TOWN OF CLIFTON LAND USE/BUILDING PERMIT APPLICATION 4.88 MW (AC) SOLAR ARRAY CLIFTON, MAINE

Prepared for

HEP CLIFTON SPV, LLC

57 Exchange Street, Suite 100 Portland, Maine



November 2020

4 Blanchard Road P.O. Box 85A Cumberland, Maine 04021 Phone: 207.829.5016 sme-engineers.com



TABLE OF CONTENTS

Section No.	Title	Page No.
TOWN OF CLIFT	ON PERMIT APPLICATION	
1.0 PROJECT DES	SCRIPTION	1-1
2.0 ARTICLE 6, S	ECTION 6.3.6 SUBMISSION REQUIREMENTS	2-1
	A. 6.3.6.1 Evidence of Legal Interest	2-1
	3. 6.3.6.2 General Description of Proposed Use	2-1
	C. 6.3.6.3 Hydrological And/ Or Hydrogeological Survey or Assessment	2-1
	D. 6.3.6.4 Net Residential Acreage Calculation	2-1
	E. 6.3.6.5 Refuse disposal	2-1
	F. 6.3.6.6 Soils	2-2
	G. 6.3.6.7 Subsurface Disposal System Report	2-2
	H. 6.3.6.8 Water and Sewer Demand	2-2
	. 6.3.6.9 Utility Statement	
	. 6.3.6.10 Storage of Material & Equipment	2-2
	K. 6.3.6.11 Traffic Impact	2-3
	6.3.6.12 Evidence of Technical Capability	2-3
	M. 6.3.6.13 Evidence of Financial Capability	2-3
	N. 6.3.6.14 Construction Schedule	2-3
	O. 6.3.6.15 Emergency Response Plan	2-4
	P. 6.3.6.16 Emergency Shutdown Plan	2-4
	Q. 6.3.6.17 Security Plan	2-4
	R. 6.3.6.18 Sign Plan	2-4
:	6.3.6.19 Blasting/Explosives Plan	2-4
•	Γ. 6.3.6.20 FAA Statement	2-5
	J. 6.3.6.21 Natural Resource Protection	2-5
3.0 ARTICLE 6, S	ECTION 6.7 SITE SPECIFIC PLAN AND SUBDIVISION REVIEW STANDARDS	3-1
	A. 6.7.1 Compatible Use	3-1
	3. 6.7.2 Buffering of Adjacent Users	3-1
(C. 6.7.3 Buffering of Residential Uses	3-1
	D. 6.7.4 Conformance to Town Road Plans and Standards	3-1
	E. 6.7.5 Conformance to Future Land Use Plan and Provision for Open	
	Space	3-1
	6.7.6 Easements	3-1
	G. 6.7.7 Exterior Lighting	3-1
	H. 6.7.8 Hazardous Waste	3-2
	. 6.7.9 Landscaping	3-2
,	6.7.10 Large Parcels	3-2
	K. 6.7.11 Lots	3-2
	6.7.12 Monuments	3-2
	M. 6.7.13 Noise	3-2
	N. 6.7.14 Material Storage	3-3

i

TABLE OF CONTENTS (cont'd)

Section No.		Title	Page No.
	Ο.	6.7.15 Road Name Signs	3-3
	Р.	6.7.16 Subdivision or Site Plan Names	
4.0 ARTICLE 6	S. SECTION	ON 6.8 STATUTORY REVIEW CRITERIA	4-1
4.0 / 11.11022	A.	6.8.1 Pollution	
	В.	6.8.2 Sufficient Water	
	C.	6.8.3 Municipal Water Supply	
	D.	6.8.4 Erosion	
	E.	6.8.5 Traffic	
	F.	6.8.6 Sewage Disposal	4-1
	G.	6.8.7 Municipal Solid Waste Disposal	
	Н.	6.8.8 Aesthetic, Cultural, and Natural Values	
	I.	6.8.9 Conformity with Local Ordinances and Plans	
	J.	6.8.10 Financial and Technical Capability	
	K.	6.8.11 Surface Waters; Outstanding River Segments	4-2
	L.	6.8.12 Groundwater	4-2
	M.	6.8.13 Flood Areas	4-2
	N.	6.8.14 Freshwater Wetlands	4-3
	Ο.	6.8.15 River, Stream, or Brook	4-3
	Р.	6.8.16 Storm Water	4-3
	Q.	6.8.17 Spaghetti-Lots Prohibited	4-3
	R.	6.8.18 Lake Phosphorous Concentration	4-3
	S.	6.8.19 Impact of Adjoining Municipality	4-3
	T.	6.8.20 Lands Subject to Liquidation Harvesting	4-3
5.0 ARTICLE 7	7	GENERAL PERFORMANCE STANDARDS	5-1
	A.	GPS 1.0 Access and Driveways	5-1
	B.	GPS 2.0 Archaeological Sites	
	C.	GPS 3.0 Buffering and Screening (Non-Residential)	5-2
	D.	GPS 4.0 Culverts Within the Right-of-Way of Town-Maintained Roads	5-2
	E.	GPS 5.0 Damage to Town Property	5-2
	F.	GPS 6.0 Dust, Fumes, Vapors, Gases, Odors, Glare, and Explosive	
		Materials	5-2
	G.	GPS 7.0 Erosion and Sedimentation Control	5-2
	Н.	GPS 8.0 Groundwater Protection	5-3
	l.	GPS 9.0 Individual Private Campsites	5-3
	J.	GPS 10.0 Lighting (Non-Residential and Multi-Family)	5-3
	K.	GPS 11.0 Mineral Exploration	5-3
	L.	GPS 12.0 Multiple Principal Structures on a Single Lot	5-3
	M.	GPS 13.0 Multiple Uses on a Single Lot	5-3
	N.	GPS 14.0 Municipal Services	5-4
	Ο.	GPS 15.0 Net Developable Acreage	5-4
	Ρ.	GPS 16.0 Net Residential Density	5-4

ii

TABLE OF CONTENTS (cont'd)

Section No.		Title	Page No.
	Q.	GPS 17.0 Noise (Non-Residential)	5-4
	R.	GPS 18.0 Off-Street Loading/Unloading Requirements (Non-Residentia	al)5-4
	S.	GPS 19.0 Off-Street Parking (Non-Residential)	5-4
	T.	GPS 20.0 Oil and Chemical Storage	5-4
	U.	GPS 21.0 On-Site Circulation (Non-Residential)	5-5
	V.	GPS 22.0 Outdoor Storage and Display of Goods (Non-Residential)	5-5
	W.	GPS 23.0 Pollution Levels	5-5
	Χ.	GPS 24.0 Preservation of the Landscape	5-5
	Υ.	GPS 25.0 Private Rights-of-Way	5-6
	Z.	GPS 26.0 Septic Waste Disposal	5-6
	AA.	GPS 27.0 Signs	5-6
	BB.	GPS 28.0 Site Conditions (Non-Residential)	5-6
	CC.	GPS 29.0 Soils	5-6
	DD.	GPS 30.0 Special Events (Non-Residential)	5-6
	EE.	GPS 31.0 Storm Water Runoff	5-7
	FF.	GPS 32.0 Temporary Storage Enclosures (Non-Residential)	5-7
LIST OF APPEN	DICES		
APPENDIX A		TITLE, RIGHT, OR INTEREST	
APPENDIX B		SITE PHOTOS	
APPENDIX C		WETLAND SURVEY	
APPENDIX D		IFW AND MNAP REQUEST LETTERS	
APPENDIX E		HEP FINANCIAL CAPABILITY LETTER	
APPENDIX F		FEMA MAP	
APPENDIX G		MHPC REQUEST LETTER	
APPENDIX H		NRCS SOIL REPORT	

LIST OF FIGURES (END OF DOCUMENT)

Figure No.		Title	
-			
1	SITE LOCATION MAP		

Town of Clifton Permit Application

Application Date: 11/20/2020 Permit Type Requested: [X] New Construction [] Expansion [] Accessory Building [] Reconstruction [] Earth Moving [] Dock/Deck [] Fence [] Foundation [] Road/Driveway [] Other **General Information** Applicants Name: **Telephone Numbers:** hep Clifton SPV, LLC Mailing Address: Days: ___ Nights: 57 Exchange Street, Suite 100, Portland Maine 04101 Cell:207-650-4799 [X] No (if no, complete owner info below and a Is the applicant also the property owner? [] Yes letter of authorization must be attached) Owner(s) Name: Joel Butler Wolf Recycling LLC **Telephone Numbers:** Mailing Address: 45 Airline Road, Clifton, Maine 04428 Days: 207-517-2782 Nights: Cell: 207-266-0820 hep Energy USA LLC **Contractor Name: Telephone Numbers:** Mailing Address: 57 Exchange Street Suite 100 Portland Maine 04101 Days: 207-517 2782 Nights: 207-650-4799 Cell: **TBD Contractors Certified in Erosion Control Practices number** Pleagse note: hep Energy USA will use a site contractor certified in **Erosion Control Practices Property Information**45 Airline Road, Clifton, Maine 04428; Town of Clifton Tax Book 12108 page 125 and Book 12912. Pages 50, Map 7 lot 2, Book 12912, Page 50, Map 7 Lot 2, containing 132 Acres Map: ______ Lot: ____ Lot Area: ______ [X] acres [] square Feet **Zoning Districts** [] GMA 1A (Village) [] GMA 2B (Enterprise) [X] GMA 1 [] GMA 2 [] GMA 3 [] Great Pond LR [] Great Pond RP [] Freshwater Wetlands LR [] Freshwater Wetlands RR [] Stream R

Existing Use:	Landscape staging are	a			<u>. </u>
Proposed Use:	4.88 MW (AC) Solar A	rray			
Lot Coverage (in perc	ent): Present	0%	Proposed	15	%
	Exist	ting Structures			
Structure Setbacks (fe	et); None Front Line:	N/A	_ Side Line:	N/A	
Rear Lin	e: N/A	Normal High War	ter Line: <u>N/A</u>		
Structure Dimensions	L_N/A	W N/A	Square Feet	per Story _	N/A
Structure Height	H N/A	# of Stories N/A	Α		
	Include a	plot plan (see exam	ple)		
		ached application s			
		Structure Dime			
Foundation L	W			Sq Ft	
Structure L	W	# Stories		Sq Ft	
Accessory L	W	# Stories		Sq Ft	,
authorized by the owne agent and we agree to o	above information is correct and that I have been authorform to all applicable lice deems necessary during	horized by the owner aws of this jurisdiction	to make this appl	ication as his	s authorized
Applicants Sign	ature Thomas G Don	inelly	Date	: 11/20/202	0
Owners Signatu	ıra		Date	•	

PLOT PLAN

wells, septic system	ms, driveways, place	ement of culverts, an	and proposed structures, d edge of clearing. Also water lines. (See sample).
			•
I hereby attest to Applicant's Signature:	There of December	mensions are correct to th	
Applicant's Signature: _ Owner's Signature: _	Thomas a controlly		Date: 11/20/2020 Date:

Erosion Control Plan

Before any soil is disturbed, I will properly install and maintain an erosion control barrier. This barrier will be adequate to prevent and soil erosion that may take place due to the construction project. The barrier shall remain in place until construction is complete and any disturbed area is re-vegetated and stabilized.

will Mark

I have marked clearing limits on the site to keep equipment out of areas with in setbacks.

I will preserve buffers between the work area and any downstream surface water and wetlands.

By signing this form, I agree to follow all erosion control measures and Best Management Practices as defined by the Department of Environmental Protection.

Applicant's Signature:	Thomas G Donnelly	Date: 11/20/2020	
Owner's Signature:		Date:	-

Checklist:

Check all that apply:	Check off for all Project where Applicable:
□ Code Enforcement Approval	☐ Complete Application
☐ Planning Board Approval	□ Paid appropriate Fee
☐ Board of Appeals Approval	☐ Lot Area
☐ Flood Hazard Development Permit	□% Lot Coverage
☐ HHE-200 Permit	☐ Height of Structure
☐ Internal Plumbing Permit	☐ Setbacks from water lines
□ DEP Permit (Site, Storm, NRPA)	☐ Setbacks from parcel lines
☐ Army Corps of Engineers Permit	☐ Expansion calculations for non-conforming structures
	☐ Planting Plan for Special Expansion Allowance
	☐ Copy of Right, Title or Interest and/or Deed
□ Construction Plans	☐ Elevation of the lowest floor
□ Culvert	□ Soil Erosion Control Plan
Ins	spections:
Completed?	Notes:
☐ Prior to Clearing and Excavation	
□ Foundation	
☐ Prior to Landscaping	
This to Ossuments	
☐ Prior to Occupancy	

Approval or Denial of Application

Permit Fee:	Permit #:	Date:	***************************************
This Application is: [} Approved	[] Denied		
If approved, the following conditions ap	ply:		
	· · · · · · · · · · · · · · · · · · ·		
If denied, reasons for denial:			
<u> </u>			
Code Enforcement Office	er	Date	

TOWN OF CLIFTON LAND USE/BUILDING PERMIT APPLICATION 4.88 MW (AC) SOLAR ARRAY CLIFTON, MAINE

1.0 PROJECT DESCRIPTION

Hep Clifton SPV, LLC, a wholly owned subsidiary HEP USA Project Development, LLC (HEP), proposes to construct a 4.88 MW (AC) ground mounted solar array on a parcel of land off Airline Road (ME 9) in Clifton, Maine. The array will be a community scale development that will be operated by HEP to provide clean energy opportunities for residents, businesses, and municipalities in Maine. The site was identified for proximity to a utility substation available for connection, appropriate sun exposure, land slope, and availability. The leased parcel is mapped as a minimal flood hazard area. The location of the project is shown in Figure 1, Site Location Map. Additional project details are outlined in the engineering drawing set attached to this application.

The solar array will be constructed on a 20-acre leased parcel on the current 132-acre property owned by Joel Butler of Wolf Recycling, LLC. A copy of the property deeds outlining ownership of the parcels and the lease agreement are in Appendix A. The property is identified as Lot 2 of the Town of Clifton Tax Map 7 and located in the GMA 1 (Growth) zoning district and the GMA 1B (Enterprise) zoning overlay. The Owner reports that the property was logged in 2011 and has been unused since that point. Immediately adjacent to the Subject Property to the north is a deconstructed sawmill, which is currently used as a staging area for a landscape company. Remaining trees on the 20-acre project site will be cleared for the installation of the solar array and to provide adequate setbacks for maximum sun exposure on the panels. Access to the project area will be through a new dedicated gravel access drive from Airline Road (ME 9). Photos of the existing site are included in Appendix B.

Three streams, two vernal pools, and multiple wetland areas were identified on the property by Burman Land and Tree Company, LLC (Burman) during a site visit in October 2020. Details are included in the project plan set. A copy of Burman's Preliminary Natural Resources Plan for the property is included in Appendix C of this application.

Array layout was designed to minimize impact to existing natural resources on the property. Access to the project area will be new gravel access drive from Airline Road. The proposed array will consist of two cells. The western cell will consist of approximately 17.4 acres of solar panels constructed in the west central portion of the property. The eastern cell will consist of approximately 1.32 acres of solar panels constructed in the east central portion of the property.

Site work will include seeding of the array area with a New England Meadow Mix, or approved equal, to provide meadow buffer treatment of the developed array areas. The project will include cutting slightly less than 20 acres of trees for construction of the array, associated access drives, and appropriate sun

exposure. The area of tree cutting will be grubbed, stumped, and graded for the footprint of the solar array modules.

The developed area of the array will include approximately 40,863 square feet of gravel access road. An additional 400 square feet of concrete pad are anticipated to support the electrical equipment proposed at the site. The solar panels themselves are not considered impervious area; however, the supports for the modules are expected to total less than 500 square feet of impervious footprint. With these different impacts, the total new impervious area at the site is anticipated to be 41,763 square feet (0.96 acres). Final construction of the solar array will result in approximately 0.96 acres of impervious area, 17.82 acres of planted meadow buffer, and 0.34 acres of remaining area consisting primarily of vegetated embankment slopes adjacent to the new access road.

Based on the overall size of the proposed development and anticipated impervious area, this project will require a Maine Department of Environmental Protection (MEDEP) Stormwater Permit by Rule (PBR) notification prior to the start of construction. The project will also require a NRPA PBR Notification for a portion of proposed solar array within 75 feet but greater than 25 feet of Snowshoe Pond Brook at the southeast edge of the site. Road. SME intends to prepare and submit this notification to the MEDEP in November 2020.

The project will also require a Maine Department of Transportation (Maine DOT) Entrance Permit SME intends to prepare and submit this notification to the Maine DOT in November 2020.

2.0 ARTICLE 6, SECTION 6.3.6 SUBMISSION REQUIREMENTS

This section outlines project conformance with written supporting information submission requirements

for Tier 3 (High) Site Plans identified in Article 6, Section 6.3.6 of the Town of Clifton Land Use Ordinance:

A. <u>6.3.6.1 Evidence of Legal Interest</u>

The solar array will be constructed on a 20-acre leased parcel on the current 132-acre property owned by Joel Butler of Wolf Recycling, LLC. As previously outlined, the property is identified as Lot 2 on the Town

of Clifton Tax Map 7. Copies of the property deed outlining ownership of the parcel and the lease

agreement are in included in Appendix A.

B. <u>6.3.6.2 General Description of Proposed Use</u>

Hep Clifton SPV, LLC, a wholly owned subsidiary HEP USA Project Development, LLC (HEP), proposes to

construct a 4.88 MW (AC) ground mounted solar array on a leased parcel of land off Airline Road (ME 9).

The array will be a community scale development that will be operated by HEP to provide clean energy

opportunities for residents, businesses, and municipalities in Maine.

C. <u>6.3.6.3 Hydrological And/ Or Hydrogeological Survey or Assessment</u>

Activities conducted from this project will not deposit on or into the ground or discharge any pollutant by

itself or in combination with other activities or substances to the waters of the State. This project will not

be serviced by water and sewer. Groundwater discharge and extraction are not planned or anticipated as

part of this project. This section does not apply to this project.

D. 6.3.6.4 Net Residential Acreage Calculation

The proposed development is not a residential project. This section does not apply to this project.

E. 6.3.6.5 Refuse disposal

The applicant does not intend to use a commercial solid waste facility for disposal of waste generated

from construction of the road and infrastructure. Stumps, grubbings, and excess excavation spoils will be

transported off site by the site contractor for storage and re-use on other projects. Stumps and grubbings

will be ground and used to create erosion control mix for use on this and other construction projects.

2-1

There is no on-site disposal of wood waste or land clearing debris planned for this project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) Construction debris from array construction will be collected in dumpsters and disposed of by the contractor at a commercial solid waste facility. After construction is completed, the facility will not generate waste. Special or hazardous waste is not anticipated for the proposed development.

F. <u>6.3.6.6 Soils</u>

Soils in the project area were mapped using an online USDA Natural Resource Conservation Service (NRCS) Custom Soil Resource Report for Penobscot County, Maine, Southern Part. A copy of the report is provided in Appendix H. Array foundations are shallow and loads on individual foundation elements are light. We anticipate on-site soils will support the proposed development.

G. <u>6.3.6.7 Subsurface Disposal System Report</u>

Proposed development does not generate sewage, and subsurface wastewater disposal is not included in the project design. This section does not apply to this project.

H. 6.3.6.8 Water and Sewer Demand

Proposed development does not include water and sewer services. This section does not apply to this project.

I. 6.3.6.9 Utility Statement

Site development does not include water, sewer, or fire protection services. This section does not apply to this project.

J. 6.3.6.10 Storage of Material & Equipment

Site work for this project will be completed using traditional earth moving equipment, including bucket loaders, excavators, graders, bulldozers and dump trucks. Array foundations will be installed using track mounted drill rigs or pile driving equipment. Night and weekend work are not proposed, and appreciable noise at the property line is not anticipated during construction of the array.

The project will include installation of an inverter and transformer for the electrical conversion of the energy produced by the solar array. This equipment will require small volumes of petroleum products for operation. However, the proposed equipment and facility operations will not require the storage of petroleum products, pesticides, herbicides, fertilizer, road salt, solvents, acids, or other materials in significant quantities.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

K. 6.3.6.11 Traffic Impact

Except for workers entering the project site in the morning and leaving at the end of the workday, vehicle trips to and from the site will be minimal. Once construction is completed, activity on site will be limited to periodic inspection and system maintenance, which is anticipated to occur less than twice per year. Proposed site development and future operation and maintenance of the solar array will not cause unsafe conditions or unreasonable highway or public road congestion.

L. 6.3.6.12 Evidence of Technical Capability

Hep Clifton SPV, LLC has contracted with Sevee & Maher Engineers, Inc. to assist with project design and permitting. The following personnel are integral to the site planning, design, and permitting of the Clifton 5 MW Solar Array Project:

Daniel P. Diffin, P.E., LEED AP - Site Design and Permitting,

Sevee & Maher Engineers, Inc.

Mr. Diffin has more than 16 years of experience on a wide variety of civil engineering design and construction management projects for private and public sector clients. Mr. Diffin has been responsible for the engineering, design, and construction services for land development projects, commercial, industrial, and medical site developments, educational campuses, stormwater management and erosion control projects, and local, state, and federal permitting. Typical projects include: 5 MW Solar Array Developments in Dedham, Jay, Rumford, and arrays of various sizes in Mattawamkeag, Chester, Holden, Milo, and in other municipalities.

SME is working with the following subconsultants to support the Town of Clifton Permit application:

Burman Land and Tree Company, LLC – Wetland Scientist
Plisga & Day Land Surveyors – Surveyors
Northern Survey Engineering, LLC - Surveyors

M. 6.3.6.13 Evidence of Financial Capability

A letter describing the developer's financial capability is provided as Appendix E.

N. 6.3.6.14 Construction Schedule

Construction of the proposed solar array is expected to begin in April 2021 with placement of erosion control measures and survey layout for site clearing, grubbing, and perimeter fence installation. Foundation and racking installation will start in May 2021 and is expected to be complete in July 2021. Installation of solar modules and electrical infrastructure are scheduled to be complete in late October

2021. A final electrical inspection and utility certification of completion are expected to occur in April

2022.

O. 6.3.6.15 Emergency Response Plan

The gravel access drive is designed to provide safe access to the solar array for large tractor trailer delivery

of solar array components. The access road will provide suitable site access for emergency vehicles, if

necessary.

A fire suppression system is not proposed for the project. Solar array components are generally not

combustible. Electric inverters, transformers, lithium batteries, and proposed equipment pose a minimal

risk of fire. The panels themselves are silicon based and do not contain hazardous materials.

P. <u>6.3.6.16 Emergency Shutdown Plan</u>

The proposed solar array will be designed and constructed with appropriate safeguards and shutdowns

to protect the public as required by electrical code. An emergency shutdown plan is not included in this

application but can be provided if requested by the Board.

Q. 6.3.6.17 Security Plan

The solar array installation will include a 6-foot tall perimeter fence in conformance with applicable

electrical code. Fence details are included in the project plan set. After construction is complete, the

proposed road will be used by hep Clifton SPV, LLC staff on a semi-annual basis for routine array

maintenance. The site will be secured by a 16-foot wide double leaf gate and chain link fence around the

perimeter of the array. A sign identifying the site owner and emergency contact will be visible on the wire

mesh security fence to the array.

R. 6.3.6.18 Sign Plan

A sign identifying the site owner and emergency contact will be visible on the wire mesh security fence to

the array. The inverter and transformer will have appropriate danger warnings signs on them.

S. <u>6.3.6.19</u> Blasting/Explosives Plan

Blasting of rock or other earth materials is not anticipated for the proposed development. Any rock or

ledge that may be encountered will be removed mechanically or supports for the solar panels will be

2-4

drilled directly into the ledge.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296)

T. <u>6.3.6.20</u> FAA Statement

The solar array will not have any structures that the height is 200 feet. Therefore, this section does not apply to this project.

U. <u>6.3.6.21</u> Natural Resource Protection

Site development will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites, significant wildlife habitat identified by the Department of Inland Fisheries and Wildlife or by the municipality or rare and irreplaceable natural areas or any public rights for physical or visual access to the shoreline. Additionally, Department of Inland Fisheries and Wildlife (IFW) and Maine Natural Areas Program (MNAP) were requested to review the site. The IFW response letter and a copy of the request letter to MNAP is included in Appendix D. A response from MNAP will be forwarded to the town when received.

3.0 ARTICLE 6, SECTION 6.7 SITE SPECIFIC PLAN AND SUBDIVISION REVIEW STANDARDS

This section outlines project conformance with specific Site Plan Review standards identified in Article 6,

Section 6.7 of the Town of Clifton Land Use Ordinance:

A. 6.7.1 Compatible Use

Based on conversation with Town staff, we understand the development of a solar array is an approved

use in the Town of Clifton.

B. 6.7.2 Buffering of Adjacent Users

The proposed site development area is bordered by undeveloped forested land and wetlands to the east,

south, and west. The site is bordered by an existing commercial use to the north. Site development will

not encroach into the required setbacks in these areas. A natural buffer will remain in-place.

C. 6.7.3 Buffering of Residential Uses

As outlined in the previous section, the proposed solar array will adhere to approved municipal lot

setbacks. Additional clearing is not proposed within the setback to provide visual screening to abutting

properties.

D. 6.7.4 Conformance to Town Road Plans and Standards

The proposed gravel access drive is not intended to serve a subdivision or other public use. Access to the

project area will be through a new gravel access drive from Airline Road (ME 9). Conformance with Town

Road Plans and Standards is outlined in the project plan set and Section 5.A of this application.

E. 6.7.5 Conformance to Future Land Use Plan and Provision for Open Space

This project is not a proposed public building site. This section does not apply to this project.

F. <u>6.7.6 Easements</u>

Site access permissions and requirements for construction, maintenance, and utility interconnection are

outlined in the lease agreement included in Appendix A.

G. 6.7.7 Exterior Lighting

No exterior lighting is proposed. This section does not apply to this project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

3-1

H. <u>6.7.8 Hazardous Waste</u>

The proposed development and use of this site will not generate hazardous waste. This section does not

apply to this project.

I. <u>6.7.9 Landscaping</u>

Following construction, disturbed areas of the site will be stabilized with loam and seed. Site work will

include seeding of the array area with a New England Meadow Mix, or approved equal, to provide

meadow buffer treatment beneath and adjacent to the solar array area. The project does not include

parking and natural buffers will be used to provide screening for abutting properties. Additional

landscaping is not proposed for this project.

J. <u>6.7.10 Large Parcels</u>

Proposed development does not include subdivision of the lot. This section does not apply to this project.

K. 6.7.11 Lots

This project does not include the formation of new lots. This section does not apply to this project.

L. 6.7.12 Monuments

This project is not a subdivision. No new monuments will be installed as a result of this site development.

M. 6.7.13 Noise

No noise is anticipated from the proposed solar array except for equipment around the inverter located

near the center of the array. This equipment will be located more than 1000 feet from the nearest property line. Sound levels from the on-site equipment will be attenuated prior to reaching the closest

residence on all sides.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

3-2

N. <u>6.7.14 Material Storage</u>

The proposed site development does not include exposed storage areas. This section does not apply to this project.

O. 6.7.15 Road Name Signs

Proposed development does not include installation of a public street or right-of-way. This section does not apply to this project.

P. <u>6.7.16 Subdivision or Site Plan Names</u>

The name of this site will not duplicate or too closely approximate the name of any other subdivision within the Town.

4.0 ARTICLE 6, SECTION 6.8 STATUTORY REVIEW CRITERIA

This section outlines project conformance with Statutory Review Criteria identified in Article 6, Section

6.8 of the Town of Clifton Land Use Ordinance:

A. <u>6.8.1 Pollution</u>

This project will not result in undue water or air pollution. The proposed array will not discharge to the

atmosphere or groundwater.

B. <u>6.8.2 Sufficient Water</u>

The proposed site development and use does not require water service. Any water required during site

construction will be provided by the contractor.

C. <u>6.8.3 Municipal Water Supply</u>

This section does not apply to this project.

D. 6.8.4 Erosion

Work on this project will conform to the requirements outlined in the *Maine Erosion and Sedimentation*

Control Best Management Practices (BMPs) Manual dated October 2016 (or as currently revised).

Additional notes and details can be found on the design drawings included with this submittal.

E. 6.8.5 Traffic

As previously outlined, proposed site development and future operation and maintenance of the solar

array will not cause unsafe conditions or unreasonable highway or public road congestion.

F. 6.8.6 Sewage Disposal

The proposed solar array does not require sewage disposal. This section does not apply to this project.

G. 6.8.7 Municipal Solid Waste Disposal

The proposed solar array will not require municipal solid waste collection or disposal. This section does

not apply to this project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

4-1

H. 6.8.8 Aesthetic, Cultural, and Natural Values

As previously outlined, proposed site development will not have an undue adverse effect on the scenic or

natural beauty of the area, aesthetics, historic sites, significant wildlife habitat, rare and irreplaceable natural areas, or any public rights for physical or visual access to the shoreline. Copies of the IFW response

letter and a copy of the request letter to MNAP is included in Appendix D. A response from MNAP will be

forwarded to the town when received.

I. <u>6.8.9 Conformity with Local Ordinances and Plans</u>

This project was designed to conform with local municipal ordinances and design standards.

J. 6.8.10 Financial and Technical Capability

The applicant's financial and technical capacity to complete the project are outlined in sections 6.3.6.12

and 6.3.6.13 of this application. A letter describing the developer's financial capability is provided as

Appendix E.

K. <u>6.8.11 Surface Waters; Outstanding River Segments</u>

The proposed solar array layout encroaches within 75 feet but remain greater than 25 feet from Snowshoe Pond Brook at the southeast edge of the site. A MEDEP NRPA Permit by Rule notification will be required

for the project. SME intends to prepare and submit this notification to the MEDEP in November 2020.

L. <u>6.8.12 Groundwater</u>

Activities conducted from this project will not deposit on or into the ground or discharge any pollutant by

itself or in combination with other activities or substances to the waters of the State. The proposed site

development and use will not adversely impact either the quality or quantity of groundwater available to

abutting properties or public water supply systems.

M. 6.8.13 Flood Areas

The proposed site development is not in a flood-prone area. Copies of the Federal Emergency

Management Agency's Flood Boundary and Floodway Maps and Flood Insurance Rate Maps for the area

4-2

are included as Appendix F.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) N. 6.8.14 Freshwater Wetlands

A Site Map showing all freshwater wetlands within the proposed development site has been included as

Figure 1. Burman Land & Tree Company, LLC. was contracted to conduct the wetland delineation and

survey of protected natural resources at the site. A summary report of their findings is included in

Appendix C.

O. <u>6.8.15 River, Stream, or Brook</u>

Burman Land & Tree Company, LLC. was contracted to conduct the survey of protected natural resources

at the site. A summary report of Burman's findings is included in Appendix C. Additional details are

included in the project plan set.

P. <u>6.8.16 Storm Water</u>

Development of the site was designed to minimize stormwater runoff in excess of the natural

predevelopment conditions. Stormwater management will be accomplished using a combination of

meadow buffers below the solar panels, roadside ditches, and 15-inch diameter ditch relief culverts.

The project is not located in the direct watershed of a lake most at risk from new development or an urban

impaired stream. Phosphorous removal will not be required.

Q. 6.8.17 Spaghetti-Lots Prohibited

There are no new lots proposed as part of this development. This section does not apply to this project.

R. 6.8.18 Lake Phosphorous Concentration

The project is not located in the direct watershed of a lake most at risk from new development or an urban

impaired stream. This section does not apply to this project.

S. <u>6.8.19 Impact of Adjoining Municipality</u>

The proposed development does not cross municipal boundaries. This section does not apply to this

project.

T. <u>6.8.20 Lands Subject to Liquidation Harvesting</u>

Tree cutting on site will be for the proposed use, not part of a timber harvesting plan. This section does

4-3

not apply to this project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296)

5.0 ARTICLE 7 GENERAL PERFORMANCE STANDARDS

This section outlines project conformance with specific General Performance Standards identified in Article 7 of the Town of Clifton Land Use Ordinance:

A. GPS 1.0 Access and Driveways

A 12-foot wide gravel access road is proposed from Airline Road to the center of the solar array to service the transformer/inverter areas. The proposed road will be used for construction access and maintenance operations by HEP staff on a semi-annual basis after construction is complete. The site will be secured by a 6-foot tall chain link fence with a 16-foot wide double leaf gate. The top of the fence and gate will include 1 foot of barbed wire around the perimeter of the array. The access drive is located outside of the Resource Protection Areas and will not be sloped greater than 20 percent. Ditch relief culverts and roadside ditches are proposed to direct road stormwater runoff away from proposed development to existing wetland areas on the property. The location and construction details for the gravel access road are included in the project plan set.

The following access road design considerations have been addressed to comply with the General Performance Standards:

- a. Safe sight distance: Airline Road is a moderate volume, 50 mile-per-hour (mph) road. The Town Ordinance requires 500 feet of sight distance for the 50-mph posted speed limit. More than 500 feet of sight distance is available in both directions on Airline Road, which meets the requirement of the ordinance.
- b. The 12-foot wide gravel access road is designed to accommodate pick-up truck access on a semiannual basis.
- c. The access drive will be used for two-way traffic and has been designed to intersect Airline Road at an angle of 90 degrees.
- d. The access drive does not have a grade in excess of ten percent (10%) over the entire length and is not be more than three percent (3%) for the first one hundred feet (100') from the road. The driveway will not be located where visibility is limited because of curves or topography.
- e. HEP is leasing the land from Joel Butler of Wolf Recycling, LLC who has land behind the parcel where the solar array proposed. Joel Butler of Wolf Recycling, LLC already has a 50' right of way to access the property.

B. GPS 2.0 Archaeological Sites

The National Register of Historic Places does not list the site or adjacent parcels as historic locations. A letter requesting a Maine Historic Preservation Commission (MHPC) review is included in Appendix G of this application. The MHPC response will be forwarded to the Town when it is received.

C. GPS 3.0 Buffering and Screening (Non-Residential)

As previously outlined, the proposed solar array site is bordered by undeveloped forested land and wetlands to the east, south, and west. The site is bordered by an existing landscape storage area to the north. Site development will not encroach into the required setbacks in these areas, which will provide visual screening to abutting properties.

D. GPS 4.0 Culverts Within the Right-of-Way of Town-Maintained Roads

The proposed gravel access drive connects to Airline Road at a local high point. A culvert is not proposed within the right-of-way of the town-maintained road. Ditch relief culverts will be constructed in new 12-foot wide access road. Locations and construction details are provided in the project plan set.

E. GPS 5.0 Damage to Town Property

Any and all damage to Town property or the Town-maintained road from construction or maintenance of the solar array will be repaired by the Applicant.

F. GPS 6.0 Dust, Fumes, Vapors, Gases, Odors, Glare, and Explosive Materials

Emission of dust, dirt, fly ash, fumes, vapors or gases which pose an unreasonable risk of harm to human health or the environment are not anticipated as a result of the proposed solar array. Those generated during construction will be minimized and controlled by the contractor.

G. GPS 7.0 Erosion and Sedimentation Control

As previously outlined, work on this project will conform to the requirements outlined in the *Maine Erosion and Sedimentation Control Best Management Practices (BMPs) Manual* dated October 2016 (or as currently revised). Additional notes and details can be found on the design drawings included with this submittal.

H. GPS 8.0 Groundwater Protection

Activities conducted from this project will not deposit on or into the ground or discharge any pollutant by

itself or in combination with other activities or substances to the waters of the State. The proposed site development and use will not adversely impact either the quality or quantity of groundwater available to

abutting properties or public water supply systems.

The project will include installation of an inverter and transformer for the electrical conversion of the

energy produced by the solar array. This equipment will require small volumes of petroleum products for

operation. However, the proposed equipment and facility operations will not require the storage of petroleum products, pesticides, herbicides, fertilizer, road salt, solvents, acids, or other materials in

significant quantities.

This project will not be serviced by water and sewer. Groundwater discharge and extraction are not

planned or anticipated as part of this project.

I. GPS 9.0 Individual Private Campsites

The proposed solar array is not a campsite. This section does not apply to this project.

J. GPS 10.0 Lighting (Non-Residential and Multi-Family)

There are no exterior lights proposed for this project. This section does not apply to this project.

K. GPS 11.0 Mineral Exploration

All excavations, including test pits and holes, shall be promptly capped, refilled, or secured by other

equally effective measures to reasonably restore disturbed areas and to protect the public health and

safety.

L. GPS 12.0 Multiple Principal Structures on a Single Lot

The proposed ground mounted solar array has no floor area and is not considered a principal structure.

This section does not apply to this project.

M. GPS 13.0 Multiple Uses on a Single Lot

The proposed solar array will be a single use on the subject property. This section does not apply to this

5-3

project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

r Engineers, inc. (19296)

N. GPS 14.0 Municipal Services

The proposed site development and use will not adversely impact municipal services including municipal road systems, public safety services, solid waste program, schools, open spaces, recreational programs

and facilities, and other municipal services and facilities.

O. GPS 15.0 Net Developable Acreage

The existing property has sufficient developable acreage to support the proposed solar array construction.

Zoning notes and lot setbacks are outlined in the project plan set.

P. GPS 16.0 Net Residential Density

The proposed site development and use is non-residential. This section does not apply to this project.

Q. GPS 17.0 Noise (Non-Residential)

Minimal noise is anticipated from the proposed solar array following construction. The only system

equipment that generates noise will be the inverter, which will near the center of the array over 1000 feet from the nearest property line. Sound levels from the on-site equipment will be attenuated prior to

reaching the closest residence on all sides.

R. GPS 18.0 Off-Street Loading/Unloading Requirements (Non-Residential)

The newly constructed gravel access road and turnaround area will be used for loading and unloading of

vehicles, construction equipment, and material deliveries for array construction. Vehicles will pull onto

this road from Airline Road and not obstruct traffic during loading and unloading.

S. GPS 19.0 Off-Street Parking (Non-Residential)

Designated parking for operation and maintenance of the solar array is not proposed. Hep Clifton SPV,

LLC, staff will park on the newly constructed gravel access road from Airline Road to the center of the

solar array.

T. GPS 20.0 Oil and Chemical Storage

The project will include installation of an inverter and transformer for the electrical conversion of the

energy produced by the solar array. This equipment will require small volumes of petroleum products for

operation. However, the proposed equipment and facility operations will not require the storage of

5-4

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) petroleum products, pesticides, herbicides, fertilizer, road salt, solvents, acids, or other materials in significant quantities.

U. GPS 21.0 On-Site Circulation (Non-Residential)

The gravel access drive is designed to provide safe access to the solar array for large tractor trailer delivery

of solar array components. The access road will provide suitable site access for emergency vehicles, if

necessary.

Designated parking and loading areas are not proposed for the operation and maintenance of the solar

array once construction is complete. The site is not designed for public vehicle or pedestrian circulation.

The proposed array is more than 1,300 feet from the site access at Airline Road. The project will not

impose significant burdens on public facilities and is not anticipated to create safety hazards for the

general public.

V. GPS 22.0 Outdoor Storage and Display of Goods (Non-Residential)

Outdoor storage and display of goods is not anticipated at the site. This section does not apply to this

project.

W. GPS 23.0 Pollution Levels

The proposed site development and use will not introduce any pollutant into the soil that will exceed a

concentration in the groundwater that is greater than the guideline established for it in the Safe Drinking

Water Standard, EPA Health Advisory or NAS Health Advisory. Should such a release occur, hep Clifton

SPV, LLC will be responsible for the cost of all resulting remedial actions and damages.

Air pollutions from the project area are limited to traffic on the new gravel road that provides access to

the solar array. Traffic is anticipated to be minimal for the solar project, occurring generally semi-annually

for maintenance.

X. GPS 24.0 Preservation of the Landscape

The proposed site layout encroaches within 75 feet (but greater than 25 feet) of Snowshoe Pond Brook at

the southeast edge of the site. As a result, a MEDEP NRPA Permit by Rule is required. SME intends to

5-5

prepare and submit this notification to the MEDEP in November 2020.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) Y. GPS 25.0 Private Rights-of-Way

The proposed site development will not require any new private rights-of-way. This section does not apply

to this project.

Z. GPS 26.0 Septic Waste Disposal

The proposed solar array will not require the disposal of septic waste. This section does not apply to this

project.

AA. GPS 27.0 Signs

A sign identifying the site owner and emergency contact will be visible on the wire mesh security fence to

the array.

BB. GPS 28.0 Site Conditions (Non-Residential)

During construction, the site will be maintained and left each day in a safe and sanitary manner. A

description of the required procedures is included on the Erosion Control Notes and Details included in

the project plan set.

CC. GPS 29.0 Soils

On-site soils were identified using the USDA Natural Resources Conservation Service (NRCS) soil

information for Penobscot County, Maine. A copy of the custom soil resource report is included in

Appendix H. The report includes a soil map for the project area and soil mapping information is included

in project plan set included with this application.

The soil within the area of work consists of Pushaw-Swanville (SWB) complex, Monarda-Burnham (MXA),

Monarda-Telos (TmB), Chesuncook-Elliotsville-Telos (CEC), and Bucksport and Wonsqueak (BWF). Soil

classifications range from "Well drained" Hydrologic Soil Group A to "Poorly drained" Hydrologic Soil

Group D.

DD. GPS 30.0 Special Events (Non-Residential)

No special events will take place on this site. This section does not apply to this project.

Clifton Permit Document.docx Sevee & Maher Engineers, Inc. (19296) November 2020

5-6

EE. GPS 31.0 Storm Water Runoff

Development of the site was designed to minimize stormwater runoff in excess of the natural predevelopment conditions. Stormwater management will be accomplished using a combination of meadow buffers below the solar panels, roadside ditches, and 15-inch diameter ditch relief culverts.

The project is not located in the direct watershed of a lake most at risk from new development or an urban impaired stream. Phosphorous removal will not be required.

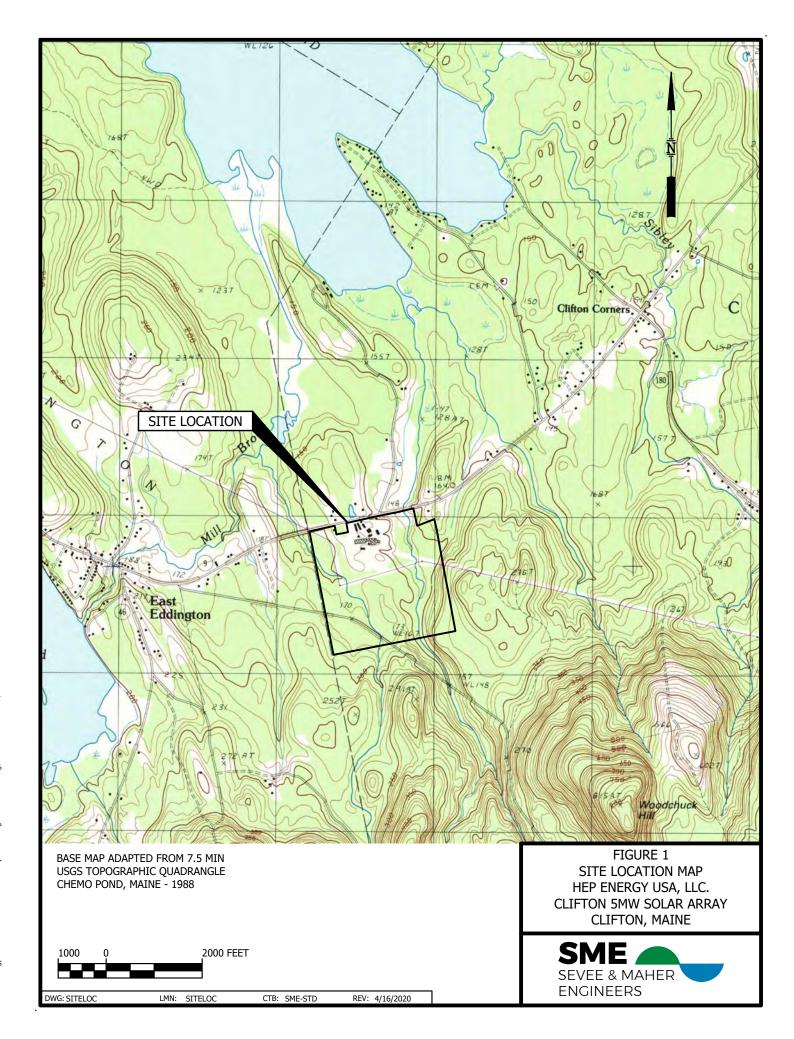
The proposed development will result in net increases of approximately 19.12 acres of new developed area and 41,763 square feet (0.96 acres) of new impervious area to the existing property.

FF. GPS 32.0 Temporary Storage Enclosures (Non-Residential)

The use of temporary storage enclosures is not anticipated on this site. This section does not apply to this project.

FIGURES





APPENDIX A

TITLE, RIGHT, OR INTEREST



State of Delaware
Secretary of State
Division of Corporations
Delivered 01:54 PM 08/19/2020
FILED 01:54 PM 08/19/2020
SR 20206827983 - File Number 3486623

CERTIFICATE OF FORMATION

of

hep Clifton SPV, LLC

Pursuant to Section 18-201 of the Delaware Limited Liability Company Act

First: The name of the limited liability company is "hep Clifton SPV, LLC."

Second: The address of its registered office in the State of Delaware is Corporation Trust Center, 1209 Orange Street, in the City of Wilmington, Delaware 19801, County of New Castle. The name of its registered agent at such address is The Corporation Trust Company.

Third: This Certificate of Formation shall be effective on the date of filing.

In Witness Whereof, hep Clifton SPV, LLC has caused this Certificate of Formation to be executed as of this 19th day of August, 2020.

hep Clifton SPV, LLC-

By: Name: Frederick L. Lipp, Esq.

Title: Organizer

SOLAR ENERGY FACILITY SITE LEASE AGREEMENT

(Clifton, Maine Project)

This **SOLAR ENERGY FACILITY SITE LEASE AGREEMENT** (this "<u>Agreement</u>") is made, dated, and effective as of October 2, 2019 (the "<u>Effective Date</u>") by and between Joel Butler and Wolf Recycling LLC ("<u>Lessor</u>"), and hep energy USA LLC a Delaware Limited Liability Company with a mailing address of 57 Exchange Street, Ste 100 Portland Maine 04101 ("<u>Lessee</u>"). Each of Lessor and Lessee are sometimes referred to individually as a "Party" and collectively as the "Parties."

RECITALS

- A. Lessor is the owner of the following described real property: ___ **WHEREAS,** Owner is the owner of a certain lot or parcel of land located at 45 Airline Road Clifton Maine. Being the said parcel identified on the Town of Clifton Tax Book 12108, Page 125 and Book 12912, Pages 50, Map 7 lot 2, Book 12912, Page 50, Map 7 Lot 2, containing 80 to 85 Acres approximately. hereto and incorporated herein by this reference (the <u>"Premises"</u>); as shown in attached survey in Exhibit A.
- B. Lessee wishes to install and operate a commercial-scale photovoltaic solar generation and/or storage system, including solar panels and other solar-power generating equipment, batteries, and related infrastructure (the "System") on the Premises, and to deliver electrical energy produced by the System to third parties via underground and above-ground wires and cables for the transmission of electrical energy and/or for communication purposes, and all necessary appliances and fixtures for use in connection with said wires and cables under, along, above and in or adjacent to the Premises; and one or more substations or interconnection or switching facilities, together with all related or appropriate rights of way, on, along and in or adjacent to the Premises (the "Transmission Facilities").
- C. Lessee desires to obtain from Lessor, and Lessor desires to grant to Lessee, an exclusive lease of the Premises for purposes of (i) performing tests and studies to determine the viability of the System on the Premises; (ii) if viable, in Lessee's sole determination, constructing, installing, maintaining, owning, operating, repairing, and removing the System; (iii) transmitting electrical energy to, on, over, and across the Premises; and (iv) accessing the System, all on the terms and conditions set forth in this Agreement.
- NOW, THEREFORE, in consideration of the foregoing, the mutual covenants and agreements herein contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged; and intending to be legally bound hereby, Lessor and Lessee hereby agree as follows:

AGREEMENT

1. Grant of Lease; Purpose of Lease; Permitted Uses and Activities.

- **1.1** <u>Lease and Confirmation</u>. For good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by Lessor and Lessee, Lessor hereby leases the Premises to Lessee.
- 1.2 <u>Lease Rights</u>. Lessor hereby grants to Lessee the following lease rights in, on, under, over, across, along and above the Premises (the "<u>Lease Rights</u>"):

- (a) A right of access and of ingress to and egress from the Premises, as well as access over and across other lands adjacent to the Premises and owned by Lessor, in each case by means of any existing roads on the Premises, and by such other roads as Lessee may construct on the Premises from time to time at locations reasonably agreed between Lessor and Lessee, for the benefit of and for purposes incidental to Operations on the Premises. During the Term, Lessee shall have access to the leased area of the Premises twenty-four (24) hours a day, seven (7) days a week, without prior notice to Lessor.
- (b) The right to install, use, repair, improve, relocate, replace and remove the System and Transmission Facilities on the approximate twenty (20) acre portion of the Premises, including the right to install, use, maintain, repair, replace, improve, remove, re-power and relocate battery systems and system modules within the Solar Footprint from time to time.
- (c) The exclusive right for any audio, visual, view, light, shadow, noise, vibration, air turbulence, wake, electromagnetic or other effect of any kind or nature whatsoever resulting, directly or indirectly, from any Operations conducted on the Premises.
- (d) The right to enter the Premises and lands adjacent to the Premises and owned by Lessor from time to time with personnel, vehicles, materials and equipment twenty-four (24) hours a day, seven (7) days a week for the purposes permitted hereunder, and to excavate and/or fill areas on the Premises, all to such extent as Lessee deems reasonably necessary; together with the right to use construction staging and laydown areas and operate cranes and other heavy-duty equipment in locations on the Premises and on lands adjacent to the Premises and owned by Lessor at all times as shall be reasonably necessary for installing, using, maintaining, repairing, replacing, improving, removing, repowering and relocating the System and Transmission Facilities on the Premises.
- (e) The exclusive right to study, develop and use the Premises for converting solar energy into electrical energy and collecting and transmitting the electrical energy so converted.
- (f) The exclusive right to access, relocate (within the Premises) and maintain the System and Transmission Facilities on the Premises.
- (g) The exclusive right to capture, use and convert unobstructed solar resources over and across the Premises.
 - (h) The right to subjacent and lateral support for the System and Transmission Facilities.
- 1.3 Permitted Uses and Activities. The Lease Rights granted to Lessee in this Agreement shall permit Lessee to use the Premises for solar energy purposes, and Lessee shall have the exclusive right to use the Premises for solar energy purposes. "Solar energy purposes" means converting solar energy into electrical energy, and storing, collecting and transmitting the electrical energy so converted, and for related and incidental purposes and activities, all to such extent as Lessee shall deem reasonable or necessary in its sole discretion, including but not limited to: (a) determining the feasibility of solar energy conversion on the Premises, including studies on solar radiance, light direction and other meteorological data and extracting soil samples, and all other testing, studies or sampling desired by Lessee; (b) locating, constructing, installing, operating, maintaining, improving, repairing, relocating, and removing the System and Transmission Facilities on, above and below the ground of the Premises; (c) removing trees and other vegetation from the Premises; (d) depositing gravel, sand, soil and other natural materials on the Premises to access and support the System and Transmission Facilities (and equipment incidental to the System and Transmission Facilities) and digging trenches on the Premises; (e) installing gates, fences, and such other security measures as may be necessary or desirable in Lessee's sole determination, to secure the System and Transmission

Facilities; and (f) installing, maintaining, using, and repairing on, above and below the Premises, structures, inverters, electrical wires, appurtenances and cables required for the conversion, collection, storage and transmission of electrical energy (collectively, "Operations").

- 1.4 Radiation Lease Right. Among the Lease Rights granted and conveyed by Lessor to Lessee is the exclusive right to the flow of sunshine and solar radiation to and across the Premises (the "Radiation Lease Right"). Lessor hereby covenants that neither Lessor nor any other person shall obstruct or interfere with the free passage of solar radiation to the System. Any obstruction to the passage of direct solar radiation across the Premises to the System by Lessor or any other person (including, without limitation, a tenant or assignee of Lessor) is strictly prohibited. Trees, structures, and improvements located on abutting properties as of the Effective Date shall be allowed to remain, and Lessee may not require their removal. Lessor shall not place or plant any trees, structures, or improvements whatsoever on the Premises or abutting properties controlled by Lessor after the Effective Date that may, in Lessee's sole judgment, impede or interfere with the passage of direct solar radiation to the System or cause a decrease in the output or efficiency of the System, unless Lessor has received prior written approval from Lessee for any such trees, structures, or improvements. The Parties acknowledge and agree that the grant of the Radiation Lease Right and the covenants by Lessor contained in this Agreement are a material inducement for Lessee to enter into this Agreement, and each of the Parties acknowledge and recognize that a violation of the terms hereof will cause irreparable damage to Lessee and that Lessee may have no adequate remedy at law for such violation. Accordingly, each of the Parties agrees that Lessee shall be entitled, as a matter of right, to an injunction from any court of competent jurisdiction restraining any violation of such covenants and to specifically enforce Lessee's exclusive right to the Radiation Lease Right. This right to injunctive relief will be cumulative and in addition to any other remedies that Lessee may otherwise have at law or in equity. Lessee and Lessor further agree to execute and record such instruments or addenda to this Agreement as may be required under applicable State or local law to evidence the grant of the Radiation Lease Right and the covenants by Lessor made in this Section 1.4.
- 1.5 Lessee's Exercise of Rights; Acknowledgment of Lessor. Lessee may construct and install the System and Transmission Facilities on the Premises in the manner Lessee deems reasonable and appropriate in Lessee's sole discretion. Nothing expressly or impliedly contained in this Agreement shall be construed to require Lessee to undertake construction or installation of the System or Transmission Facilities on the Premises; to continue operation of any part of the System or Transmission Lines from time to time located on the Premises or elsewhere; or to generate or sell any minimum or maximum amount of electrical energy from the System and Transmission Facilities; and the decision if, when and to what extent that construction and generation will occur shall be solely in Lessee's discretion. Lessor acknowledges that Lessee has made no representations or warranties to Lessor, including any regarding development of, or the likelihood of power generation from, the Premises. Lessor acknowledges that the installation of all or a portion of the System and Transmission Facilities will require physically mounting and adhering the System and Transmission Facilities to the ground, and by execution of this Agreement, Lessor hereby consents to the same.
- 1.6 Clearing of the Premises; Harvesting of Timber. During the Term, Lessee may clear the Premises as it solely determines appropriate for the purpose of carrying out the Operations and/or otherwise exercising Lessee's rights hereunder. To the extent Lessee receives net proceeds for stumpage from its clearing of the Premises, Lessee shall account to Lessor for such net proceeds, and pay the net proceeds to Lessor on or before the earlier to occur of (i) commencement of the Operating Period (as defined in Section 2 below) or (ii) termination of this Agreement.
- **2.** Term; Renewal Term; Termination. This Agreement shall contain three (3) Terms. The first is the "Development Term", during which period the Lessee shall perform development activities on the Premises, including, without limitation, evaluating the Premises for suitability as a

solar photovoltaic energy generation site, measuring the solar resource, obtaining permits, securing Lessee's position to interconnect to the grid, and constructing System and the Transmission Facilities. The term of the Development Term shall commence on the Effective Date and shall continue for a period not to exceed five years (5) years. Lessee will use best efforts to have the development period not exceed two years. If the Premises are deemed suitable for such purposes in Lessee's sole discretion, and if the System and Transmission Facilities are installed on the Premises, then on the date upon which commercial electrical power is first delivered to the grid, the Development Term shall end and the "Operating Term" shall commence and continue for a period of Twenty Five (25) years. Lessee's right of access shall continue in full force and effect for a period of one hundred eighty (180) days following the expiration or earlier termination of this Agreement for purposes of removing the System (the "Restoration Term"). On or before the expiration of the Restoration Term, Lessee shall: (i) remove from the Premises any part of the Operations owned, installed or constructed by Lessee thereon, (ii) fill in and compact all trenches or other borings or excavations made by Lessee on the Premises (excepting borrow pits and quarries), and (iii) leave the surface of the Premises free from debris (the "Restoration Obligations"); provided however, that the Restoration Obligations shall not include the replanting of trees, removing of access roads or regrading to existing conditions, and Lessee shall only be required to remove any part of the Operations located beneath the surface of the land (such as, without limitation, footings and foundations) to a depth of thirty six inches (36) below the surface of the land. Notwithstanding the foregoing or anything in this Agreement to the contrary, if construction of the System is not commenced on the Premises on or before the Fourth (4) anniversary of the Effective Date, Lessee shall have the option to terminate this Agreement by written notice to Lessor; and, upon the giving of such notice, this Agreement shall automatically terminate and be of no further force or effect, and neither Lessor nor Lessee shall have any further obligations hereunder. Upon the expiration or earlier termination of this Agreement, Lessee shall surrender to Lessor all of Lessee's right, title, and interest in and to the Premises by executing and recording in the real property records of the Penobscot County Registry of Deeds, (the "Records") an instrument evidencing the termination of this Agreement and Lessee's interest in the Premises. In the event that the municipality requires it, Lessee shall obtain and maintain a surety bond, and pay all premium costs associated therewith, in an amount sufficient to cover the estimated cost of the Restoration Obligations less the estimated salvage value of the System (as determined by an engineer licensed in the State of Maine) in the event that Lessee (i) shall file a petition in bankruptcy or for reorganization or for any arrangement pursuant to any present or future federal or state bankruptcy law or under any similar federal or state law, (ii) shall be adjudicated as bankrupt or insolvent or shall make an assignment for the benefit of its creditors, or (iii) shall be unwilling or unable, for any reason other than Force Majeure, to perform the Restoration Obligations in accordance with the terms and conditions of this Lease. If said bond is not a requirement of the Municipality, Lessee shall obtain and maintain a surety bond for these purposes and in such amount at least five years prior to the anticipated termination of this Lease, naming the Lessor as the obligee.

Provided that Lessee is not in default (beyond the expiration of all applicable notice, grace and cure periods) of this Agreement at the expiration of the initial Twenty-Five (25) year Operating Term and does not otherwise notify Lessor, the first Twenty-Five (25) Operating Term shall automatically be renewed for an additional Twenty (20) year period (the "Renewal Operating Term"). The provisions of this Agreement shall remain the same during the Renewal Operating Term, except that Lessee shall have no option to extend the Term after the Renewal Operating Term. If Lessee provides written notice to Lessor at least sixty (60) days prior to the expiration of the first Twenty (20) year Operating Period that Lessee does not wish to extend the Term of this Agreement, the Term of this Agreement shall not be extended beyond the initial Twenty-Five (25) year Operating Period.

Rent. As consideration for the rights and interests granted by Lessor under this Agreement, Lessee shall pay the rent to Lessor in the following amounts and on the following terms and conditions:

- (a) During the Development Term, Lessee shall pay Lessor rent in the amount of Four Thousand Dollars (\$4,000.00) per year for each calendar year of the Development Term payable in advance in annual instalments on or before the anniversary of the Effective Date of each year of the Development Term, said rent to be prorated for portions of a calendar year at the beginning or end of the Development Term. Upon signing this agreement an additional onetime payment of One Thousand Dollars (\$1,000.00) will be made. This initial Five Thousand dollars total payment (\$5,000.00) will be paid within 30 days of signing the agreement.
- (b) For the first Five (5) years of the Operating Term, Lessee shall pay the Lessor rent in the amount of Five Hundred and Twenty Five Dollars (\$525.00) per acre per calendar year for each acre of land upon which any portion of the System or Transmission Facilities is located (expressly including equipment setback and buffer areas, but expressly excluding areas upon which construction is prohibited or unfeasible in Lessee's reasonable discretion due to the presence of wetlands or other matters), payable in advance on or before January 31 of each year of the Operating Term. From years six (6) to years twenty-five (25) the \$525.00 per acre per year lease payment shall increase at a rate of Two percent (2%) annually as shown in exhibit A Lease Payment Schedule. During the first year of the Operating Term, the Five Hundred Dollars (\$525.00) per acre rent will be pro-rated from the commencement of the Operating Term through December 31 of that year. Should Operations terminate on other than December 31 of the final year of the Term, rent for the period from January 1 through the termination date shall be pro-rated accordingly. Please see attached Rent Schedule in Exhibit B
 - (c) Lessee shall have no obligation to pay rent during the Restoration Term.

Rent shall be paid at Lessor's address first stated, unless otherwise noticed by Lessor to Lessee in writing in accordance with the terms and conditions of Section 12.

4. Ownership of System; Financing Statements. The System and Transmission Facilities are and shall remain Lessee's exclusive personal property at all times, shall not be or become a fixture on the Premises, and may be removed by Lessee at any time in accordance with the terms and conditions of this Agreement. Lessee shall have the right to file in the Penobscot County Registry of Deeds statements evidencing Lessee's title to the System and the Transmission Facilities. Neither the System, nor the Transmission Facilities, nor any of their respective components may be sold, leased, assigned, mortgaged, pledged or otherwise alienated or encumbered by Lessor. Lessor shall not cause or permit the System, the Transmission Facilities, or any part thereof to become subject to any lien, encumbrance, pledge, levy or attachment arising by, under or through Lessor. Lessor shall indemnify Lessee against all losses, claims, costs and expenses (including reasonable attorneys' fees) incurred by Lessee in discharging and releasing any such lien, encumbrance, pledge, levy or attachment arising by, under or through Lessor. Without limiting the generality of the foregoing, Lessor hereby waives any statutory or common law lien that it might otherwise have in or to the System, Transmission Facilities, or any part thereof. Any and all solar resource data collected by or on behalf of Lessee after the Effective Date is the sole property of Lessee.

5. <u>Lessee's Representations, Warranties, and Covenants</u>.

5.1 Security. Lessee shall provide all security measures that Lessee determines are or may be reasonably necessary for the System and the Transmission Facilities. Such measures may, but will not necessarily, include warning signs, closed and locked gates, and other measures appropriate and reasonable to protect against damage or destruction of the System or the Transmission Facilities

or injury or damage to persons or property resulting from the System, Transmission Facilities and/or the Operations.

- **5.2** <u>Maintenance</u>. During the Term, Lessee shall, at Lessee's sole cost and expense, maintain the System, the Transmission Facilities and the Premises in accordance with all applicable laws, rules, ordinances, orders, and regulations of all governmental agencies.
- **Clean Condition**. Lessee shall not unreasonably clutter the Premises and shall collect and dispose of any and all of Lessee's refuse and trash. Tenant shall not use the Premises for storage except for materials, equipment and vehicles associated with construction and/or maintenance of the System and Transmission Lines on the Premises or adjacent lands that are part of the Operations, and Lessee shall have the right to designate for use in this regard during the construction and development process (or at any time thereafter) such laydown yards or areas as it shall determine to be appropriate given the then current nature of the Operations.
- <u>Indemnity</u>. Lessor and Lessee, on behalf of itself and its principals, members, officers, employees, agents, representatives, contractors, successors and assigns (the "Indemnifying Party"), shall indemnify, defend and hold harmless the other party and its principals, members, officers, employees, agents, representatives, contractors, successors and assigns (collectively, the "Indemnified Party") from and against any costs and expenses (including, without limitation, court filing fees, court costs, witness fees, and reasonable fees and disbursements of legal counsel, investigators, expert witnesses, consultants, accountants and other professionals, and any and all losses, costs, obligations, liabilities, settlement payments, awards, judgments, fines, penalties, damages, expenses, deficiencies or other charges with respect thereto) incurred in connection with investigating, defending or asserting any claim, action, suit or proceeding arising from (i) physical damage to Premises (including the personal property of the Indemnified Party) or physical injury to or death of any person, in each case to the extent caused by the negligence or gross misconduct of the Indemnifying Party, (ii) any violation by the Indemnifying Party of any law, or (iii) any material default by the Indemnifying Party, or any failure to be true of any representation or warranty made by the Indemnifying Party, under this Agreement. The reference to property damage in the preceding sentence does not include losses of rent, business opportunities, profits and other consequential damages that may result from Lessor's loss of use of any portion of the Premises occupied by the System and the Transmission Facilities pursuant to this Agreement or the Lease Rights; provided, however, that an Indemnifying Party shall have no obligation to indemnify or defend any Indemnified Party with respect to any expenses that result or arise from an Indemnified Party's acts or omissions, negligence or willful misconduct.
- 5.5 Hazardous Materials. Lessee shall not violate, and shall indemnify Lessor against, any claims, costs, damages, fees, or penalties arising from a violation by Lessee or Lessee's agents or contractors of any federal, state, or local law, ordinance, order, or regulation relating to the generation, manufacture, production, use, storage, release or threatened release, discharge, disposal, transportation, or presence on or under the Premises of any substance, material, or waste that is now or hereafter classified as hazardous or toxic, or that is regulated under current or future federal, State, or local laws or regulations ("Hazardous Materials"). Lessor represents and warrants that, to the best of Lessor's knowledge: (i) the Premises is in compliance with Environmental Laws (defined below); and (ii) there are no Hazardous Materials in, on, or under the Premises. "Environmental Laws" means any and all federal, state, local, and foreign environmental, health and/or safety-related laws, ordinances, codes, rules, regulations (as interpreted by judicial and administrative decisions) relating to protection of the environment, health and safety, and natural resources. Environmental Laws includes the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ("CERCLA"), the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. Sec. 6901 et seq., the Environmental Protection Title of the General Statutes of Maine ("Environmental Code"), and

the common law. No liability shall arise in Lessee from the mere discovery of facts or conditions existing or pertaining to the Premises.

6. <u>Lessor's Representations, Warranties, and Covenants.</u>

- 6.1 Authority; No Third-Party Rights. Lessor represents and warrants to Lessee that there are no circumstances known to Lessor and no commitments to third parties that may damage, impair, or otherwise adversely affect Lessee's rights hereunder. In the event that Lessor becomes a party to an oil and gas lease or subsurface agreement or mineral interest lease or subsurface agreement affecting the Premises that is executed after the date hereof, Lessor agrees to include surface use provisions in such oil and gas or mineral interest lease or surface agreement in form and substance acceptable to Lessee in its sole discretion. Lessor and each person signing this Agreement on behalf of Lessor has the full and unrestricted right and authority to do so. When signed by Lessor, this Agreement constitutes a valid and binding agreement enforceable against Lessor in accordance with its terms.
- 6.2 No Interference. Lessor hereby agrees, for itself, its agents, employees, representatives, successors, and assigns, that it will not initiate or conduct activities that it knows or reasonably should know may damage, impair, or otherwise adversely affect the System, the Transmission Facilities, or the Operations on the Premises, including, without limitation, activities that may adversely affect the System's exposure to sunlight. Lessor further covenants for itself and its agents, employees, representatives, successors, and assigns that it will not (i) interfere with or prohibit the free and complete use and enjoyment by Lessee of its rights granted under this Agreement; (ii) take any action that will or may interfere with the availability and accessibility of solar radiation over and above the Premises; (iii) take any action that will or may interfere with the transmission of electrical energy to or from the Premises; (iv) take any action that will or may impair Lessee's access to the Premises for the purposes specified in this Agreement; (v) plant or maintain any vegetation or erect or maintain any structure that will cast a shadow on the System or adversely affect the System or the Transmission Facilities; or (vi) take any action that may impair Lessee's access to any portion of the System or the Transmission Facilities.
- 6.3 Title Review and Cooperation. Lessor shall use good faith and best efforts to obtain non-disturbance, subordination and other title curative agreements from any person with a lien, encumbrance, mortgage, lease or other exception to Lessor's fee title to the Premises to the extent necessary to eliminate any actual or potential interference by any such person with any rights granted to Lessee under this Agreement. If Lessee and Lessor are unable to obtain such agreements from any third party holding an interest in the Premises, Lessee and any assignee shall be entitled (but not obligated) to make payments in fulfillment of Lessor's obligations to such third party and may offset the amount of such payments from amounts due Lessor under this Agreement. Lessor shall also provide Lessee with any further assurances and shall execute any estoppel certificates, consents to assignments or additional documents that may be reasonably necessary for recording purposes or otherwise reasonably requested by Lessee.
- 6.4 <u>Cooperation</u>. Lessor shall reasonably support and cooperate (and shall use reasonable efforts to cause any other person with any other right, title or interest in the Premises to cooperate) with Lessee, at no cost to Lessor, in the conduct of Lessee's construction and Operations and in otherwise giving effect to the purpose and intent of this Agreement, including in Lessee's efforts to obtain from any governmental authority or any other person any environmental impact review, permit, entitlement, approval, authorization or other rights necessary or convenient in connection with construction and Operations; and Lessor shall (and shall use reasonable efforts to cause any such other person to) promptly upon request, without demanding additional consideration therefor, execute, and, if appropriate, cause to be acknowledged and recorded, any map, application, permit or document that

is reasonably requested by Lessee in connection therewith (as well as any amendment to this Agreement or any recordable memorandum executed in connection herewith for purposes of correcting or replacing property descriptions based on surveys or other relevant information obtained after the Effective Date, or making other non-substantive corrections, additions or substitutions). Without limiting the generality of the foregoing, in connection with any application by Lessee for a governmental permit, approval, authorization, entitlement or other consent, Lessor agrees (and shall use reasonable efforts to cause any such other person to agree) not to oppose, in any way, whether directly or indirectly, any such application or approval at any administrative, judicial or legislative level.

6.5 <u>Setback Waiver</u>. To the extent that (i) Lessor now or in the future owns or leases any land adjacent to the Premises, or (ii) Lessee or any affiliate of Lessee owns, leases or holds an easement over land adjacent to the Premises and has installed or constructed or desires to install or construct any part of the Operations on said land at and/or near the common boundary between the Premises and said land, Lessor hereby waives any and all setbacks and setback requirements, whether imposed by law or by any person, including any setback requirements described in any applicable zoning ordinance or in any governmental entitlement or permit heretofore or hereafter issued to Lessee any affiliate of Lessee. Further, if so requested by Lessee or any affiliate of Lessee, Lessor shall promptly, without demanding additional consideration thereof, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver, setback elimination or other document or instrument required by any governmental authority or that Lessee or any affiliate of Lessee deems necessary or convenient to the obtaining of any entitlement or permit.

7. Taxes; CRP

- (a) Lessor shall pay when due any taxes attributable to (a) improvements or facilities installed by Lessor or others (excluding Lessee) on the Premises and (b) the underlying value of the Premises; provided, however, that if, following the start of construction of the System and Transmission Facilities on the Premises, the taxes against the underlying value of the Premises are increased by reason of a change of use determination by a taxing entity, change of tax classification of the Premises from forest or tree growth to another tax classification, or increased assessment of the Premises resulting from the Operations, then Lessee shall pay the entire amount of such increase so attributable.
- (b) Lessor shall submit any real property tax bill regarding the Premises to Lessee within thirty (30) days after Lessor's receipt thereof from the taxing authority. If any taxes payable by Lessee hereunder are levied or assessed in the name of Lessor as part of the real property taxes payable by Lessor, then, within thirty (30) days after Lessor submits the real property tax bill to Lessee, Lessee shall pay to Lessor or directly to the taxing authority all such taxes payable by Lessee hereunder, it being specifically understood that in no event shall Lessor be obligated to advance Lessee's tax payment. Lessee shall promptly request of the City of Saco Assessor that Lessee's improvements and the leasehold interest of Lessee hereunder be separately assessed and taxed directly to Lessee. Lessee shall have the right, in its sole discretion, to contest by legal proceedings (which may be brought in the name(s) of Lessor and/or Lessee where appropriate or required), the validity or amount of any assessments or taxes for which Lessee is responsible hereunder. Lessor shall in all respects cooperate with Lessee in any such contest.

8. <u>Insurance</u>.

- (a) Lessee shall, at its own cost and expense, maintain during the Term, with a company or companies licensed or qualified to do business in the State of Maine, commercial general liability insurance with limits not less than \$1,000,000 for injury to or death of one or more persons in any one occurrence and \$1,000,000 for damage or destruction to property in any one occurrence. The Lessor shall be named as an additional insured under the Lessee's policy. For the avoidance of doubt, Lessee's property insurance shall cover the System, and Lessor's property insurance shall cover the Premises.
- (b) Lessor shall, at its own cost and expense, maintain during the Term, with a company or companies licensed or qualified to do business in the State of Maine, commercial general liability insurance with limits of not less than \$1,000,000 for injury to or death of one or more persons in any one occurrence and \$1,000,000 for damage or destruction to property in any one occurrence resulting from Lessor's actions on the Premises. Lessee and Lessee's lender (if any) shall be named as an additional insured under Lessor's policy. Upon written request by Lessee, Lessor shall deliver to Lessee a certificate of insurance evidencing said policy, which certificate shall provide that (i) Lessee and Lessee's lender (if any) shall be given notice of any modification, cancellation or termination of such insurance in accordance with policy terms, and (ii) the insurer waives all rights of subrogation against Lessee in connection with any loss or damage covered by such policy.
- (c) All dollar amounts stated in this Section 8 shall be subject to adjustment based on amounts typical for comparable projects in the State of Maine.

9. Assignment.

- 9.1 Assignment by Lessor; Transfer of the Premises. Lessor acknowledges and agrees that Lessee will be and remain throughout the Term the exclusive owner and operator of the System and Transmission Facilities, that no portion or component of the System or Transmission Facilities is a fixture, that the System and Transmission Facilities may not be sold, leased, assigned, mortgaged, pledged, or otherwise alienated or encumbered with the conveyance of any fee or leasehold interest in or to any portion of the Premises, and that the conveyance of any fee or leasehold interest in or to any portion of the Premises to any person or entity other than Lessee or its successors and assigns shall be made subject and subordinate to this Agreement and Lessee's rights hereunder (any such conveyance, a "Transfer"). Lessor shall notify Lessee in writing no fewer than thirty (30) days before any Transfer of all or any portion of the Premises. Any such notice shall identify the transferee, the portion of the Premises to be transferred, and the proposed date of the Transfer. This Agreement shall survive any Transfer.
- 9.2 <u>Assignment by Lessee</u>. Lessor's rights and obligations under the lease will automatically be transferred to any new owner by operation of law with any transfer or sale of the property, but see proposed language below which expressly addresses a Lessor transfer of ownership:
- (a) Lessee and any Assignee (as defined below) shall have the right, without need for Lessor's consent, to finance the System and/or the Transmission Facilities and to convey, assign, mortgage, or transfer to one or more Assignees this Agreement (or any right or interest of Lessee in this Agreement), Lessee's leasehold interest in the Premises, or the System and/or Transmission Facilities. An "Assignee" is any of the following: (i) any one or more parties involved in financing or refinancing of the System and/or the Transmission Facilities, including, without limitation, any Lender (as defined in Section 10.1); (ii) any purchaser of the System and/or Transmission Facilities, or any purchaser of all or any portion of Lessee's interest in this Agreement; (iii) a corporation, limited liability company, partnership or other entity now existing or hereafter organized in which

Lessee, or any affiliate, owns (directly or indirectly) at least fifty-one percent (51%) of all outstanding shares of voting stock or ownership interests; (iv) a partnership now existing or hereafter organized, a general partner of which is such a corporation or limited liability company as described in subclause (iii); or (v) a corporation, limited liability company, partnership or other entity that acquires all or substantially all of Lessee's business, assets or capital stock, directly or indirectly, by purchase, merger, consolidation or other means. Lessee will give notice to Lessor of any such assignment (including the address of the Assignee for notice purposes), provided that failure to give such notice shall not constitute a default under this Agreement but rather shall only have the effect of not binding Lessor with respect to such assignment until such notice shall have been given. Upon any assignment of all of Lessee's right, title and interest under this Agreement in accordance with the terms and conditions of this Section 9.2, Lessee shall automatically (without the need for any writing) be released from all of its obligations and liability under this Agreement, except for liabilities that accrued prior to the date of such assignment. (b) Lessor shall have the right, at any time during the term of this Lease, to sell, assign, lease, mortgage, or otherwise convey the Premises or any portion thereof subject to the terms and conditions of this Lease, provided that doing so will not constitute a violation of local or state subdivision laws, and provided further, that as a condition of such sale, assignment, lease, mortgage, or conveyance, Lessor's successor-in-interest shall execute and deliver to Lessor and Lessee an assignment and assumption of this Lease in form and substance reasonably acceptable to the parties and pursuant to which Lessor's successor-ininterest shall agree to be bound by all of the obligations of Lessor hereunder.

10. Lender Protections.

- 10.1 <u>Notice of Lender</u>. Lessee shall deliver to Lessor written notice of and contact information for any bank, financial institution or other institutional investor providing debt or equity financing for the System (each, a "<u>Lender</u>") and any trustee or agent acting on any such Lender's behalf, within thirty (30) days of any such party becoming a Lender.
- **10.2** <u>Lender Collateral Assignment</u>. Upon notice and delivery by Lessee pursuant to <u>Section 10.1</u> of the name and contact information for any Lender, then Lessor shall be automatically deemed to:
- **10.2.1** Acknowledge any collateral assignment by Lessee to the Lender, of Lessee's right, title and interest in, to and under this Agreement, as consented to under <u>Section 10.2.2</u>;
- 10.2.2 Acknowledge that any Lender, as such collateral assignee, shall be entitled to exercise any and all rights of lenders generally with respect to Lessee's interests in this Agreement; and
- 10.2.3 Acknowledge that it has been advised that Lessee has granted a security interest in the System and the Transmission Facilities to the Lender and that the Lender has relied upon the characterization of the System and the Transmission Facilities as personal property, as agreed in this Agreement, in accepting such security interest as collateral for its financing of the System and Transmission Facilities.
- 10.3 <u>Lender Cure Rights Upon Lessee Default</u>. Upon any Lessee Default (as defined in <u>Section 11.1</u>), Lessor shall deliver to each Lender of which it has notice a copy of any notice of default delivered under <u>Section 11</u>. Following the receipt by any Lender of any notice that Lessee is in default in its obligations under this Agreement beyond the expiration of all applicable notice, grace and cure periods, such Lender shall have the right but not the obligation to cure any such default, and Lessor agrees to accept any cure tendered by any Lender on behalf of Lessee in accordance with the

following: (a) a Lender shall have the same period after receipt of a notice of default from Lessor to remedy a Lessee Default, or cause the same to be remedied, as is given to Lessee after Lessee's receipt of a notice of default hereunder; *provided, however*, that any such cure periods shall be extended for the time reasonably required by the Lender to complete such cure; and (b) the Lender shall not be required to cure those Lessee Defaults that are not reasonably susceptible of being cured or performed by the Lender. The Lender shall have the absolute right to substitute itself or an affiliate for Lessee and perform the duties of Lessee hereunder for purposes of curing such Lessee Default. Lessor expressly consents to such substitution, and authorizes the Lender, its affiliates (or either of their employees, agents, representatives or contractors) to enter upon the Premises to complete such performance with all of the rights and privileges of Lessee, but subject to the terms and conditions of this Agreement.

New Lease to Lender. If this Agreement terminates as a result of any default, foreclosure or assignment in lieu of foreclosure, or bankruptcy, insolvency or appointment of a receiver in bankruptcy, Lessor shall give prompt written notice to each Lender of which Lessor has notice. Lessor shall, upon written request of the first priority Lender that is made within ninety (90) days after notice to such Lender, enter into a new lease of the Premises with such Lender, or its designee, within thirty (30) days after the receipt of such request. Such new lease shall be effective as of the date of the termination of this Agreement, and shall be upon the same terms, covenants, conditions and agreements as contained in this Agreement. Upon the execution of any such new lease, the Lender shall (i) pay Lessor any amounts that are due Lessor from Lessee; (ii) pay Lessor any and all amounts that would have been due under this Agreement (had this Agreement not been terminated) from the date of termination to the date of the new lease; (iii) perform all other obligations of Lessee under the terms of this Agreement, to the extent performance is then due and susceptible of being cured and performed by the Lender; and (iv) agree in writing to perform, or cause to be performed, all nonmonetary obligations that have not been performed by Lessee that would have accrued under this Agreement up to the date of commencement of the new lease, except those obligations that are not reasonably susceptible of being cured by such Lender. Any new lease granted to the Lender shall enjoy the same priority as this Agreement over any lien, encumbrance or other interest created by Lessor. The provisions of this Section 10.4 shall survive termination of this Agreement and shall continue in effect thereafter and, from the effective date of termination to the date of execution and delivery of such new lease, such Lender may use and enjoy the Premises without hindrance by Lessor or any person claiming by, through or under Lessor, provided that all of the conditions for a new lease as set forth in this Section 10.4 are complied with.

11. <u>Default and Termination; Remedies.</u>

- 11.1 Lessor's Right to Terminate. Except as qualified by Section 10 above and subject to all notice and cure rights set forth therein, Lessor shall have the right to terminate this Agreement after (i) a material default in the performance of Lessee's obligations under this Agreement beyond the expiration of all applicable notice, grace and cure periods (a "Lessee Default"), (ii) Lessor simultaneously notifies Lessee and all Lenders in writing of the default, which notice sets forth in reasonable detail the facts pertaining to the default and specifies the method of cure, and (iii) the default shall not have been remedied within sixty (60) days after Lessee, or within one hundred twenty (120) days in the case of all Lenders, receive the written notice, or, if cure will take longer than 60 days for Lessee or 120 days for any Lender, Lessee or Lender has not begun diligently to undertake the cure within the relevant time period and thereafter diligently prosecutes the cure to completion. Any termination by Lessor after the applicable notice, grace and cure periods set forth above and in Section 10 shall be effective upon thirty (30) days' written notice to Lessee.
- 11.2 <u>Lessee's Right to Terminate</u>. Lessee shall have the right to terminate this Agreement at any time prior to the commencement of the Operating Term upon at least thirty (30) days' prior written notice to Lessor. After the commencement of the Operating Term, Lessee shall have the right to

terminate this Agreement if a material default in the performance of Lessor's obligations under this Agreement (a "Lessor Default") has occurred and remains uncured after thirty (30) days' written notice from Lessee of such Lessor Default. Any termination by Lessee after the applicable notice and cure period set forth above shall be effective upon thirty (30) days' written notice to Lessor.

12. <u>Notice</u>. Any written notice required, permitted, or contemplated hereunder shall be addressed to the Party to be notified at the address set forth below or at such other address or addresses as a Party may designate for itself from time to time by notice hereunder. Such notices may also be sent by email provided that such transmission includes read-receipt confirmation:

Notice to Lessor:	Notice to Lessee:				
Joel Butler	Hep Energy USA				
Wolf recycling LLC	Thomas G Donnelly				
45 Airline Road	President Engineering & Operations				
Clifton Maine 04428	57 Exchange Street Ste. 100,				
Tel. 1-207-266-0820	Portland Maine 04101				
Email: jebutlerLLC@gmail.com					
,	With a copy to:				
With a copy to:					
	Bernstein Shur, Sayer & Nelson, PA				
	100 Middle Street, West Tower				
	P.O. Box 9729				
	Portland Maine 04104-5029				
Attn:	Tel. 207-228-7343				
Tel	Email: bsmith@bernsteinshur.com				
Email:	_				
	If to any Lender or Assignee: At the address				
	given for such Lender or Assignee pursuant to				
	Section 10.1 or Section 9.				

Either Party may, by written notice given at any time or from time to time, require subsequent notices to be given to another individual Person, whether a party or an officer or representative, or to a different address, or both. Notices given before actual receipt of notice of change shall not be invalidated by the change.

13. <u>Legal Matters.</u>

- 13.1 Governing Law; Dispute Resolution. This Agreement shall be governed by the laws of the State of Maine, without regard to any conflict of laws principles. If the Parties are unable to resolve amicably any dispute arising out of or in connection with this Agreement, they agree that venue for resolving such dispute shall be the U.S. District Court, District of Maine.
- 13.2 <u>Consequential Damages</u>. NOTWITHSTANDING ANY PROVISION IN THIS AGREEMENT TO THE CONTRARY, NEITHER LESSEE NOR LESSOR SHALL BE LIABLE TO THE OTHER FOR INCIDENTAL, CONSEQUENTIAL, SPECIAL, PUNITIVE, OR INDIRECT DAMAGES, ARISING OUT OF OR RELATED TO THIS AGREEMENT. THE FOREGOING PROVISION SHALL NOT PROHIBIT LESSEE OR

LESSOR FROM SEEKING AND OBTAINING GENERAL CONTRACT DAMAGES OR EQUITABLE RELIEF FOR A BREACH OF THIS AGREEMENT.

13.2.1 Jury Trial. TO THE EXTENT ALLOWED BY APPLICABLE LAW, EACH OF THE PARTIES KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVES THE RIGHT TO A TRIAL BY JURY IN RESPECT OF ANY LITIGATION BASED ON THIS AGREEMENT, OR ARISING OUT OF, UNDER OR IN AND ANY **CONNECTION WITH THIS AGREEMENT AGREEMENT** CONTEMPLATED TO BE EXECUTED IN CONJUNCTION HEREWITH, OR ANY COURSE OF CONDUCT, COURSE OF DEALING, STATEMENTS (WHETHER VERBAL OR WRITTEN) OR ACTIONS OF ANY PARTY HERETO. EACH OF THE PARTIES TO THIS AGREEMENT WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION IN WHICH A JURY TRIAL HAS BEEN WAIVED WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT OR HAS NOT BEEN WAIVED. THIS PROVISION IS A MATERIAL INDUCEMENT TO EACH OF THE PARTIES FOR ENTERING INTO THIS AGREEMENT.

Safety Measures; Waiver and Recognition. Lessor shall comply with all safety, environmental, security, or other procedures reasonably set forth by Lessee as required for compliance with all applicable rules, regulations, laws, orders, and standards, including those set forth by the Federal Energy Regulatory Commission, the North American Electric Reliability Corporation (including the Critical Infrastructure Protection standards), any other applicable regulatory authority, and any other applicable standard setting-entity generally recognized in the energy industry. LESSOR IS AWARE OF THE POTENTIAL RISKS ASSOCIATED WITH ELECTROMAGNETIC AND STRAY VOLTAGE RESULTING FROM THE PRODUCTION AND TRANSMISSION OF ELECTRICITY, AND KNOWINGLY WAIVES ALL CLAIMS RESULTING FROM THESE CAUSES, AND LESSOR SHALL HAVE NO RIGHT TO INDEMNITY PURSUANT TO SECTION 5.4 OF THIS AGREEMENT FOR ANY SUCH CLAIMS. LESSOR ADDITIONALLY RECOGNIZES THE NEED TO EXERCISE EXTREME CAUTION WHEN IN PROXIMITY TO ANY PORTION OF THE PROJECT AND THE IMPORTANCE OF RESPECTING GATES, FENCES, SIGNAGE, RULES AND OTHER SAFETY MEASURES UTILIZED BY LESSEE, AND LESSOR AGREES TO EXERCISE SUCH CAUTION AND RESPECT SUCH MEASURES AT ALL TIMES AND TO CAUSE ITS PRINCIPALS, MEMBERS, OFFICERS, EMPLOYEES, AGENTS, REPRESENTATIVES AND CONTRACTORS TO DO THE SAME, WITH FAILURE TO DO SO CONSTITUTING A MATERIAL DEFAULT AND SUBJECTING LESSOR TO AN OBLIGATION OF INDEMNITY FOR THE CONSEQUENCES THEREOF AS SET FORTH IN SECTION 5.4.

14. <u>Miscellaneous</u>.

- 14.1 <u>Further Assurances</u>. Upon the receipt of a written request from the other Party, each Party shall execute such additional documents, instruments, and assurances and take such additional actions as are reasonably necessary and desirable to carry out the terms and intent hereof. Neither Party shall unreasonably withhold, condition, or delay its compliance with any reasonable request made pursuant to this <u>Section 14.1</u>.
- 14.2 Force Majeure. If performance of this Agreement or of any obligation hereunder is prevented or substantially restricted or interfered with by reason of an event of "Force Majeure" (defined below), the affected Party, upon giving notice to the other Party, shall be excused from such performance to the extent of and for the duration of such prevention, restriction or interference. The affected Party shall use its reasonable efforts to avoid or remove such causes of nonperformance and shall continue performance hereunder whenever such causes are removed. "Force Majeure" means

fire, earthquake, flood or other casualty or accident; strikes or labor disputes; war, civil strife or other violence, any law, order, proclamation, regulation, ordinance, action, demand or requirement of any government agency or utility, or any other act or condition beyond the reasonable control of a party hereto.

- 14.3 Confidentiality. Lessor shall maintain in the strictest confidence, for the benefit of Lessee and any Assignee, all information pertaining to the financial terms of or payments under this Agreement, the System and related equipment design, methods of operation, and the like, whether disclosed by Lessee or any Assignee, or discovered by Lessor, unless such information either (i) is in the public domain by reason of prior publication through no act or omission of Lessor or its employees or agents; or (ii) was already known to Lessor at the time of disclosure and which Lessor is free to use or disclose without breach of any obligation to any person or entity. Notwithstanding the foregoing, Lessor may disclose such information to Lessor's lenders, attorneys, accountants and other personal financial advisors solely for use in connection with their representation of Lessor regarding this Agreement; any prospective purchaser of the Property who has made a written offer to purchase or otherwise acquire the Property that Lessor desires to accept; or pursuant to lawful process, subpoena or court order requiring such disclosure, provided Lessor in making such disclosure advises the party receiving the information of the confidentiality of the information and obtains the written agreement of said party not to disclose the information, which agreement shall run to the benefit of and be enforceable by Lessee. Lessor shall obtain Lessee's written consent before issuing a press release or having any contact with or responding to the news media with any operational, sensitive or confidential information with respect to this Agreement or the System.
- **14.4 Quiet Enjoyment**. Lessor covenants and warrants that Lessee shall peacefully hold and enjoy all of the rights granted by this Agreement for its entire Term without hindrance or interruption by Lessor or any person lawfully or equitably claiming by, through, under or superior to Lessor subject to the terms of this Agreement.
- 14.5 <u>Successors and Assigns; Agreement to Run With Land</u>. This Agreement and the leasehold interest granted herein shall run with the land and survive any transfer of the Premises. This Agreement shall inure to the benefit of and be binding on the heirs, successors, assigns and personal representatives of the Parties.
- 14.6 <u>Severability</u>. In the event that any provision of this Agreement is held to be unenforceable or invalid by any court or regulatory agency of competent jurisdiction, Lessor and Lessee shall negotiate an equitable adjustment in the provisions of this Agreement with a view toward effecting the purposes of this Agreement, and the validity and enforceability of the remaining provisions shall not be affected by it.
- **14.7 Headings**. The headings in this Agreement are solely for convenience and ease of reference and shall have no effect on interpreting the meaning of any provision of this Agreement.
- 14.8 <u>Memorandum of Lease</u>. Lessor and Lessee shall execute in recordable form and Lessee shall then record in the Penobscot County Registry of Deeds a memorandum of the lease evidenced by this Agreement reasonably satisfactory in form and substance to Lessee and Lessor, which memorandum of lease shall set forth, among other things, the names and addresses of the parties, a reference to this lease and its date, a description of the Premises, and such other information as either party may reasonably request and such other facts as may be required by the laws of the State of Maine to give appropriate notice pursuant to the recording acts; provided, however, in no event shall such document set forth the rent or other charges payable by Lessee under this Agreement; and any such document shall expressly state that it is executed pursuant to the provisions contained in this

Agreement, and is not intended to vary the terms and conditions of this Agreement. By execution of this Agreement, Lessor hereby consents to the recordation of any Assignee's interest in the Premises.

- **14.9** <u>Amendments</u>. This Agreement may be amended only in writing signed by Lessee and Lessor, or their respective successors in interest.
- 14.10 <u>Binding Effect</u>. This Agreement and the rights, privileges, duties, and obligations of the Parties as set forth herein shall inure to the benefit of and be binding upon each of the Parties, together with their respective successors and assigns.
- 14.11 <u>Entire Agreement</u>. This Agreement represents the full and complete agreement between the Parties with respect to the subject matter contained herein and therein and supersedes all prior written or oral agreements between the Parties with respect to such subject matter.
- 14.12 <u>Waivers</u>. Any waiver of this Agreement must be in writing. Either Party's waiver of any breach or failure to enforce any term of this Agreement shall not affect or waive that Party's right to enforce any other term of this Agreement.
- 14.13 <u>Counterparts</u>. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.
- 14.14 <u>Attorney's Fees</u>. In the event of any litigation related to the interpretation or enforcement of this Agreement, or which in any other manner relates to the lease, the Lease Rights, this Agreement or the Premises, the prevailing party shall be entitled to recover from the other party all of its reasonable attorney's fees and court and other costs awarded by a court of competent jurisdiction.
- 14.15 <u>Covenant Running with the Land</u>. The Premises shall be held, conveyed, assigned, hypothecated, encumbered, leased, used and occupied subject to the provisions of this Agreement, which provisions shall run with the Premises, and shall be binding upon and inure to the benefit of the parties and each other person having any interest therein during their ownership thereof, and their respective tenants, heirs, executors, administrators, successors and assigns.
- 14.16 <u>Joint and Several Liability</u>. If Lessor consists of more than one person, each reference herein to "Lessor" shall include each person signing this Agreement as or on behalf of Lessor and the liability of each person signing this Agreement as Lessor shall be joint and several.

15. <u>Casualty and Condemnation</u>.

- (a) If all or part of the Premises is proposed to be taken as a result of any action or proceeding in eminent domain, or is proposed to be transferred in lieu of condemnation to any authority entitled to exercise the power of eminent domain (collectively, a "Taking"), Lessor shall provide Lessee with immediate written notice of any impending proceeding or meeting related to such Taking and shall not in the absence of Lessee settle with the Taking authority or agree on compensation for such Taking.
- (b) After payment of all reasonable fees and expenses incurred by Lessor and/or Lessee in collecting the award, any award or other compensation ("Award") payable as a consequence of such Taking shall be paid to Lessor and Lessee in accordance with their interests in the Premises, as follows:
- (i) Lessee shall first be entitled to receive out of the Award (A) the value of the leasehold estates pursuant to the lease and the Lease Rights in the portions of the Premises subject to

the Taking that would have existed but for the Taking; and (B) the value of the Operations; and (C) any other compensation or benefits payable by law to Lessee as a consequence of the interruption of Lessee's business and the other costs and expenses incurred by Lessee as consequence of the Taking; and thereafter,

- (ii) Lessor shall be entitled to receive out of the Award (A) the value of its fee interest in the Premises; and (B) any remainder of the Award.
- (c) This Agreement shall terminate as to any portion of the Premises so condemned or taken (except in the case of a temporary Taking after the duration of which Lessee desires to continue this Agreement, and the Term shall be extended, in such event, by the duration of such temporary Taking).
- (d) Following any casualty event affecting the Premises, or any other facilities installed thereon by Lessee, including, without limitation, any earthquake or wildfire, Lessee shall have the right to terminate this Agreement in the event any of the following events occurs:
- (i) Net insurance proceeds (after deducting the cost of recovery of such proceeds) are not available to pay one hundred percent (100%) of the cost of such repair, excluding any deductible that Lessee may be required to pay pursuant to other provisions of this Agreement;
- (ii) The Premises or any facilities installed thereon by Lessee cannot, with reasonable diligence, be fully repaired by Lessee within one hundred twenty (120) days after the date of the damage or destruction; or
- (iii) The Premises or any facilities installed thereon by Lessee cannot be safely repaired because of the presence of hazardous factors, including, but not limited to, earthquake faults, radiation, chemical waste and other similar dangers.
- (e) If Lessee elects to terminate this Agreement pursuant to Section 15(d), Lessee may give Lessor written notice of its election to terminate within thirty (30) days after such damage or destruction, and this Agreement shall terminate fifteen (15) days after the date Lessor receives such notice. If Lessee elects not to terminate this Agreement, Lessee shall, following the date of such damage or destruction, commence repair of its facilities on the Premises as soon as practicable and thereafter prosecute the same diligently to completion, in which event this Agreement shall continue in full force and effect, including Lessee's obligation to pay rent. All insurance proceeds from insurance maintained by Tenant under this Agreement shall be disbursed and paid to Lessee. Lessee shall not be entitled to any compensation or damages from Lessor for loss of the use of the Premises, damage to Lessee's facilities or personal property or any inconvenience occasioned by such damage, repair or restoration.

[SIGNATURE PAGES FOLLOW]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed and delivered by their duly authorized representatives as of the Effective Date.

LESSOR:	LESSEE: hep energy USA LLC				
By:	By:				
Name: Joel Butler	Name Thomas G Donnelly				
Wolf Recycling LLC	Partner				
	Hep energy USA LLC				

EXHIBIT A

DEPICTION OF PREMISES





SURVEY STANDARD:

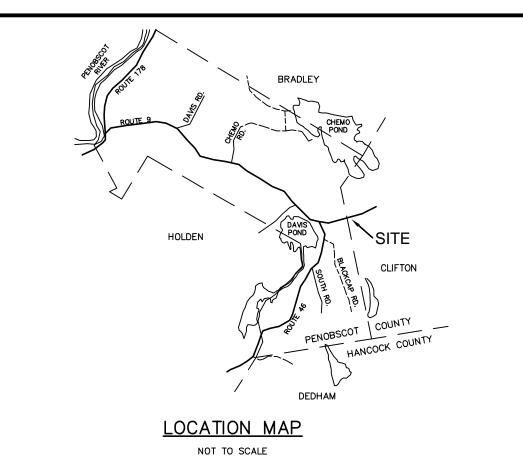
THESE PLANS WERE PREPARED FROM INFORMATION OBTAINED BY A SURVEY CONFORMING SUBSTANTIALLY TO THE REQUIREMENTS OF TECHNICAL STANDARDS CONTAINED IN CHAPTER 90, PART 2, OF THE RULES OF THE BOARD OF LICENSURE FOR PROFESSIONAL LAND

KEITH E. BLANCHARD, MAINE LICENSED PROFESSIONAL LAND SURVEYOR No. 2383

SCALE: 1"= 150'

NOTES

- (1) Documents referenced on this plan are recorded in the Penobscot County Registry of Deeds unless otherwise noted.
- (2) Reference is made to a survey by David Pooler PLS #2094, for G & D Properties, Inc., of the R. Leon Williams Mill Lot.
- (3) Bearings depicted on this plan are referenced to the Maine State Highway Commission, Right of Way Map, S.H.C File No. 10-173, recorded in the Penobscot County Registry of Deeds Plan Book 26, Page 89.
- (4) Not all measurements depicted on this plan are the results of a Standard Boundary Survey. This plan is a combination of deed measurements, evidence from aerial photos, tax map information and boundary survey dated July 22, 2015 titled Boundary Survey Plan of 45 Airline Road Clifton, Maine of the Wolf Recycling, LLC





- O IRON PIPE FOUND
- O IRON ROD/BOLT FOUND ☐ GRANITE/CONCRETE MONUMENT
- \varnothing UTILITY POLE
- STONE WALL

TREE LINE GRAVEL ROAD/DRIVEWAY

----- CULVERT

SHEET TITLE

Survey Sketch

45 Airline Road Clifton, Maine of the

Wolf Recycling, LLC property Book 12108, Page 125

Book 12912, Page 50

PLISGA & DAY

LAND SURVEYORS 72 MAIN STREET BANGOR, ME 04401 (207) 947-0019

DATE: February 21, 2017 SCALE:

1"=60'

EXHIBIT B

Rent Schedule

						19-Sep-19	
Year	Development Phase						
2019	contrabution		5 000 00		Target Date for completition of		
2013			\$ 3,000.00		_	Phase is Two Years.	
2020	Development Phase Payment		4,000.00	Ĺ			
2021	Development Phase Payment		4,000.00				
2022	Development Phase Payment		4,000.00				
2023	Development Phase Payment	\$	4,000.00				
	Wolf LLC						
	Clifton Maine						
	Operation Phase Annual Lease Payment Per Acre	\$	525.00			Annual Escalation Factor	
	Minimum Acreage (or part of)		20			ractor	
	Total Annual Payment			:	10,500.00		
Year							
1	Total Annual Payment in advance			\$	10,500.00	0%	
2	Total Annual Payment in advance			\$	10,500.00	0%	
3	Total Annual Payment in advance			\$	10,500.00	0%	
4	Total Annual Payment in advance			\$	10,500.00	0%	
5	Total Annual Payment in advance			\$	10,500.00	0%	
6	Total Annual Payment in advance			\$	10,710.00	2.00%	
7	Total Annual Payment in advance			\$	10,924.20	2.00%	
8	Total Annual Payment in advance			\$	11,142.68	2.00%	
9	Total Annual Payment in advance			\$	11,365.54	2.00%	
10	Total Annual Payment in advance			\$	11,592.85	2.00%	
11	Total Annual Payment in advance			\$	11,824.71	2.00%	
12	Total Annual Payment in advance			\$	12,061.20	2.00%	
13	Total Annual Payment in advance			\$	12,302.42	2.00%	
14	Total Annual Payment in advance			\$	12,548.47	2.00%	
15	Total Annual Payment in advance			\$	12,799.44	2.00%	
16	Total Annual Payment in advance			\$	13,055.43	2.00%	
17	Total Annual Payment in advance			\$	13,316.54	2.00%	
18	Total Annual Payment in advance			\$	13,582.87	2.00%	
19	Total Annual Payment in advance			\$	13,854.53	2.00%	
20	Total Annual Payment in advance			\$	14,131.62	2.00%	
21	Total Annual Payment in advance			\$	14,414.25	2.00%	
22	Total Annual Payment in advance			\$	14,702.53	2.00%	
23	Total Annual Payment in advance			\$	14,996.59	2.00%	
24	Total Annual Payment in advance			\$	15,296.52	2.00%	
				_			

Total Annual Payment in advance

Total Value of Rent over 25 Years

25

\$ 15,602.45

\$ 312,724.83

2.00%



September 10, 2020

Joel Butler Wolf Recycling LLC 45 Airline Road Clifton, ME 04428 jebutlerLLC@gmail.com

Via Electronic Mail and U.S. Mail

Re: Notice of Assignment of Solar Energy Facility Site Lease Agreement

Dear Mr. Butler:

We hope you are staying safe and healthy. We are writing to let you know that on June 8, 2020, the Solar Lease Energy Facility Site Lease Agreement (the "Agreement") between you and hep energy USA LLC has been assigned to hep Clifton SPV, LLC, another hep entity. hep Clifton SPV, LLC has assumed all of hep energy USA LLC's rights and obligations, and the assignment will have no effect on your rights or our obligations as your tenants under the Agreement.

Your point of contact shall remain Bob Patton, and we look forward to a long relationship as we work together to bring clean, renewable energy to the State of Maine. If you have any questions regarding this notice or anything else under the Agreement, we can be reached at:

Robert Patton hep Clifton SPV, LLC 57 Exchange Street, Ste 100 Portland, ME 04101 Tel: (207) 747-4800 b.patton@hep.global

Thank you for your attention, and please do not hesitate to contact us for any reason.

Sincerely,

Robert Patton

CC: Bernstein, Shur, Sawyer & Nelson, P.A.

100 Middle Street, West Tower

P.O. Box 9729

Portland, ME 04104-5029 Attn: Beth A. Smith, Esq.

APPENDIX B

SITE PHOTOS



Inspection Photos – October 15, 2020 Butler (W Wolf LLC) Property, Airline Road (Route 9) Clifton, Maine



Wood Construction Mats



Typical previously cleared area on Subject Property



Previously cleared area looking toward transmission lines



Typical wooded area on Subject Property

Inspection Photos – October 15, 2020 Butler (W Wolf LLC) Property, Airline Road (Route 9) Clifton, Maine



Fire Hydrant Along Subject Property Border with Bangor Water Works Road



Subject Property Boundary along Bangor Water Works Road



Stream at southern edge of Subject Property



Walking access to Subject Property from Bangor Water Works Road

Inspection Photos – October 15, 2020 Butler (W Wolf LLC) Property, Airline Road (Route 9) Clifton, Maine



Old Sawmill Property - Building and Trucks



Old Sawmill Property - Mulch Storage



Old Sawmill Property - Debris Storage

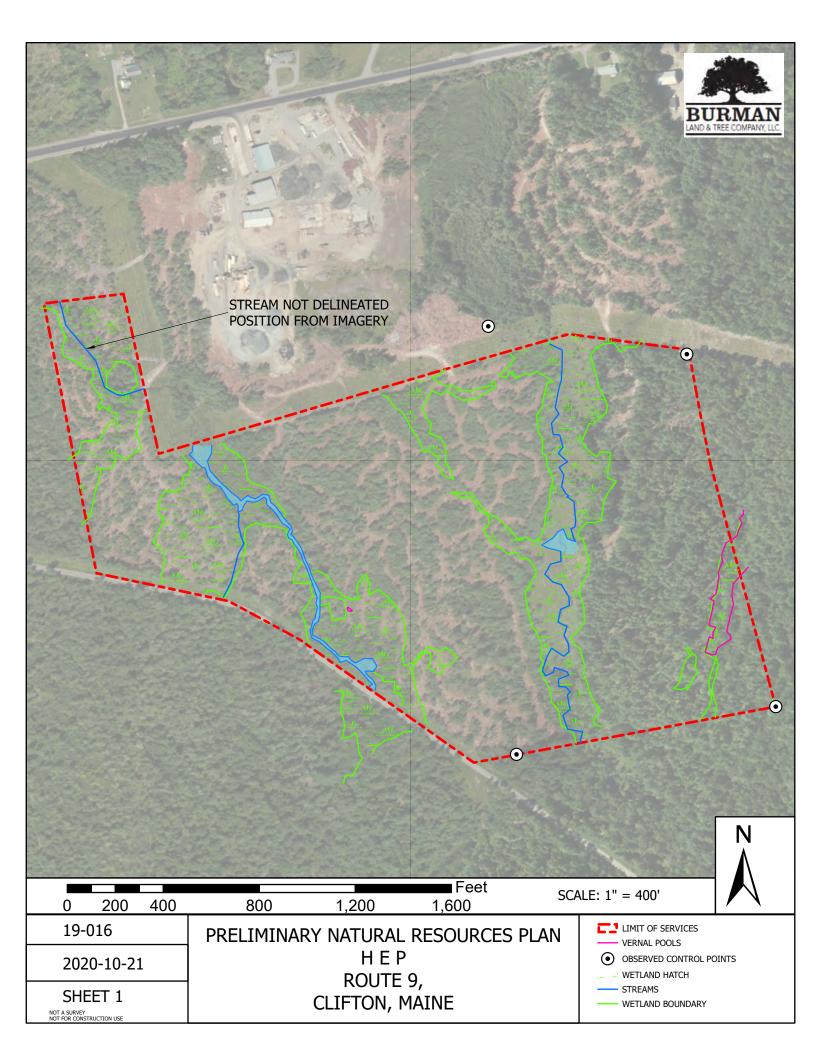


Old Sawmill Property - Trailer and Landscape Wood Debris

APPENDIX C

WETLAND SURVEY





APPENDIX D

IFW AND MNAP REQUEST LETTERS





STATE OF MAINE DEPARTMENT OF INLAND FISHERIES & WILDLIFE 284 STATE STREET 41 STATE HOUSE STATION AUGUSTA ME 04333-0041



November 19, 2020 Jeffrey Read Sevee & Maher Engineers 4 Blanchard Rd, PO Box 85A Cumberland. ME 04021

RE: Proposed Clifton Solar Project; Endangered, Threatened Species, Habitat Determination

Dear Jeffrey Read:

PHONE: (207) 287-8000

I am writing in response to your request for a determination from the Maine Department of Inland Fisheries and Wildlife (MDIFW) on the potential for the above referenced project to result in adverse impacts to Maine-listed Endangered or Threatened species or their habitats, pursuant to the Maine Public Utilities Commission's Distributed Generation Siting Attribute criteria.

The Maine Endangered Species Act (MESA; 12 M.R.S §12801 et. seq.) identifies all inland fish and wildlife species that are listed as Endangered or Threatened in Maine and provides the Commissioner of MDIFW with the authority to implement MESA. Pursuant to MESA, listed species are afforded protection against activities that may cause "take" (kill or cause death), "harassment" (create injury or significantly disrupt normal behavior patterns), and other adverse actions. There is no comprehensive statewide inventory that includes all Endangered and Threatened species occurrences and habitats. Though many resources are included on data layers and resource maps, the completeness of these varies by species, habitat type, location, and previous survey efforts. Thus, such tools should be considered preliminary unless otherwise indicated by MDIFW. It is the applicant's ultimate responsibility to ensure that their actions do not result in take, harassment, or other adverse actions for Endangered or Threatened species, regardless of whether species occurrences or habitats have been previously identified and mapped.

MDIFW's determination for this proposed project site is indicated in the selection below:

~	Based on review of the information provided, current documentation and available information indicate no known adverse impacts to Maine-listed Endangered or Threatened species or habitats on the proposed project site or in the vicinity.
	Based on review of the information provided, current documentation and available information indicate no known adverse impacts to Maine-listed Endangered or Threatened species or habitats on the proposed project site. However, Maine-listed Endangered or Threatened species or habitats

Please note that this determination relates only to known information on Maine-listed Endangered or Threatened species and their habitats in relation to the proposed project site. This determination does not constitute a full environmental review of the proposed project and no assertions are being made in reference to any other fisheries, wildlife, or other natural resources typically of concern to MDIFW and which may or may not be present on or in the vicinity of the project site. If you require additional information, please contact IFWEnvironmentalreview@maine.gov.

Sincerely,

Robert D. Stratton

Bob Strutter, on

Environmental Program Manager

Maine Department of Inland Fisheries & Wildlife

Cc: Sally Zeh, Christine Cook (MPUC)



4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021 Tel: 207.829.5016 • Fax: 207.829.5692 info@smemaine.com smemaine.com

November 17, 2020

VIA EMAIL

Mr. John Perry Maine Department of Inland Fisheries and Wildlife

Email: John.Perry@maine.gov

Subject: 6.41 MW DC (4.88 MW AC) Solar Array

45 Airline Road, Clifton, Maine

Dear John:

HEP Clifton SPV, LLC, a wholly owned subsidiary HEP USA Project Development, LLC (HEP) is seeking approval for construction of a 6.41 MW DC (4.88 MW AC) ground-mounted solar power installation in Clifton, Maine under a Town Land Use Permit. The project location is outlined in the attached Figure 1 - Site Location Map.

We would appreciate receiving any information relative to rare, threatened, or endangered species, or the presence of important wildlife or fisheries habitat at or in the immediate vicinity of the project.

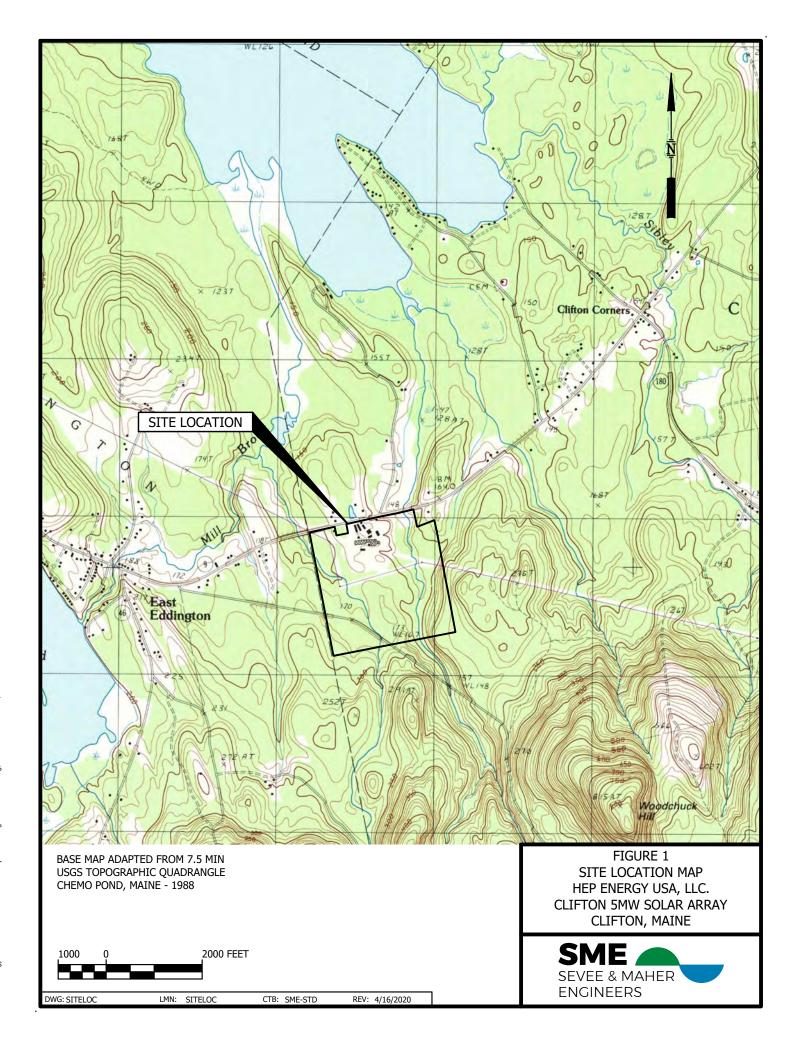
Please feel free to contact me at 207.829.5016 or jtr@smemaine.com if you have any questions or need additional information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Jeffrey T. Read, P.E. Project Manager

Attachment: Figure 1 – Site Location Map





4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021 Tel: 207.829.5016 • Fax: 207.829.5692 info@smemaine.com smemaine.com

November 17, 2020

VIA EMAIL

Ms. Lisa St. Hilaire Maine Natural Areas Program

Email: Lisa.St.Hilaire@maine.gov

Subject: 6.41 MW DC (4.88 MW AC) Solar Array

45 Airline Road, Clifton, Maine

Dear Lisa:

HEP Clifton SPV, LLC, a wholly owned subsidiary HEP USA Project Development, LLC (HEP) is seeking approval for construction of a 6.41 MW DC (4.88 MW AC) ground-mounted solar power installation in Clifton, Maine under a Town of Land Use Permit. The project location is outlined in the attached Figure 1 - Site Location Map.

We would appreciate receiving any information relative to unusual natural areas at or in the immediate vicinity of our project.

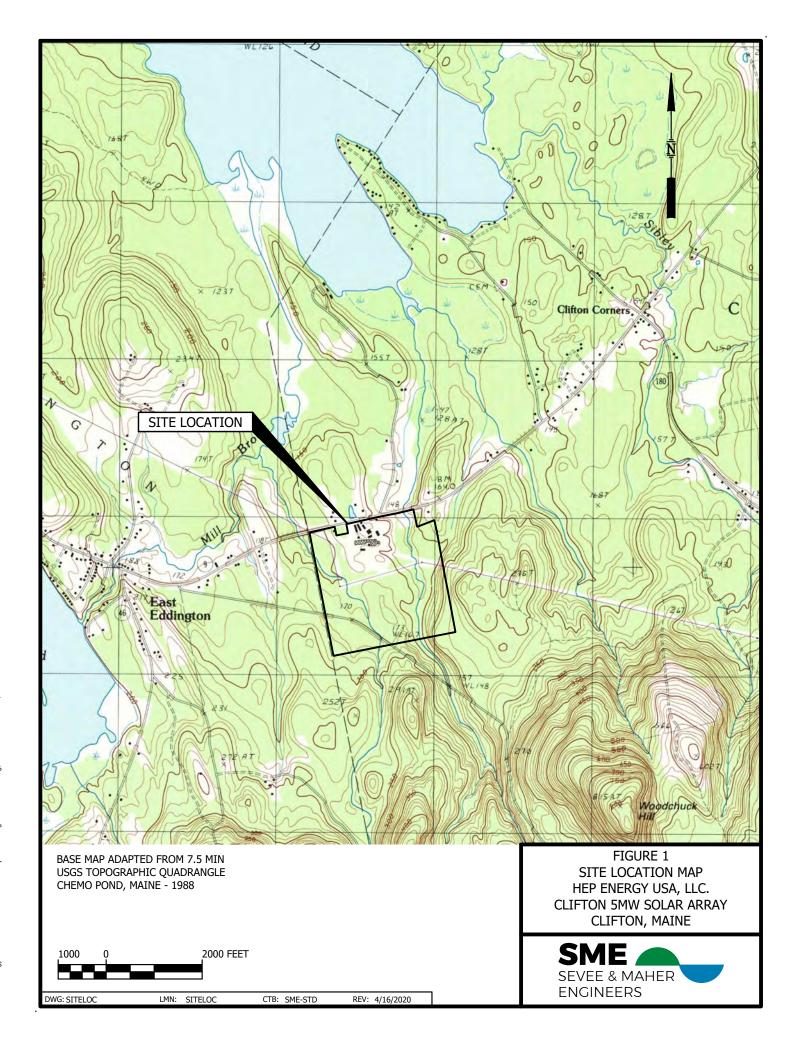
Please feel free to contact me at 207.829.5016 or jtr@smemaine.com if you have any questions or need additional information.

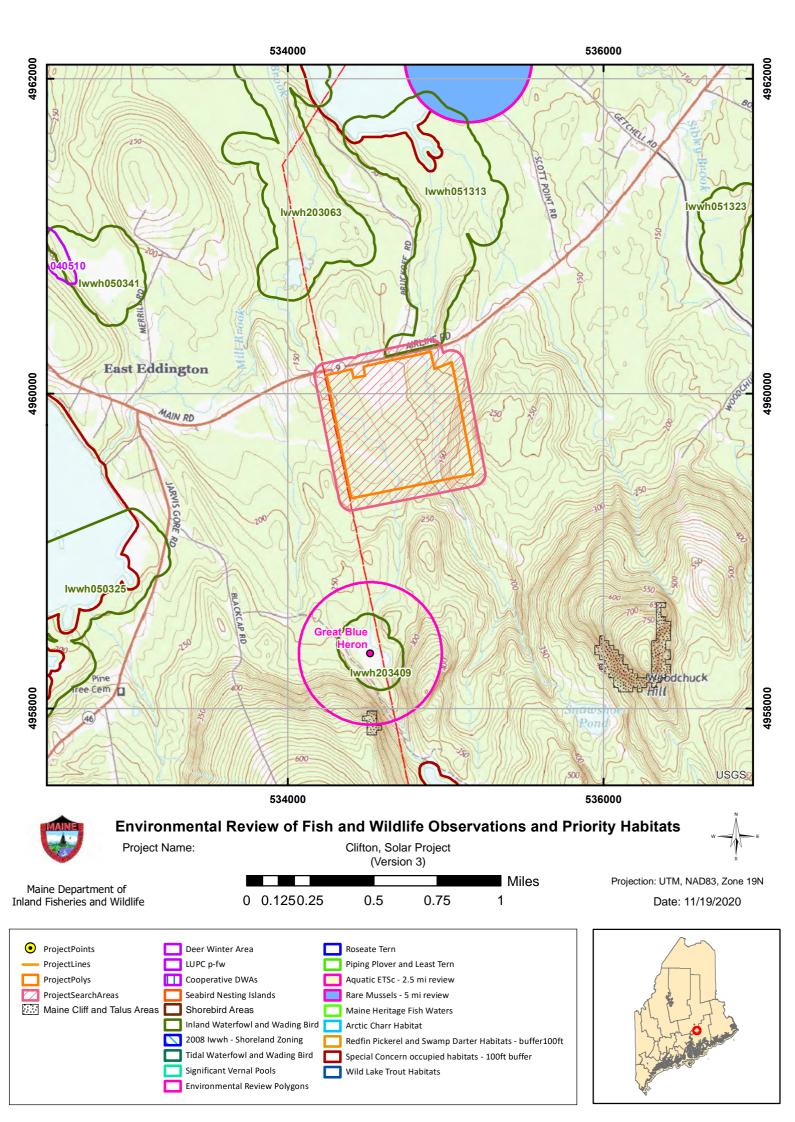
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Jeffrey T. Read, P.E. Project Manager

Attachment: Figure 1-Site Location Map





APPENDIX E

HEP FINANCIAL CAPABILITY LETTER







Statement of Financial Capability

A. Hep Energy Project LLC

hep Corporate Introduction

hep is a worldwide operating corporation headquartered in the south of Germany. Hep's business focus is on large utility scale photovoltaic power plants. Different entities of hep's corporate structure specialize in all areas of the solar power plant project cycle. The hep corporation funds development, construction and operation of solar parks via special investment funds; the structure is outlined in the following.

hep capital

hep capital is a licensed fund managing corporate identity, managing investments for more than 1,400 private and institutional investors with a total investment volume of over EUR 100 million. Collected invested capital is organized into different fund according to the preferred risk class of the investors. hep capital maintains funds specialized on the project development, which provides capital to the special purpose vehicle (SPV) and supports early development activities by regional partners. The development fund maintains 100% of the membership interest or shares of the SPV until it's development cycle reaches a construction ready state, usually before notice to proceed (NTP) to the engineering, procurement and construction (EPC) partner. For holding operational projects, special funds have been set up to provide long term investment opportunities for investors seeking lower risk exposure than the development fund participants.

After the project development activities are completed, the local holding company of the development fund will then transfer the project SPV to the corresponding holding company of a solar investment fund that is specialized on project construction and operation. The project transfer will happen by means of a membership interest purchase or share purchase agreement between the two holding companies.

hep energy

hep energy is the engineering, construction and operation provider in the hep corporate structure. The inhouse engineering department takes responsibility for engineering, procurement and construction and work together with regional partners to ensure local value creation and short reaction times. hep energy has constructed over 40 solar parks with 300MWp so far worldwide. hep's inhouse operation and maintenance (O&M) provides services to all SPVs and constantly monitors the remote power plant



output performance and dispatches local personnel ensuring the project dependability and performance. The O&M department also schedules all routine maintenance task such as inverter replacements, vegetation control, module cleaning, etc. hep energy provides a one stop solution for all technical and operational details of the solar project throughout all stages of the life cycle.

hep energy also coordinates the project development phase with its partners and affiliates around the world. All activities of hep energy are billed to the related SPV, where they are accounted for as development, construction and O&M cost. Development and O&M agreements are in place to govern all activities and ensuring financial transparency.

Financial Capacity and Strength

Funding

<u>Project Development:</u>

HEP-Projektentwicklung VII GmbH & Co. geschlossene Investment KG

The HEP-Projektentwicklung VI GmbH & Co. geschlossene Investment KG, is the fund primarily developed to be used for the project development in North America in 2019. As outlined above, this fund's sole purpose is the funding of early development efforts such as land surveys, consulting

		ā	s of Dec 31st, 2017
Assets	EUR	Liabilities and Equity	EUF
1. Participating Interests	915,714	1. Provisions	63,125
2. Cash and Equivalents	749,179	2. Debt	9
a) Cash	748,979	a) Bank loans	9
b) Others	200		
		3. Accounts Payable	1,363,342
3. Accounts Receivable	2,826,649	 a) Liabilities for goods and services 	1,363,342
a) Outstanding contributions	356,071		
b) Others	2,470,578	4. Other Liabilities	72,417
		a) Liabilities towards partners	9,728
4. Deficit Not Covered by Equity	0	b) Others	62,690
		5. Equity	2,992,637
		a) Partner equity	4,502,000
		b) Retained earnings	93,716
		c) Non-realised earnings from revaluation	(164,325
		d) Carried forward losses	(24,266
		e) Realized earnings	(1,414,488)
		f) Attributable losses to partners	0
	4,491,541	,======================================	4,491,531

activities, environmental, geo-tech and other studies, site control, and permit application activities. The project's ownership will be transferred to the operation fund as soon as permits are in place and construction is ready to commence (NTP).



The fund managed a total invested capital of 8 million EUR at the end of 2017. Due to high demand, hep capital is currently opening an additional fund capped at 25 million EUR by the end of 2020.

Construction and Operation:

Hep-Solar USA 1 GmbH & Co. geschlossene Investment KG

The operation fund Hep-Solar USA 1 GmbH & Co. geschlossene Investment KG is part of the specialized investment fund Hep Solar Portfolio 1 GmbH & Co which will be opened to investors from middle of September 2018. Hep Solar Portfolio 1 is conceived with a total investment capital of over 100 million EUR and will invest into country specific funds, such as the Hep-Solar USA 1 GmbH & Co. geschlossene Investment KG.

The Hep-Solar USA 1 fund will construct and operate solar projects in the US. On the capital site, the fund is backed by international banks:

- Berenberg Bank, a globally acting German Bank, with their US head-office in New York, has offered to provide junior debt (debt first financing) to the 2020 project pipeline in the US. hep has received a letter of intent stating the above.
- LBBW (Landesbank Baden-Württemberg), a German bank with a strong presence in the US, has offered senior debt for the construction and operational phase of hep's 2020 US projects. LBBW has provided a letter of intent for the bridge financing during construction and will also provide letter of credit to the SPVs in a later stage of the development.

Track Record:

Solar Japan 1 GmbH & Co. geschlossene Investment KG

Using a similar approach as outlined above, hep has successfully developed 4 solar power plants for the Solar Japan 1 GmbH & Co. geschlossene Investment KG, a Japan focused solar fund, with an aggregate capacity of over 6.4 MWp. Projects were developed with funds from the HEP Projektentwicklung VI GmbH & Co. geschlossene Investment KG, the same development fund that will be used initially for the USA project development activities



			as of Dec 31,.2017
Assets	EUR	Liabilities and Equity	EUR
1. Participating Interests	13,264,837 €	1. Provisions	55,000 €
2. Cash and Equivalents	2,616,188€	2. Debt	0 €
a) Cash	2,616,188 €	a) Bank loans	0 €
b) Others	0€		
		3. Accounts Payable	561,004 €
3. Accounts Receivable	10,782,674€	 a) Liabilities for goods and services 	561,004 €
a) Outstanding contributions	9,241,456 €		
b) Others	1,541,218 €	4. Other Liabilities	347,550 €
		a) Liabilities towards partners	9,250 €
4. Deficit Not Covered by Equity	0€	b) Others	338,300 €
		5. Equity	25,700,144 €
		a) Partner equity	18,386,947 €
		b) Retained earning	559,549 €
		c) Non-realised earnings from revaluation	9,971,378 €
		d) Carried forward losses	-1,948,463 €
		e) Realized earnings	-1,269,267 €
		f) Attributable losses to partners	0 €
	26,663,698 €		26,663,698 €

All projects were transferred to the operation fund, the HEP-Solar Japan 1 GmbH & Co. geschlossene Investment KG, before the actual construction activities commenced. The operation fund used bridge financing provided by the German Berenberg Bank at SPV level for the entire construction period.

hep energy was acting as the main EPC partner for all projects. hep energy successfully managed to overcome local spacing constraints, by developing plant layouts that maximize project land usage and satisfy all local legal and environmental obligations. hep energy is also the main O&M provider, together with local partners.

The operational fund, HEP-Solar Japan 1 GmbH, was audited at the end of 2017 by KPMG. At that point in time, the Kinokawa project in Japan was under construction.

1.21
2.26
2,20
1.31
1.47



Project Team

Christian Hamann

Christian Hamann is one of the founders and shareholders of hep global and also the Chairman of the Board of HEP Kapitalverwaltung AG. He holds a degree in economics from the University of Münster and is a chartered public accountant ('CPA') and a tax advisor. Prior to founding HEP, he was a consultant at one of the big four accounting firms. In total, he has more than 18 years of experience as a consultant in the energy industry. At HEP he is among others responsible for the finance, controlling and accounting departments, conception of solar investment funds pertinent to utility-scale photovoltaic facilities and international project development

Thorsten Eitle

Thorsten Eitle is one of the founders and shareholders of hep global and the CEO of HEP Kapitalverwaltung AG. Thorsten Eitle studied economics at the universities of Heidelberg and Hohenheim, Germany. He has more than 15 years of experience as an investment manager and as an entrepreneur with a focus on renewable energies, especially on utility-scale photovoltaic facilities.

Matthias Hamann

Matthias Hamann has been the Managing Director of Hep energy GmbH since its foundation in 2015. As the head of the technical division of Hep energy GmbH, he is responsible for the conceptual design, planning and construction of the solar projects worldwide. Prior to the establishment of Hep energy GmbH, Matthias Hamann held various Key Account Manager as well as a Project Manager positions in the construction and photovoltaic sectors.

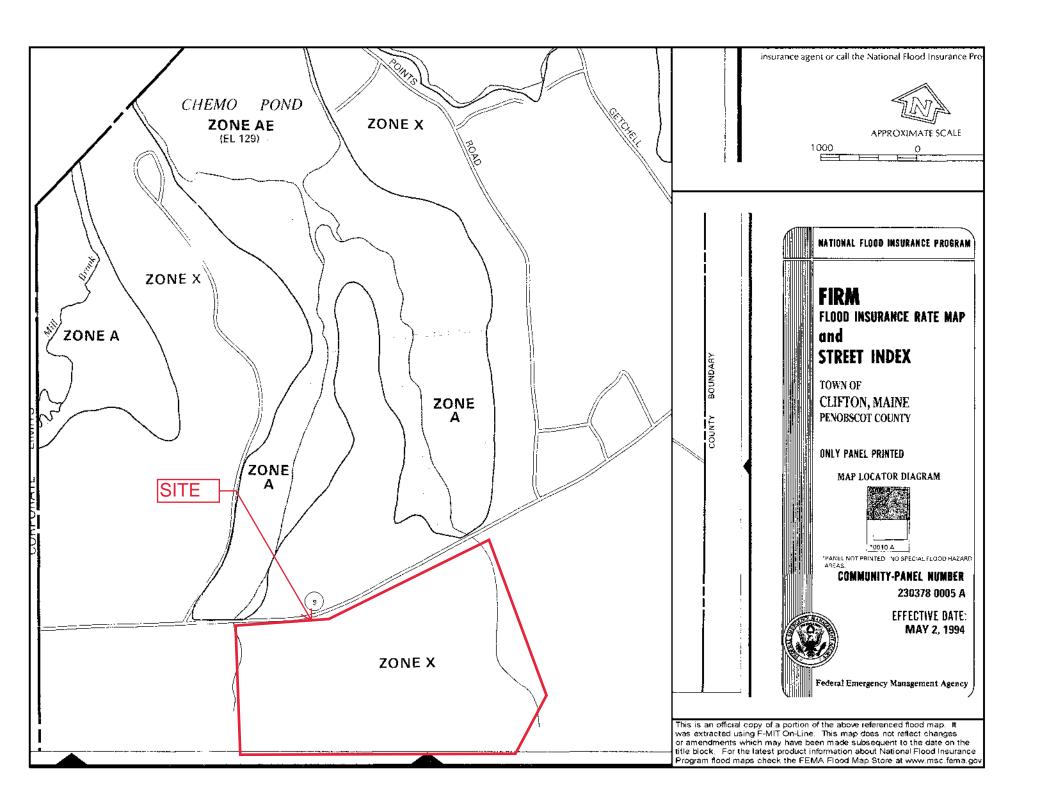
Joachim Kindler

Joachim Kindler holds a degree in business administration with the specialization in Logistics, Materials and Supply Chain Management. He has more than 20 years of experience as a Business Analyst and Supply Chain Manager. During this time, Joachim Kindler was primarily responsible for controlling and structuring business processes for global companies. Currently, he is the Managing Director of Hep energy GmbH and Hep Energy projects GmbH. Further, he is also the head of the business division of Hep Energy and responsible for the global project management and controlling.

APPENDIX F

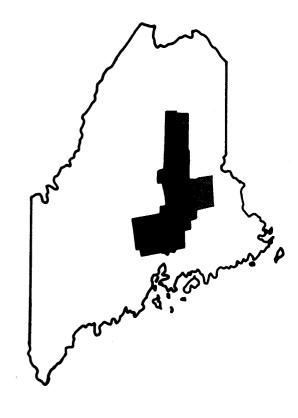
FEMA MAP







TOWN OF CLIFTON, MAINE PENOBSCOT COUNTY



MAY 2, 1994



NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial FIS Effective Date: May 2, 1994

Revised FIS Date:

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgments	1
	1.3 Coordination	1
2.0	AREA STUDIED	3
	2.1 Scope of Study	3
	2.2 Community Description	3
3.0	ENGINEERING METHODS	3
	3.1 Hydrologic Analyses	4
	3.2 Hydraulic Analyses	4
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	5
	4.1 Floodplain Boundaries	5
	4.2 Floodways	5
5.0	INSURANCE APPLICATIONS	6
6.0	FLOOD INSURANCE RATE MAP	8
7.0	OTHER STUDIES	9
8.0	LOCATION OF DATA	9
9.0	BIBLIOGRAPHY AND REFERENCES	9

TABLE OF CONTENTS - continued

		Page
	FIGURES	
Figure 1 - Vicinity Map		2
Figure 2 - Floodway Schematic		6
	TABLES	
Table 1 - Summary of Discharges		4

EXHIBITS

Exhibit 1 - Flood Insurance Rate Map and Street Index

FLOOD INSURANCE STUDY TOWN OF CLIFTON, PENOBSCOT COUNTY, MAINE

1.0 <u>INTRODUCTION</u>

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Clifton, Penobscot County, Maine, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

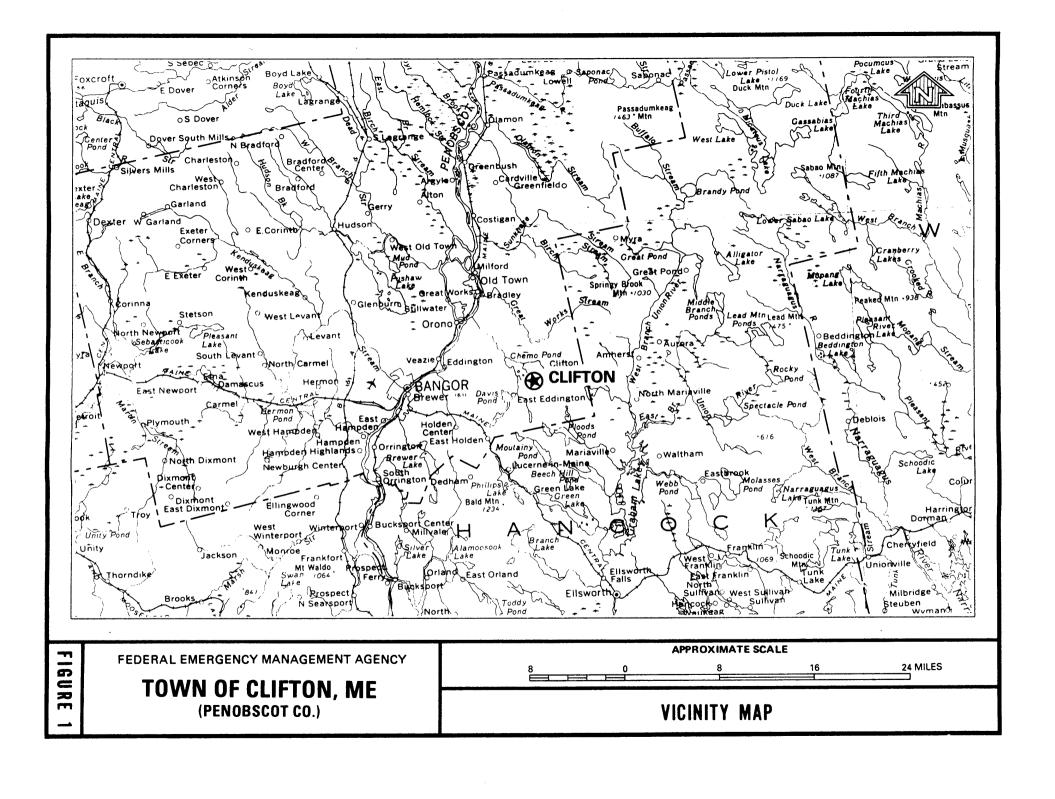
The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses of the flood levels of Chemo Pond were developed by the A.B.B. Environmental Services, Inc., formerly Edward C. Jordan Co. of Portland, Maine, during the preparation of the Flood Insurance Study for the Town of Bradley (Reference 1). The work for that study was completed in February 1977.

1.3 Coordination

On August 28, 1991, the Town of Clifton was notified by the Federal Emergency Management Agency (FEMA) of the initiation of a Flood Insurance Study for the community.

On October 7, 1992, a final Consultation Coordination Officer's meeting was held with the Town of Clifton, the study contractor, and FEMA to review the results of the study.



2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Clifton, Penobscot County, Maine. The area of study is shown on the Vicinity Map (Figure 1).

Chemo Pond was studied by detailed methods for its entire shoreline within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

All or portions of the following flooding sources were studied by approximate methods: Parks Pond Brook, Mill Brook, Intervale Brook, Bradbury Brook, Great Works Stream, Saddleback Brook, and Sibley Brook. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

The Town of Clifton is located in the south central portion of Maine in Penobscot County. The town is bordered by the Town of Bradley to the northwest, the Town of Eddington to the west, the Towns of Dedham and Otis to the south, and the Towns of Amherst and Mariaville to the east.

Chemo Pond has a drainage area of approximately 41 square miles. There are a few camps located on the shore of Chemo Pond.

The climate is characterized by moderately comfortable summers with temperatures averaging between 65 degrees Fahrenheit (°F) and 70°F in July and August, respectively, and fairly cold winters when temperatures average between 15°F and 20°F in January and February, respectively. The mean annual temperature is about 43°F, and the average annual precipitation is about 40 inches, which is distributed uniformly throughout the year (Reference 2).

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between

floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

The peak discharges for Chemo Pond were developed from an analysis of the individual drainage areas contributing to Chemo Pond. A tabular method of flood routing developed by the Soil Conservation Service (UD-21) was used to route a 24-hour duration storm into Chemo Pond (Reference 3). An arithmetic trial and error method of flood routing was then employed to compute the peak discharges (Reference 4).

A summary of the drainage area-peak discharge relationships for Chemo Pond is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

DRAINAGE AREA	PEAK DISCHARGES (cfs)			
(sq. miles)	10-YEAR	<u>50-YEAR</u>	100-YEAR	<u>500 - YEAR</u>
41.0	210	310	400	650
	(sq. miles)	(sq. miles) 10-YEAR	(sq. miles) 10-YEAR 50-YEAR	(sq. miles) 10-YEAR 50-YEAR 100-YEAR

The 100-year flood elevation of Chemo Pond was taken from the Flood Insurance Study for the Town of Bradley (Reference 1). The 100-year stillwater elevation for Chemo Pond is 128.6.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The hydraulic analyses for the flooding source studied by detailed methods were obtained from the Flood Insurance Study for the Town of Bradley (Reference 1).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study, and their descriptions, are shown on the maps.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the l percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the flooding source studied in detail, the 100-year floodplain boundaries have been delineated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 5).

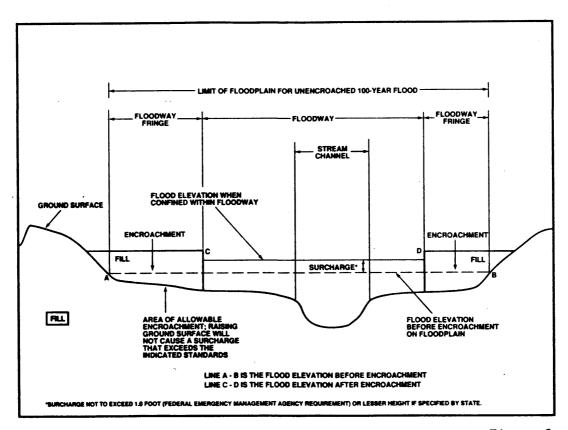
For the flooding source studied by approximate methods, the 100-year floodplain boundaries remain unchanged from the delineation shown on the previously printed Flood Hazard Boundary Map for the Town of Clifton (Reference 6).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 1). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.



FLOODWAY SCHEMATIC

Figure 2

No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the Towns of Bradley, Eddington, Dedham, Otis, Mariaville, and Amherst (References 1, 7, 8, 9, 10, and 11).

Because it is based on more detailed analyses, this study supersedes the Flood Hazard Boundary Map for the Town of Clifton (Reference 6).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

- 1. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Bradley, Penobscot County, Maine, Washington, D. C., Flood Insurance Study report dated November 19, 1977, Flood Insurance Rate Map dated May 1, 1978.
- 2. U. S. Army Corps of Engineers, New England Division, Flood Plain Information, Penobscot and Stillwater Rivers, Maine, December 1975.
- 3. U. S. Department of Agriculture, Soil Conservation Service, "Tabular Method of Flood Routing 24-Hour Type 1 Storm Distribution," Technical Note, UD-21, May 1972.
- 4. U. S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, 1965.
- 5. U. S. Department of the Interior, Geological Survey, 7.5-Minute
 Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet:
 Chemo Pond and Hopkins Pond, Maine, 1988.
- 6. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Clifton, Penobscot County, Maine, February 7, 1975.
- 7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Eddington, Penobscot County, Maine, Washington, D. C., July 3, 1978.
- 8. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Dedham, Penobscot County, Maine, Washington, D. C., April 18, 1975.

- 9. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Otis, Penobscot County, Maine, Washington, D. C., July 26, 1977.
- 10. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Mariaville, Penobscot County, Maine, Washington, D. C., March 14, 1975.
- 11. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Amherst, Penobscot County, Maine, Washington, D. C., January 24, 1975.

APPENDIX G

MHPC REQUEST LETTER





4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021 Tel: 207.829.5016 • Fax: 207.829.5692 info@smemaine.com smemaine.com

November 17, 2020

Mr. Kirk F. Mohney, Director Maine Historic Preservation Commission 55 Capitol Street 65 State House Station Augusta, Maine 04333-0065

Subject: 4.88 MW AC (6.41 MW DC)

45 Airline Road Clifton, Maine

Dear Mr. Mohney:

HEP Clifton SPV, LLC, a wholly owned subsidiary HEP USA Project Development, LLC (HEP) is seeking approval for construction of a 4.88 MW AC (6.41 MW DC) ground-mounted solar power installation in Clifton, Maine under a Town Land Use Permit. We are requesting a review by the Maine Historic Preservation Commission to support the Land Use Permit application.

PROJECT DESCRIPTION

HEP Clifton SPV, LLC is proposing a 5 MW AC (6 MW DC) ground-mounted solar array on a leased parcel of land off Airline Road in Clifton, Maine. The lease agreement includes approximately 20 acres leased area on a current 132-acre parcel owned by Wolf Recycling LLC. The parcel is identified as Lot 2 on Town of Clifton Tax Map 7. The 20-acre leased area is primarily undeveloped forested land. SME understands the intention is to clear and grub the majority of the 20 acres for the installation of the solar array and to provide adequate setbacks for maximum sun exposure on the panels.

The site is bordered to the north by Airline Road (ME-9), and to the south by Bangor Water Works Road. Developed residential properties and undeveloped woodland exist to the east and west. The project location is outlined in the attached Figure 1 - Site Location Map.

HISTORICAL FINDINGS

A search of the National Register of Historic Places online maps identified two historical properties in the area of the project site. The Harold Allen Schoolhouse and Cliffwood Hall are located at 15 Rebel Hill Road in Clifton. These building are located approximately 6,500 feet from the subject property.

Unfortunately, the Town does not maintain electronic copies of individual property assessments on their website and the date of construction was not available for adjacent parcels. We were not able to identify any neighboring properties suspected of being 50 years old.



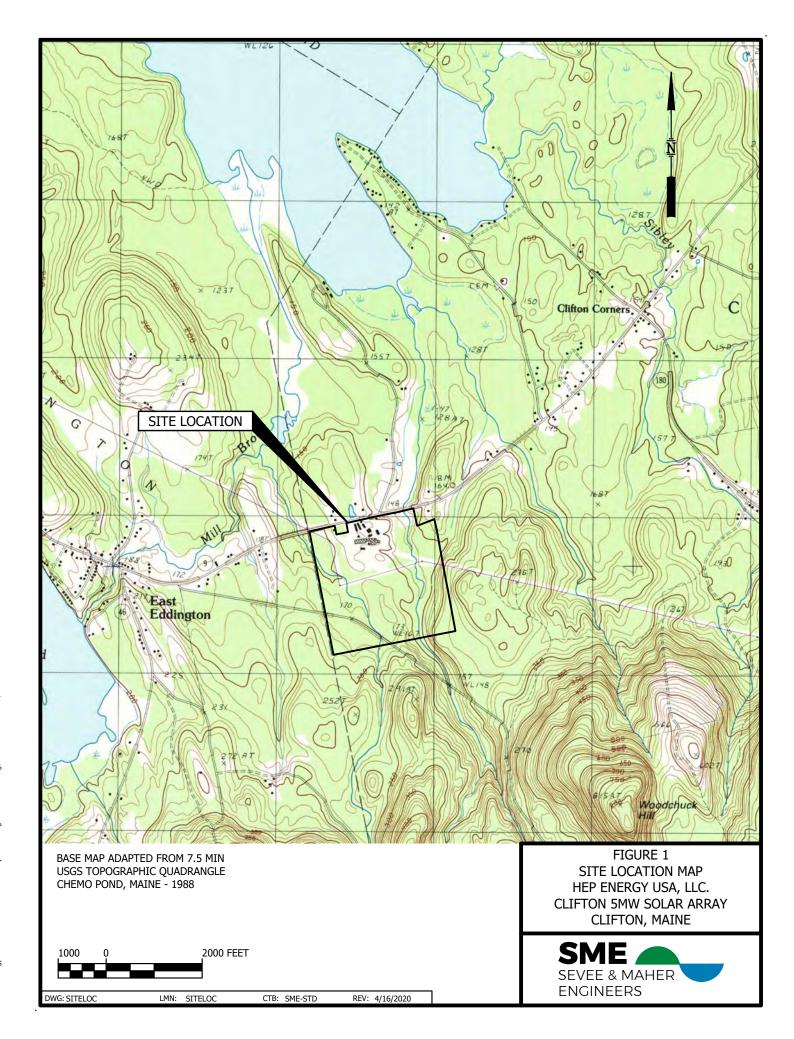
Please feel free to contact me at 207-829-5016 or jtr@smemaine.com if you have any questions or need additional information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Jeffrey T. Read, P.E. Project Manager

Attachments: Figure 1 – Site Location Map



APPENDIX H

NRCS SOIL REPORT





Natural Resources Conservation Service A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Penobscot County, Maine, Southern Part

Town of Clifton Solar Project



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2 053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	
Soil Map	
Soil Map	
Legend	
Map Unit Legend	11
Map Unit Descriptions	11
Penobscot County, Maine, Southern Part	14
BWF—Bucksport and Wonsqueak mucks, 0 to 2 percent slopes,	
frequently flooded	14
CEC—Chesuncook-Elliottsville-Telos association, 3 to 15 percent	
slopes, very stony	16
MuB—Telos-Monarda-Urban land association, 0 to 8 percent slopes	19
MVD—Monson-Elliottsville-Abram complex, 8 to 30 percent slopes,	
very rocky	
MXA—Monarda-Burnham complex, 0 to 3 percent slopes, very stony	
RnB—Roundabout-Nicholville association, 0 to 8 percent slopes	
SWB—Pushaw-Swanville complex, 0 to 8 percent slopes	
TcB—Telos-Chesuncook complex, 0 to 8 percent slopes, very stony	
TmB—Monarda-Telos complex, 0 to 8 percent slopes, very stony	33
TRB—Telos-Chesuncook-Ragmuff association, 0 to 8 percent slopes,	
very stony	35
UrB—Urban land-Anthroportic Udorthents complex, 0 to 8 percent	
slopes	
References	41

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

-

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

(0)

Blowout

 \boxtimes

Borrow Pit

Ж

Clay Spot

 \wedge

Closed Depression

~

.....

۰

Gravelly Spot

0

Landfill Lava Flow

٨.

Marsh or swamp

@

Mine or Quarry

0

Miscellaneous Water

0

Perennial Water
Rock Outcrop

Saline Spot

. .

Sandy Spot

Severely Eroded Spot

Sinkhole

20

Slide or Slip Sodic Spot 8

Spoil Area

۵

Stony Spot

00

Very Stony Spot

Δ

Wet Spot Other

...

Special Line Features

Water Features

_

Streams and Canals

Transportation

ransp

Rails

~

Interstate Highways

US Routes

~

Major Roads

~

Local Roads

Background

1

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24.000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Penobscot County, Maine, Southern Part Survey Area Data: Version 6, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50.000 or larger.

Date(s) aerial images were photographed: Jul 27, 2010—Aug 31, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BWF	Bucksport and Wonsqueak mucks, 0 to 2 percent slopes, frequently flooded	14.8	13.1%
CEC	Chesuncook-Elliottsville-Telos association, 3 to 15 percent slopes, very stony	3.8	3.4%
MuB	Telos-Monarda-Urban land association, 0 to 8 percent slopes	12.5	11.1%
MVD	Monson-Elliottsville-Abram complex, 8 to 30 percent slopes, very rocky	0.4	0.3%
MXA	Monarda-Burnham complex, 0 to 3 percent slopes, very stony	31.4	27.9%
RnB	Roundabout-Nicholville association, 0 to 8 percent slopes	0.0	0.0%
SWB	Pushaw-Swanville complex, 0 to 8 percent slopes	12.5	11.1%
TcB	Telos-Chesuncook complex, 0 to 8 percent slopes, very stony	4.6	4.0%
TmB	Monarda-Telos complex, 0 to 8 percent slopes, very stony	17.2	15.2%
TRB	Telos-Chesuncook-Ragmuff association, 0 to 8 percent slopes, very stony	4.5	4.0%
UrB	Urban land-Anthroportic Udorthents complex, 0 to 8 percent slopes	11.2	9.9%
Totals for Area of Interest		112.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some

observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Penobscot County, Maine, Southern Part

BWF—Bucksport and Wonsqueak mucks, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: sx25

Elevation: 40 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Bucksport, frequently flooded, and similar soils: 45 percent Wonsqueak, frequently flooded, and similar soils: 40 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bucksport, Frequently Flooded

Setting

Landform: Marshes

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear Parent material: Organic material

Typical profile

Oe - 0 to 3 inches: mucky peat Oa1 - 3 to 24 inches: muck Oa2 - 24 to 69 inches: muck Cg - 69 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 1.42 in/hr) Depth to water table: About 0 to 6 inches Frequency of flooding: NoneFrequent

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Very high (about 27.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D Hydric soil rating: Yes

Description of Wonsqueak, Frequently Flooded

Setting

Landform: Marshes

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Organic material over glaciolacustrine deposits

Typical profile

Oe - 0 to 10 inches: mucky peat Oa - 10 to 44 inches: muck Cg - 44 to 65 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Very high (about 23.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D Hydric soil rating: Yes

Minor Components

Medomak, fine-silty

Percent of map unit: 10 percent

Landform: Marshes

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: Yes

Biddeford, frequently flooded

Percent of map unit: 3 percent

Landform: Marshes

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: F144BY002ME - Marine Terrace Depression

Hydric soil rating: Yes

Burnham, frequently flooded

Percent of map unit: 2 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: Yes

CEC—Chesuncook-Elliottsville-Telos association, 3 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1ls7t

Elevation: 50 to 900 feet

Mean annual precipitation: 39 to 45 inches

Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Chesuncook and similar soils: 40 percent Elliottsville and similar soils: 30 percent Telos and similar soils: 15 percent Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chesuncook

Setting

Landform: Drumlinoid ridges

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

E - 2 to 5 inches: silt loam

Bs - 5 to 18 inches: gravelly silt loam BC - 18 to 24 inches: cobbly silt loam Cd - 24 to 65 inches: cobbly loam

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 21 to 31 inches to densic material

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 16 to 28 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D Hydric soil rating: No

Description of Elliottsville

Setting

Landform: Drumlinoid ridges

Landform position (two-dimensional): Backslope, shoulder, summit Landform position (three-dimensional): Side slope, nose slope

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Coarse-loamy subglacial till

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material

E - 2 to 5 inches: silt loam
Bs - 5 to 14 inches: silt loam
BC - 14 to 23 inches: silt loam

C - 23 to 30 inches: gravelly silt loam

R - 30 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 21 to 43 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to

0.01 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C Hydric soil rating: No

Description of Telos

Settina

Landform: Drumlinoid ridges

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Concave Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material

E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 14 to 23 inches to densic material

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 20 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D Hydric soil rating: No

Minor Components

Monson

Percent of map unit: 5 percent Landform: Drumlinoid ridges

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Crest

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Monarda

Percent of map unit: 4 percent Landform: Drumlinoid ridges

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: Yes

Ragmuff

Percent of map unit: 4 percent Landform: Drumlinoid ridges

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Abram

Percent of map unit: 2 percent

Landform: Drumlinoid ridges

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Crest

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

MuB—Telos-Monarda-Urban land association, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2lfb6

Elevation: 50 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 40 percent Monarda and similar soils: 30 percent

Urban land: 15 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Rise

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Loamy lodgment till

Typical profile

Ap - 0 to 7 inches: silt loam
Bs - 7 to 11 inches: silt loam
BC - 11 to 15 inches: silt loam
Cd - 15 to 65 inches: loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 13 to 19 inches to densic material

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 20 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D Hydric soil rating: No

Description of Monarda

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Loamy lodgment till

Typical profile

Ap - 0 to 7 inches: gravelly silt loam
Bg - 7 to 15 inches: gravelly silt loam
Cd - 15 to 65 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 13 to 19 inches to densic material

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: D Hydric soil rating: Yes

Description of Urban Land

Setting

Landform: Ground moraines

Landform position (two-dimensional): Backslope, summit Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Anthroportic udorthents

Percent of map unit: 5 percent Landform: Ground moraines

Landform position (two-dimensional): Backslope, summit Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Chesuncook

Percent of map unit: 5 percent Landform: Ground moraines

Landform position (two-dimensional): Footslope, backslope Landform position (three-dimensional): Side slope, base slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Ragmuff

Percent of map unit: 5 percent Landform: Ground moraines

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

MVD—Monson-Elliottsville-Abram complex, 8 to 30 percent slopes, very rocky

Map Unit Setting

National map unit symbol: t1bp Elevation: 50 to 900 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Monson and similar soils: 40 percent Elliottsville and similar soils: 30 percent Abram and similar soils: 15 percent Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Monson

Setting

Landform: Hills

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Nose slope, crest

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Loamy subglacial till

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material

E - 2 to 4 inches: silt loam
Bs - 4 to 10 inches: loam
BC - 10 to 16 inches: silt loam
R - 16 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 30 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 11 to 23 inches to lithic bedrock

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to

0.01 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D Hydric soil rating: No

Description of Elliottsville

Setting

Landform: Hills

Landform position (two-dimensional): Backslope, shoulder Landform position (three-dimensional): Side slope, nose slope

Down-slope shape: Convex Across-slope shape: Linear

Parent material: Coarse-loamy subglacial till

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material

E - 2 to 5 inches: silt loam

Bs - 5 to 14 inches: silt loam

BC - 14 to 23 inches: silt loam

C - 23 to 30 inches: grayelly silt

C - 23 to 30 inches: gravelly silt loam

R - 30 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 30 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 21 to 43 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to

0.01 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C Hydric soil rating: No

Description of Abram

Setting

Landform: Hills

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Nose slope, crest

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Loamy subglacial till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material

E - 3 to 7 inches: loam

Bhs - 7 to 9 inches: silt loam

R - 9 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 30 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 4 to 13 inches to lithic bedrock

Drainage class: Excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately

low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D Hydric soil rating: No

Minor Components

Chesuncook

Percent of map unit: 7 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Telos

Percent of map unit: 5 percent

Landform: Hills

Landform position (two-dimensional): Backslope, footslope Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent

Landform: Hills

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Crest, nose slope

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

MXA—Monarda-Burnham complex, 0 to 3 percent slopes, very stony

Map Unit Setting

National map unit symbol: t1bm

Elevation: 50 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Monarda and similar soils: 45 percent Burnham and similar soils: 35 percent Minor components: 20 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Monarda

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Loamy lodgment till

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 8 inches: cobbly silt loam
Bg - 8 to 16 inches: gravelly silt loam

BC - 16 to 19 inches: loam

Cd - 19 to 65 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 15 to 24 inches to densic material

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D Hydric soil rating: Yes

Description of Burnham

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Organic material over loamy lodgment till

Typical profile

Oe - 0 to 13 inches: mucky peat

Eg - 13 to 16 inches: channery silt loam Bg - 16 to 24 inches: channery loam Cdg - 24 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 14 to 35 inches to densic material

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None Frequency of ponding: Frequent

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D Hydric soil rating: Yes

Minor Components

Telos

Percent of map unit: 10 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Rise

Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

Ragmuff

Percent of map unit: 5 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Rise

Down-slope shape: Convex Across-slope shape: Convex Hydric soil rating: No

Wonsqueak

Percent of map unit: 3 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Dip

Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Swanville, very stony

Percent of map unit: 2 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Concave

Ecological site: F144BY001ME - Marine Terrace Flat

Hydric soil rating: Yes

RnB—Roundabout-Nicholville association, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2p9qc

Elevation: 20 to 600 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Roundabout and similar soils: 50 percent Nicholville and similar soils: 30 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Roundabout

Setting

Landform: Lakebeds (relict)

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Concave

Parent material: Coarse-silty glaciolacustrine deposits

Typical profile

Ap - 0 to 7 inches: very fine sandy loam
Bg - 7 to 17 inches: very fine sandy loam
BCg - 17 to 30 inches: very fine sandy loam
C - 30 to 65 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Very high (about 13.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B/D Hydric soil rating: Yes

Description of Nicholville

Setting

Landform: Lakebeds (relict)

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Coarse-silty glaciolacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam
Bs - 8 to 16 inches: silt loam
BC - 16 to 27 inches: silt loam

2C - 27 to 65 inches: loamy very fine sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high

(0.14 to 14.17 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B Hydric soil rating: No

Minor Components

Roundabout, somewhat poorly drained

Percent of map unit: 10 percent Landform: Lakebeds (relict)

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Concave

Hydric soil rating: No

Swanville

Percent of map unit: 5 percent Landform: Lakebeds (relict)

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Linear

Ecological site: F144BY001ME - Marine Terrace Flat

Hydric soil rating: Yes

Colonel

Percent of map unit: 5 percent Landform: Lakebeds (relict)

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No.

Hydric soil rating: No

SWB—Pushaw-Swanville complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: szrm

Elevation: 20 to 300 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Pushaw and similar soils: 50 percent Swanville and similar soils: 40 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pushaw

Settina

Landform: Marine terraces, river valleys

Landform position (two-dimensional): Footslope, backslope Landform position (three-dimensional): Base slope, side slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Fine-silty glaciomarine deposits

Typical profile

Oe - 0 to 2 inches: mucky peat Bw - 2 to 15 inches: silt loam BCg - 15 to 18 inches: silt loam C - 18 to 65 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 17 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: C/D Hydric soil rating: No

Description of Swanville

Setting

Landform: Marine terraces, river valleys

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Concave

Parent material: Fine-silty glaciomarine deposits

Typical profile

Oe - 0 to 2 inches: mucky peat Bg - 2 to 10 inches: silt loam BCg - 10 to 20 inches: silt loam C - 20 to 65 inches: silty clay loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: D

Ecological site: F144BY001ME - Marine Terrace Flat

Hydric soil rating: Yes

Minor Components

Boothbay

Percent of map unit: 5 percent

Landform: Marine terraces, river valleys

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

Monarda

Percent of map unit: 3 percent

Landform: Marine terraces, river valleys

Landform position (two-dimensional): Toeslope, footslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave, linear Across-slope shape: Linear, concave

Hydric soil rating: Yes

Biddeford

Percent of map unit: 2 percent

Landform: Marine terraces, river valleys

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Concave

Ecological site: F144BY002ME - Marine Terrace Depression

Hydric soil rating: Yes

TcB—Telos-Chesuncook complex, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2rk0c

Elevation: 50 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 45 percent

Chesuncook and similar soils: 40 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material

E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 14 to 23 inches to densic material

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 20 inches

Frequency of flooding: None Frequency of pondina: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D Hydric soil rating: No

Description of Chesuncook

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

E - 2 to 5 inches: silt loam

Bs - 5 to 18 inches: gravelly silt loam BC - 18 to 24 inches: cobbly silt loam Cd - 24 to 65 inches: cobbly loam

Properties and qualities

Slope: 5 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 21 to 31 inches to densic material

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 16 to 28 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D Hydric soil rating: No

Minor Components

Monarda

Percent of map unit: 9 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Linear Hydric soil rating: Yes

Ragmuff

Percent of map unit: 4 percent Landform: Ground moraines

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

Monson

Percent of map unit: 2 percent Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Base slope

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

TmB—Monarda-Telos complex, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1ls63

Elevation: 50 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 45 percent Monarda and similar soils: 40 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material

E - 3 to 5 inches: silt loam

Bs - 5 to 11 inches: silt loam

BC - 11 to 16 inches: gravelly loam

Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 14 to 23 inches to densic material

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 20 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D Hydric soil rating: No

Description of Monarda

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope, footslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Linear

Parent material: Loamy lodgment till

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 8 inches: cobbly silt loam
Bg - 8 to 16 inches: gravelly silt loam

BC - 16 to 19 inches: loam

Cd - 19 to 65 inches: channery silt loam

Properties and qualities

Slope: 0 to 5 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 15 to 24 inches to densic material

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D Hydric soil rating: Yes

Minor Components

Burnham

Percent of map unit: 6 percent Landform: Ground moraines

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: Yes

Chesuncook

Percent of map unit: 5 percent Landform: Ground moraines

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Ragmuff

Percent of map unit: 4 percent Landform: Ground moraines

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

TRB—Telos-Chesuncook-Ragmuff association, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1ls9c

Elevation: 50 to 750 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 40 percent Chesuncook and similar soils: 30 percent Ragmuff and similar soils: 20 percent Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope, backslope Landform position (three-dimensional): Side slope, base slope

Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material

E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 6 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 14 to 23 inches to densic material

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 6 to 20 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D Hydric soil rating: No

Description of Chesuncook

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope, backslope Landform position (three-dimensional): Side slope, base slope

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

E - 2 to 5 inches: silt loam

Bs - 5 to 18 inches: gravelly silt loam BC - 18 to 24 inches: cobbly silt loam Cd - 24 to 65 inches: cobbly loam

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent Depth to restrictive feature: 21 to 31 inches to densic material

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to

0.14 in/hr)

Depth to water table: About 16 to 28 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water capacity: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D Hydric soil rating: No

Description of Ragmuff

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope, backslope Landform position (three-dimensional): Base slope, side slope

Down-slope shape: Linear Across-slope shape: Convex

Parent material: Coarse-loamy lodgment till

Typical profile

Oa - 0 to 4 inches: highly decomposed plant material *E* - 4 to 9 inches: gravelly very fine sandy loam

Bs - 9 to 20 inches: gravelly loam BC - 20 to 31 inches: gravelly loam Cd - 31 to 34 inches: gravelly loam R - 34 to 79 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 21 to 37 inches to densic material; 23 to 45 inches to

lithic bedrock

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to

0.01 in/hr)

Depth to water table: About 16 to 28 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D Hydric soil rating: No

Minor Components

Monarda

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (two-dimensional): Backslope, footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Concave

Hydric soil rating: Yes

Monson

Percent of map unit: 3 percent Landform: Ground moraines

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Convex Hydric soil rating: No

Elliottsville

Percent of map unit: 2 percent Landform: Ground moraines

Landform position (two-dimensional): Backslope, shoulder Landform position (three-dimensional): Nose slope, base slope

Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

UrB—Urban land-Anthroportic Udorthents complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: sw80 Elevation: 20 to 1,200 feet

Mean annual precipitation: 39 to 45 inches Mean annual air temperature: 42 to 45 degrees F

Frost-free period: 115 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent

Anthroportic udorthents and similar soils: 15 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Ground moraines, marine terraces

Landform position (two-dimensional): Backslope, summit Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Description of Anthroportic Udorthents

Setting

Landform: Ground moraines, marine terraces

Landform position (two-dimensional): Backslope, summit

Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear Parent material: Loamy till

Typical profile

^A - 0 to 30 inches: silt loam

C - 30 to 65 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very

high (0.01 to 99.90 in/hr)

Depth to water table: About 24 to 39 inches

Frequency of flooding: None Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Tunbridge

Percent of map unit: 3 percent Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Base slope

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Swanville

Percent of map unit: 3 percent

Landform: River valleys, marine terraces Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: F144BY001ME - Marine Terrace Flat

Hydric soil rating: Yes

Pushaw

Percent of map unit: 3 percent

Landform: River valleys, marine terraces Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope, side slope, rise

Down-slope shape: Linear Across-slope shape: Convex

Hydric soil rating: No

Chesuncook

Percent of map unit: 3 percent Landform: Ground moraines

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Telos

Percent of map unit: 3 percent Landform: Ground moraines

Landform position (two-dimensional): Footslope, backslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2 053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2 053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2 053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf