GEOTECHNICAL ENGINEERING REPORT
PROPOSED BATTERY STORAGE SYSTEM
40 NORWICH ROAD
WATERFORD, CONNECTICUT

Prepared for:

Hanwha Q Cells America, Inc.
501 2nd Street, Suite 500
San Francisco, California 94107

Prepared by:

Down To Earth Consulting, LLC
27 Siemon Company Drive – Suite No. 363W
Watertown, Connecticut 06795

File No. 0320-002.00
September 2023

September 5, 2023
File No. 0320-002.00

Mr. Andrew McDonald
Hanwha Q Cells America, Inc.
501 2nd Street, Suite 500
San Francisco, California 94107

Via email: andrew.mcdonald@qcells.com

Re: Geotechnical Engineering Report
Proposed Battery Storage System
40 Norwich Road, Waterford, Connecticut

Down To Earth Consulting, LLC (DTE) is pleased to submit this geotechnical engineering report for the proposed battery storage system at 40 Norwich Road in Waterford, Connecticut (Site) for Hanwha Q Cells America, Inc. (Client). Our services were completed in general accordance with our June 23, 2023, proposal. We appreciate this opportunity to work with you. Please call if you have any questions.

Sincerely,

Down To Earth Consulting, LLC

Thomas J. Orszulak, P.E.
Project Manager

Raymond P. Janeiro, P.E.
Reviewer/ Principal

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APPENDICES

1.0 INTRODUCTION

Down To Earth Consulting, LLC, completed a subsurface exploration program and geotechnical engineering evaluation for the proposed battery storage system at the referenced Site. Our geotechnical engineering services included: reviewing project plans, observing subsurface explorations, characterizing subsurface conditions within the structure limits, performing geotechnical engineering analyses, and providing geotechnical design and construction recommendations for the project. Refer to Figure 1 and 2 (in Appendix 1) for an area plan and site plan, respectively.

Our services were performed in accordance with our June 23, 2023 proposal, which was based in part on the provided drawings (*30% Drawings – Q Cells – 40 Norwich Road, Waterford, CT,* prepared by the Client, dated May 11, 2023).

Our recommendations are based on allowable stress design methods and the 2022 Connecticut State Building Code which references the 2021 International Building Code.

2.0 BACKGROUND

The Site is generally bordered by Norwich Road (Route 32) to the east, commercial properties to the north and south, and a residential property to the west. The site consists of a relatively level, landscaped (grass) area and is also occupied by an existing 475-square-foot, single-level building with an associated parking lot.

We understand the project will generally consist of constructing an approximate 50- by 90-foot fenced compound for the proposed battery storage units. Four proposed battery storage systems (BESS units) and ancillary equipment will be founded on concrete slabs within the compound. Proposed finished grade elevations were not provided to DTE at the time of this writing. It is anticipated that limited cuts and fills (on the order of 2 feet or less) will be required for the project. Refer to the Site and Boring Location Plan (Figure 2) for additional proposed development details.

3.0 SUBSURFACE DATA

3.1 GENERAL SITE GEOLOGY

Published surficial and bedrock geological map data (*1:24,000 scale, Surficial Geology of the Uncasville Quadrangle, Connecticut, Richard Goldsmith, 1960* and *1:125,000 scale, Bedrock Geological Map of Connecticut, John Rodgers, 1985*) was reviewed. The Site surficial material is mapped as a variable mixture of gravel, sand, silt, and clay that is intermixed with cobbles and boulders. The underlying bedrock is classified as well-foliated gneiss.

3.2 EXPLORATIONS

We observed and logged three test borings (B-1 through B-3) drilled by our subcontractor General Borings, Inc. on August 3, 2023. Exploration locations are depicted on Figure 2 (Appendix 1) and the logs are included in Appendix 2. Exploration locations were located in the field by taping/pacing from existing site features and should be considered approximate.

The borings were drilled to explore the soil, bedrock, and groundwater conditions in the proposed Site area. Hollow stem auger drilling methods were used to advance the borings to depths ranging from approximately 11 to 18 feet below existing grades. Each boring was terminated upon encountering drilling refusal on inferred boulders or possible bedrock.

Representative soil samples were obtained from the borings for soil classification by split barrel sampling procedures in general accordance with ASTM D-1586. The split-spoon sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the middle 12-inches of a normal 24-inch penetration is recorded as the Standard Penetration Resistance Value (N). The blows (i.e., "N-Value") are indicated on the boring logs at their depth of occurrence and provide an indication of the relative consistency of the material.

Groundwater levels were measured using a weighted tape in open exploration holes during drilling.

4.0 SUBSURFACE CONDITIONS

4.1 SUBSURFACE PROFILE

The generalized subsurface profile in the area of the proposed battery storage system development, as inferred from the subsurface exploration data, generally consists of an approximately 7- to 9-inch-thick surficial layer of topsoil overlying subsoil and natural sand, and is summarized as follows:

- Subsoil: Loose, orange-brown, SAND and SILT, containing trace amounts (0 to 5%) of roots
  – about 0 to 2 feet thick; over

- Sand: Loose to very dense, brown, poorly graded SAND
  – about 9 to 17 feet thick prior to encountering drilling refusal.

Visual classifications of soil samples and conditions encountered at each exploration location can be found in the provided test boring logs, included as Appendix 2.

4.2 GROUNDWATER

Groundwater levels were measured in the explorations at the times and under the conditions stated on the logs. Groundwater was encountered at a depth of approximately 15 feet below existing grade at Boring B-3. Groundwater levels measured in the explorations may not have had sufficient time to stabilize and should be considered approximate.

Groundwater levels will vary depending on factors such as temperature, season, precipitation, construction activity, and other conditions, which may be different from those at the time of these measurements. Therefore, groundwater levels during construction or at other times in the life of the structures may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 EQUIPMENT SLABS-ON-GRADE

We recommend supporting the proposed battery storage system equipment on a structural slab that is adequately designed to accommodate the proposed loading conditions. The slab should bear on natural Sand or on CGF over these materials. The slabs-on-grade should be constructed with a perimeter frost wall unless seasonal movement of the equipment pads is acceptable.

We recommend a maximum net allowable bearing pressure of 2 kips per square foot (ksf) for slab design. Frost walls should be embedded a minimum of 42 inches below final grades for frost protection. Alternatively, dense insulation boards could be used under lightly loaded slabs-on-grade to reduce frost penetration. We recommend an ultimate coefficient of sliding friction of 0.45 (except if insulation boards are used to minimize frost penetration). A factor of safety of at least 1.5 should be applied to calculated sliding resistance.

We recommend placing the concrete slabs over a minimum twelve-inch-thick base course layer of compacted Crushed Stone placed over the surface of the natural Sand or CGF over these materials. When CGF is used beneath the slab, we recommend that it be placed one foot beyond the edge of the slab and at a one horizontal to one vertical slope away and downward from the bottom outside edge of the slab.

The design subgrade modulus for the recommended subgrade and base course is 150 pounds per cubic inch.

5.2 SEISMIC DESIGN

Based on the standard penetration test results, location of the groundwater table, visual soil classification, and design peak ground acceleration at this locale, the site soils are not susceptible to liquefaction.

We recommend using the following design parameters as defined by the Building Code and, where applicable, the 2021 International Building Code (IBC):

- Site Class: C (Section 1613.5 of the IBC)
- MCE spectral response accelerations: S_s = 0.194g and S_1 = 0.053g (Building Code Appendix P)

6.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

Geotechnical construction considerations include: removal of unsuitable bearing materials below proposed structures; slab subgrade preparation; fill material placement and compaction; reuse of excavated materials; and temporary groundwater control.

6.1 REMOVAL OF BURIED STRUCTURES AND UTILITIES

All existing substructures and utilities (if applicable) within the proposed Site area must be removed in their entirety prior to construction of new slabs. Disturbed materials must be removed down to the level of firm, natural soil and the resulting excavations must be backfilled with CGF to achieve required subgrades. Backfill materials placed in the building area should be placed in accordance with Section 7.0.

6.2 SUBGRADE PREPARATION

Excavation to subgrade elevations for slab construction should be performed using a smooth-edged bucket to minimize possible disturbance to the subgrade. Soil subgrades should be proof-compacted prior to CGF or concrete placement under the observation of a qualified Geotechnical Engineer with at least four (4) passes of a smooth-drum vibratory roller (minimum 8,000 pounds, minimum centrifugal force of 12,500 pounds) or, where approved by the Geotechnical Engineer, a vibratory plate compactor with a minimum of 2,500 pounds of centrifugal force. Any soft or loose zones identified during proof-rolling should be excavated and replaced with CGF, as necessary, and as recommended the Geotechnical Engineer.

Final excavations should not be made until the areas are ready for CGF placement. The base of footing and slab excavations should be free of water, frost, ice, organic material, and loose soils prior to placing CGF and concrete.

6.3 SLOPES

Permanent slopes may be needed adjacent to the proposed development. We recommend slopes be constructed no steeper than 3 Horizontal to 1 Vertical (3H:1V). Permanent slope surfaces should be vegetated and protected with erosion mats until the vegetation is established. Grading should be designed to reduce the likelihood of water ponding near the proposed structures.

6.4 TEMPORARY EXCAVATIONS

The site soils are classified as OSHA Class “C” soil and can be cut at a maximum one vertical to one and a half horizontal (1V:1.5H) slope up to a maximum excavation depth of 20 feet. These maximum slope and excavation depths assume no surcharge load (i.e., stockpiles, construction equipment, etc.) at the top of the excavations or groundwater seepage.

If excavations cannot be sloped in accordance with OSHA requirements, a temporary excavation support system will be required. The system should be chosen and installed by the contactor and designed by a Professional Engineer registered in the State of Connecticut.

6.5 TEMPORARY GROUNDWATER CONTROL

Based on information obtained from the subsurface exploration program, the proposed slabs-on-grade will be constructed above the groundwater table. Stormwater runoff should not be permitted to accumulate on/within exposed subgrades and the runoff should be directed away from the exposed subgrade areas.

7.0 MATERIALS RECOMMENDATIONS

7.1 ON-SITE MATERIALS

Based on our visual soil classifications, existing Site soils will likely not satisfy the requirements for CGF. It is anticipated that excavated soils may be re-used as Common Fill during Site development. If during construction excavated materials are planned for reuse, gradation analyses and Modified Proctor Test (ASTM D-1577, Method C) should be performed on representative soil samples and the results submitted to the Geotechnical Engineer for review and approval.

7.2 COMPACTED GRANULAR FILL

Compacted Granular Fill (CGF) for use as structural fill shall consist of inorganic soil free of clay, loam, ice and snow, tree stumps, roots, and other organic matter; graded within the following limits:

Sieve Size	Percent finer by weight
3-inches	100%
1/2-inch	50 - 85
No. 4	40 - 75
No. 50	8 - 28
No. 200	0 – 12

7.3 CRUSHED STONE

Crushed Stone for use below slabs shall consist of sound, tough, durable, rock that is graded within the following:

Sieve Size	Percent finer by weight
5/8-inches	100%
1/2-inch	85 - 100
3/8 inch	15 - 45
No. 4	0 - 15
No. 8	0 - 5

7.4 COMMON FILL

Common Fill may be used for general site grading, and other areas as appropriate, or as directed by the Geotechnical Engineer or his/her representative. The material should not be used beneath sensitive structures. Common Fill should conform to the following gradation requirements:

Sieve Size	Percent finer by weight
6-inches	100%
No. 200	0 - 25

7.5 MATERIAL COMPACTION

CGF should be placed in loose lifts not exceeding 8 inches in depth and compacted to at least 95 percent of its maximum dry density (and within 2% of optimum moisture content) as determined by ASTM D1557, Method C (Modified Proctor).

Common Fill should also be placed in loose lifts not exceeding 8 inches in depth, and compacted to at least 92 percent of its maximum dry density.

Crushed Stone is considered to be “self-compacting” and would negate the need to run laboratory proctor testing and have field density testing of in-place lifts. The crushed stone should be plate compacted to “chink up” the working surface in lifts. We recommend placing Crushed Stone in maximum 12-inch lifts and compacting the lifts with a minimum of four passes with a vibratory plate compactor weighing a minimum of 1,000 pounds and with a minimum centrifugal force of 10,000 pounds.

7.6 GEOTEXTILE FABRIC

Geotextile fabric used as a separation fabric for crushed stone and soil material should meet the following criteria:

Property	Criteria	Test Method
Grab Strength	min. 120lbs	ASTM D4632
Static (CBR) Puncture	min. 310lbs	ASTM D6241
Trapezoid Tear	min. 50lbs	ASTM D4533
Apparent Opening Size	No. 70 (max.) U.S. Sieve Size	ASTM D4751

Fabric should be needle-punched non-woven material. Seams should be overlapped a minimum of six inches. During stone placement, the stone drop height should not exceed three feet and equipment traffic should be kept off the fabric until at least 6 to 12 inches of material is placed.

8.0 REVIEW OF FINAL DESIGN, PLANS, AND SPECIFICATIONS

When project plans are finalized, and specifications are available, they should be provided to DTE for review of conformance with our geotechnical recommendations. If any changes are made to the proposed battery storage system development or elevations, the recommendations provided in this report will need to be verified by DTE for applicability.

9.0 CONSTRUCTION QUALITY CONTROL

We further recommend that DTE be retained during earthwork construction to observe excavation to slab subgrade, subgrade preparation, and fill placement and compaction in accordance with Building Code requirements. The geotechnical engineer in the field should observe the work for compliance with the recommendations in this report, identify changes in subsurface conditions from those observed in the explorations should they become apparent, and assist in the development of design changes should subsurface conditions differ from those anticipated prior to the start of construction.

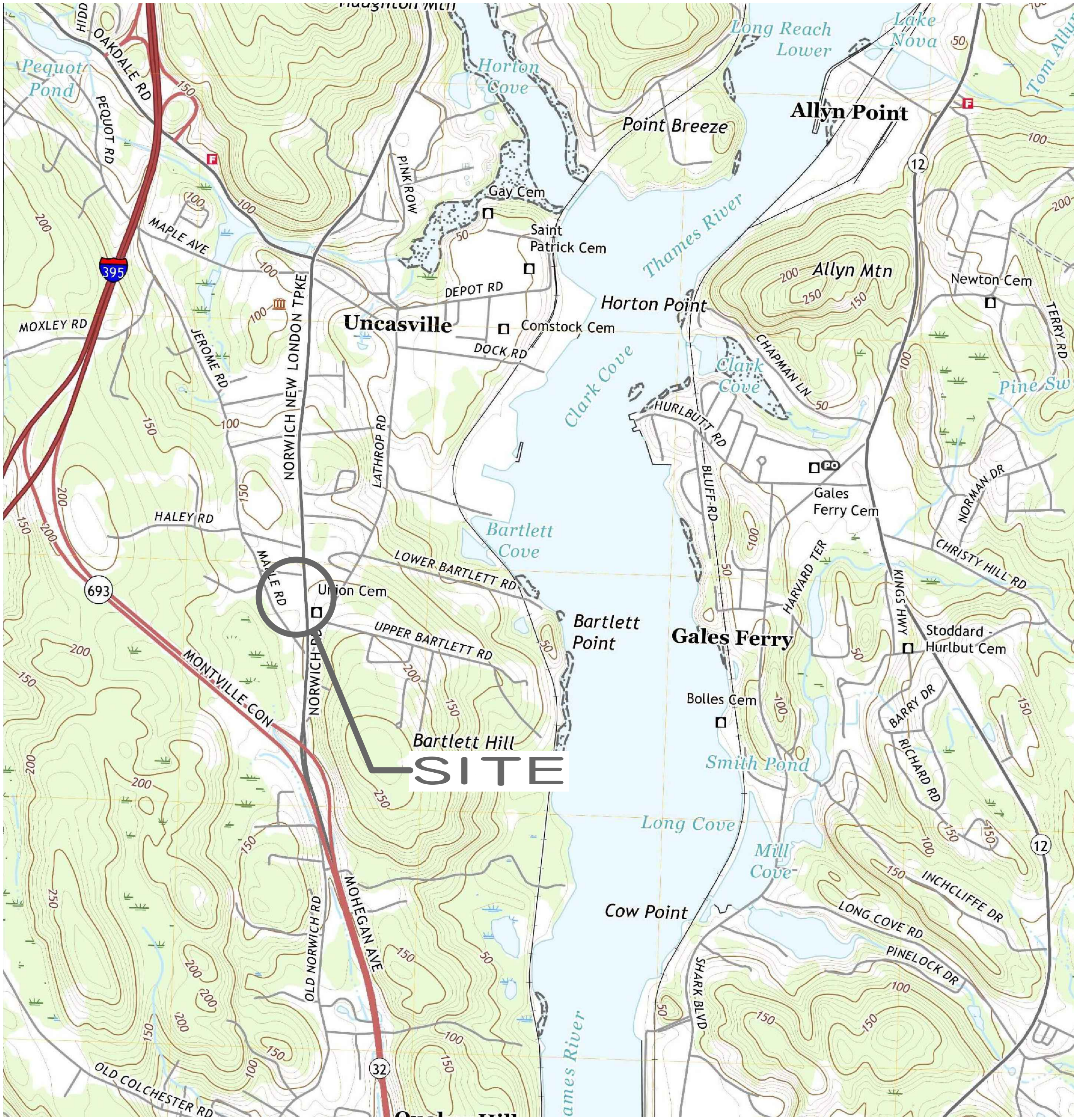
10.0 CLOSURE

We trust the information presented herein is sufficient for your use to progress design of the proposed battery storage system development. We have enjoyed working with you on this project and look forward to our continued involvement. Please do not hesitate to call us if you have any questions.

This report is subject to the limitations included in Appendix 3.

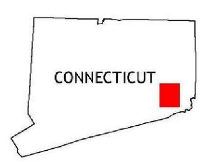
APPENDIX 1 -

FIGURES



DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

27 SIEMON COMPANY DRIVE #363W
WATERTOWN, CONNECTICUT 06795



QUADRANGLE LOCATION

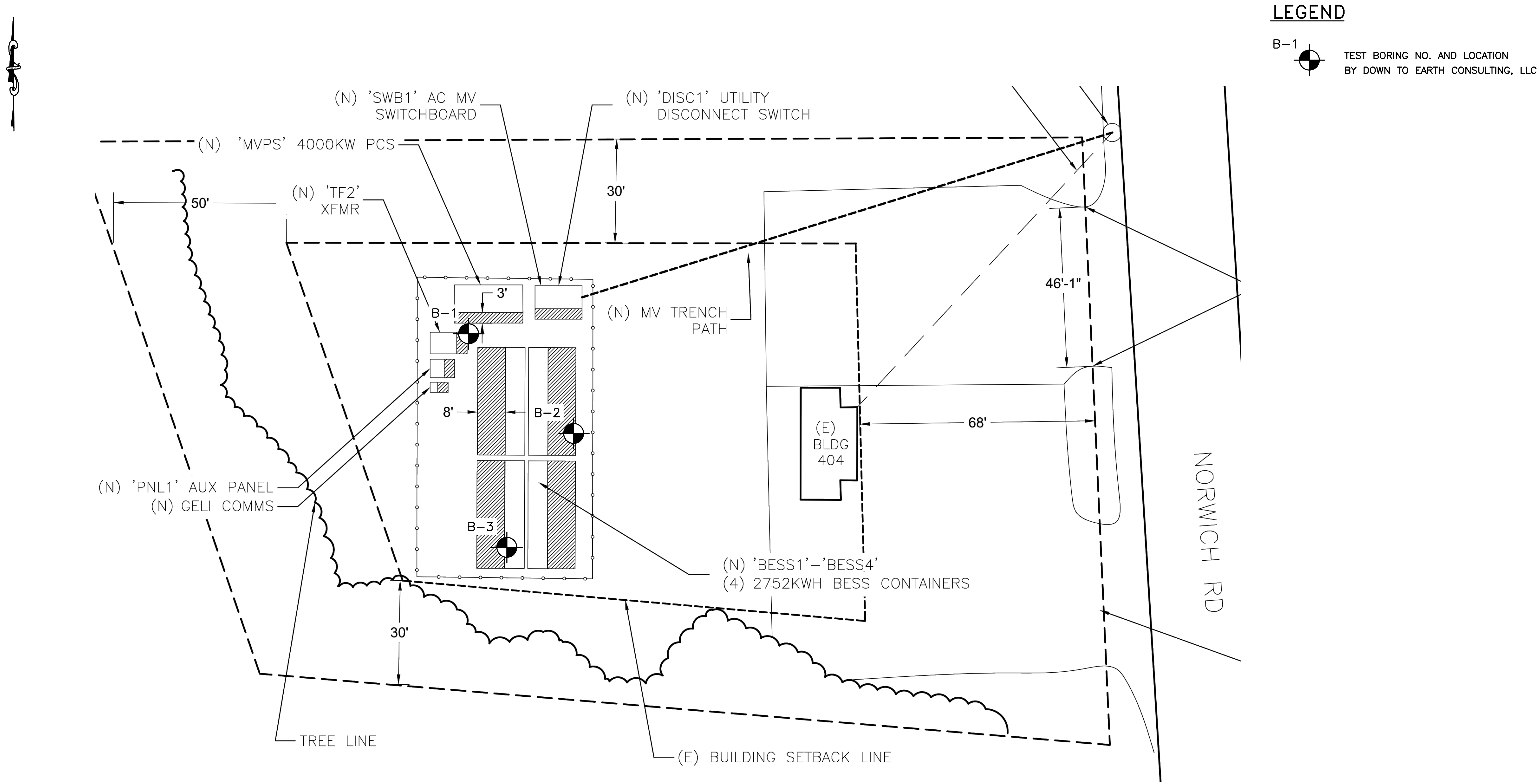
AREA PLAN
PROPOSED BATTERY STORAGE SYSTEM
40 NORWICH ROAD
WATERFORD, CONNECTICUT

REFERENCE:
USGS TOPOGRAPHIC QUADRANGLE: UNCASVILLE, CT

SCALE 1"= 2,000'
2,000' 1,000' 0 2,000'

PROJECT NO. 0320-002.00
DATE: 8/8/2023
FIGURE NO. 1

DRAWN BY: MF
REVIEWED BY: RPJ



NOTES:
1) BASE MAP DEVELOPED FROM AN ELECTRONIC FILE PREPARED BY HYDE RENEWABLES, INC., ENTITLED 'SITE PLAN, Q CELLS – 40 NORWICH RD'. SHEET NUMBER: E.100. DATED MAY 11, 2023. ORIGINAL SCALE 1/16":1'.
2) BORINGS WERE COMPLETED BY GENERAL BORINGS, INC. AND OBSERVED BY DOWN TO EARTH CONSULTING, LLC.
3) THE LOCATIONS OF THE EXPLORATIONS WERE DETERMINED BY TAPING AND VISUAL ESTIMATES FROM EXISTING SITE FEATURES. THESE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

DESIGNED BY OTHERS					
DRAWN BY MF					
CHECKED BY RPJ	NO.	DATE	DRWN.	CHKD	APPVD
APPROVED BY RPJ	REVISIONS				

SCALE 1" = 30'
30 15 0 30

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING
27 SIEMON COMPANY DRIVE #363W
WATERTOWN, CONNECTICUT 06795

PROJECT
PROPOSED BATTERY STORAGE SYSTEM
40 NORWICH ROAD
WATERFORD, CONNECTICUT

DWG. TITLE.
EXPLORATION LOCATION PLAN

FILE NO. 0320-002.00
SCALE AS NOTED
DATE 8/8/2023
FIGURE NO. 2

APPENDIX 2 -

TEST BORING LOGS

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT

PROPOSED BATTERY STORAGE SYSTEM
40 NORWICH ROAD
WATERFORD, CONNECTICUT

BORING NO.	B-1
SHEET	1 of 1
FILE NO.	0320-002.00
CHKD. BY	TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	John Wyant	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	8/3/2023	Date End	8/3/2023

Hammer Type:	Safety Hammer Driven by Lever	**Groundwater Readings (from ground surface)**				
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted D50 Diedrich	8/3/23	-	-	-	Not Encountered
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	12/24	0 to 2	2-4-4-3		Loose, red-brown, fine SAND and SILT, trace (-) Roots	9"+/- Topsoil
2								SUBSOIL
3		S-2	14/24	2 to 4	4-5-5-7		Loose, gray-brown, fine SAND, some Silt	SAND
4								
5								
6		S-3	17/24	5 to 7	17-25-33-40		Very dense, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt	
7								
8		S-4	2/6	7 to 7.5	56/6"		Very dense, brown, fine to coarse SAND, little fine Gravel, trace Silt	
9								
10								
11		S-5	18/24	10 to 12	17-33-48-23		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt	
12								
13								
14								
15								
16		S-6	12/24	15 to 17	7-46-22-21		Very dense, brown, fine to coarse SAND, little fine to coarse Gravel, trace Silt, with decomposed rock fragments at sample tip	
17								
18								
19							END OF EXPLORATION AT 17.5 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 7 to 17.5 feet below grade.
4) Auger refusal encountered at about 17.5 feet below grade on inferred boulder or possible bedrock.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT		
PROPOSED BATTERY STORAGE SYSTEM	BORING NO.	B-2
40 NORWICH ROAD	SHEET	1 of 1
WATERFORD, CONNECTICUT	FILE NO.	0320-002.00
	CHKD. BY	TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan
Driller	John Wyant	Ground Surface El.	Not Available — Datum: Not Available
Logged By	Mateusz Fekieta	Date Start	8/3/2023 — Date End: 8/3/2023

Hammer Type:	Safety Hammer Driven by Lever	**Groundwater Readings (from ground surface)**				
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted D50 Diedrich	8/3/23	-	-	-	Not Encountered
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	12/24	0 to 2	1-2-2-3		Loose, red-brown, fine SAND and SILT, trace (-) Roots	9"+/- Topsoil
2								SUBSOIL
3		S-2	14/24	2 to 4	3-4-5-25		Loose, gray-brown, fine SAND, some Silt, with stone fragment at sample tip	SAND
4								
5								
6		S-3	0/4	5 to 5.4	50/4"		Very dense, No Recovery	
7								
8								
9								
10								
11		S-5	2/4	10 to 10.4	65/4"		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt	
12							END OF EXPLORATION AT 11 FEET BELOW GROUND SURFACE	
13								
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40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
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FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 7 to 11 feet below grade.
4) Auger refusal encountered at about 11 feet below grade on inferred boulder or possible bedrock.

DOWN TO EARTH CONSULTING, LLC GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING	**PROJECT**		
	PROPOSED BATTERY STORAGE SYSTEM	BORING NO.	B-3
	40 NORWICH ROAD	SHEET	1 of 1
	WATERFORD, CONNECTICUT	FILE NO.	0320-002.00
		CHKD. BY	TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	John Wyant	Ground Surface El.	Not Available	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	8/3/2023	Date End	8/3/2023

		Groundwater Readings (from ground surface)				
Hammer Type:	Safety Hammer Driven by Lever	Date	Time	Depth (ft)	Elev.	Stabilization Time
Sampler Size:	1-3/8" I.D. Split Spoon	8/3/23	-	15	-	Wet Sample
Type Drill Rig:	Track Mounted D50 Diedrich	8/1/23	-	16	-	15min
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	4-11-16-22		Medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt	7"+/- Topsoil
2								
3		S-2	14/24	2 to 4	30-27-38-21		Very dense, gray, fine to coarse pulverized GRAVEL and fine to coarse SAND, trace Silt	
4								
5								
6		S-3	16/24	5 to 7	14-27-18-23		Dense, brown, fine to coarse SAND, little fine Gravel, trace Silt	
7								
8		S-4	17/24	7 to 9	27-41-29-34		Very dense, brown, fine to coarse SAND, little fine Gravel, trace Silt	
9								
10								SAND
11		S-5	17/24	10 to 12	18-21-28-48		Very dense, brown, fine to coarse SAND, little fine Gravel, trace Silt	
12								
13								
14								
15								
16		S-6	18/24	15 to 17	32-30-44-29		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace Silt, wet	
17								
18								
19							END OF EXPLORATION AT 18 FEET BELOW GROUND SURFACE	
20								
21								
22								
23								
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31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 6 to 18 feet below grade.
4) Auger refusal encountered at about 18 feet below grade on inferred boulder or possible bedrock.

APPENDIX 3 -

LIMITATIONS

LIMITATIONS

Explorations

1. The analyses and recommendations submitted in this report are based in part upon the data obtained from subsurface explorations by Down To Earth Consulting, LLC (DTE) and others. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tidal, temperature, and other factors occurring since the time measurements were made.

Review

4. In the event that any changes in the nature, design or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by DTE. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Construction

5. It is recommended that this firm be retained to provide soil engineering services during construction of the earthworks and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

Use of Report

6. This report has been prepared for the exclusive use of Hanwha Q Cells America, Inc. for specific application to the project noted in this geotechnical report in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

7. This soil and foundation engineering report has been prepared for this project by DTE. This report is for design purposes only and is not sufficient to prepare an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

8. This report may contain comparative cost estimates for the purpose of evaluating alternative foundation schemes. These estimates may also involve approximate quantity evaluations. It should be noted that quantity estimates may not be accurate enough for construction bids. Since DTE has no control over labor and materials cost and design, the estimates of construction costs have been made on the basis of experience. DTE does not guarantee the accuracy of cost estimates as compared to contractor's bids for construction costs.