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

December 15, 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 Supplemental 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, an updated stormwater report, and revised plans for the above-referenced project in response to peer review comments by Charles L. Rowley, PE, PLS in a letter dated November 27, 2020. 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 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 and the Conservation Commission.

1. *Sheet C-4.6 shows the location of the most southerly access road to the site from Tihonet Road. The proposed surface of the road widens from 20 feet to 30 feet along the edge of the 175 foot buffer. No indication as to why this should be widened is given. The access road should be limited to 20 feet.*

   The proposed access road is shown at a width of 20-feet. Temporary wider stabilized construction entrances are depicted, which will be reduced to smaller final widths and radii as depicted on the plans.

2. *Sheet C-5.0, Detail 4. This detail shows a stabilized construction entrance for each of three locations. The entrance is limited to 12 feet in width with 10 foot radii on each side. These dimensions are not sufficient to allow heavy vehicle traffic to enter and exit Tihonet Road without running off the prepared surface. The radii should be greater and the width of the access for the first 50 to 75 feet should be wider to allow for easier turning of tractor trailer units. See Item 8 below.*

   The detail has been updated to reference widths depicted on the plans.

3. *Sheet C-5.0, Detail 1. This detail should show typical shoulders as required for grading and for loam and seed shoulder treatment. It should also include a note to indicate that all disturbed areas within the project site are to be loamed and seeded.*

   The details for both the gravel access driveway and reclaimed pavement driveway have been revised to include a note indicating loam and seed treatment along the sides of the driveway and off-grading. Note #7 was also added to refer to the note present on various plan sheets indicating loaming and seeding of disturbed areas within the site.

4. *Sheet C-5.1, Detail 3. Remove this detail if it is not required or revise accordingly. The only connecting pipe for the revised plan is between the two portions of Infiltration Basin #6 where the access road crosses over. There is no berm over the pipe.*

   The typical Infiltration Basin cross-section detail has been modified to depict the rip-rap spillway overflow present on all basins. A new detail was added showing the culvert pipe beneath the access road, connecting the two parts of Infiltration Basin-5 (formerly #6).

5. *Sheet C-5.1, Detail 6. The detail shows the stone trench directly adjacent to the access road whereas the plan view shows the trench away from the edge of the road as shown on Sheet C-4.6. The detail or the plan view should be changed accordingly for consistency.*

   The plan has been revised to be consistent with the detail, which shows the crushed stone trench directly adjacent to the access driveway. The crushed stone trench location is shown in detail on Sheet C-4.6 along the northern edge of the realigned southern driveway.

6. *Sheet C-5.1, Detail 7. The detail does not show the raised crown for the northeast access driveway. Further information on this driveway is below.*

   The northeast access drive has been eliminated per Comment 7 below. The detail has been revised to clarify that the access drives should be either cross-pitched or crowned as shown on the grading plans.

7. *After review of the revised plans, the northeast access driveway continues to be of concern and is redundant to the project as a whole. The grade at the most critical area is 7.7%, a steep grade for maintenance and erosion control purposes. The concern for the grade and maintaining the access without potential for erosion is overcome by eliminating this access and providing a connector to the center access road just northerly of Infiltration Basins #5 and #6. The connector would be running with the contours of the original ground. No exaggerated crown for the relocated access would be required.*

   The northeast access drive has been eliminated as requested.

8. *Each of the three access roads as proposed have excessively large return radii and wide entrances that would not be necessary once construction is completed. The return radii for the finished entrances should be reduced to 25 feet and a total width of disturbed areas should be reduced to the radius for each side and a 20 feet wide road section. Temporary wider access points used during the construction phase should be removed and the buffers closed up accordingly. The northeasterly access should be eliminated.*

   The access roads have been updated to depict temporary wider stabilized construction access as well as the final narrower permanent condition 20' width. The northeasterly access road has been eliminated.

9. *There is no indication on the plans as to where the vehicle access control gates are to be located.*

   The access gates were depicted on the plans with a "typ." label approach. For clarity, all access gates have now been labeled on the Layout and Materials plans.

10. *The Sight Line Plan suggests that there will be a vegetated obstructed view of the solar array from Red Pine Lane. This assumes that once clearing is completed for the array area and the access road that runs parallel to the open transmission line easement that remaining trees will be dense enough cover left to act as an obstruction. This is questionable given that the cover left is only a small corner. It is recommended that the most southerly portion of the project area covering approximately 2.6 acres of the 50.69 acres be left in its natural state. (See Project Review letter dated Nov. 9, 2020) The maintenance of this small area with the current vegetation will greatly reduce the impact of the project on Red Pine Lane as well as from Tihonet Road. I recommend the plans be revised accordingly.*

    The southerly entrance drive has been shifted north and the western extent of solar panels reduced in order to preserve additional wooded buffer. These adjustments to the design result in a mature vegetated buffer of approximately 192 feet from the existing tree line on the eastern side of Tihonet Road to limit of clearing.

When combined with (i) the approximately 126 feet of vegetated buffer from the residence on Red Pine Lane and the edge of Tihonet Pond, (ii) approximately 800 feet across Tihonet Pond, and (iii) another 500 feet through the utility's distribution and transmission corridor, we believe any potential impact to the viewshed from the Red Pine Lane residence has been nullified.

Please refer to enclosed profile view entitled "Red Pine Lane – Sight Line to 150 Tihonet Road Project" (revision date: December 11, 2020) for a detailed rendering of the approximately 1,800 feet between the residence in question and the project.

Decommissioning Cost Estimate

1. *The estimate has greatly underestimated the cost of module removal. It assumes a labor rate of $25/hr. and that less than one minute is required to remove each module (39,798 panels) from the rack system. But the cost does not include the collection of each module and loading on a truck for removal from the site for disposal. This cost should be revised accordingly.*

   A second laborer has been included in the estimate item for the removal of racking. The second laborer can organize and load modules as the first is removing them from the racking. The result is roughly doubling the previous estimate for this item.

   An updated decommissioning plan dated December 11, 2020 consistent with recently permitted BSSI solar projects in Wareham is enclosed.

2. *The re-seeding cost for the site is greatly underestimated as well. More than 50 acres of land are disturbed from the construction of the project. Only 2.77 acres of land are presumably disturbed by the entire activity of removing modules, rack removal and loading, removal of fencing and loading. It does not cover the reclamation of the access roads. Since most of the area is covered with panels and the mounting systems, most of the land will be disturbed by trucks and other machinery required to pick up, load and removal materials. The cost could be more than 10 times the $9686 allocated to re-seeding in the cost estimate. I recommend that the cost estimate be reviewed and revised accordingly for these two items.*

   The area included for re-seeding includes all of the road areas and a portion of the array field that includes the equipment area and fence line. Work within the array field will create very little earth disturbance that would require re-seeding. Firstly, the rack supports will be turned out of the ground, similar to the installation procedure in reverse, and will not create significant earth disturbance.

Disassembled racking and modules will be transported to a flatbed trailer stationed on the access road with smaller rubber-tired vehicles that will not create significant earth disturbance that would require re-seeding. Nevertheless, the re-seeding costs on the revised estimate have been adjusted accordingly and result in an increase of more than 1.5x the original estimate.

An updated decommissioning plan dated December 11, 2020 consistent with recently permitted BSSI solar projects in Wareham is enclosed.

We trust that the information provided herein satisfies the comments on the Project. 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 December 11, 2020
Updated Stormwater Management Report dated December 15, 2020 (under separate cover)
Revised Plans dated December 15, 2020 in 16 sheets (under separate cover)
Red Pine Lane – Sight Line exhibit, revised December 11, 2020

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 (email and hard copy via US Mail with reduced plans and no stormwater report)
Charles L. Rowley PE, PLS (via email to: *crsr63@verizon.net* and hard copy via Planning Office)

SHM/JRM/mac/1833112LT003

Decommissioning Estimate

Date: 12/11/20

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	38,394
Number of Racks	1,600
Number of Inverters	5
Number of Transformers	10
Electrical Wiring Length (ft)	9,315
Number of Foundation Screws	6,399
Length of Perimeter Fence (ft)	7,577
Number of Power Poles	10
Access Rd Material Volume (YD)	4,844
Total Disturbed Area (SF)	314,030
Total Fence Weight (lbs)	5,380
Total Racking Weight (lbs)	1,359,788
Total Foundation Screw Weight (lbs)	255,960

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	4
Days req. with Fine Grader	8
Total Truckloads Required	100
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. A second laborer is included for organizing and loading modules for trucking away from the site

Module Removal Rate • Total Number of Solar Modules • Labor Rate • 2 = Module Removal Cost

Total = $ 31,995.00

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 = $ 7,998.75

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 = $ 19,996.88

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 = $ 750.00

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 = $ 77,987.81

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 = $ 20,958.75

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 = $ 15,357.60

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 = $ 12,312.63

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 = $ 15,000.00

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 = $ 25,122.39

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 = $ 13,400.00

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	$ 31,995.00
2	Rack Wiring Removal	$ 7,998.75
3	Rack Dismantling	$ 19,996.88
4	Electrical Equipment Loading and Removal	$ 750.00
5	Break Up Concrete Pads	$ 4,800.00
6	Load Racks	$ 77,987.81
7	Electrical Wiring Removal	$ 20,958.75
8	Foundation Screw Removal	$ 15,357.60
9	Fence Removal	$ 12,312.63
10	Power Pole Removal	$ 15,000.00
11	Seed Disturbed Areas	$ 25,122.39
12	Trucking to Transfer Station	$ 13,400.00
13	Energy Storage System Removal	$ 21,800.00
	Subtotal =	$ 267,479.80

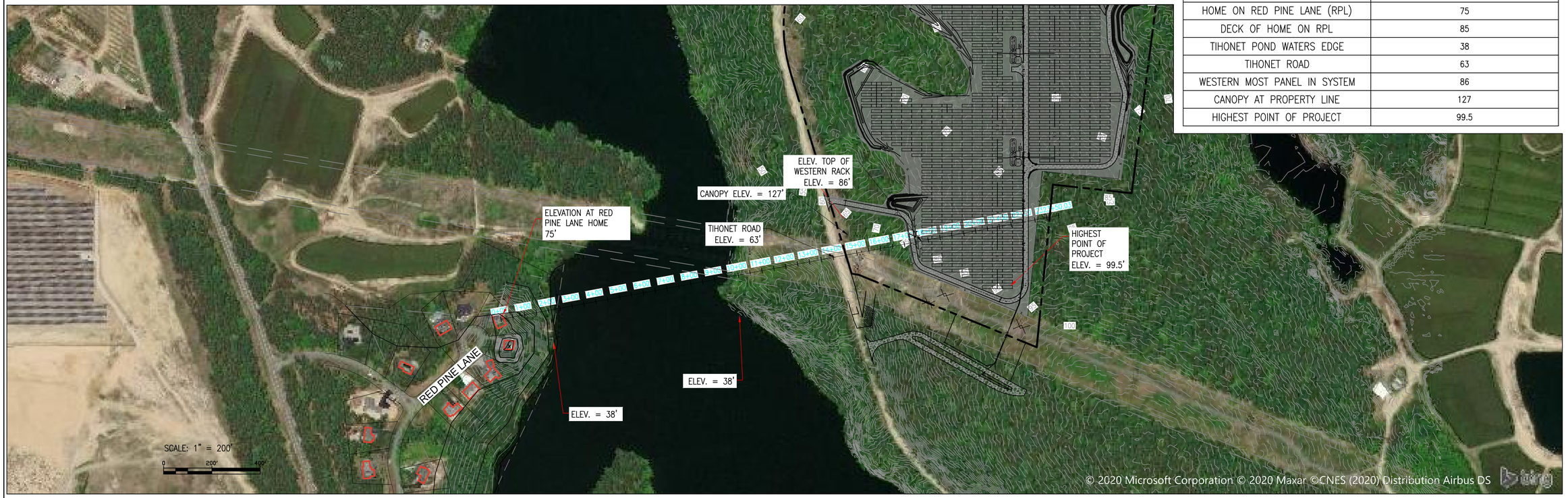
Present Value Total with 1.25% Adder = $ 334,349.75

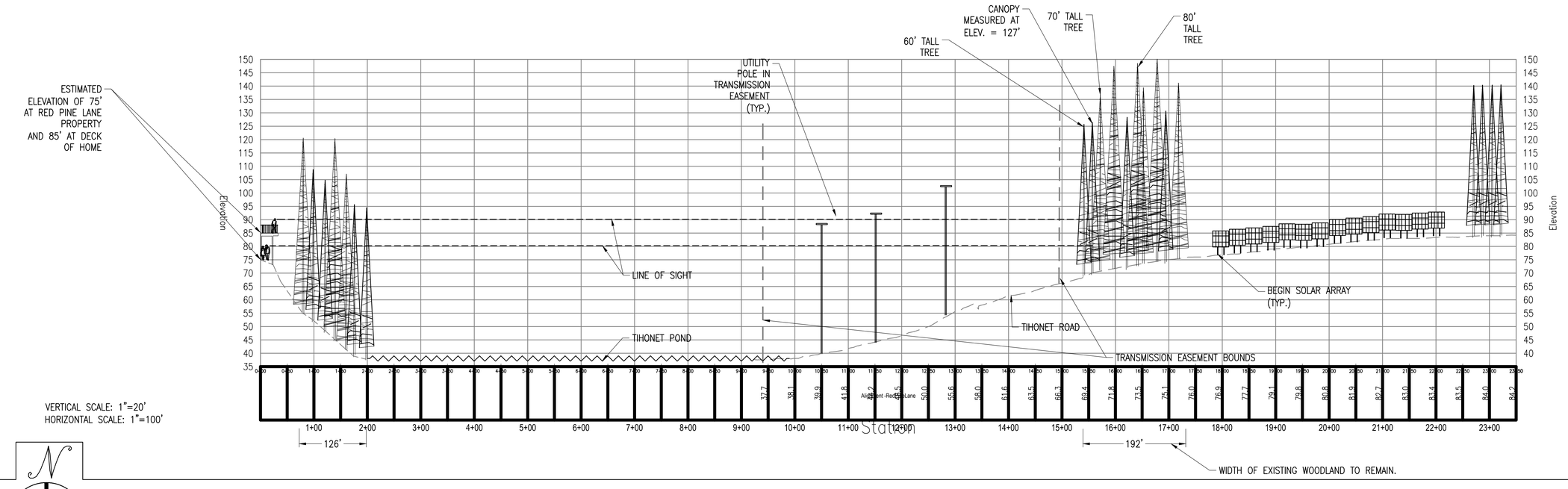
Total after 20 years @ 1.5% Inflation

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

Grand Total = $450,320.64

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	86
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
	11/23/20	WS	JM	RESUBMISSION TO LOCAL AHJ
	12/11/20	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