SHAWBORO EAST RIDGE SOLAR
PHASES 1A & 1B
SHAWBORO, CURRITUCK COUNTY, NORTH CAROLINIA

DRAINAGE NARRATIVE

DECEMBER 19, 2025

PREPARED BY:

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

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Elizabeth City, NC 27909
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License No. C-1652
www.timmons.com

Shawboro East Ridge Solar
Phases 1A & 1B – Drainage Narrative

Shawboro East Ridge Solar, LLC is proposing to develop a solar farm on East Ridge Road in Shawboro. The development will occur on four tracts owned by East Ridge Land Holdings, LLC totaling 386.69 acres. The development will take place on 282.2 acres of parcel that is currently used as farmland. The land to the west and south of the property is also agricultural land with a mixture of agricultural land and woodland to the east and woods and residential property across East Ridge Road to the north. The developer has obtained a Special Use Permit from Currituck County to allow for the development.

The portion of the site identified as Phase 1A has already been permitted and is under construction but not yet complete. It was modeled with PCSWMM using the SCS Curve Number Method to account for pre/post runoff requirements for Currituck County as the individual phase contained more than 10% coverage. Rainfall depths were taken from NOAA Atlas 14, Volume 2, Version 3. The site consists of Roanoke Soils with a hydraulic soil rating C/D. The results of the 2-year pre-development and 5-year post-development models were used to determine the size of the pond and the required outlet controls to meet the county requirements. The post-development model was run using a 10-year storm to develop proper stormwater and erosion control calculations with regards to NCDEQ requirements. Although this phase was previously permitted, the 10-yr storm model and erosion control calculations remain in the narrative appendix.

No new modeling was performed for Phase 1B to be added. The new resulting coverage for Phases 1A and 1B combined is only 527,265 sf or 4.29% of the project area; therefore, no modeling was required by the county for Phase 1B. Additionally, no new ditches are swales are proposed as part of Phase 1 be and the ditches will not be disturbed by construction.

In the existing conditions, runoff is collected in field ditches and most routed to a large roadside ditch along East Ridge Road. The ditch continues east, then south along Meads Road where it crosses through a pipe and outfalls into the adjacent swamp. The southern portion of the development drains east into the same swamp which drains south under Hwy 158 and into East Creek.

In the proposed conditions, development on the site will be limited to the installation of the solar panels, fence and gravel access roads. The Phase 1A impervious area will be routed to the stormwater attenuation basin designed only for stormwater attenuation in accordance with Currituck County regulations while all of Phase 1B will continue to drain as the field ditches drain now.

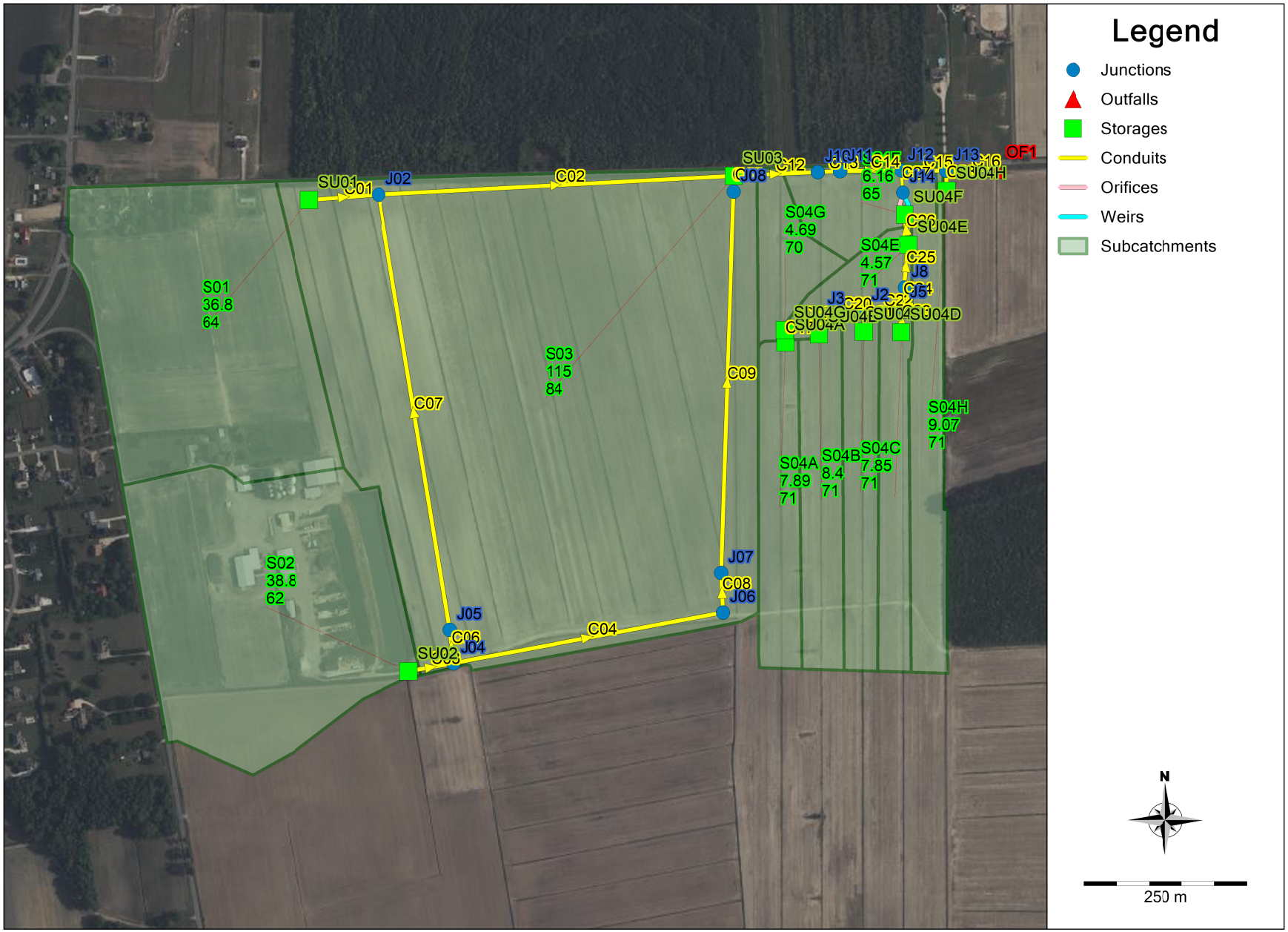
The disturbed area for the project will not exceed 197.5 acres. The disturbed area for Phase 1A drains to the attenuation basin that is being used as a skimmer basin during construction. The land in Phase 1B will continue to sheet flow across the existing field cuts to the existing ditches that will be protected by coir logs and silt fence. Additional erosion control measures such as check dams and a gravel construction entrance will also be utilized.

Appendix A

Stormwater & Erosion Control Calculations

Calculations for Phase 1A

- PCSWMM Layout
- PCSWMM Data & Results (Based on 10 yr Storm)
- Skimmer Basin Sizing


Legend
Junctions
Outfalls
Storages
Conduits
Orifices
Weirs
Subcatchments
N
250 m
SU01
J02
C01
C02
SU03
J08
C12
J12
J13
OF1
SU04H
SU04F
SU04E
S04G
4.69
70
S04E
4.57
71
C25
J8
C24
J3
J2
C22
SU04G
SU04A
SU04D
S01
36.8
64
S03
115
84
C09
C07
S04H
9.07
71
S04A
7.89
71
S04B
8.4
71
S04C
7.85
71
S02
38.8
62
J07
C08
J06
J05
C06
J04
C04
SU02
C03

PCSWMM Report

Shawboro Solar Phase 1A Post-Development 10-year Model Report

Model 47198-Post_10yr-PH1A.inp

Timmons Group

January 24, 2025

Table of Contents

Tables

Table 1A: Conduits

Name	Inlet Node	Outlet Node	Length (ft)	Roughness	Inlet Elev. (ft)	Outlet Elev. (ft)	Entry Loss Coeff.	Exit Loss Coeff.	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3
C01	SU01	J02	340	0.035	4.79	4.19	0	0	TRAPEZOIDAL	2.65	10	2
C02	J02	SU03	2040	0.035	4.19	3.54	0	0	TRAPEZOIDAL	2.65	10	2
C03	SU02	J04	20	0.035	4.83	4.86	0	0	TRAPEZOIDAL	3.74	5	1
C04	J04	J06	1520	0.035	4.86	4.2	0	0	TRAPEZOIDAL	2.6	5	1
C06	J04	J05	24	0.012	4.59	4.58	0	0	CIRCULAR	3	0	0
C07	J05	J02	2450	0.035	5.08	4.19	0	0	TRAPEZOIDAL	2.65	8	2
C08	J06	J07	30	0.022	5.53	4.01	0	0	CIRCULAR	1	0	0
C09	J07	J08	2162	0.035	4.09	3.82	0	0	TRAPEZOIDAL	2.99	3	2
C10	J08	SU03	25	0.022	4.05	3.18	0	0	CIRCULAR	1.5	0	0
C11	J08	SU03	25	0.022	3.82	2.16	0	0	CIRCULAR	1.5	0	0
C12	SU03	J10	470	0.035	3.54	3.24	0	0	TRAPEZOIDAL	3.54	10	2
C13	J10	J11	34	0.022	2.37	2.42	0	0	CIRCULAR	5	0	0
C14	J11	J12	342	0.035	3.26	2.95	0	0	TRAPEZOIDAL	4.62	10	2
C15	J12	J13	210	0.035	2.95	2.82	0	0	TRAPEZOIDAL	4.62	12	2
C16	J13	OF1	270	0.035	2.82	3.08	0	0	TRAPEZOIDAL	3.84	12	2
C17	SU04A	SU04G	60	0.012	5.1	5	0	0	CIRCULAR	1.5	0	0
C18	SU04G	J3	215	0.035	5	4.65	0	0	TRAPEZOIDAL	2	0	3
C19	SU04B	J3	60	0.012	4.7	4.65	0	0	CIRCULAR	1.5	0	0
C20	J3	J2	225	0.035	4.6	4.42	0	0	TRAPEZOIDAL	2.35	0	3
C21	SU04C	J2	60	0.012	4.6	4.5	0	0	CIRCULAR	1.5	0	0
C22	J2	J5	205	0.035	4.42	4.2	0	0	TRAPEZOIDAL	2.58	0	3
C23	SU04D	J5	78	0.012	4.4	4.2	0	0	CIRCULAR	1.5	0	0
C24	J5	J8	94	0.012	4.2	4.1	0	0	CIRCULAR	1.5	0	0
C25	J8	SU04E	313	0.035	4.1	3.75	0	0	TRAPEZOIDAL	3.25	0	3
C26	SU04E	SU04F	74	0.012	3.75	3.5	0	0	CIRCULAR	1.5	0	0
C27	J14	J12	42	0.012	3.5	2.95	0	0	CIRCULAR	1.5	0	0
C28	SU04H	J13	36	0.022	2.24	2	0	0	CIRCULAR	1.5	0	0

Table 1B: Conduits

Name	Geom4	Barrels	Slope (ft/ft)	Max. |Flow| (cfs)	Max. |Velocity| (ft/s)
C01	2	1	0.00176	1.97	0.53
C02	2	1	0.00032	4.7	0.39
C03	1	1	-0.0015	3.34	0.97
C04	1	1	0.00043	1.64	0.5
C06	0	1	0.00042	2.98	1.31
C07	2	1	0.00036	2.94	0.5
C08	0	1	0.05073	0.27	0.81
C09	2	1	0.00012	0.33	0.17
C10	0	1	0.03482	2.56	2.25
C11	0	1	0.06655	1.7	1.25
C12	2	1	0.00064	16.06	1.05
C13	0	1	-0.00147	16.06	2.1
C14	2	1	0.00091	16.06	1.05
C15	2	1	0.00062	17.51	0.92
C16	2	1	-0.00096	18.97	1.59
C17	0	1	0.00167	1.78	2.11
C18	3	1	0.00163	4.26	1.24
C19	0	1	0.00083	1.39	1.68
C20	3	1	0.0008	5.27	1.04
C21	0	1	0.00167	1.37	1.34
C22	3	1	0.00107	5.97	0.94
C23	0	1	0.00256	1.31	1.29
C24	0	1	0.00106	6.98	3.96
C25	3	1	0.00112	6.91	1.09
C26	0	1	0.00338	12.08	12.31
C27	0	1	0.0131	2.46	3.09
C28	0	1	0.00667	1.87	1.06

Table 2: Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Contributing Area (ac)
J02	4.19	6.84	2.65	0	0.17	0.79	4.98	75.6
J04	4.59	8.7	4.11	0	0.54	1.1	5.69	38.8
J05	4.58	8.66	4.08	0	0.55	1.11	5.69	38.8
J06	4.2	6.89	2.69	0	0.84	1.49	5.69	38.8
J07	4.01	7.08	3.07	0	0.19	0.76	4.77	38.8
J08	3.82	6.87	3.05	0	0.21	0.95	4.77	38.8
J10	2.37	8.14	5.77	1.13	1.39	2.11	4.48	190.6
J11	2.42	8.31	5.89	1.08	1.34	2.02	4.44	190.6
J12	2.95	7.57	4.62	0.55	0.74	1.28	4.23	236.11
J13	2	7.48	5.48	1.5	1.66	2.14	4.14	245.18
J14	3.5	7	3.5	0	0.33	0.72	4.22	45.51
J2	4.42	7	2.58	0	1.31	2.09	6.51	28.83
J3	4.65	7	2.35	0	1.13	1.86	6.51	20.98
J5	4.2	7.36	3.16	0	1.49	2.31	6.51	34.78
J8	4.1	7.35	3.25	0	1.55	2.37	6.47	34.78

Table 3A: Subcatchments

Name	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (in)	Dstore Perv (in)	Zero Imperv (%)
S01	SCS_Type_III_3.74in	SU01	36.8	1860.001	0.51	11.24	0.01	0.17	0.1	1.1	25
S02	SCS_Type_III_3.74in	SU02	38.8	2200	0.39	24.54	0.01	0.17	0.1	1.2	25
S03	SCS_Type_III_3.74in	SU03	115	3490	0.12	1.39	0.01	0.17	0.1	0.38	25
S04A	SCS_Type_III_5.74in	SU04A	7.89	1367	0.16	6.45	0.01	0.17	0.1	0.82	25
S04B	SCS_Type_III_5.74in	SU04B	8.4	1594.999	0.16	1.83	0.01	0.17	0.1	0.82	25
S04C	SCS_Type_III_5.74in	SU04C	7.85	1774.997	0.18	1.69	0.01	0.17	0.1	0.82	25
S04D	SCS_Type_III_5.74in	SU04D	5.95	1664.999	0.17	11.45	0.01	0.17	0.1	0.82	25
S04E	SCS_Type_III_5.74in	SU04E	4.57	424	1.3	43.97	0.01	0.17	0.1	0.82	25
S04F	SCS_Type_III_5.74in	SU04F	6.16	322	0.54	26.13	0.01	0.17	0.1	1.06	25
S04G	SCS_Type_III_5.74in	SU04G	4.69	740.001	0.79	17.31	0.01	0.17	0.1	0.86	25
S04H	SCS_Type_III_5.74in	SU04H	9.07	2480.003	0.21	4.18	0.01	0.17	0.1	0.82	25

Table 3B: Subcatchments

Name	Subarea Routing	Percent Routed (%)	Curve Number	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S01	PERVIOUS	100	64	2.49	0.61	0.61	1.97
S02	PERVIOUS	100	62	2.2	0.9	0.95	3.35
S03	PERVIOUS	100	84	1.42	1.82	5.69	12.11
S04A	PERVIOUS	100	71	2.62	2.53	0.54	2.47
S04B	PERVIOUS	100	71	2.75	2.35	0.54	2.04
S04C	PERVIOUS	100	71	2.75	2.34	0.5	1.84
S04D	PERVIOUS	100	71	2.48	2.68	0.43	1.98
S04E	PERVIOUS	100	71	1.57	3.89	0.48	13
S04F	PERVIOUS	100	65	2.46	2.84	0.48	10.01
S04G	PERVIOUS	100	70	2.39	2.92	0.37	5.27
S04H	PERVIOUS	100	71	2.68	2.38	0.59	1.96

Table 4: Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Flow (cfs)	Total Flow (MG)	Contributing Area (ac)
OF1	3.08	6.92	3.5	0.42	0.42	3.5	18.97	10.386	245.18

Table 5: Storages

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Curve Name	Max. Depth (ft)	Max. HGL (ft)	Max. Volume (1000 ft³)	Contributing Area (ac)
SU01	4.79	7.58	2.79	0	SU01	0.26	5.05	0.083	36.8
SU02	4.83	8.57	3.74	0	SU02	0.87	5.7	0.295	38.8
SU03	2.16	7.08	4.92	1.34	SU03	2.61	4.77	18.569	190.6
SU04A	5.1	7.85	2.75	0	SU04A	1.41	6.51	38.726	7.89
SU04B	4.7	7.45	2.75	0	SU04B	1.81	6.51	23.535	8.4
SU04C	4.6	7.78	3.18	0	SU04C	1.91	6.51	17.392	7.85
SU04D	4.4	7.54	3.14	0	SU04D	2.11	6.51	16.084	5.95
SU04E	3.75	7.9	4.15	0	SU04E	2.72	6.47	0.342	39.35
SU04F	3.5	7.5	4	0	PH1APOND	2.94	6.44	203.304	45.51
SU04G	5	7	2	0	SU04G	1.51	6.51	15.376	12.58
SU04H	2.24	6.53	4.29	1.26	SU04H	1.92	4.16	2.194	9.07

Table 6: Orifices

Name	Inlet Node	Outlet Node	Type	Cross-Section	Height (ft)	Inlet Elev. (ft)	Discharge Coeff.	Max. |Flow| (cfs)
OR1	SU04F	J14	BOTTOM	CIRCULAR	0.5	3.5	0.65	1.62

Table 7: Weirs

Name	Inlet Node	Outlet Node	Type	Height (ft)	Length (ft)	Side Slope (ft/ft)	Inlet Elev. (ft)	Discharge Coeff. (CFS)	Max. |Flow| (cfs)
W1	SU04F	J14	TRANSVERSE	1	3	0	6.25	3.33	0.85

Temporary Sediment Basin *Simplified design*

Okay

56.13	Disturbed Area (Acres)
22	Peak Flow from 10-year Storm (cfs)

101034	Required Volume ft^3
9583	Required Surface Area ft^2
69.2	Suggested Width ft
138.4	Suggested Length ft

175	Trial Top Width at Emergency Spillway Invert ft	
446	Trial Top Length at Emergency Spillway Invert ft	
5	Trial Side Slope Ratio Z:1	(2.5:1 or flatter)
3	Trial Depth ft	(2 to 13.5 feet above grade)
145	Bottom Width ft	
416	Bottom Length ft	
60320	Bottom Area ft^2	
207105	Actual Volume ft^3	**Okay**
78050	Actual Surface Area ft^2	**Okay**

Use Spillway Capacity Sheet to Size Primary and Emergency Spillways

6	Skimmer Size (inches)
0.417	Head on Skimmer (feet)
4	Orifice Size (1/4 inch increments)
4.23	Dewatering Time (days)
	Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Check L:W ratio

Okay 2:1 to 6:1

Check dam height (max. 15 ft)

Okay

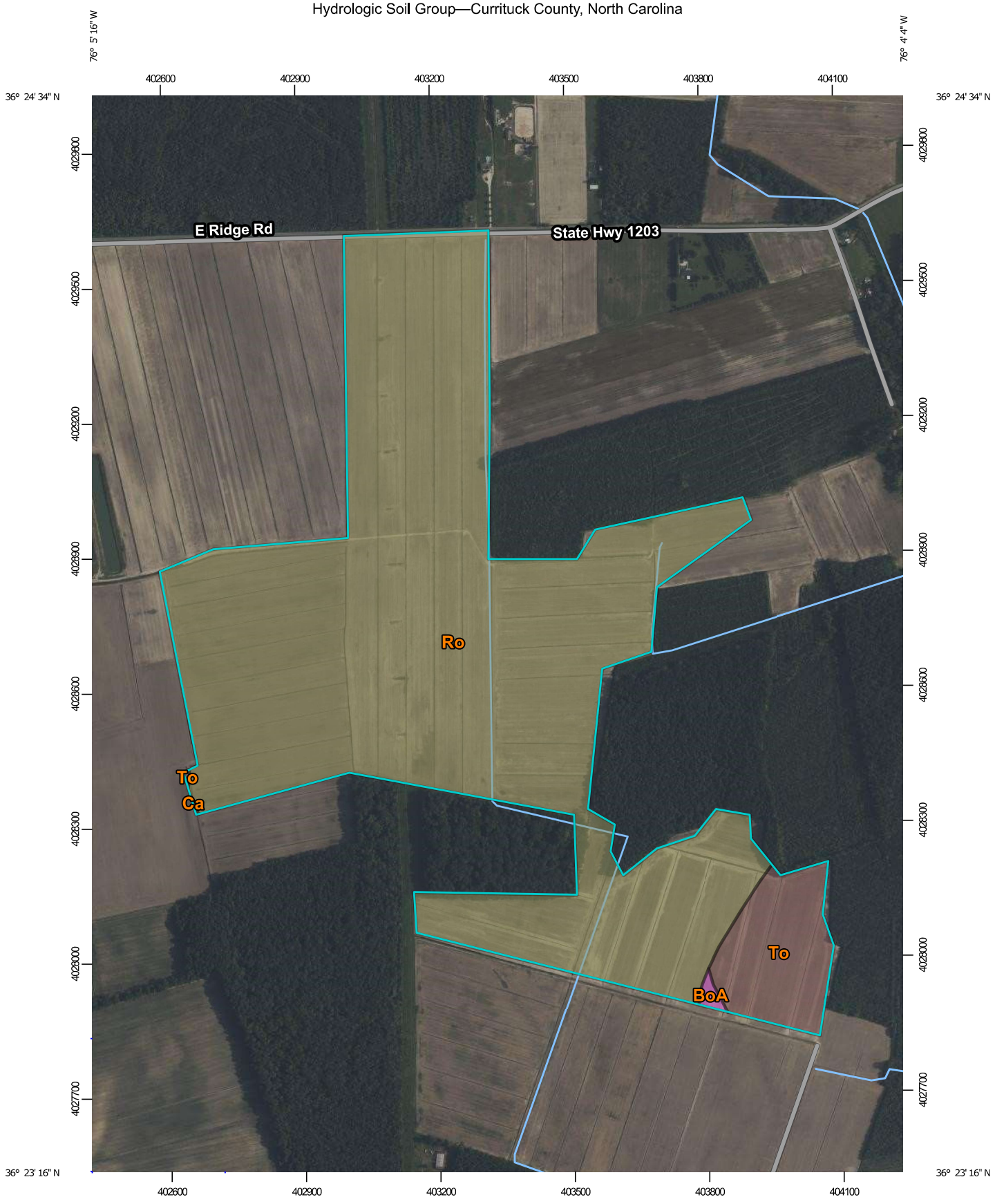
Cleanout elevation (ft)

3.50	Elevation of bottom of basin near riser structure
5.0	Depth at one-half of sediment storage volume. Elevation to be staked in the field.

Appendix B

Soil Data

- Web Soil Survey



Map Scale: 1:11,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Currituck County, North Carolina
Survey Area Data: Version 25, Sep 2, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 18, 2022—May 31, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BoA	Bojac loamy sand, 0 to 3 percent slopes	A	0.7	0.3%
Ca	Cape Fear loam, 0 to 2 percent slopes, rarely flooded	C/D	0.0	0.0%
Ro	Roanoke fine sandy loam	C/D	239.4	92.6%
To	Tomotley fine sandy loam	B/D	18.5	7.2%
Totals for Area of Interest			**258.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

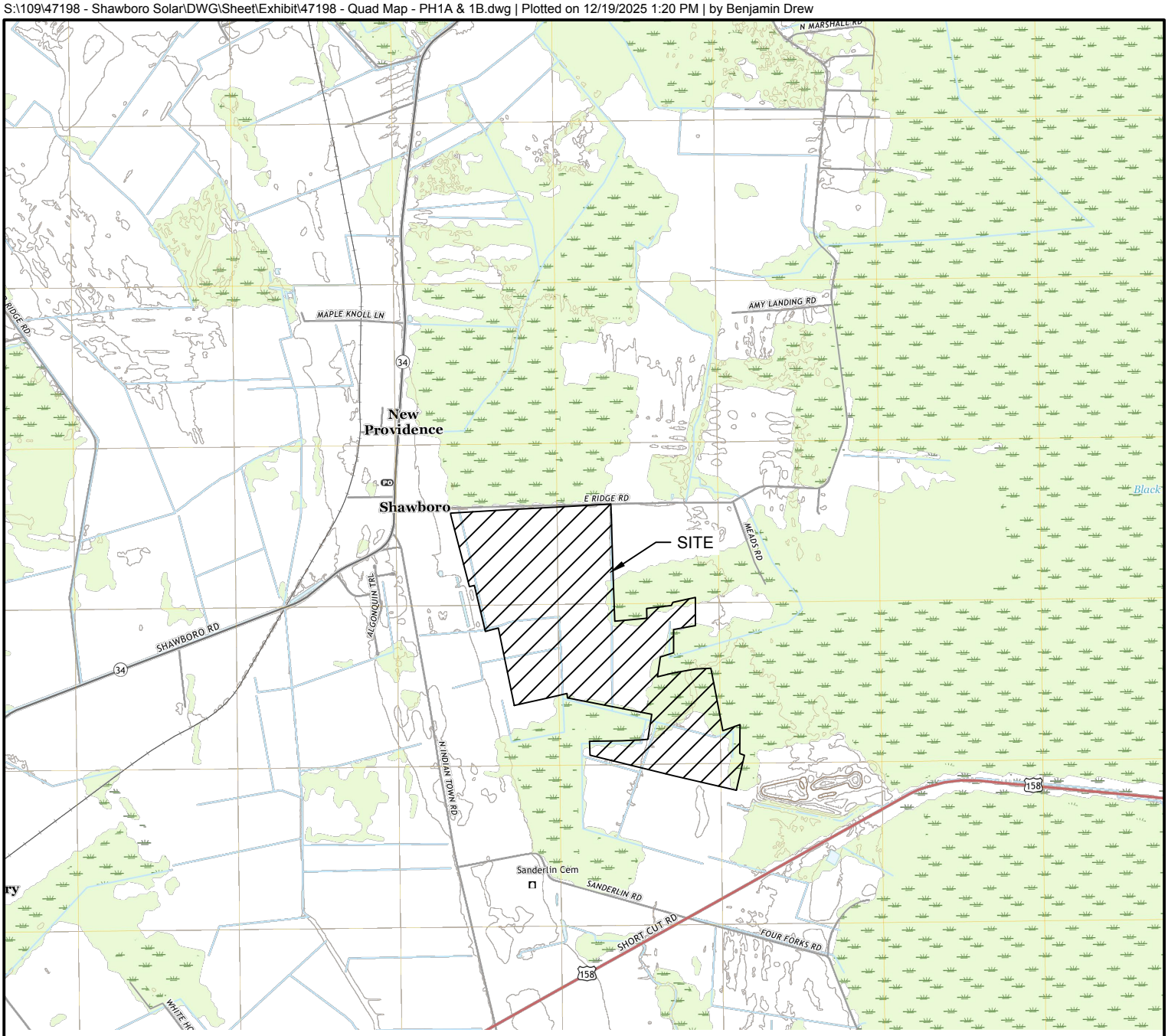
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C

USGS QUAD Map

S:\109\47198 - Shawboro Solar\DWG\Sheet\Exhibit\47198 - Quad Map - PH1A & 1B.dwg | Plotted on 12/19/2025 1:20 PM | by Benjamin Drew



USGS QUAD MAP EXHIBIT

CURRITUCK, NC

2019

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

THIS DRAWING PREPARED AT THE
ELIZABETH CITY OFFICE
1805 West City Drive, Unit E | Elizabeth City, NC 27909
TEL 252.621.5030 FAX 252.562.6974 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

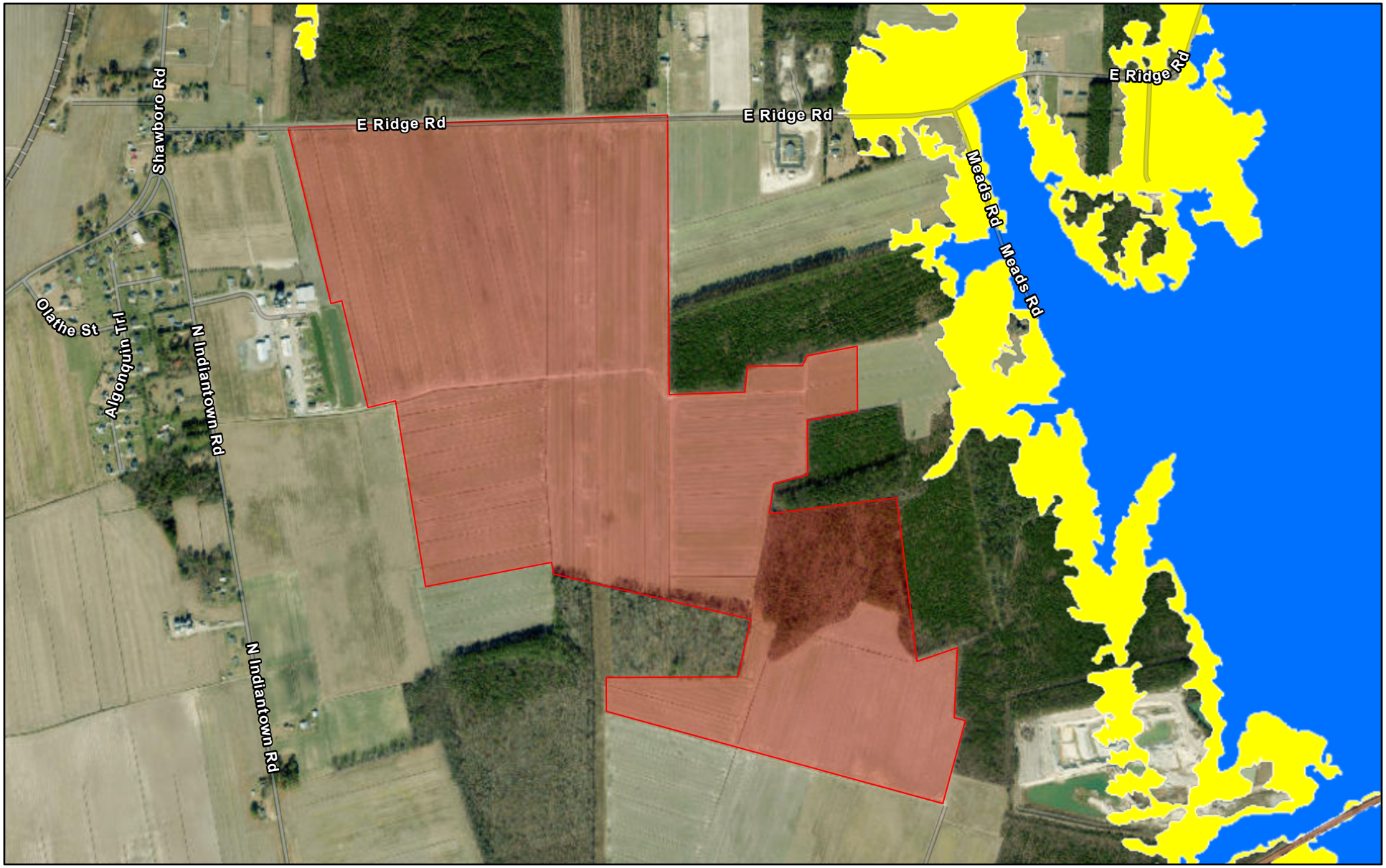
CRAWFORD TOWNSHIP	*CURRITUCK COUNTY*
Date:12/19/2025	*Scale:1"=3000'*
Sheet 1 of 1	*J.N.:47198*
Drawn by:SL	*Checked by:KH*

TIMMONS GROUP

Appendix D

Flood Map

Shawboro Solar Phase 1A & 1B Flood Hazard Map



12/19/2025

Stream Centerlines

Flood Hazard Lines

2% Annual Chance Flood Hazard; 1% Annual Chance Flood Hazard ; Floodway; Future 1% Annual Chance Flood Hazard ; Limit of Detailed Study/Zone Break; Limit of Floodway/Zone Break; Limit of Study/Zone Break; Zone Break; Zone Break/Floodway; Zone D

Limit of Detailed Study; Limit of Floodway; Limit of Study; Apparent Limit

Flood Hazard Areas

Zone VE

Zones A, AH, AO, A99, V

Zone

Zone

Zone

0.2%

Zone

1%

Zone

1:17,774

0 0.1 0.2 0.4 mi

0 0.17 0.35 0.7 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, NC CGIA, Vantor

Appendix E

Rainfall Data

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

NOAA Atlas 14, Volume 2, Version 3
Location name: Shawboro, North Carolina, USA*
Latitude: 36.4131°, Longitude: -76.0826°
Elevation: 7.35 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.435 (0.394-0.480)	0.508 (0.459-0.562)	0.575 (0.520-0.636)	0.659 (0.594-0.729)	0.742 (0.666-0.820)	0.818 (0.732-0.902)	0.886 (0.789-0.978)	0.953 (0.844-1.05)	1.03 (0.908-1.14)	1.11 (0.970-1.23)
10-min	0.695 (0.630-0.767)	0.812 (0.735-0.898)	0.920 (0.832-1.02)	1.05 (0.950-1.17)	1.18 (1.06-1.31)	1.30 (1.17-1.44)	1.41 (1.25-1.55)	1.51 (1.34-1.67)	1.63 (1.44-1.81)	1.75 (1.53-1.94)
15-min	0.869 (0.787-0.958)	1.02 (0.924-1.13)	1.16 (1.05-1.29)	1.33 (1.20-1.47)	1.50 (1.35-1.66)	1.65 (1.48-1.82)	1.78 (1.59-1.96)	1.91 (1.69-2.10)	2.06 (1.81-2.27)	2.20 (1.92-2.43)
30-min	1.19 (1.08-1.31)	1.41 (1.28-1.56)	1.65 (1.50-1.83)	1.93 (1.74-2.14)	2.22 (1.99-2.45)	2.48 (2.22-2.74)	2.73 (2.43-3.01)	2.97 (2.63-3.27)	3.27 (2.88-3.62)	3.56 (3.10-3.94)
60-min	1.49 (1.35-1.64)	1.77 (1.60-1.96)	2.12 (1.92-2.35)	2.52 (2.27-2.78)	2.96 (2.66-3.27)	3.37 (3.01-3.71)	3.75 (3.34-4.14)	4.16 (3.69-4.59)	4.70 (4.13-5.19)	5.20 (4.53-5.75)
2-hr	1.74 (1.57-1.94)	2.08 (1.87-2.32)	2.55 (2.28-2.83)	3.07 (2.75-3.41)	3.69 (3.29-4.09)	4.28 (3.79-4.74)	4.85 (4.28-5.38)	5.46 (4.79-6.06)	6.29 (5.47-6.98)	7.07 (6.10-7.84)
3-hr	1.86 (1.68-2.08)	2.23 (2.00-2.49)	2.73 (2.45-3.05)	3.32 (2.97-3.71)	4.03 (3.59-4.49)	4.72 (4.17-5.25)	5.41 (4.76-6.01)	6.16 (5.38-6.83)	7.20 (6.22-7.98)	8.20 (7.01-9.09)
6-hr	2.22 (2.00-2.47)	2.64 (2.38-2.96)	3.25 (2.92-3.63)	3.95 (3.53-4.41)	4.81 (4.28-5.36)	5.66 (5.00-6.28)	6.51 (5.72-7.21)	7.44 (6.48-8.22)	8.73 (7.52-9.66)	9.99 (8.50-11.1)
12-hr	2.61 (2.35-2.92)	3.11 (2.79-3.49)	3.83 (3.43-4.29)	4.69 (4.18-5.24)	5.75 (5.10-6.41)	6.81 (5.99-7.57)	7.89 (6.87-8.75)	9.09 (7.84-10.1)	10.8 (9.15-11.9)	12.4 (10.4-13.7)
24-hr	3.07 (2.83-3.37)	3.74 (3.44-4.10)	4.83 (4.43-5.29)	5.74 (5.26-6.27)	7.09 (6.44-7.73)	8.26 (7.44-8.99)	9.53 (8.50-10.4)	10.9 (9.65-11.9)	13.0 (11.3-14.2)	14.8 (12.7-16.2)
2-day	3.56 (3.27-3.89)	4.31 (3.96-4.71)	5.53 (5.08-6.04)	6.57 (6.01-7.17)	8.14 (7.39-8.86)	9.50 (8.55-10.3)	11.0 (9.81-12.0)	12.7 (11.2-13.9)	15.2 (13.1-16.7)	17.4 (14.8-19.2)
3-day	3.78 (3.50-4.12)	4.58 (4.24-4.99)	5.85 (5.40-6.37)	6.93 (6.36-7.52)	8.51 (7.76-9.23)	9.86 (8.93-10.7)	11.3 (10.2-12.3)	13.0 (11.5-14.1)	15.4 (13.4-16.9)	17.6 (15.1-19.4)
4-day	4.01 (3.73-4.35)	4.86 (4.51-5.28)	6.18 (5.72-6.70)	7.28 (6.72-7.87)	8.88 (8.13-9.60)	10.2 (9.30-11.0)	11.7 (10.5-12.6)	13.2 (11.8-14.3)	15.6 (13.7-17.0)	17.8 (15.4-19.5)
7-day	4.68 (4.36-5.06)	5.65 (5.26-6.11)	7.10 (6.59-7.65)	8.29 (7.68-8.93)	10.0 (9.22-10.8)	11.4 (10.5-12.3)	13.0 (11.8-14.0)	14.6 (13.1-15.8)	17.0 (15.0-18.5)	19.0 (16.5-20.7)
10-day	5.28 (4.96-5.66)	6.34 (5.94-6.79)	7.85 (7.34-8.40)	9.10 (8.49-9.73)	10.9 (10.1-11.6)	12.4 (11.4-13.2)	14.0 (12.8-15.0)	15.6 (14.2-16.8)	18.1 (16.1-19.5)	20.0 (17.7-21.8)
20-day	7.18 (6.76-7.64)	8.55 (8.06-9.11)	10.4 (9.78-11.1)	11.9 (11.2-12.7)	14.1 (13.1-15.0)	15.8 (14.7-16.8)	17.7 (16.2-18.9)	19.6 (17.9-21.0)	22.3 (20.1-24.1)	24.5 (21.8-26.6)
30-day	8.85 (8.36-9.39)	10.5 (9.94-11.2)	12.6 (11.9-13.4)	14.4 (13.5-15.2)	16.7 (15.7-17.7)	18.6 (17.3-19.7)	20.5 (19.0-21.8)	22.5 (20.7-24.0)	25.2 (22.9-27.0)	27.3 (24.7-29.5)
45-day	11.0 (10.4-11.7)	13.0 (12.3-13.8)	15.5 (14.6-16.5)	17.6 (16.6-18.7)	20.6 (19.3-21.8)	23.0 (21.4-24.4)	25.4 (23.5-27.1)	28.0 (25.8-29.9)	31.7 (28.7-33.9)	34.6 (31.1-37.2)
60-day	13.2 (12.5-13.9)	15.5 (14.7-16.4)	18.4 (17.4-19.4)	20.6 (19.5-21.8)	23.7 (22.3-25.1)	26.2 (24.5-27.7)	28.6 (26.7-30.4)	31.1 (28.9-33.1)	34.5 (31.7-36.9)	37.2 (33.8-39.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Certificate of Compliance

Certificate:	80021505	**Master Contract:**	266494
Project:	**80219044**	**Date Issued:**	**2024-08-08**

Issued To: **Longi Green Energy Technology Co., Ltd.**
No. 388, Middle Hangtian Road,
Chang'an District, Xi'an., Shaanxi, 710100
China

Attention: Guoyi Tang

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Tom Yang
Tom Yang

PRODUCTS

CLASS - C531110 - POWER SUPPLIES Photovoltaic Modules and Panels
CLASS - C531190 - POWER SUPPLIES Photovoltaic Modules and Panels - Certified to US Standards

Bifacial dual glass photovoltaic modules with maximum system voltage of 1500 V dc, Safety Class II PV modules.
LR6-72BP-xxxM, xxx=350 to 380, in steps of 5W,
LR6-72PD-xxxM, xxx= 345 to 370, in steps of 5W,
LR6-72DG-xxxM, xxx= 330 to 360, in steps of 5W,
LR6-72HBD-xxxM, xxx= 360 to 395, in steps of 5W,
LR6-72HIBD-xxxM, xxx= 360 to 385, in steps of 5W,
LR6-72OPD-xxxM, xxx= 380 to 405, in steps of 5W,
LR6-72HPD-xxxM, xxx= 360 to 385, in steps of 5W,

LR6-72MBD-xxxM, xxx= 360 to 380, in steps of 5W,
LR6-72MPD-xxxM, xxx= 360 to 380, in steps of 5W,
LR4-72HBD-xxxM, xxx= 415 to 455, in steps of 5W,
LR4-72HIBD-xxxM, xxx= 420 to 450, in steps of 5W,
LR6-60BP-xxxM, xxx=290 to 315, in steps of 5W,
LR6-60PD-xxxM, xxx=285 to 305, in steps of 5W,
LR6-60DG-xxxM, xxx=275 to 300, in steps of 5W,
LR6-60HBD-xxxM, xxx= 300 to 320, in steps of 5W,
LR6-60HIBD-xxxM, xxx= 300 to 320, in steps of 5W,
LR6-60OPD-xxxM, xxx= 315 to 335, in steps of 5W,
LR6-60HPD-xxxM, xxx= 300 to 320, in steps of 5W,
LR6-60MBD-xxxM, xxx= 300 to 320, in steps of 5W,
LR6-60MPD-xxxM, xxx= 300 to 320, in steps of 5W,
LR4-60HBD-xxxM, xxx= 345 to 380, in steps of 5W,
LR4-60HIBD-xxxM, xxx= 350 to 380, in steps of 5W,
LR6-78HBD-xxxM, xxx= 390 to 420, in steps of 5W,
LR6-78OPD-xxxM, xxx= 410 to 435, in steps of 5W,
LR5-72HBD-xxxM, xxx= 520 to 565, in steps of 5W,
LR5-66HBD-xxxM, xxx= 475 to 515, in steps of 5W,
LR4-78ZBD-xxxM, xxx= 465 to 485, in steps of 5W,
LR5-72HIBD-xxxM, xxx= 520 to 565, in steps of 5W,
LR5-66HIBD-xxxM, xxx= 475 to 515, in steps of 5W,
LR4-78HBD-xxxM, xxx= 470 to 500, in steps of 5W,
LR5-78HBD-xxxM, xxx= 570 to 610, in steps of 5W,
LR5-78ZBD-xxxM, xxx= 560 to 580, in steps of 5W,
LR5-72HTD-xxxM, xxx= 550 to 600, in steps of 5W,
LR5-54HTD-xxxM, xxx= 415 to 450, in steps of 5W,
LR5-60HBD-xxxM, xxx= 435 to 470, in steps of 5W,
LR5-60HIBD-xxxM, xxx= 435 to 470, in steps of 5W,
LR5-54HBD-xxxM, xxx= 390 to 425, in steps of 5W,
LR5-54HIBD-xxxM, xxx= 390 to 425, in steps of 5W,
LR5-54HABB-xxxM, xxx= 395 to 415, in steps of 5W,
LR5-54HIBB-xxxM, xxx= 395 to 415, in steps of 5W,
LR5-54HABD-xxxM, xxx= 395 to 420, in steps of 5W,
LR5-72HGD-xxxM, xxx = 560 to 590, in steps of 5W,
LR5-60HND-xxxM, xxx= 455 to 475, in steps of 5W,
LR5-66HND-xxxM, xxx= 500 to 520, in steps of 5W,
LR5-72HND-xxxM, xxx= 545 to 570, in steps of 5W,
LR5-72HND-xxxM, xxx= 545 to 570, in steps of 5W,
LR5-72HAD-xxxM, xxx= 535 to 560, in steps of 5W,
LR5-72HID-xxxM, xxx= 535 to 560, in steps of 5W,
LR7-72HGD-xxxM, xxx= 585 to 620, in steps of 5W,
LR5-72HJD-xxxM, xxx= 560 to 605, in steps of 5W,
LR7-72HJD-xxxM, xxx= 600 to 625, in steps of 5W,
LR5-54HTBB-xxxM, xxx= 410 to 435, in steps of 5W,

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LR5-78HGD-xxxM, xxx = 610 to 645, in steps of 5W,
LR7-54HGBB-xxxM, xxx = 440 to 460, in steps of 5W,
LR8-66HGD-xxxM, xxx = 595 to 625, in steps of 5W,
LR8-48HGD-xxxM, xxx = 430 to 455, in steps of 5W,

Note:

1. All electrical data are shown as relative to standard test conditions (STC) (1 000 W/m2, (25 ± 2) °C, AM 1,5 according to IEC 60904-3).
2. Manufacturer's stated tolerance is ±3% for Voc and Pm, and Isc**,** except for the following:

Model series	Voc	Isc
LR5-72HGD-xxxM LR7-72HGD-xxxM LR5-72HTD-xxxM LR5-54HTD-xxxM LR5-72HJD-xxxM LR7-72HJD-xxxM LR5-54HTBB-xxxM LR5-78HGD-xxxM	±5%	±5%

3. Rated electrical characteristics are only reflected the front side performance, regardless of the back side.
4. All modules model with suffix 'BP' after '72' or '60', are Bifacial PERC modules
5. All modules model with suffix 'PD' after '72' or '60', are modules with PERC Dual Glass.
6. All modules model with suffix 'DG' after '72' or '60', are modules with Dual Glass.
7. All modules model with suffix 'HBD' after '72' or '60' or '78', are modules with Multi-Busbar Bifacial Dual Glass.
8. All modules model with suffix 'OPD' after '72' or '60' or '78', are modules with Overlap Bifacial PERC Dual Glass.
9. All modules model with suffix 'HPD' after '72' or '60', are modules with Half Cell PERC Dual Glass.
10. All modules model with suffix 'MBD' after '72' or '60', are modules with Multi-Busbar Bifacial Dual Glass.
11. All modules model with suffix 'MPD' after '72' or '60', are modules with Multi-Busbar PERC Dual Glass.
12. All modules model with suffix 'HIBD' after '72' or '60', are modules with Half Improved Bifacial Cell Dual Glass.
13. All modules model with suffix 'ZBD' after '72' or '60', are modules with Zero Clearance Bifacial Dual Glass.
14. LR6 is for models with 156mm cells, LR4 is for models with 166mm cells, and LR5 is for models with 182mm.
15. All modules model with suffix 'HABB' after '54', are modules with Half Cell Advanced Bifacial Black Dual Glass.
16. All modules model with suffix 'HIBB' after '54', are modules with Half Improved Bifacial Cell Black Dual Glass.
17. All modules model with suffix 'HABD' after '54', are modules with Half Cell Advanced Bifacial Dual Glass.
18. All modules model with suffix 'HGD' after '72' or '78', are modules with Half Cell G Technology Bifacial Dual Glass.
19. All modules model with suffix 'HND', are modules with Half Cell N Type Technology Bifacial Dual Glass.

20. All modules model with suffix 'HAD', are modules with Half Cell Advanced Bifacial Technology Cell and white encapsulation on the rear side of cell.
21. All modules model with suffix 'HID', are modules with Half Improved Bifacial Cell and white encapsulation on the rear side of cell.
22. All modules model with suffix 'HJD', are modules with Half Heterojunction Cell.
23. All modules model with suffix 'HTD', are modules with cell M10P0B(BC technology).
24. All modules model with suffix 'HTBB' after '54', are modules with cell M10P0B(BC technology) and Black Dual Glass.
25. All modules model with suffix 'HGBB' after '54', are modules with cell G11N18B, Half Cell G Technelogy Bifacial Dual Glass Black.
26. LR6 is for models with 156mm cells, LR4 is for models with 166mm cells, and LR5 is for models with 182mm **cells**, LR7 is for models with 182.2(±2)mm x 95.8(±2)mm **cells**, LR8 is for models with **182(±2)mm x 105(±2)mm cells**
27. The operating ambient temperature of these devices may exceed 40℃ at full load for all wire sizes if it is determined suitable in the field use application.

APPLICABLE REQUIREMENTS

CSA C22.2 No. 61730-1:19	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction, 2019-12
CSA C22.2 No. 61730-2:19	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing, 2019-12
UL 61730-1 2nd Edition	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, October 28, 2022
UL 61730-2 2nd Edition	Photovoltaic (PV) Module Safety Qualification – Part 2: Requirements for Testing, October 28, 2022(Reprint with revisions through and including November 10, 2023)

Notes:

Products certified under Class C531110 have been certified under CSA's ISO/IEC 17065 accreditation with the Standards Council of Canada (SCC). www.scc.ca

Supplement to Certificate of Compliance

Certificate: 80021505 **Master Contract:** 266494

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
80219044	**2024-08-08**	**Update report to include new model series LR8-66HGD-xxxM and LR8-48HGD-xxxM, with new cell G12N16B and cell interconnector Φ0.26.**
80219043	2024-07-30	Update report to include new model series LR7-54HGBB-xxxM, with cells & strings interconnectors covered with outer black coating, little change on frame design and 4 methods of installation verified.
80219045	2024-07-24	Update report 80021505 to add alternative superstrate 3.2 mm thickness for model series LR5-72HBD-xxxM, LR5-72HGD-xxxM, and LR7-72HGD-xxxM, update module fire performance types. Update report to add alternative strings connector manufacturers NANTONG DEJINCHANG OPTOELECTRONICS TECHNOLOGY CO.,LTD, KUNSHAN DEJINCHANG OPTOELECTRONICS TECHNOLOGY CO.,LTD and DEJINCHANG NEW MATERIAL (THAILAND) CO., LTD, alternative encapsulation manufacturer Bette rial(Vietnam) Film Technology Company Limited, with confirmation letters.
80195905	2024-03-08	Update report to add alternative new reduced thickness 165±16.5 um cell M10B9B.
80182557	2024-02-29	Update report to add new factory - ILLUMINATE USA LLC., with tests on representative samples assembly in the factory, Initial Factory Evaluation performed in project 80182558 with satisfying result.
80189374	2024-01-17	Update report to include new model series LR5-78HGD-xxxM.
80189375	2024-01-12	Update report 80021505 to add new model series LR5-54HTBB-xxxM with only maximum power determination test, base on already approved models LR5-54HABB-xxxM and LR5-54HTD-xxxM, include a new bypass diode 35SQ045 to Jbox PV-LR07A, change the Voc and Isc tolerance for LR5-72HJD-xxxM, LR7-72HJD-xxxM and LR5-54HTBB-xxxM to ±5%.

80189372	2023-12-22	Update report 80021505 to add new encapsulation combination B602/B601HP(LRPT02/ LRET02), new encapsulation combination P507/S201MT1(LRPT06/LRET06), which are opposite with the previous approved application for upper and lower side of cells, change the Voc and Isc tolerance for LR5-72HTD-xxxM and LR5-54HTD-xxxM to ±5%.
80194220	2023-12-14	Update report 80021505 to add new model series LR5-72HJD-xxxM and LR7-72HJD-xxxM, with new Half Heterojunction Cell G10-H-18B and G11-H-18B, add new encapsulation EP308/ EP308 by Hangzhou First Applied Material Co., Ltd, new cells interconnector Φ0.25 with coating materials Sn43Pb43Bi14, add new model series LR5-54HTD-xxxM based on the test data in Edition 31: Project 80121445 of this report.
80175116	2023-12-01	Update report 80021505 to use the latest version of UL 61730-2, to update the module fire performance type to Type 38, which not covered in the previous version of this standards. Update the Manufacturer's stated tolerance to ±5% for Voc and Isc for model series LR5-72HGD-xxxM and LR7-72HGD-xxxM.
80167978	2023-11-14	Update report to add new factory - LONGI MALAYSIA SDN. BHD., with tests on representative samples assembly in the factory, Initial Factory Evaluation performed in project 80167979 with satisfying result.
80189369	2023-11-08	Update report to add new model series LR7-72HGD-xxxM with new cell G11N18B.
80176131	2023-10-17	Update report 80021505 to add alternative size 2465 mm x 1134 mm x 30 mm for LR5-78HBD-xxxM and enlarge power range to 610W for LR5-78HBD-xxxM.
80181955	2023-10-10	Update report 80021505 to add alternative superstrate & substrate glass 1.6mm thickness by Suolate Special Glass(Jiangsu) Co.,Ltd.
80181953	2023-10-07	Update report to add alternative superstrate & substrate glass 1.6mm thickness by Flat Solar Glass Group Co., Ltd.
80177109	2023-09-06	Update report 80121505 to add new 1.6mm glass superstrate and substrate by Changzhou Huamei Photovoltaic New Materials Co., Ltd.
80169310	2023-08-18	Update report to add new frame design for module series LR5-72HAD-xxxM, add new frame tape DT9123 , qualification for TÜV Rheinland (Suzhou) Co., Ltd. under APT program.
80151913	2023-08-10	Update report 80021505 to include new encapsulation F406PS/TFW-8015, add new model series LR5-72HAD-xxxM and LR5-72HID-xxxM, add alternative cell manufacturer NWESTERN SOLAR VIETNAM COMPANY LIMITED with declaration letter.

80137009	2023-07-19	Update report 80021505 to include new cell M10N20B, add alternative cell cell connection φ0.25 mm, add new model series LR5-72HND, LR5-66HND, LR5-60HND, LR5-54HND, using this cell.
80166880	2023-04-25	Update report 80021505 to add new N type solar cell G10N18B for new model series LR5-72HGD-xxxM.
80165189	2023-04-14	Update report 80021505 to add alternative steal frame for LR5 series.
80163912	2023-03-29	Update report 80021505 to add alternative frame design little change with already approved ones, add 30 mm frame B side for several LR5 series models.
80151911	2023-02-17	Update report 80021505 to add alternative method of module series no. by laser coding on the inner side of substrate glass, update fire ratings to type 38 for modules with 1.6 mm thickness substrate & superstrate glass, update applicable standards to UL 61730-1 2nd Edition, UL 61730-2 2nd Edition.
80151908	2022-12-30	Update report 80021505 to add new model series LR5-5HABB-xxxM, LR5-54HIBB-xxxM, LR5-54HABD-xxxM, with specified superstrate and/or substrate glasses by Changzhou Almaden Co., Ltd, add alternative superstrate and substrate manufacturer Hunan Kibing Solar Technology Co., Ltd and Zhuzhou Kibing Group Co.,Ltd, by confirmation letter, little change on cell size for M10B9B and M10D9B, add alternative flux manufacturer TONGFANG TECHNOLOGY VIETNAM CO.,LTD, add 5 installation methods with tests on LR5-54HABD-xxxM.
80128861	2022-11-22	Update report 80021505 to add alternative frame and Jbox adhesives 9661 and 888C, combined with Longi Junction boxes and approved substrates glass, add alternative connectors PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/y for Longi Jboxes. add alternative encapsulation LRPT/LRPT, LRET/LRET, LRET/LRPT, , which are multiple listings with already approved encapsulations.
80131321	2022-09-26	Update report to add 4 installation methods for little change on the frame design verifications. and qualification of TÜV Rheinland (Shanghai) Co., Ltd under APT program.
80131823	2022-09-18	Update report to add alternative adhesives HT-8188, 1581, and CREVO709, combined with Longi Junction boxes and approved substrates glass.
80137011	2022-08-26	Update report 80021505 to include new model series LR5-60HBD-xxxM, LRT-60HIBD-xxxM, LR5-54HBD-xxxM, LR5-54HIBD-xxxM base on approved model series LR5-72HBD-xxxM and LR5-72HIBD-xxxM, enlarge power range for several model series based on the test data in previous projects, add new cell M10B18B, add new cell interconnector Φ0.25, and manufacturer sites for flux, base on the manufacturers' declarations.
80121445	2022-08-10	Update report 80021505 to include new model series LR5-72HTD-xxxM with new cell M10P0B.

80125870	2022-05-07	Update report 80021505 to revise the 182 mm cells dimension with little change, enlarge power range to 555W for model series LR5-72HIBD, enlarge power range to 505W for model series LR5-66HBD and LR5-66HIBD, revise the triangle cells connectors description, add the manufacturers name for the strings & cells Interconnector change the manufacturers name from MULTI-CONTACT ESSEN GMBH to Staubli Electrical Connectors AG as acquisition.
80100720	2022-01-14	Update report 80021505 to include reflective string connection 0.3mm x 4mm, 0.3mm x 7mm, include new installation methods and designed loads, 9 in total, include new size with little change for model series LR5-72HBD-xxxM and LR5-66HBD-xxxM, Requalification for CCIC Southern Testing Co., Ltd, under APT program.
80108451	2021-12-31	Update report 80021505 to include alternative superstrate and substrate glass 2.0 mm thickness by Ningxia Jinjin Technology Co., Ltd, include alternative output wiring system PV-LR07A complied with IEC 62790, base on TÜV SÜD Test Report No.: 70.407.21.168.01-01A1, 70.407.21.168.01-01 with additional evaluation requirement by CSA Group.
80105635	2021-12-01	Update report to enlarge power range for model series LR5-72HBD-xxxM to 555W, add alternate superstrate/substrate glass by CHANGZHOU HONGXIE SAFETY GLASS CO.,LTD, multiple listing information for encapsulation LET02/LRPT02 by LONGi, Co-license for Tesla Inc, type JB-TS03, and Co-license for SolarEdge Technologies Ltd, type PV-SE05A, add alternative frame adhesive RS-3316, and potting RS-3200 by ZHENJIANG RAYBOND HEW MATERIAL TECHIIOLOGY CO.LTD, new design for approved cells M6B9B, M6D9B, M10B9B, M10D9B, alternative fixing tape 9966 by Shanghai Hyperion Adhesive Material Co., Ltd..
80096054	2021-09-13	Update report 80021505 to include alternate superstrate and substrate glass 2.0mm and 2.5mm thickness by Anhui Shengshi New Energy Materials Technology Co.,Ltd, add alternative encapsulation combination LRPT03/LRPT03 by Longi Green Energy Technology Co., Ltd, supplement encapsulation LRPT01/LRPT01 as included in project 80084260.
80084260	2021-07-05	Update report 80021505 to include model series LR5-78HBD-xxxM, LR5-78ZBD-xxxM, new flux.
80075688	2021-06-17	Update report 80021505 to add: (1) Alternative superstrate 2.0 or 2.5mm coating tempered glass by Henan Ancai Hi-Tech Co., Ltd.; (2) Alternative substrate 2.0 or 2.5mm embossed coating tempered glass or floating coating tempered glass, with white gridding mask by Henan Ancai Hi-Tech Co., Ltd.; (3) Alternative encapsulation combination LRET/LRPT by Longi Green Energy Technology Co., Ltd.
80063327	2021-05-21	Update report 80021505 to add new model series LR4-78HBD-xxxM.
80075686	2021-03-25	Update report 80021505 to include superstrate and substrate glass 2.0mm and 2.5mm thickness by Changli glass Honghu Co., Ltd, add alternate adhesive and

		potting GUIBAO 888N for junction box PV-LR04A, and PV-LR05A, alternate junction box adhesive GUIBO 4808.
80070016	2021-01-26	Update report 80021505 to include new model series LR5-72HIBD-xxxM and LR5-66HIBD-xxxM, using new cell M10D9B, also enlarge the power range to 545W for model series LR5-72HBD-xxxM, update the naming code to make it clearer, add new connectors for Junction box PV-LR04B, refer to CSA report 70176715.
80057350	2021-01-05	Update report 80021505 to add alternate superstrate/substrate 2.5mm and 2.0mm thickness glass by CAI HONG GROUP NEW ENERGY COMPANY LIMITED, alternate fixing tape DT-9609 by Yantai Darbond Technology Co., Ltd.
80057346	2020-12-25	Update report 80021505 to include alternate cell M6B6B by JIANGSU RUNERGY YUEDA PV TECHNOLOGY CO.,LTD, alternate flux GOLF703-C by YIK SHING TAT INDUSTRIAL CO.,LTD.
80055318	2020-12-14	Update report 800215055 to add new designed model series LR4-78ZBD-xxxM.
80063164	2020-11-27	Update report to include new model series LR5-72HBD-xxxM and LR5-66HBD-xxxM, using halved cut cell M10B9B, output wiring system PV-LR05A.
80062314	2020-11-20	Update report 80021505 to include new superstrate and substrate 2.0mm/2.5mm glass by Shanxi RiShengDa New Energy Group Co.,Ltd, new POE by CHANGZHOU BBETTER FILM TECHNOLOGIES CO., LTD, and encapsulation SV15926/SE-556 by Changzhou Sveck Photovoltaic New Material Co., Ltd.
80055162	2020-10-16	Update report 80021505 to add alternate superstrate/substrate 2.5mm glass by Shaanxi Topray Solar Co., Ltd.
80055161	2020-10-16	Update report 80021505 to add alternate superstrate/substrate 2.5mm glass by Shenzhen New Kibing Technology Co., Ltd. Cell manufactures update as client's declaration.
80055163	2020-09-11	Update report 80021505 to add alternate superstrate 2.0mm by Shenzhen New Kibing Technology Co., Ltd, and alternate encapsulation ISARD2180&ISARD1180 by Crown Advanced material Co., Ltd, revise the power range of model series LR6-72HBD to 390W, supplemented the missing cell M2B6B and Jbox PV-LR03B.
80055164	2020-09-11	Update report 80021505 to add alternate superstrate 2.0mm by Shaanxi Topray Solar Co., Ltd, and alternate encapsulation B601HP&B602 by Changzhou BBETTER FILM TECHNOLOGY CO.,LTD, add fixing tap UV-T.
80052562	2020-08-21	Update report to add alternate cell M6D9B and cell-connectors φ0.32mm, update output wiring system configuration base on the TÜV SÜD Test IEC 62790 Report and manufacturer's statement, and enlarge the power range of model series LR4-72HIBD-xxxM and LR4-60HIBD-xxxM, add alternate lamination designs which have no clearance and creepage changed.

80042753	2020-05-28	Update report to add encapsulation combination F606PS/TF4, and glazed tempered glass.
80040323	2020-04-14	Update report to add Embossed Tempered glass or Floating Tempered Glass, and update information for output wiring system.
80037990	2020-04-02	Update report to add alternate cell M6B6B by Vina Cell Technology Co., Ltd, and flux SF105.
80035967	2020-03-25	Update report to add alternate cells interconnectors, and alternate output wiring compartments PV-LR02A, PV-LR03A, PV-LR04A.
80027423	2020-03-25	Update report to add alternate cells M6B9B and M6E9B, interconnectors, and alternate module sizes for models with 9bb M6 cells.
80034138	2020-02-27	Update report to add models LR4-72HBD-xxxM and LR4-60HBD-xxxM for new bifacial cell type M6B6B manufactured by LONGi.
80023865	2020-02-21	Update report to add alternate cell M2D5B.
80023861	2020-02-19	Update report to add new model series LR6-72HIBD-xxxM, LR6-60HIBD-xxxM, with cell M2D6B, and LR4-60HIBD-xxxM, LR4-72HIBD-xxxM, with cell M6D6B.
80030667	2020-01-10	Update report to add combinations of materials and new model series, as a reference of Test Report No. 704061700509-09 by TÜV SÜD Certification and Testing (China) Co., Ltd and previous CSA projects.
80021505	2019-11-28	Original certification.

Need help? View AccessDEQ instructional videos ×

Financial Responsibility / Ownership Form

Division of Energy, Mineral, and Land Resources

Project Information

The term “Project” refers to a project site.

Project Name *

Shawboro East Ridge Solar - Phase 1A & 1B (EI-76548)

Add New | View / Edit

Total Acreage Disturbed or Uncovered *

197.5

Approximate Date Land-Disturbing Activity Will Begin *

3/02/2026

Purpose of Development *

Other

Purpose of Development - Other (Describe) *

Solar Farm

Stream Classification (select all that apply) *

C: Aquatic Life, Secondary Contact Recreation, Fresh water | SW: Swamp Waters

If you are unsure of the stream classification, you can use the NC Surface Water Classifications Map to determine water classifications.

Individual to contact should erosion & sediment control issues arise during land-disturbing activity *

David Harris (david.harris@sunenergy1.com)

Engineering/Consulting Firm

Timmons Group, Inc (kim.hamby@timmons.com)

Funding Sources

Is this project to be funded with ARPA (American Rescue Plan Act) funds from DEQ's Division of Water Infrastructure? *

No

Is this project to be funded through DEQ's Division of Water Infrastructure (DWI) under Section 12.2(e) of North Carolina's Session Law 2023-134 (H259)? *

No

Click the following link for more information about North Carolina's Session Law 2023-134 and Section 12.2(e) to determine if this applies.

Hi-MO 5 (Assembled in US) (V4)

LR5-72HBD

540~560M

- Based on M10 wafer, best choice for ultra-large power plants
- Advanced module technology delivers superior module efficiency
  - M10 Gallium-doped Wafer
  - Integrated Segmented Ribbons
  - 18-busbar Half-cut Cell
- Globally validated bifacial energy yield
- High module quality ensures long-term reliability

12 12-year Warranty for Materials and Processing

30 30-year Warranty for Extra Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

IEC62941: Guideline for module design qualification and type approval

LONGi

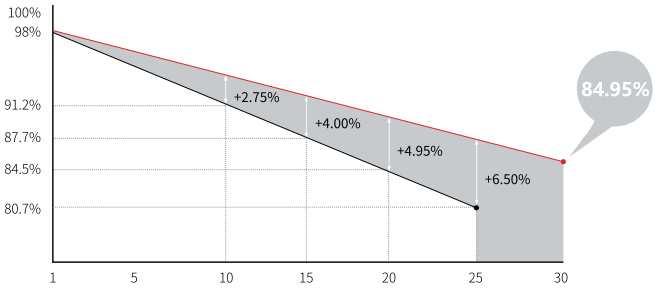
Hi-MO 5

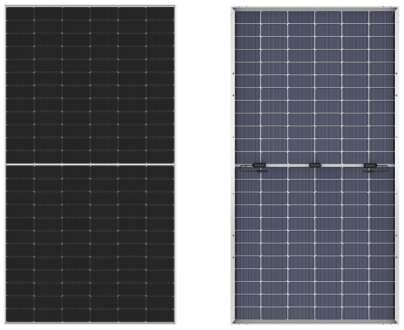
LR5-72HBD 540~560M

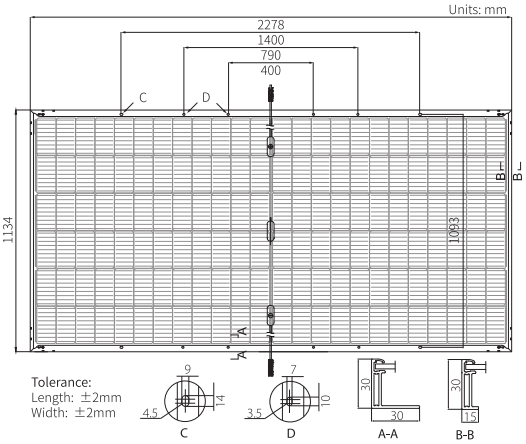
21.7%	0~3%	<2%	0.45%	HALF-CELL
MAX MODULE EFFICIENCY	POWER TOLERANCE	FIRST YEAR POWER DEGRADATION	YEAR 2-30 POWER DEGRADATION	Lower operating temperature

Additional Value

30-Year Power Warranty







Mechanical Parameters

Cell Orientation	144 (6×24)
Junction Box	IP68, three diodes
Output Cable	4mm², +400, -200mm/±1400mm length can be customized
Glass	Dual glass, 2.0+2.0mm heat strengthened glass
Frame	Anodized aluminum alloy frame
Weight	31.8kg
Dimension	2278×1134×30mm
Packaging	36pcs per pallet / 180pcs per 20' GP / 720pcs or 576pcs (Only for USA) per 40' HC

Electrical Characteristics

STC : AM1.5 1000W/m² 25°C NOCT : AM1.5 800W/m² 20°C 1m/s Test uncertainty for Pmax: ±3%

Module Type	LR5-72HBD-540M		LR5-72HBD-545M		LR5-72HBD-550M		LR5-72HBD-555M		LR5-72HBD-560M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	540	403.6	545	407.4	550	411.1	555	414.8	560	418.6
Open Circuit Voltage (Voc/V)	49.50	46.54	49.65	46.68	49.80	46.82	49.95	46.97	50.10	47.11
Short Circuit Current (Isc/A)	13.85	11.17	13.92	11.23	13.99	11.29	14.05	11.34	14.10	11.38
Voltage at Maximum Power (Vmp/V)	41.65	38.86	41.80	39.00	41.95	39.14	42.10	39.28	42.25	39.42
Current at Maximum Power (Imp/A)	12.97	10.39	13.04	10.45	13.12	10.51	13.19	10.56	13.26	10.62
Module Efficiency(%)	20.9		21.1		21.3		21.5		21.7	

Electrical characteristics with different rear side power gain (reference to 550W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
578	49.80	14.68	41.95	13.77	5%
605	49.80	15.38	41.95	14.43	10%
633	49.90	16.08	42.05	15.08	15%
660	49.90	16.78	42.05	15.74	20%
688	49.90	17.48	42.05	16.39	25%

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Bifaciality	70±5%
Fire Rating	UL type 29 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.265%/°C
Temperature Coefficient of Pmax	-0.340%/°C

LONGi

No.8369 Shangyuan Road, Xi'an Economic And Technological Development Zone, Xi'an, Shaanxi, China.

Web: www.longi.com

Major Stormwater Plan
Form SW-002

OFFICIAL USE ONLY:
Permit Number: _____
Date Filed: _____
Date Approved: _____

Contact Information

APPLICANT:
Name: Shawboro East Ridge Solar, LLC
Address: 200 Liberty Street, 14th Floor
New York, NY 10281
Telephone: 717-917-8483
E-Mail Address: john.mcvaigh@brookfieldrenewable.com

PROPERTY OWNER:
Name: East Ridge Land Holdings, LLC
Address: 595 Summer Street, 4th Floor
Stamford, CT 06901
Telephone: 252.825.1731
E-Mail Address: project.development@sunenergy1.com

Property Information

Physical Street Address: 1021 East Ridge Road
Parcel Identification Number(s): 0034000024P0000, 0043000010D0000, 0043000002100000
FEMA Flood Zone Designation: X

Request

Project Description: Solar Farm
Total land disturbance activity: 8,603,100 sf
Calculated volume of BMPs: 287,344 sf
Maximum lot coverage: N/A sf
Proposed lot coverage: 527,265 sf

TYPE OF REQUEST

- ☐ Major subdivision (10-year, 24-hour rate)
- ☐ Major site plan (5-year, 24-hour rate)

METHOD USED TO CALCULATE PEAK DISCHARGE

- ☐ Rational Method
- ☐ NRCS Method (TR-55 and TR-20)
- ☐ Simple volume calculation for small sites (less than 10 acres)
- ☐ Alternative stormwater runoff storage analysis
- ☐ Downstream drainage capacity analysis

I hereby authorize county officials to enter my property for the purpose of determining compliance. All information submitted and required as part of this process shall become public record.

John McVaigh Digitally signed by John McVaigh Date: 2026.01.06 11:28:15 -05'00'
Applicant — Date

Property Owner(s) — January 6, 2026 — Date

***NOTE: Form must be signed by the owner(s) of record, contract purchaser(s), or other person(s) having a recognized property interest. If there are multiple property owners/applicants a signature is required for each.**

DEMLR USE ONLY		
Date Received	Fee Paid	Permit Number

Applicable Rules: ☐ Coastal SW – 1995 ☐ Coastal SW – 2008 ☐ Ph II - Post Construction
(select all that apply) ☐ Non-Coastal SW- HQW/ORW Waters ☐ Universal Stormwater Management Plan
☐ Other WQ Mgmt Plan: _____

State of North Carolina
Department of Environmental Quality
Division of Energy, Mineral and Land Resources

POST-CONSTRUCTION STORMWATER MANAGEMENT PERMIT APPLICATION FORM

This form may be photocopied for use as an original.

I. GENERAL INFORMATION

1. Project Name (subdivision, facility, or establishment name - should be consistent with project name on plans, specifications, letters, operation and maintenance agreements, etc.):

   Shawboro East Ridge Solar - Phase 1A & 1B

2. Location of Project (street address):

   1021 East Ridge Road

   City:Shawboro County:Currituck Zip:27973

3. Directions to project (from nearest major intersection):

   From the intersection of US Hwy 158 and NC 34 in Camden County, travel approx. 5.67 miles on NC 34. East Ridge Road (SR 1203) will be on the right shortly after crossing the railroad tracks. Travel east on East Ridge Road for 0.73 miles. Project access is on the right through Phase 1A.

4. Latitude:36° 24' 24.5988" N Longitude:76° 4' 48.2052" W of the main entrance to the project.

II. PERMIT INFORMATION:

1.a. Specify whether project is (check one): ☐New ☒Modification ☐ Renewal w/ Modification†

†*Renewals with modifications also requires SWU-102 – Renewal Application Form*

b. If this application is being submitted as the result of a **modification** to an existing permit, list the existing permit number _____, its issue date (if known)_____, and the status of construction: ☐Not Started ☒Partially Completed* ☐ Completed* **provide a designer's certification*

2. Specify the type of project:
   ☒Low Density ☐High Density ☐Drains to an Offsite Stormwater System ☐Other

3. If this application is being submitted as the result of a **previously returned application** or a **letter from DEMLR requesting a state stormwater management permit application**, list the stormwater project number, if assigned, SW7250111 and the previous name of the project, if different than currently proposed, Shawboro East Ridge Solar - Phase 1A.

4.a. Additional Project Requirements (check applicable blanks; information on required state permits can be obtained by contacting the Customer Service Center at 1-877-623-6748):

   ☐CAMA Major ☒Sedimentation/Erosion Control: 197.5 ac of Disturbed Area

   ☐NPDES Industrial Stormwater ☐404/401 Permit: Proposed Impacts _____

b. If any of these permits have already been acquired please provide the Project Name, Project/Permit Number, issue date and the type of each permit:E&S approval received but also being modified for additional acreage Permit No. CURRI-2025-0132 issued 2/21/25 for Phase 1A

5. Is the project located within 5 miles of a public airport? ☐No ☒Yes
   If yes, see S.L. 2012-200, Part VI: http://portal.ncdenr.org/web/lr/rules-and-regulations

III. CONTACT INFORMATION

1.a. Print Applicant / Signing Official's name and title (specifically the developer, property owner, lessee, designated government official, individual, etc. who owns the project):

Applicant/Organization: Shawboro East Ridge Solar, LLC

Signing Official & Title: John McVaigh, Vice President

b. Contact information for person listed in item 1a above:

Street Address: 200 Liberty Street, 14th Floor

City: New York State: NY Zip: 10281

Mailing Address (*if applicable*): same

City: State: Zip:

Phone: (717) 917.8483 Fax: ( )

Email: john.mcvaigh@brookfieldrenewable.com

c. Please check **(one)** the appropriate box. The applicant listed above is:

☐ The property owner (Skip to Contact Information, item 3a)
☐ Lessee* (Attach a copy of the lease agreement and complete Contact Information, item 2a and 2b below)
☐ Purchaser* (Attach a copy of the pending sales agreement and complete Contact Information, item 2a and 2b below)
☒ Developer* (Complete Contact Information, item 2a and 2b below.)

2.a. Print Property Owner's name and title below, if you are the lessee, purchaser or developer. (This is the person who owns the property that the project is located on):

Property Owner/Organization: East Ridge Land Holdings, LLC

Signing Official & Title: Kenny Habul, Manager

b. Contact information for person listed in item 2a above:

Street Address: 595 Summer St., 4th Floor

City: Stamford State: CT Zip: 06901

Mailing Address (*if applicable*): same

City: State: Zip:

Phone: (252) 825.1731 Fax: ( )

Email: project.development@sunenergy1.com

3.a. (Optional) Print the name and title of another contact such as the project's construction supervisor or other person who can answer questions about the project:

Other Contact Person/Organization:

Signing Official & Title:

b. Contact information for person listed in item 3a above:

Mailing Address:

City: State: Zip:

Phone: ( ) Fax: ( )

Email:

4. Local jurisdiction for building permits: Currituck County

Point of Contact: Bill Newns, Planning & Insp Director Phone #: (252) 232.6023

Email: Bill.Newns@currituckcountync.gov

IV. PROJECT INFORMATION

1. In the space provided below, briefly summarize how the stormwater runoff will be treated.
For phase 1A, an attinuation pond was provided to meet county standards with some new ditches at 3:1 side slopes. All runoff not collected in the new ditches and routed to the pond will sheet flow across open grassed land to existing field ditches to remain.

2.a. **If claiming vested rights**, identify the supporting documents provided and the date they were approved:
- ☐ Approval of a Site Specific Development Plan or PUD — Approval Date: _____
- ☐ Valid Building Permit — Issued Date: _____
- ☐ Other: _____ — Date: _____

b. **If claiming vested rights**, identify the regulation(s) the project has been designed in accordance with:
☐ Coastal SW – 1995 ☐ Ph II – Post Construction

3. Stormwater runoff from this project drains to the Pasquotank River basin.

4. Total Property Area: 386.69 acres

5. Total Coastal Wetlands Area: 0 acres

6. Total Surface Water Area: 0 acres

7. Total Property Area (4) – Total Coastal Wetlands Area (5) – Total Surface Water Area (6) = Total Project Area+: 282.2 acres

+ *Total project area shall be calculated to exclude the following: the normal pool of impounded structures, the area between the banks of streams and rivers, the area below the Normal High Water (NHW) line or Mean High Water (MHW) line, and coastal wetlands landward from the NHW (or MHW) line. The resultant project area is used to calculate overall percent built upon area (BUA). Non-coastal wetlands landward of the NHW (or MHW) line may be included in the total project area.*

8. Project percent of impervious area: (Total Impervious Area / Total Project Area) X 100 = 4.29 %

9. How many drainage areas does the project have? 1 *(For high density, count 1 for each proposed SCM. For low density and other projects, use 1 for the whole property area. If there are multiple receiving streams, provide the drainage areas within the project area to each stream.)*

10. Complete the following information for each drainage area directed to an SCM or low density area identified in Project Information item 9. If there are more than four drainage areas in the project, attach an additional sheet with the information for each area provided in the same format as below.

Basin Information	Drainage Area 1	Drainage Area __	Drainage Area __	Drainage Area __
Receiving Stream Name	East Creek			
Stream Class *	C; Sw			
Stream Index Number *	30-2-3			
Total Drainage Area (sf)	12,292,923			
On-site Drainage Area (sf)	12,292,923			
Off-site Drainage Area (sf)	0			
Proposed Impervious Area** (sf)	527,265			
% Impervious Area** (total)	4.29			

Impervious** Surface Area	Drainage Area __	Drainage Area __	Drainage Area __	Drainage Area __
On-site Buildings/Lots (sf)				
On-site Streets (sf)	413,828			
On-site Parking (sf)				
On-site Sidewalks (sf)				
Other on-site (sf)	113,437			
Future (sf)				
Off-site (sf)				
Existing BUA*** (sf)				
Total (sf):	527,265			

* *Stream Class and Index Number can be determined at: https://www.deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/classifications*

** *Impervious area is defined as the built upon area including, but not limited to, buildings, roads, parking areas, sidewalks, gravel areas, etc.*

*** *Report only that amount of existing BUA that will remain after development. Do not report any existing BUA that is to be removed and which will be replaced by new BUA. See definition 15A NCAC 02H .1002(17).*

11. How was the off-site impervious area listed the Section IV, 10 Tables determined? Provide documentation.
N/A

Projects in Union County: *Contact DEMLR Central Office staff to check if the project is located within a Threatened & Endangered Species watershed that may be subject to more stringent stormwater requirements as per 15A NCAC 02B .0600.*

V. SUPPLEMENT AND O&M FORMS

The applicable state stormwater management permit supplement and operation and maintenance (O&M) forms must be submitted for each SCM specified for this project. The latest versions of the forms can be downloaded from https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/stormwater-design-manual. For SCMs subject to older design standards or offsite projects, the archived supplement can be found from https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/stormwater-design-manual/archived-stormwater-design-manual-supplemental-forms

VI. CHECKLIST OF SUBMITTAL REQUIREMENTS FOR AN ADMINISTRATIVELY COMPLETE APPLICATION PACKAGE PER 15A NCAC 02H .1042(2)

Only complete application packages will be accepted and reviewed by the Division of Energy, Mineral and Land Resources (DEMLR). An administratively complete application package includes all of the items listed below. A detailed application instruction sheet and SCM checklists are available from https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/post-construction-program/new-permits-permit-modifications**. The complete application package should be submitted to the appropriate DEMLR Office.** (The appropriate office may be found by locating project on the interactive online map at https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/post-construction-program.)

Please **indicate that the following required information have been provided by initialing** in the space provided for each item. All original documents MUST be signed and initialed in **blue ink**. **Download the latest versions for each submitted application package** from https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program.

		Initials
1.	*Original and one copy* of the Stormwater Management Permit Application Form.	kdh
2.	*Original and one copy* of the signed and notarized Deed Restrictions & Protective Covenants Form or, for major modifications, a copy of the recorded deed restrictions and protective covenants limiting the built-upon area so that it does not exceed the capacity of the SCM(s) or the BUA thresholds. *(if required as per Part VII below)* Deed book: ____ Page No: ____ Relevant section:	N/A
3.	*Original* of the applicable Supplement Form(s) (sealed, signed and dated) **and** O&M agreement(s) for each SCM. *(please refer to Section V for more information)*	kdh
4.	Appropriate permit application processing fee per NCGS 143-215.3D(e)(2) *payable to NCDEQ.* A full list of fee adjustments is available on the DEQ website: https://www.deq.nc.gov/accessdeq/permit-fees-2023-updates (For an Express review, refer to: https://www.deq.nc.gov/accessdeq/express-permitting for information on the Express program and the associated fees. Contact the appropriate Coastal regional office Express Permit Coordinator for additional information and to schedule the required application meeting.)	kdh
5.	A detailed narrative (one to two pages) describing the stormwater treatment/management for the project. This is required in addition to the brief summary provided in the Project Information, item 1.	kdh
6.	A USGS map identifying the site location. If the receiving stream is reported as class SA or the receiving stream drains to class SA waters within ½ mile of the site boundary, include the ½ mile radius on the map.	kdh
7.	Sealed, signed, and dated calculations (one copy).	kdh

8. Two sets of plans folded to 8.5" x 14" (sealed, signed, & dated), including: kdh
   a. Development/Project name.
   b. Engineer and firm.
   c. Location map with named streets and NCSR numbers.
   d. Legend.
   e. North arrow.
   f. Scale.
   g. Revision number and dates.
   h. Identify all surface waters on the plans by delineating the normal pool elevation of impounded structures, the banks of streams and rivers, the MHW or NHW line of tidal waters, and any coastal wetlands landward of the MHW or NHW lines.
      - Delineate the vegetated setback landward from the normal pool elevation of impounded structures, the banks of streams or rivers, and the MHW (or NHW) of tidal waters.
   i. Dimensioned property/project boundary with bearings & distances.
   j. Site Layout with all BUA identified and dimensioned.
   k. Existing contours, proposed contours, spot elevations, finished floor elevations.
   l. Details of roads, drainage features, collection systems, and stormwater control measures (including any applicable SCM planting plans).
   m. Wetlands delineated, or a note on the plans that none exist. (Must be delineated by a qualified person; identify the person who made the determination on the plans.
   n. Existing drainage (including off-site), drainage easements, pipe sizes, runoff calculations.
   o. Drainage areas delineated (included in the main set of plans, not as a separate document).
9. Copy of any applicable soils report with the associated SHWT elevations (Please identify elevations in addition to depths) as well as a map of the boring locations with the existing elevations and boring logs. Include an 8.5"x11" copy of the NRCS County Soils map with the project area clearly delineated. For projects with infiltration SCMs, the report should also include the soil type, expected infiltration rate, and the method of determining the infiltration rate. (**Infiltration Devices submitted to WiRO:** *Schedule a site visit for DEMLR to verify the SHWT Prior to submittal, (910) 796-7378.)* N/A also 1822/635 + 1800/141
10. A copy of the most current property deed. Deed book: 1791 Page No: 767 kdh
11. For corporations and limited liability corporations (LLC): Provide documentation from the NC Secretary of State or other official documentation, which supports the titles and positions held by the persons listed in Contact Information, item 1a, 2a, and/or 3a per 15A NCAC 2H.1040(1). The corporation or LLC must be listed as an active corporation in good standing with the NC Secretary of State, otherwise the application will be returned. http://www.secretary.state.nc.us/Corporations/CSearch.aspx kdh
12. If the applicant is not the property owner, a copy of a lease agreement, affidavit, or other document showing that the applicant has obtained legal rights to submit a stormwater permit application within the proposed project area; kdh
13. If applicable, a copy of any recorded drainage, maintenance, or operation and maintenance easements demonstrating ownership interest sufficient to operate the SW system. Deed book: _____ Page No: _____ Relevant section: _____ N/A
14. If a modification to an existing permit: kdh
    a. The applicant / permit holder will remain the same and permit has not and will not expire within the next 180 days. N/A
    b. Signed, sealed & dated Designer Certification Forms N/A
    c. Copies of the following documents recorded with the County Register of Deeds
       i. Deed restrictions and protective covenants limiting the BUA so that it does not exceed the capacity of the SCM(s) or the BUA thresholds. N/A
       ii. Drainage easements, when applicable. N/A
       iii. Operation & Maintenance Agreement N/A
       iv. Final subdivision plat referencing the Operation & Maintenance Agreement N/A

VII. DEED RESTRICTIONS AND PROTECTIVE COVENANTS

For all subdivisions, outparcels, and future development, the appropriate property restrictions and protective covenants are required to be recorded prior to the sale of any lot. If lot sizes vary significantly or the proposed BUA allocations vary, a table listing each lot number, lot size, and the allowable built-upon area must be provided as an attachment to the completed and notarized deed restriction form. The appropriate deed restrictions and protective covenants forms can be downloaded from https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/post-construction-program/post-construction-forms. Download the latest versions for each submittal.

In the instances where the applicant is different than the property owner, it is the responsibility of the property owner to sign the deed restrictions and protective covenants form while the applicant is responsible for ensuring that the deed restrictions are recorded.

By the notarized signature(s) below, the permit holder(s) certify that the recorded property restrictions and protective covenants for this project, if required, shall include all the items required in the permit and listed on the forms available on the website, that the covenants will be binding on all parties and persons claiming under them, that they will run with the land, that the required covenants cannot be changed or deleted without concurrence from the NC DEMLR, and that they will be recorded prior to the sale of any lot.

VIII. CONSULTANT INFORMATION AND AUTHORIZATION

Applicant: Complete this section if you wish to designate authority to another individual and/or firm (such as a consulting engineer and/or firm) so that they may provide information on your behalf for this project (such as addressing requests for additional information).

Consulting Engineer: Kimberly D. Hamby

Consulting Firm: Timmons Group

Mailing Address: 1805 West City Drive, Unit E

City: Elizabeth City State: NC Zip: 27909

Phone: (252) 621.5029 Fax: (252) 562.6974

Email: kim.hamby@timmons.com

IX. PROPERTY OWNER AUTHORIZATION *(if Contact Information, item 2 has been filled out, complete this section)*

I, *(print or type name of person listed in Contact Information, item 2a)* Kenny Habul of East Ridge Land Holdings, LLC, certify that I own the property identified in this permit application, and thus give permission to *(print or type name of person listed in Contact Information, item 1a)* John McVaigh with *(print or type name of organization listed in Contact Information, item 1a)* Shawboro East Ridge Solar, LLC to develop the project as currently proposed. A copy of the lease agreement or pending property sales contract has been provided with the submittal, which indicates the party responsible for the operation and maintenance of the stormwater system.

As the legal property owner I acknowledge, understand, and agree by my signature below, that if my designated agent (entity listed in Contact Information, item 1) dissolves their company and/or cancels or defaults on their lease agreement, or pending sale, responsibility for compliance with the DEMLR Stormwater permit reverts back to me, the property owner. As the property owner, it is my responsibility to notify DEMLR immediately and submit a completed Name/Ownership Change Form within 30 days; otherwise I will be operating a stormwater treatment facility without a valid permit. I understand that the operation of a stormwater treatment facility without a valid permit is a violation of NC General Statue 143-215.1 and may result in appropriate enforcement action including the assessment of civil penalties of up to $25,000 per day, pursuant to NCGS 143-215.6.

Signature: X _____ Date: 12-17-25

I, Malgorzata K. Wentland, a Notary Public for the State of Connecticut, County of Fairfield, do hereby certify that Kenny Habul personally appeared before me this 17 day of December, 2025, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

Malgorzata K. Wentland

MALGORZATA K. WENTLAND NOTARY PUBLIC My Commission Expires 04-30-2030 CONNECTICUT

SEAL

My commission expires 04.30.2030

X. APPLICANT'S CERTIFICATION

I, *(print or type name of person listed in Contact Information, item 1a)* John McVaigh, certify that the information included on this permit application form is, to the best of my knowledge, correct and that the project will be constructed in conformance with the approved plans, that the required deed restrictions and protective covenants will be recorded, and that the proposed project complies with the requirements of the applicable stormwater rules under 15A NCAC 2H .1000 and any other applicable state stormwater requirements.

Signature: _____ Date: 12/17/2025

I, Amanda M. Burgess, a Notary Public for the State of Pennsylvania, County of Lancaster, do hereby certify that John McVaigh personally appeared before me this 17th day of December, 2025, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

Amanda M. Burgess

Commonwealth of Pennsylvania - Notary Seal
Amanda M. Burgess, Notary Public
Lancaster County
My commission expires June 3, 2028
Commission number 1273712
Member, Pennsylvania Association of Notaries

SEAL

My commission expires June 3, 2028

Operation & Maintenance Agreement

Project Name: Shawboro East Ridge Solar - Phases 1A & 1B

Project Location: East Ridge Road

Cover Page

Maintenance records shall be kept on the following SCM(s). This maintenance record shall be kept in a log in a known set location. Any deficient SCM elements noted in the inspection will be corrected, repaired, or replaced immediately. These deficiencies can affect the integrity of structures, safety of the public, and the pollutant removal efficiency of the SCM(s).

The SCM(s) on this project include (check all that apply & corresponding O&M sheets will be added automatically):

Infiltration Basin	Quantity:		Location(s):	
Infiltration Trench	Quantity:		Location(s):	
Bioretention Cell	Quantity:		Location(s):	
Wet Pond	Quantity:		Location(s):	
Stormwater Wetland	Quantity:		Location(s):	
Permeable Pavement	Quantity:		Location(s):	
Sand Filter	Quantity:		Location(s):	
Rainwater Harvesting	Quantity:		Location(s):	
Green Roof	Quantity:		Location(s):	
Level Spreader - Filter Strip	Quantity:		Location(s):	
Proprietary System	Quantity:		Location(s):	
Treatment Swale	Quantity:		Location(s):	
Dry Pond	Quantity:		Location(s):	
Disconnected Impervious Surface	Present:	No	Location(s):	
User Defined SCM	Present:	No	Location(s):	
Low Density	Present:	Yes	Type:	Vegetated swales/roadside ditches

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed for each SCM above, and attached O&M tables. I agree to notify NCDEQ of any problems with the system or prior to any changes to the system or responsible party.

Responsible Party:	John McVaigh
Title & Organization:	Vice President, Shawboro East Ridge Solar, LLC
Street address:	200 Liberty Street, 14th Floor
City, state, zip:	New York, NY 10281
Phone number(s):	717-917-8483
Email:	john.mcvaigh@brookfieldrenewable.com

Signature: _____ Date: 12/16/2025

I, Amanda M. Burgess, a Notary Public for the State of Pennsylvania

County of Lancaster, do hereby certify that John McVaigh

personally appeared before me this 16th day of December and

acknowledge the due execution of the Operations and Maintenance Agreement.

Witness my hand and official seal, Amanda M Burgess.

Commonwealth of Pennsylvania - Notary Seal
Amanda M. Burgess, Notary Public
Lancaster County
My commission expires June 3, 2028
Commission number 1273712
Member, Pennsylvania Association of Notaries

Seal

My commission expires June 3, 2028

Low Density Maintenance Requirements

Important maintenance procedures:

- The drainage area to the vegetated conveyance or vegetated receiving area will be carefully managed to reduce the sediment load to the vegetated conveyance or vegetated receiving area.
- After the initial fertilization to establish the grass in the vegetated conveyance or the vegetated receiving area, fertilizer will not be applied to the vegetated receiving areas.

The vegetated conveyance or vegetated receiving area will be inspected **quarterly**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

SCM element:	Potential problem:	How to remediate the problem:
Vegetation	Vegetation is too short or too long.	Maintain grassed vegetation such that the swale or vegetated area does not erode during the peak flow from the 10-year storm
Vegetated receiving areas	Trash/debris is present.	Remove the trash/debris.
	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then re-sod (or plant with other appropriate species) and water until established. Provide lime and a one-time fertilizer application.
	Trees and/or other woody vegetation are present in the swale.	Remove the trees and woody vegetation from the swale, regrade the swale if necessary and re-establish grass as shown on the approved plans.
Vegetated conveyances / swales / roadside ditches (other than curb outlet swales)	Trash/debris is present.	Remove the trash/debris.
	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then re-sod (or plant with other appropriate species) and water until established. Provide lime and a one-time fertilizer application.
	Sediment covers the grass at the bottom of the swale.	Remove sediment and dispose in an area that will not impact streams or SCMs. Re-sod if necessary.
	The side slope is steeper than the approved configuration.	Regrade the slopes to the permitted configuration per the approved plan and reestablish vegetation. If as-built or existing conditions do not allow the slopes to be regraded, contact the applicable permitting agency.
	Grass is dead, diseased or dying.	Determine the source of the problem: soils, hydrology, disease, etc. Remedy the problem and replace plants. Provide a one-time fertilizer application to establish the ground cover if necessary.
	Trees and/or other woody vegetation are present in the vegetated conveyance.	Remove the trees and woody vegetation from the vegetated conveyance, regrade the vegetated conveyance if necessary and re-establish grass as shown on the approved plans.
The outlet device (if applicable)	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment off-site.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Repair the damage and improve the flow dissipation structure.
	Discharges from the site are causing erosion or sedimentation in the receiving water.	Contact the local NCDEQ Regional Office.

SUPPLEMENT-EZ COVER PAGE

FORMS LOADED

PROJECT INFORMATION		
1	Project Name	**Shawboro East Ridge Solar - Phase 1A & 1B**
2	Project Area (ac)	282.2
3	Coastal Wetland Area (ac)	0
4	Surface Water Area (ac)	0
5	Is this project High or Low Density?	Low
6	Does this project use an off-site SCM?	No

COMPLIANCE WITH 02H .1003(4)		
7	Width of vegetated setbacks provided (feet)	N/A
8	Will the vegetated setback remain vegetated?	N/A
9	If BUA is proposed in the setback, does it meet NCAC 02H.1003(4)(c-d)?	N/A
10	Is streambank stabilization proposed on this project?	No

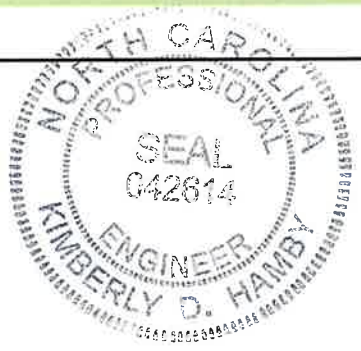
NUMBER AND TYPE OF SCMs:		
11	Infiltration System	
12	Bioretention Cell	
13	Wet Pond	
14	Stormwater Wetland	
15	Permeable Pavement	
16	Sand Filter	
17	Rainwater Harvesting (RWH)	
18	Green Roof	
19	Level Spreader-Filter Strip (LS-FS)	
20	Disconnected Impervious Surface (DIS)	
21	Treatment Swale	
22	Dry Pond	
23	StormFilter	
24	Silva Cell	
25	Bayfilter	
26	Filterra	

FORMS LOADED

DESIGNER CERTIFICATION		
27	Name and Title:	Kimberly D. Hamby, PE
28	Organization:	Timmons Group
29	Street address:	1805 W. City Drive Unit E
30	City, State, Zip:	Elizabeth City, NC 27909
31	Phone number(s):	252.621.5029
32	Email:	kim.hamby@timmons.com

Certification Statement:
I certify, under penalty of law that this Supplement-EZ form and all supporting information were prepared under my direction or supervision; that the information provided in the form is, to the best of my knowledge and belief, true, accurate, and complete; and that the engineering plans, specifications, operation and maintenance agreements and other supporting information are consistent with the information provided here.

Designer



Seal

Kimberly D. Hamby
Signature of Designer

12/18/25
Date

DRAINAGE AREAS

1	Is this a high density project?	No
2	If so, number of drainage areas/SCMs	0
3	Does this project have low density areas?	Yes
4	If so, number of low density drainage areas	1
5	Is all/part of this project subject to previous rule versions?	No

FORMS LOADED

DRAINAGE AREA INFORMATION		Entire Site	LD 1
4	Type of SCM	None	None
5	Total drainage area (sq ft)	12,292,923	12,292,923
6	Onsite drainage area (sq ft)	12,292,923	12,292,923
7	Offsite drainage area (sq ft)	0	0
8	Total BUA in project (sq ft)	527265 sf	527265 sf
9	New BUA on subdivided lots (subject to permitting) (sq ft)		
10	New BUA not on subdivided lots (subject to permitting) (sf)		
11	Offsite BUA (sq ft)		
12	Breakdown of new BUA not on subdivided lots:		
	- Parking (sq ft)		
	- Sidewalk (sq ft)		
	- Roof (sq ft)		
	- Roadway (sq ft)	413828 sf	413828 sf
	- Future (sq ft)		
	- Other, please specify in the comment box below (sq ft)	113437 sf	113437 sf
13	New infiltrating permeable pavement on subdivided lots (sq ft)		
14	New infiltrating permeable pavement not on subdivided lots (sq ft)		
15	Existing BUA that will remain (not subject to permitting) (sq ft)		
16	Existing BUA that is already permitted (sq ft)		
17	Existing BUA that will be removed (sq ft)		
18	Percent BUA	4%	4%
19	Design storm (inches)	1.5 in	1.5 in
20	Design volume of SCM (cu ft)	N/A	N/A
21	Calculation method for design volume	N/A	N/A

ADDITIONAL INFORMATION	
22	Please use this space to provide any additional information about the drainage area(s):

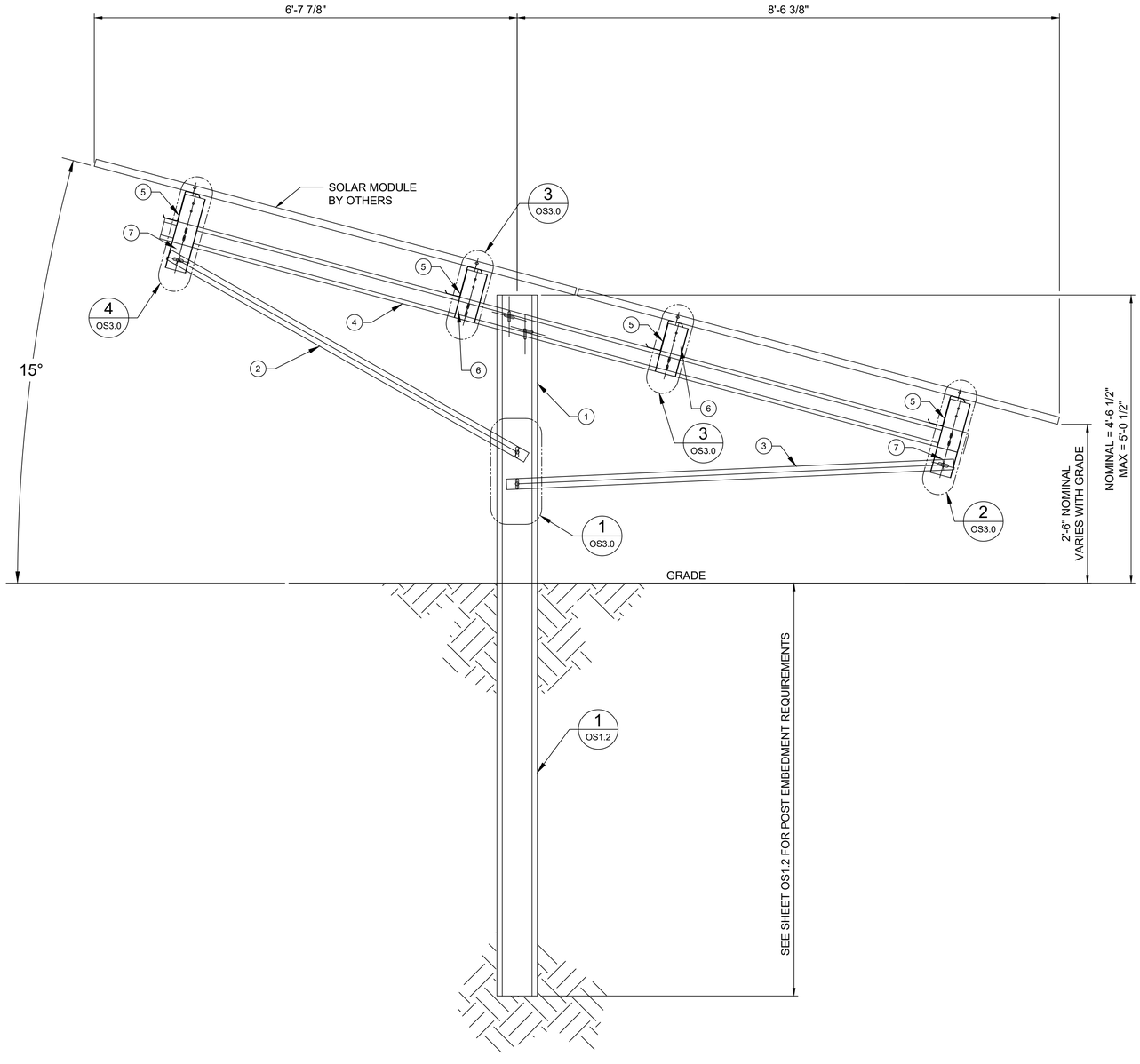
This project is low density and does not include a treatment SCM. There will be a pond on the project due to the Currituck County Stormwater regulations. Other coverage refers to equipment pad areas including the substation. Coverage is 4.29% which rounds to 4%.

LOW DENSITY

DESIGN REQUIREMENTS FOR LOW DENSITY PROJECTS FROM 02H .1003		
1	Is project below density thresholds set forth in the applicable stormwater rule?	Yes
2	Does project maximize dispersed flow and minimize channelization of flow?	Yes
3	Has the use of piping been minimized per .1003(2)(c)?	Yes
4	Side slopes of the vegetated conveyances (H:V)	3 sf
5	Maximum velocity in the vegetated conveyances during the 10-year storm?	1.24
6	Are curb outlet swales proposed?	No
7	Maximum longitudinal slope of curb outlet swale(s) (%)	
8	Bottom width of curb outlet swale(s) (feet)	
9	Maximum side slope of curb outlet swale(s) (H:V)	
10	Minimum length of curb outlet swale(s) (feet)	
11	Are treatment swales used instead of curb outlet swales?	
12	Is stormwater released at the edge of the setback as dispersed flow?	N/A
13	Have stormwater outlets been designed to prevent downslope erosion?	Yes
14	Are variations to rule .1003 proposed?	No
ADDITIONAL INFORMATION		
15	Please use this space to provide any additional information about this low density project:	

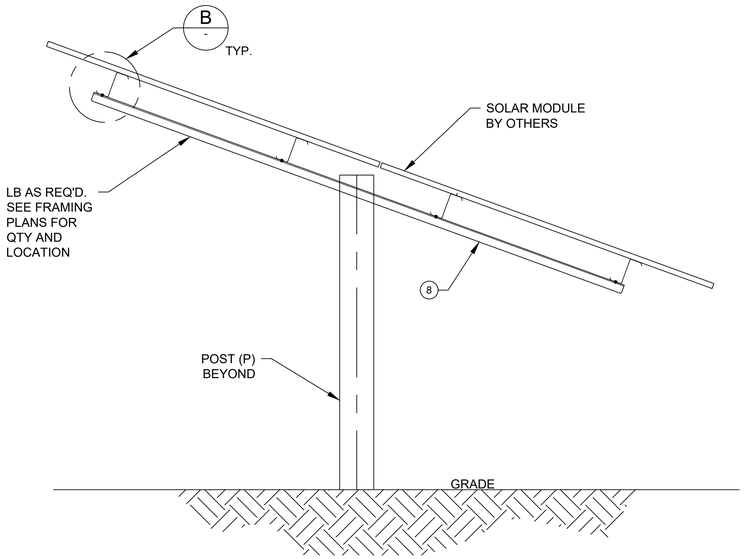
Please note that line 4 is supposed to read 3:1, which applies to all new swales. This project is substantially utilizing existing agricultural ditches to remain. The proposed swales included below were included in the original submission for Phase 1A. No new ditches are proposed for Phase 1B which will utilize existing drainage only.

Swale #	Drainage Area (ac)	BUA (ac)	Pervious area (ac)	C	Q (cfs)	Slope (%)	V_{allow} (fps)	V_{actual} (fps)	Flow depth (ft)
1	12.58	1.32	11.26	71.00	4.26	0.16	4.50	1.24	1.68
2	34.78	2.29	32.49	71.00	6.91	0.11	4.50	1.09	2.53
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

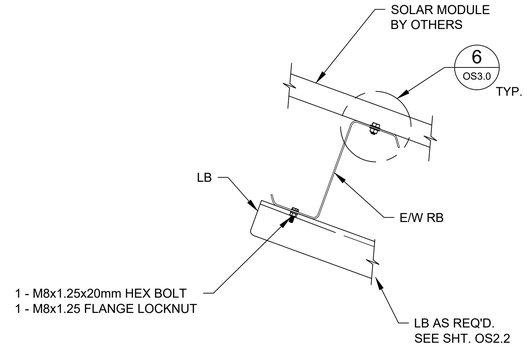


TYP. SECTION AT POST A -

(NTS)



SECTION AT LB C -



E/W RB TO LB CONNECTION B -

TYP.

NOTE: MODULE INSTALLATION SHALL BE PER MODULE MANUFACTURERS REQUIREMENTS.

DIMENSIONS

DESCRIPTION	WIDTH	LENGTH	THICKNESS	HOLE SPACING
Q.PEAK DUO ML-G12S	51.3"[1303mm]	93.9"[2384mm]	1.38"[35mm]	55.12"[1400mm]

COMPONENTS

ITEM NO.	DESCRIPTION	MARK
1	POST	P
2	DIAGONAL BRACE UPPER	DBU
3	DIAGONAL BRACE LOWER	DBL
4	TILT BRACKET	TB
5	EAST/WEST RACK BEAM	E/W RB
6	"U" CONNECTOR BRACKET SHORT	CBS
7	"U" CONNECTOR BRACKET LONG	CBL
8	LATERAL BRACE	LB

OMCO SOLAR

CHOICE GROUND MOUNT
SHAWBORO
SHAWBORO, NC, USA

REV	DATE	DRAWN	CHECK	RELEASE DESCRIPTION
0	1/31/25	IST		INITIAL RELEASE

PROJECT NAME: SHAWBORO

PROJECT NUMBER: 8362498426

FILE NAME: J:\CHOICE\SunEnergy1\Shawboro\Construction Package\Choice Construction Package - Shawboro.dwg

DRAWING NAME: TYPICAL SECTIONS

DRAWING NUMBER: OS2.1

OMCO SOLAR
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