



New England Environmental

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**SWCA**  
ENVIRONMENTAL CONSULTANTS

October 20, 2016

Mr. Jonathan Mancini  
Director of Development  
BlueWave Capital  
137 Newbury Street  
Boston, MA 02116

**RE: Assessment of Proposed Solar Site  
4 Alwardt Way  
Oak Bluffs, Massachusetts  
NEE #: 040516.00**

Dear Mr. Mancini,

New England Environmental (NEE), a Division of SWCA Environmental Consultants, is pleased to provide you with this report summarizing the results of our site assessment for a proposed five-acre solar array to be built on property owned by the Oak Bluffs Water Department. The site is centered around a section of Alwardt Way, between two town well/pump houses. It is our understanding that the entire construction footprint, including the associated shade buffer, amounts to approximately 9.8 acres.

## METHODS

There are two main components to this assessment: 1) a desktop assessment that includes an analysis of available GIS data layers pertaining to the site in question and review of relevant literature, and 2) a field assessment of the proposed work footprint. The GIS data used in the desktop analysis included orthophotographs from 2014 and historic and current land use data. Historic land use in and around the site was examined using the 1830 Map of Land Cover and Cultural Features in Massachusetts from the Harvard Forest Data Archive (Foster and Motzkin, 2009). NEE calculated current land use percentages within a one-mile radius of the site, based on Land Use (2005) from MassGIS (MassGIS, 2009), and aerial photo interpretation of more recent imagery. Regarding the literature review, we reviewed Historical Influences on the Landscape of Martha's Vineyard, Perspectives on the Management of the Manuel F. Correllus State Forest (Foster and Motzkin, 1999). The research, observations, and conclusions drawn in the Foster and Motzkin paper are particularly pertinent, as the proposed solar site is located 80 feet from the State Park.

On 10 and 12 October 2016, SWCA Senior Ecologist Steve Johnson walked the site of the proposed solar array and shade buffer. Dr. Johnson followed a meander/crisscross pattern across the site, focusing on species composition within the site, as well as discrete groups of *Quercus* spp. stems that may indicate mature stump sprouts or ancient Oak stools as described in Foster and Motzkin (1999). A list of observed plant species was recorded for both the under- and over-stories. Representative photographs were taken of typical forest conditions and suspected oak stools (discrete groups or rings of oak stems, with a 6-inch ruler for scale). GPS coordinates were also taken for all suspected oak stools observed.



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## RESULTS

The proposed solar site is located with the central “Great Plain” of Martha’s Vineyard. This is an outwash plain of the past glacial period, with soils composed primarily of sand. A review of available GIS data indicates that the site was still forested in 1830, during a period of widespread land clearing for agriculture in Massachusetts, suggesting the site has never been cleared for agriculture. However, portions of the surrounding area to the north of the site have been cleared for development and gravel mining (Figure 1 and 2). Based on our examination of current land use within one mile of the site, 83% (1950 ac) of the surrounding area is Undeveloped and predominantly forested, 7% (159 ac) is Residential or Recreational (i.e., ball fields), 5% (107 ac) is Commercial, Industrial, or Institutional (i.e., schools), 4% (94 ac) is Agricultural, 0.8% (18 ac) is Open Water/Wetland, and 0.4 % (10 ac) is the Martha’s Vineyard Airport.

Most of the non-forested and developed portions of the surrounding area are north of the site. The area immediately to the north of the site is an active gravel operation. To the south, the site is part of a contiguous block of forest 1,020 acres in size, fragmented by a few roads and some small clearings which are likely vegetated with herbaceous vegetation. However, the oak forest on site is further fragmented from nearby native oak forest to the south. Figure 21 in Foster and Motzkin (1999), shows that the site is partially separated from native/undisturbed oak forest to the south by pine plantations within the Manuel F. Correllus State Forest (MFCSF) (Figure 3). We have calculated that 50% of the contiguous forest south of the project site is composed of pine plantations, likely made up of the non-native Red Pine (*Pinus resinosa*) and/or White Pine (*P. strobus*).

An interesting feature of the oak forests within MFCSF, noted by Foster and Motzkin (Foster and Motzkin, 1999), were rings of mature (35-75-year-old) oak stems forming rings, in many cases greater than one meter in diameter. They noted that oak stools of this size were uncommon in other parts of the state, and it was speculated that these larger stools may have formed in response to multiple cutting and/or burning events over time. These stools were referred to as ancient oak stools. Foster and Motzkin also speculated that some of these larger stools may be hundreds of years old, likely pre-dating European settlement. While Foster and Motzkin recommend that forests with these larger oak stools be protected, it is unlikely that forests with these larger oak stools provide ecological functions significantly different from other mature oak forests (Motzkin, per. com.)

The proposed solar site is completely wooded, with a dense understory of native shrubs (Photo 1), and is relatively flat, with very little change in elevation. The forest canopy within the site is dominated by White Oak (*Quercus alba*) ranging 3-8 inches in Diameter at Breast Height (DBH) Approximately 85% of the canopy is made up of this one species. Other tree species observed during our site visits were Black Oak (*Q. velutina*), White Pine, Pitch Pine (*P. rigida*) and Post Oak (*Q. stellata*). This last is a Watch-listed Species according to The Vascular Plants of Massachusetts: a County Checklist, First Revision. *Q. stellata* were observed at seven locations on or near the site (Photo 2, Figure 4). This species is fairly common on the outwash plain of Martha’s Vineyard, and found throughout the oak forests of the island.

The maximum age for tree stems on site was 103 years, according to Jack Edward’s letter dated 30 August 2016; however, the vast majority of trees present appeared to be much smaller in diameter (and therefore younger) than the oldest trees on site. For example, one cut tree used for aging was a Red Oak with a basal diameter of approximately 18.5 inches and an age of 103 years. The majority of tree stems observed on site had basal diameters less than 10 inches. However, because the majority of trees on site are White Oak, it would be useful to determine the diameters of the two *Q. alba* used by Edwards for aging.

The understory is dominated by Scrub Oak (*Q. ilicifolia*), Huckleberry (*Gaylussacia baccata/frondosa*), and Low-bush Blueberry (*Vaccinium pallidum*). Other understory species observed include Pennsylvania Sedge (*Carex*



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*pensylvanica*), Bracken (*Pteridium aquilinum*), Green Briar (*Smilax rotundifolia*), and oak seedlings (primarily *Q. alba*). The presence of dense ericaceous understory (e.g., huckleberry and blueberry), as well as the lack of Poison Ivy (*Toxicodendron radicans*) and Bayberry (*Morella pensylvanica*) suggest soils within the site have never been plowed for agriculture, or otherwise heavily disturbed. It should be noted that there is no indication that the ecological functions of undisturbed soils with native vegetation differ significantly from disturbed soils with similar vegetative cover (Motzkin, per. com.)

Data was collected for 30 oak stools observed during the course of our site visits (Figure 4). Of the 30 observed stools, 26 (87%) were *Q. alba*. Unlike the oak stools described by Foster and Motzkin in 1999, who observed many oak stools over one meter in diameter, the average diameter for the observed stools was 18.9 inches (0.48 m), and the greatest diameter measured was 36 inches (0.91 m) (Photo 3). At least one stool showed evidence of past cutting (Photo 4), and the average number of stems per stool was 3.9. The smaller size of the oak stools on and near the project area suggests the rings may be 100-200 years old (Motzkin, per. com.) It was also noted that the representative photos of ancient oak stools in Foster and Motzkin 1999 depict an understory and forest in general that appears to be much more open than the vegetation observed on site.

## SUMMARY

The majority of the site of the proposed five-acre solar array is composed of native hardwood forest and understory, dominated by oak species, primarily White Oak. Both the review of past land use data and our field assessment suggest that the proposed solar site has not been cleared for agricultural purposes; however, the site is largely fragmented from nearby native oak forest by an active gravel operation, development, roads, and pine plantations. The oldest trees on site were just over 100 years in age, and the estimated age of the oak root systems is not more than 200 years. In our opinion, it is unlikely that the forest found on site is ancient forest. It has also been noted that oak stools and undisturbed forest soils are unlikely to provide additional ecological functions beyond those offered by mature forests with similar species composition but lacking these two features.

Please feel free to contact me if you have any questions regarding this report.

Sincerely,

**New England Environmental**

Steve Johnson  
Senior Ecologist



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## REFERENCES

Edwards, Jack. 2016. Site Evaluation Report of Oak Bluffs Water District Property. August 30, 2016

Foster D. and Motzkin G. 1999. Historical Influences on the Landscape of Martha's Vineyard, Perspectives on the Management of the Manuel F. Correllus State Forest. Harvard Forest, Harvard University, Petersham, Massachusetts: Harvard Forest Paper No. 23.

Foster D. and Motzkin G. 2009. 1830 Map of Land Cover and Cultural Features in Massachusetts. Harvard Forest Data Archive: HF122.

MassGIS. 2009. Land Use (2005). Office of Geographic Information, Commonwealth of Massachusetts, Information Technology Division.

Motzkin, Glenn. 2016. Personal communication, October 15, 2016.





Photo 1. Typical canopy cover and understory vegetation within the proposed solar site.





Photo 2. Post Oak (*Quercus stellata*) observed during site visit.





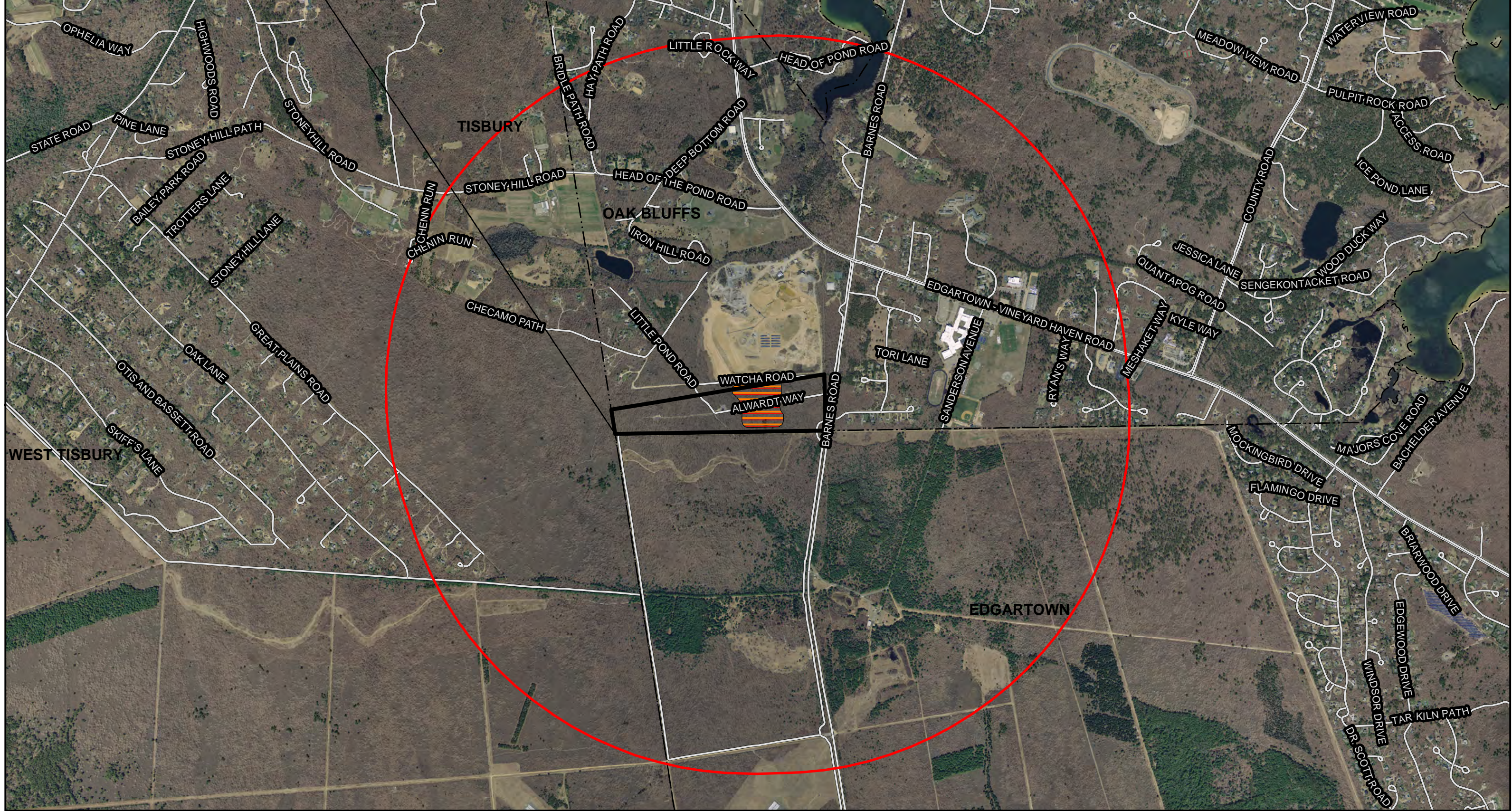
Photo 3. Well defined White Oak stool observed on site.





Photo 4. Small White Oak stool with evidence of cut stump in middle of ring.







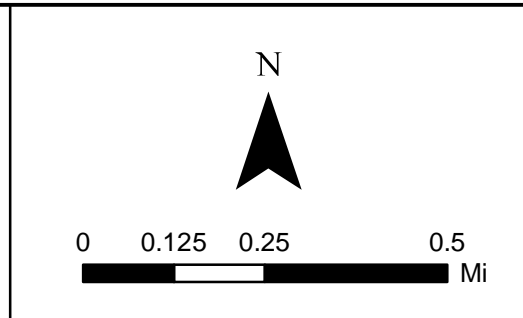



  
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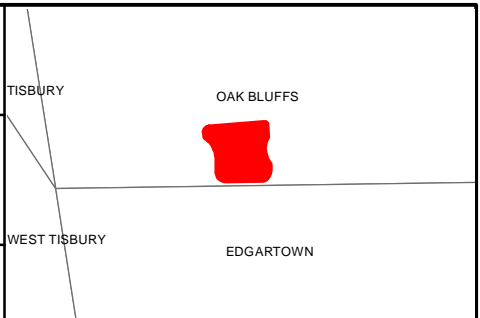
  
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**Figure 1. Landscape Context**
  
**Proposed Solar Array**
  
**4 Alwardt Way**
  
**Oak Bluffs, MA**

-  Property Boundary
-  Proposed Solar Array
-  One-mile Buffer
-  Town Boundary



Latitude 41.41474° N
   
 Longitude 70.60694° W
   
 Data Sources: Office of Geographic Information (MassGIS), New England Environmental, Inc.
   
 06 Oct 2016      Job # 040516









  
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**Figure 2. 2014 Land Use**  
**Proposed Solar Array**  
**4 Alwardt Way**  
**Oak Bluffs, MA**

**Land Use**

- Agriculture
- Airport
- Commercial/Industrial/Institutional
- Open Water/Wetland
- Residential/Recreation
- Undeveloped

Property Boundary  
 Proposed Solar Array  
 Town Boundary

N

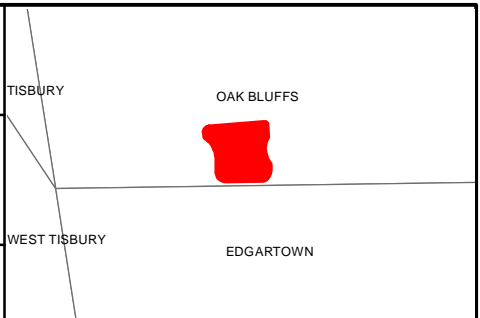


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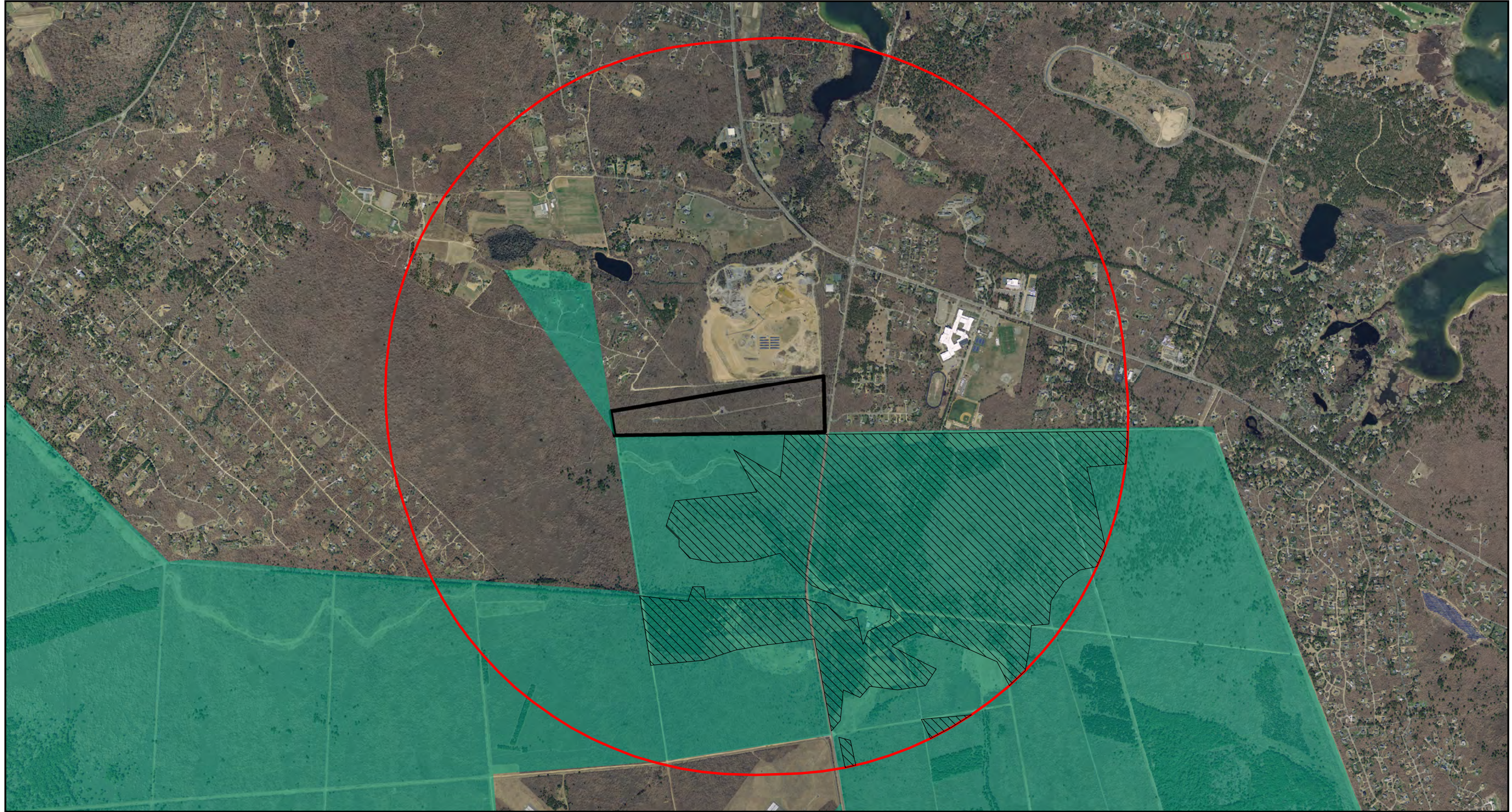
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Data Sources: Office of Geographic Information (MassGIS), New England Environmental, Inc.



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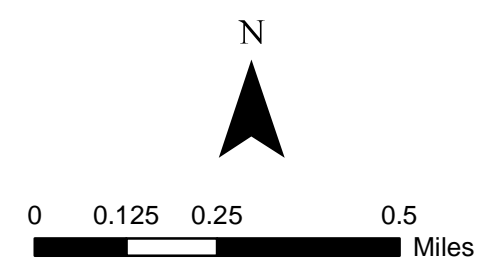






**Figure 3. Plantations**  
**Proposed Solar Array**  
**4 Alwardt Way**  
**Oak Bluffs, MA**

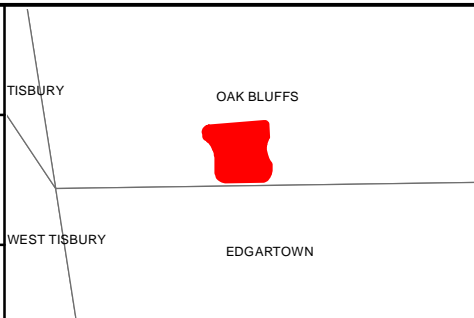
-  MFCSF
-  One-mile Buffer
-  Plantation
-  Property Boundary



Latitude 41.41474° N  
 Longitude 70.60694° W

Data Sources: Office of Geographic Information (MassGIS), New England Environmental, Inc.

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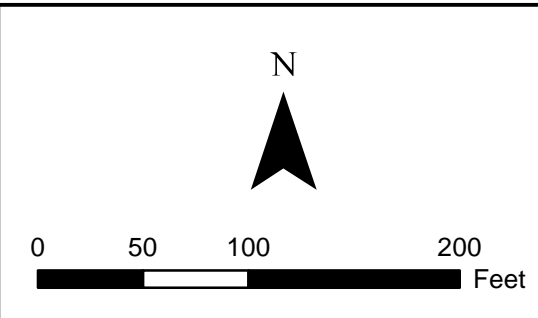



  
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**Figure 4. Observed Oak**
  
**Proposed Solar Array**
  
**4 Alwardt Way**
  
**Oak Bluffs, MA**

-  Oak Stool
-  Post Oak
-  Property Boundary
-  Proposed Solar Array



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