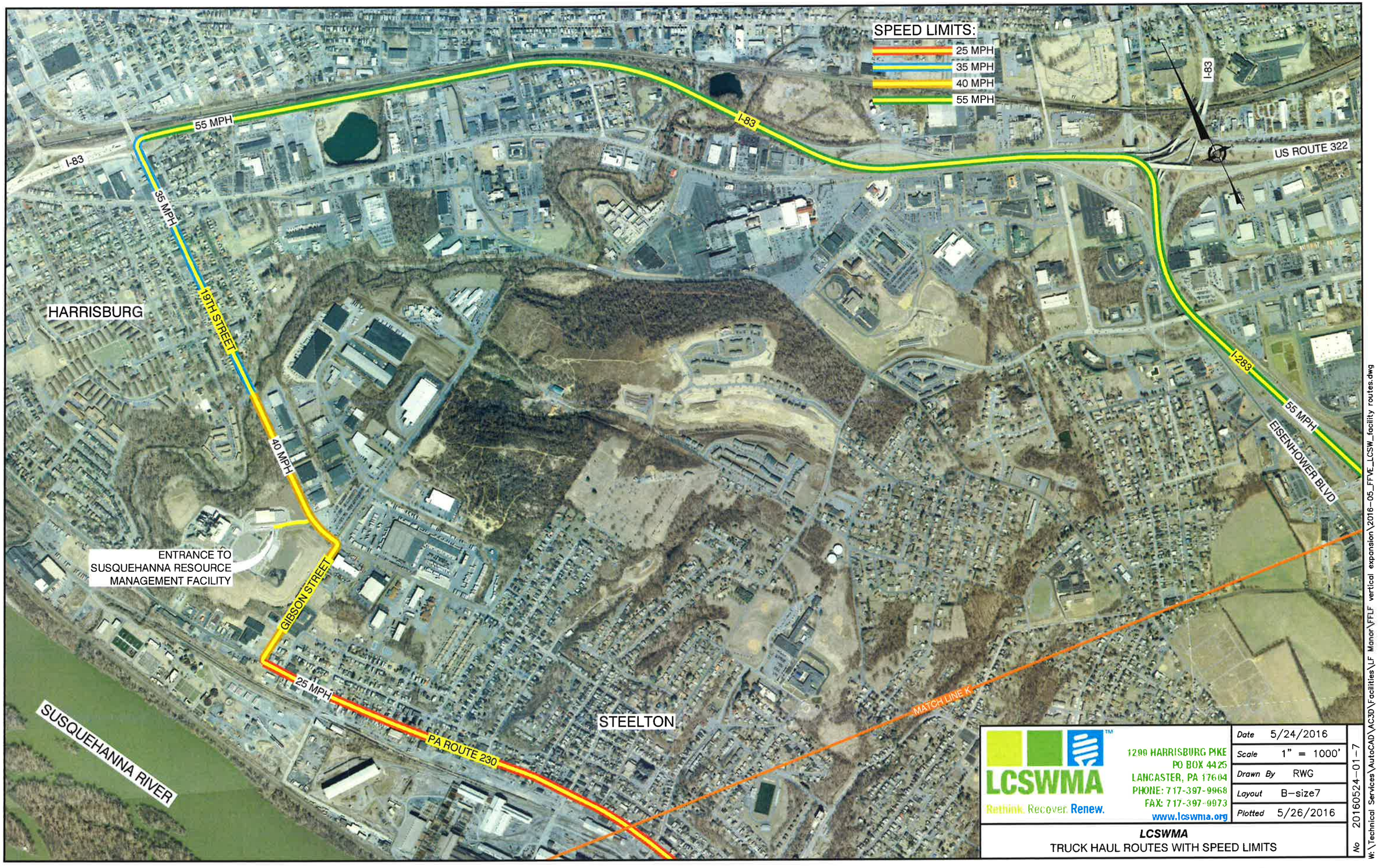
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size6
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-6

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg



LCSWMA™
Rethink. Recover. Renew.

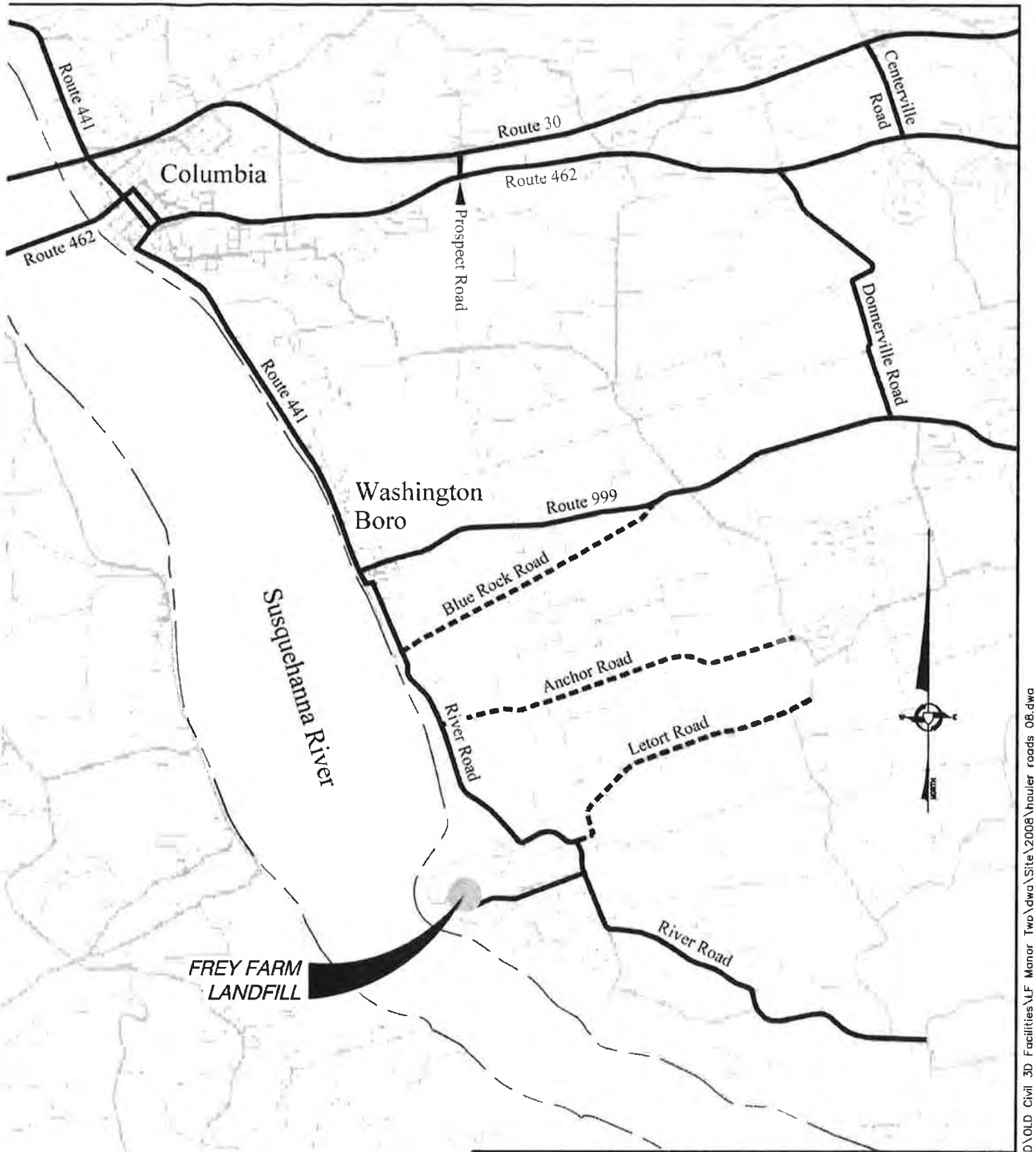
1299 HARRISBURG PIKE
PO BOX 4425
LANCASTER, PA 17604
PHONE: 717-397-9968
FAX: 717-397-9973
www.lcswma.org

Date	5/24/2016
Scale	1" = 1000'
Drawn By	RWG
Layout	B-size7
Plotted	5/26/2016

LCSWMA
TRUCK HAUL ROUTES WITH SPEED LIMITS

No 20160524-01-7

W:\Technical Services\AutoCAD\AC3D\Facilities\LF Manor\FFLF vertical expansion\2016-05_FFVE_LCSW_facility routes.dwg



Acceptable Routes

Prohibited Routes per Manor Twp ordinance #2-90

LCSWMA
1299 Harrisburg Pike
PO Box 4425
Lancaster, PA 17604
717-397-9968
www.lcswma.org

FREY FARM LANDFILL
HAULER ROUTES

Drawn By	Scale	Date	Drawing No	Plotted	Layout
RWG	1"=1 mile	11/3/08	20051111-08	5/26/2016	8.5 x 11

W:\Technical Services\AutoCAD\OLD Civil 3D Facilities\LF Manor Twp\dwg\Site\2008\hauler roads 08.dwg