BEALS+THOMAS
CIVIL ENGINEERS | LANDSCAPE ARCHITECTS |
LAND SURVEYORS | PLANNERS | ENVIRONMENTAL SPECIALISTS

November 23, 2020

Mr. George Barrett, Chair
Wareham Planning Board
c/o Mr. Kenneth Buckland, Town Planner
54 Marion Road
Wareham, Massachusetts 02571

Via: FedEx and Email to *kbuckland@wareham.ma.us* and *sraposo@wareham.ma.us*

Reference: Response to Peer Review Comments
Application for Site Plan Review, Case #9-20
150 Tihonet Road PV+ES Project
Wareham, Massachusetts
B+T Project No. 1833.112

Dear Planning Board Members:

On behalf of the Applicant, Borrego Solar Systems, Inc. (BSSI), Beals and Thomas, Inc. (B+T) respectfully submits this response to comments and associated revised plans for the above-referenced project in response to peer review comments by Charles L. Rowley, PE, PLS in a letter dated November 9, 2020, as well as associated Planning Board feedback during its November 9, 2020 hearing. For ease of review, peer review comments are indicated in *italicized* font, with our responses in regular font.

Enclosed are nine hard copies of this letter with full size plans. We understand that the Board will distribute one of these copies to the peer review consultant for supplemental review, and an electronic copy has also been sent to Mr. Rowley. A separate copy of the letter and plans have been submitted directly to Wareham Fire.

1. *The plans consist of 14 sheets indicating the location of the project, topography, existing site conditions and proposed changes to these site conditions. The project is located in the R-60 residential zoning district.*

   No response required.

2. *The plans indicate that the trees in the easterly portion of the project would be cut in the 50-foot buffer area. Section 594.1.4 of the Zoning By-Law requires a 50-foot minimum vegetated buffer where the property abuts a residential zoning district. The plan is in violation of this section.*

   Based upon discussion with the Board at the hearing, the plans have been modified to shift the limit of clearing westward along the eastern property line to eliminate clearing within the 50-foot zoning setback.

3. *The southerly portion of the project abuts an overhead powerline easement that has been cleared for a width of approximately 200 feet. The plan in this area shows an access road 20 feet wide abutting a cleared slope for panel installation. This clearing will be visible from Tihonet Road as viewed across the powerline easement.*

   It is recommended that the 175-foot wide buffer be included in this area to reduce the visual impact of the large array that will be seen. Tihonet Road at the powerline is at elevation 63 while the slope to be cleared rises to elevation 90 and more.

   Section 591 of the By-Law indicates that the purpose is to minimize the impacts on scenic, natural and historic resources. Section 594.1 allows the approving authority to require buffers in excess of 50 feet at its discretion. The elimination of solar panels in this area would cover an area of approximately 2.6 acres and would reduce the number of panels by 0.2%.

   As discussed at the hearing, Tihonet Road in the vicinity of the project is a privately owned and gated road. Therefore, requiring full screening of the array from Tihonet Road is not appropriate, and because of the 175 foot treed buffer between Tihonet Road and the proposed project, views of the array from Tihonet Road have been limited to those as a vehicle crosses through the existing transmission and distribution corridor within the local utility's easement.

   The Planning Board also expressed concern regarding potential views from the Red Pine Lane neighborhood to the project. Enclosed please find a profile view of the area discussed at the hearing, to document that the project will not be visible from the Red Pine Lane neighborhood.

4. *Why are there two access driveways at the northerly end of the project. See Sheet C-3.1 of the plan set? An internal connection to one of the two would appear to be feasible. Look for ways to screen the direct visual impact of the open roadway to the solar field.*

   As discussed at the hearing, the two northerly access points are preferred from a safety and traffic maneuverability standpoint, and reduce the extent of grading and gravel access drive associated with an east/west cross connector that would otherwise be necessary to maintain necessary emergency access. At the hearing, it was agreed that the northeasterly access drive could remain unless its removal was necessitated for stormwater reasons or if desired by Conservation Commission. We have discussed the access drive with the Conservation Administrator, and presented it at the Commission's November 18, 2020 hearing. We have also provided the requested stormwater information pursuant to Comment 6 herein. Therefore, it is the Applicant's understanding that the northeasterly access drive is acceptable.

5. *Explain the overhead wire connections from the existing powerline easement to the project site as required by Section 593.5 of the By-Law.*

   As discussed at the hearing, the Applicant prefers an overhead connection. Given the location adjacent to the existing medium and high voltage lines, and the distance from Tihonet Road, it was agreed at the hearing that the overhead connection could remain.

6. *The access road grades compute to be 4% for the southerly entrance, 3% for the northwest entrance and 6.7% for the northeast entrance. To properly assess the slope of these roads, a 30-scale plan should be developed for each showing how surface runoff and erosion will be controlled for each one. Minimum buffers should be respected, however the use of part of the expanded buffers could be used as discharge points for storm water if properly screened and controlled.*

   A 30-scale plan has been provided showing greater detail of the proposed grading strategy for each of the proposed access points into the site. For the south entrance, the sheet shows a cross-pitched driveway section which will flow into a crushed stone filled trench lined with filter fabric. The north-central driveway shows the driveway cross-pitched to the west side of the driveway where runoff can flow to adjacent existing vegetated areas which are gently sloped for infiltration. The northeastern access driveway cross section has been reworked to depict a crowned driveway section from the crest of the hill adjacent to Basin 5 that will shed water to either side of the driveway where it can flow towards natural depression areas on either side of the driveway at the toe of the fill slope embankments. For the three entry portions of the driveways and other areas where the driveways have an extended downhill grade, a modified driveway section comprised of 12-inches of reclaimed asphalt and gravel base material is proposed.

This material is a blend of pulverized asphalt and gravel base material created when reclaiming pavement and should be more resistant to surficial erosion after placement and compaction. A detail has been added to the plan indicating the material shall conform to the MassDOT M1.09.0-Reclaimed Pavement Borrow Material specification.

7. *Please explain the need for pipe outfalls for Infiltration Basins 2 and 6. The 100-year storm appears to be effectively controlled within each basin below the top of the rip rap spillway. Why is a point source discharge needed?*

   The proposed pipes have been eliminated from Basins 2 and 6, and spot grades added to the berm to ensure the minimum 1-foot of freeboard is maintained during the 100-year storm.

8. *The cross-connecting pipe for Basin 6 should have at least some pitch to prevent sediment buildup and potential clogging. It is also recommended that each end by protected against small animal entry.*

   The pipe invert has been revised to provide positive pitch to reduce the potential for sediment buildup or clogging. Installation of a rack or grate on the flared end may make the pipe more difficult to maintain, and we understand from discussion with Mr. Rowley that the main focus is to ensure positive pitch on the pipe. A note has been added to the plan indicating that the appropriateness of protection against small animal entry will be evaluated in conjunction with the Town/peer reviewer during construction and if deemed necessary will be installed.

9. *As required by Section 595 et sec, an Abandonment or Dismantlement plan should be provided. The cost estimate should be included and should include a provision for assessing the adjustment of cost on a continuing 5- year basis.*

   A revised decommissioning plan is enclosed herewith. As with past similar projects, the Applicant anticipates that conditions relating to assessing the adjustment of cost on a continuing 5-year basis will be included in the Planning Board's decision on the project.

We trust that the information provided herein satisfies the comments on the Project and look forward to meeting with the Planning Board at the continued hearing on November 23, 2020. Please do not hesitate to contact us should you have any questions in the interim.

Very truly yours,

BEALS AND THOMAS, INC.

Stacy H. Minihane, PWS
Senior Associate

Jeffrey R. Murphy, PE
Civil Engineer

Attachments: Revised Decommissioning Plan dated November 20, 2020
Supplemental Profile View Sheet C-6.0 dated November 20, 2020 in 1 sheet
Revised Plans dated November 20, 2020 in 16 sheets

cc: Wareham Conservation Commission (via email to: dpichette@wareham.ma.us and 2 hard copies via FedEx)
Wareham Fire Department (via Certified Mail)
Borrego Solar Systems, Inc. (via Box upload)
A.D. Makepeace Company, James Kane (US Mail with reduced plans and email)
Charles L. Rowley PE, PLS (via email to: crsr63@verizon.net and hard copy via Planning Office)

MKS/JRM/shm/aak/1833112LT003

Decommissioning Estimate

Date: 11/20/20

150 Tihonet Road
Wareham, MA

This Decommissioning Estimate has been prepared by Borrego Solar in an attempt to predict the cost associated with the removal of the proposed solar facility. Key assumptions used include the fact that the fencing, electrical cabinetry, solar racks, solar panels, wiring and all other equipment are all one hundred percent recyclable, therefore, the primary cost of decommissioning is the labor to dismantle and load as well as the cost of trucking. No salvage values have been assumed in these calculations. The concrete pads will be broken up at the site and hauled to the nearest transfer station where it will be accepted without a charge.

The following values were used in this Decommissioning Estimate:

System Specifications	
Number of Modules	39,798
Number of Racks	1,658
Number of Inverters	2
Number of Transformers	2
Electrical Wiring Length (ft)	5,720
Number of Foundation Screws	6,633
Length of Perimeter Fence (ft)	7,759
Number of Power Poles	12
Access Rd Material Volume (YD)	4,315
Total Disturbed Area (SF)	121,078
Total Fence Weight (lbs)	5,509
Total Racking Weight (lbs)	1,409,513
Total Foundation Screw Weight (lbs)	265,320

Labor and Equipment Costs		
Labor Rate ($/hr)	$	25.00
Bobcat Cost ($/hr)	$	50.00
Front End Loader Cost ($/Day)	$	1,000.00
Excavator Cost ($/Day)	$	1,000.00
Trucking Cost ($/hr)	$	120.00
Backhoe Cost ($/hr)	$	245.00
Power Pole Removal Cost ($/pole)	$	1,500.00
Grader Cost ($/day)	$	1,800.00
Gravel Export Cost ($/YD)	$	10.00
Loam Import Cost ($/YD)	$	25.00
Seeding Cost ($/SF)	$	0.08
Fuel Cost ($/mile)	$	0.25

Equipment & Material Removal Rates	
Module Removal Rate (min/module)	1
Rack Wiring Rem. Rate (min/mod)	0.5
Racking Dismantling Rate (min/rack)	30
Inverter Removal Rate (units/hr)	1
Transformer Removal Rate (units/hr)	0.5
Rack Loading Rate (min/Rack)	15
Elect. Wiring Removal Rate (min/LF)	0.5
Screw Rem. Rate (screws/day)	500
Fence Removal Rate (min/LF)	0.5
Days req. to break up concrete pads	4
Days req. with Rough Grader	2
Days req. with Fine Grader	3
Total Truckloads Required	104
Round-Trip Dist. to Trans. Sta.(miles)	56
Round-Trip Time to Trans. Sta. (hr)	1

Energy Storage Decommissioning		
Number of Energy Storage Units		5
Battery Disposal Fee	$	2,000.00
Battery Loading Prep Time (hr)		32
Battery Loading Time (hr)		8

Labor, Material, and Equipment Costs

1. Remove Modules

The solar modules are fastened to racking with clamps. They slide in a track. A laborer needs only unclamp the module and reach over and slide the module out of the track.

Module Removal Rate • Total Number of Solar Modules • Labor Rate = Module Removal Cost

Total = $ 16,582.50

2. Remove Rack Wiring

The modules are plugged together in the same manner as an electrical cord from a light is plugged into a wall socket. The string wires are in a tray. A laborer needs only unplug the module, reach into the tray and remove the strands of wire.

Wire Removal Rate • Total Number of Solar Modules • Labor Rate = Rack Wiring Removal Cost

Total = $ 8,291.25

3. Dismantle Racks

The racking is supported by screw foundations. The racking will be disconnected from the foundation and removed seperately.

Number of Racks • Rack Dismantling Rate • Labor Rate = Rack Dismantling Cost

Total = $ 20,728.13

4. Remove and Load Electrical Equipment

Electrical equipment includes transformers and inverters.

(Number of Inverters • Inverter Removal Rate + Number of Transformers • Transformer Removal Rate) • (Labor Rate + Bobcat Cost) = Electrical Equipment Removal Cost

Total = $ 225.00

5. Break Up Concrete Pads

Concrede pads are broken up using an excavator and jackhammer.

Number of Demolition Days • (Excavator Cost + Labor Cost) = Total Concrete Pad Removal

Total = $ 4,800.00

6. Load Racks

Once the racks have been dismantled, they will be loaded onto trucks for removal from the site. The trucking cost associated with this line item represents the additional time a truck will be needed during loading. Please see item # 13 for additional trucking costs.

Number of Racks • Rack Loading Rate • (Labor Cost + Front End Loader Cost + Trucking Cost) = Total Rack Removal Cost

Total = $ 80,839.69

7. Remove Electrical Wiring

Electrical wiring will be removed from all underground conduits.

Cable Length • Cable Removal Rate • (Labor Cost + Backhoe Cost) = Total Cable Removal Cost

Total = $ 12,870.00

8. Remove Foundation Screws

Foundation screws will be backed out of the ground and loaded onto a truck to be removed from site.

(Total Number of Screws / Daily Screw Removal Rate) • (Labor Rate + Excavator Cost) = Total Screw Removal Cost

Total = $ 15,919.20

9. Remove Fencing

Fencing posts, mesh, and foundations will be loaded onto a truck and removed from site. Trucking costs included in this line item are for the removal process. Trucking to a recycling facility are included in item #13.

(Total Length of Fence • Fence Removal Rate) • (Labor Rate + Bobcat Cost + Trucking Cost) =

Total = $ 12,608.38

10. Remove Power Poles

Power poles will be removed and shipped off site.

Number of Power Poles • Pole Removal cost = Total Power Pole Removal Cost

Total = $ 18,000.00

11. Seed Disturbed Areas

Seeding cost includes labor and materials for reseeding all disturbed areas including the reclaimed gravel road area, former electrical areas, and areas disturbed by racking foundation removal.

Seeding Cost • Disturbed Area = Total Seeding Cost

Total = $ 9,686.23

12. Truck to Transfer Station

All material will be trucked to the nearest Transfer station that accepts construction material. The nearest transfer station is Raynham Transfer Station

(Total Truckloads • Roundtrip Distance • Fuel Cost) + (Total Truckloads • Round Trip Time • Trucking Cost) =
Total Trucking Cost to Transfer Station

Total = $ 13,936.00

13. Remove and Dispose of Energy Storage Equipment

The battery units will be prepared for shipment and loaded onto a truck. A disposal fee will also be required for the disposal company to accept the batteries.

Number of Battery Units • ((Loading Prep Time • Labor Cost) + Loading Time • (Labor Rate + Bobcat Cost + Trucking Cost) + Disposal Fee) =
Total Energy Storage Removal and Disposal Cost

Total = $ 21,800.00

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Summary of Decommissioning Costs

Line Item	Task	Cost
1	Module Removal	$ 16,582.50
2	Rack Wiring Removal	$ 8,291.25
3	Rack Dismantling	$ 20,728.13
4	Electrical Equipment Loading and Removal	$ 225.00
5	Break Up Concrete Pads	$ 4,800.00
6	Load Racks	$ 80,839.69
7	Electrical Wiring Removal	$ 12,870.00
8	Foundation Screw Removal	$ 15,919.20
9	Fence Removal	$ 12,608.38
10	Power Pole Removal	$ 18,000.00
11	Seed Disturbed Areas	$ 9,686.23
12	Trucking to Transfer Station	$ 13,936.00
13	Energy Storage System Removal	$ 21,800.00
	Subtotal =	$ 236,286.37

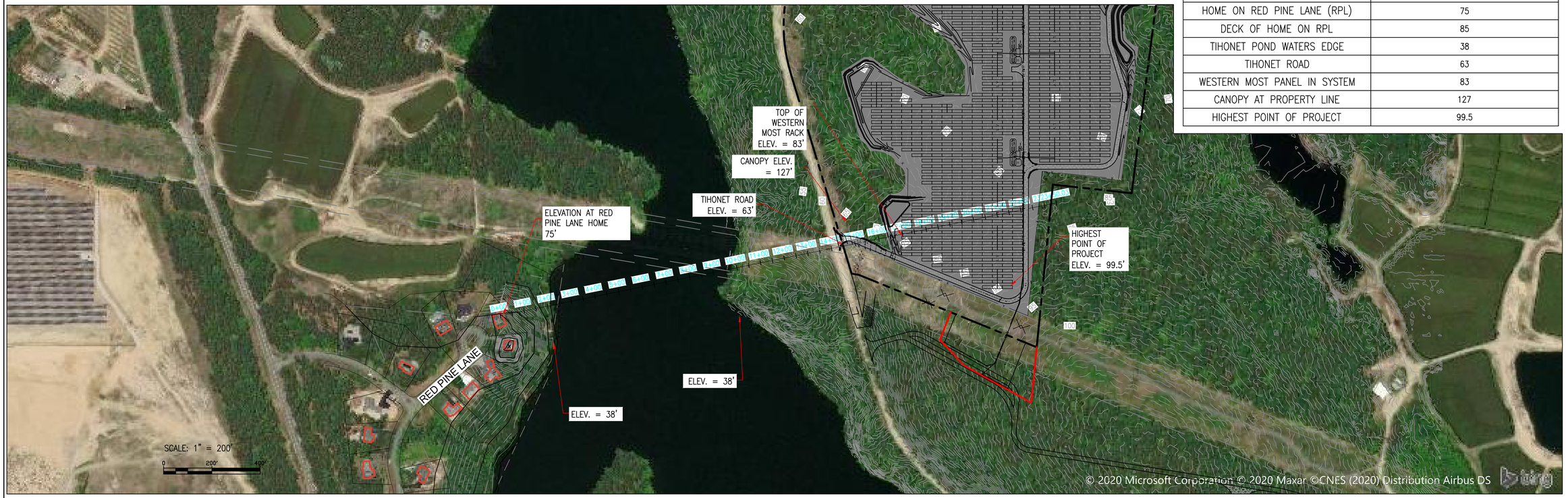
Present Value Total with 1.25% Adder = $ 295,357.96

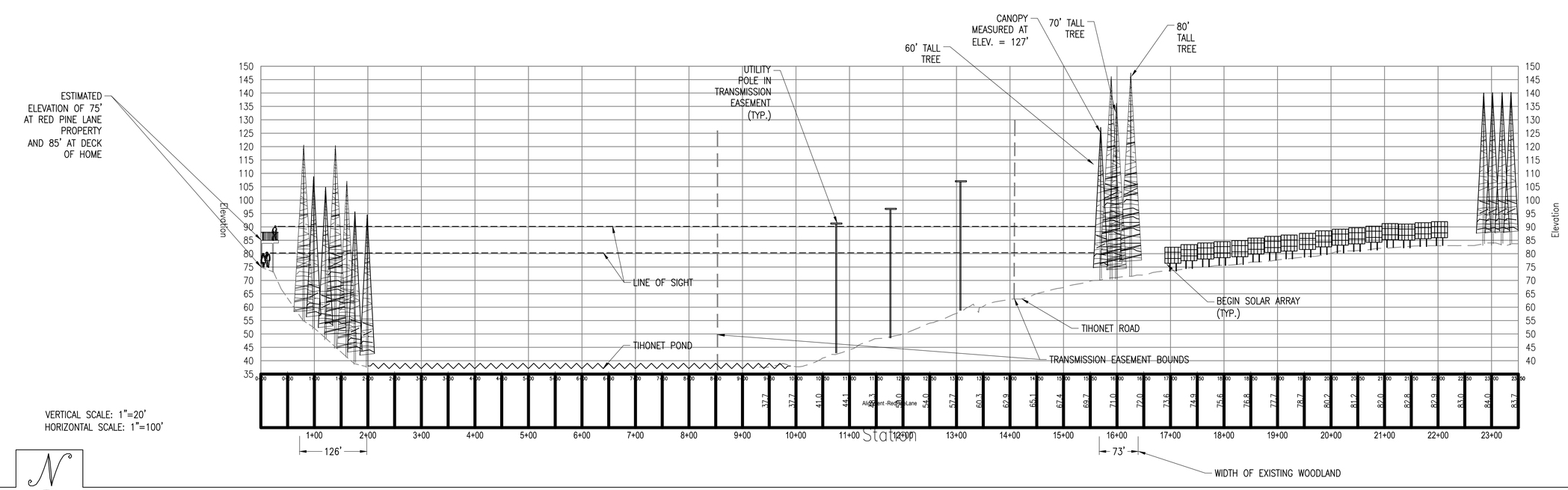
Total after 20 years @ 1.5% Inflation

Present Value • (1+ Inflation Rate)^Number of Years = Future Value

Grand Total = $397,804.35

LINE OF SIGHT – RED PINE LANE TO 150 TIHONET SOLAR	
ELEVATIONS OF KEY POINTS	
	APPROX. FEET
HOME ON RED PINE LANE (RPL)	75
DECK OF HOME ON RPL	85
TIHONET POND WATERS EDGE	38
TIHONET ROAD	63
WESTERN MOST PANEL IN SYSTEM	83
CANOPY AT PROPERTY LINE	127
HIGHEST POINT OF PROJECT	99.5





RED PINE LANE - SIGHT LINE TO 150 TIHONET ROAD PROJECT

SCALE: 1" = 100'

0 100' 200'

BORREGO SOLAR
55 TECHNOLOGY DRIVE, SUITE 102
LOWELL, MA 01851
PHONE: (888) 898-6273
FAX: (888) 843-6778
WWW.BORREGOSOLAR.COM

NOT FOR CONSTRUCTION

SITE USE PLANS
150 TIHONET ROAD
WAREHAM, MA 02571

PROJECT NUMBER:
905-2710

REV	DATE	DRAWN	CHECKED	RELEASE LEVEL
	06/08/20	WS	DS	ISSUED FOR LOCAL PERMITTING
	08/14/20	DTL	AW	UTILITY SUBMISSION
	08/19/20	WS	DS	CREATE SIGHT LINE EXHIBIT
	11/02/20	WS	DS	RESUBMISSION TO LOCAL AHJ
	11/20/20	WS	JM	RESUBMISSION TO LOCAL AHJ

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

C-6.0
RED PINE LANE - SIGHT LINE