

# Fighting the Nutrient Problem on Cape Cod, MA: Potential Sites for Alternative Wastewater Treatment Facilities



## Introduction

**Background:** The Conservation Law Foundation (CLF) and Buzzards Bay Coalition recently filed suit against the Environmental Protection Agency (EPA) for not committing to their responsibility under federal law to regulate the discharge of nitrogen flowing into the bays of Cape Cod.

**Problem:** The primary source of nitrogen influx is from wastewater flowing from individual septic tanks, primarily Title 5 systems.

**Solution:** One remedial proposal to nitrogen overloading is the "Eco-Machine," which was invented by Dr. John Todd as an alternative natural greenhouse-type remedy to the issue.

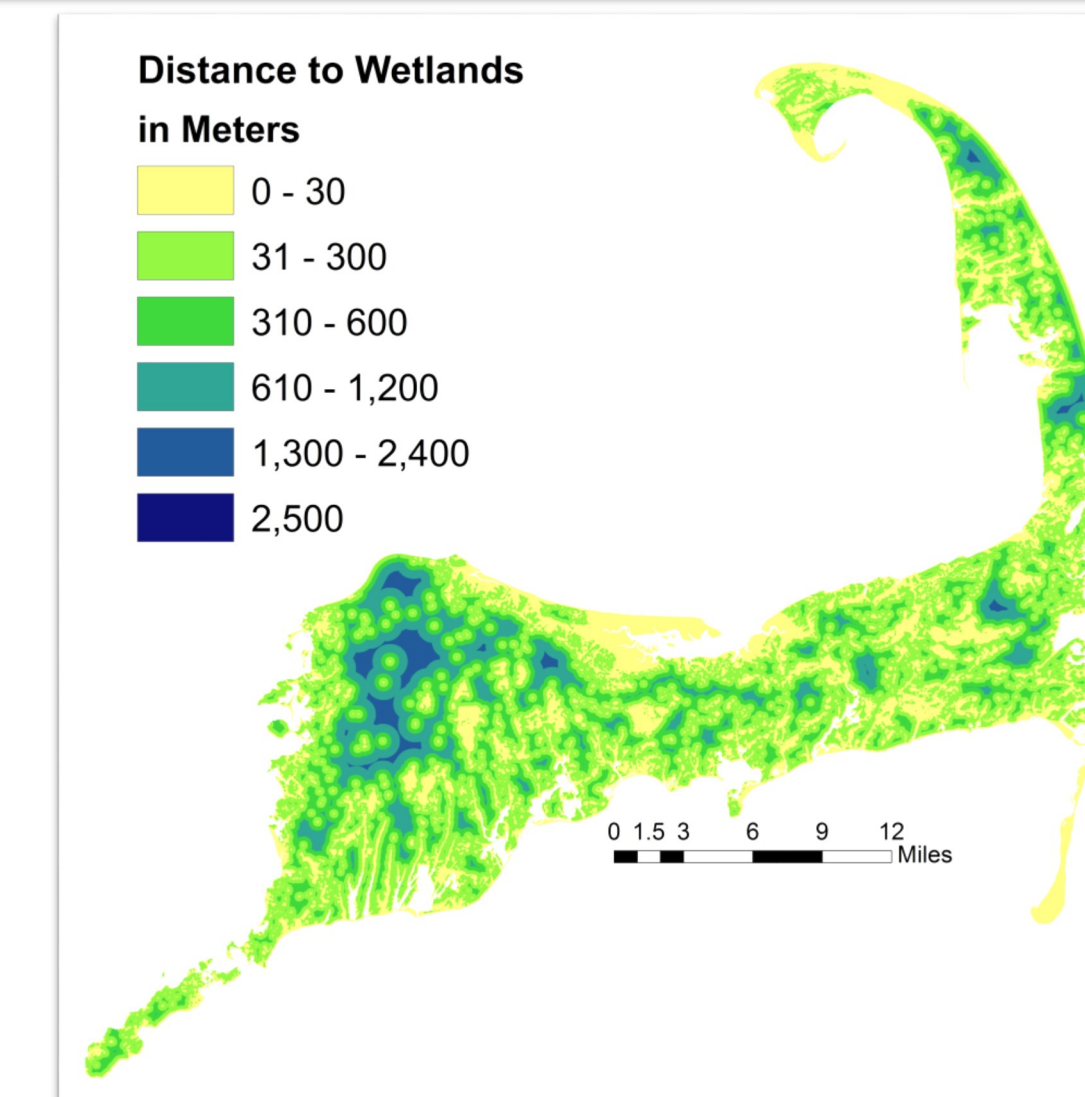
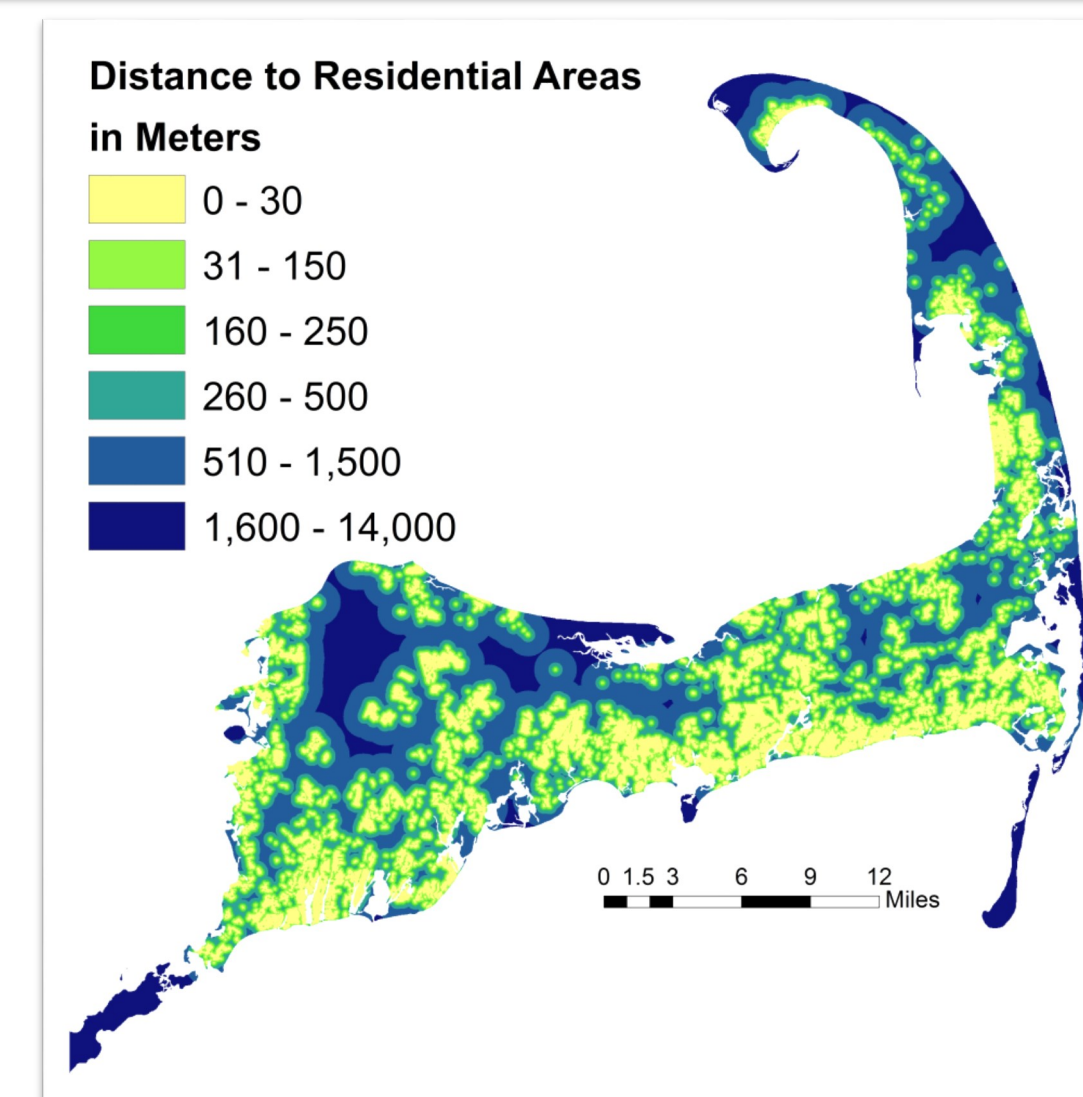
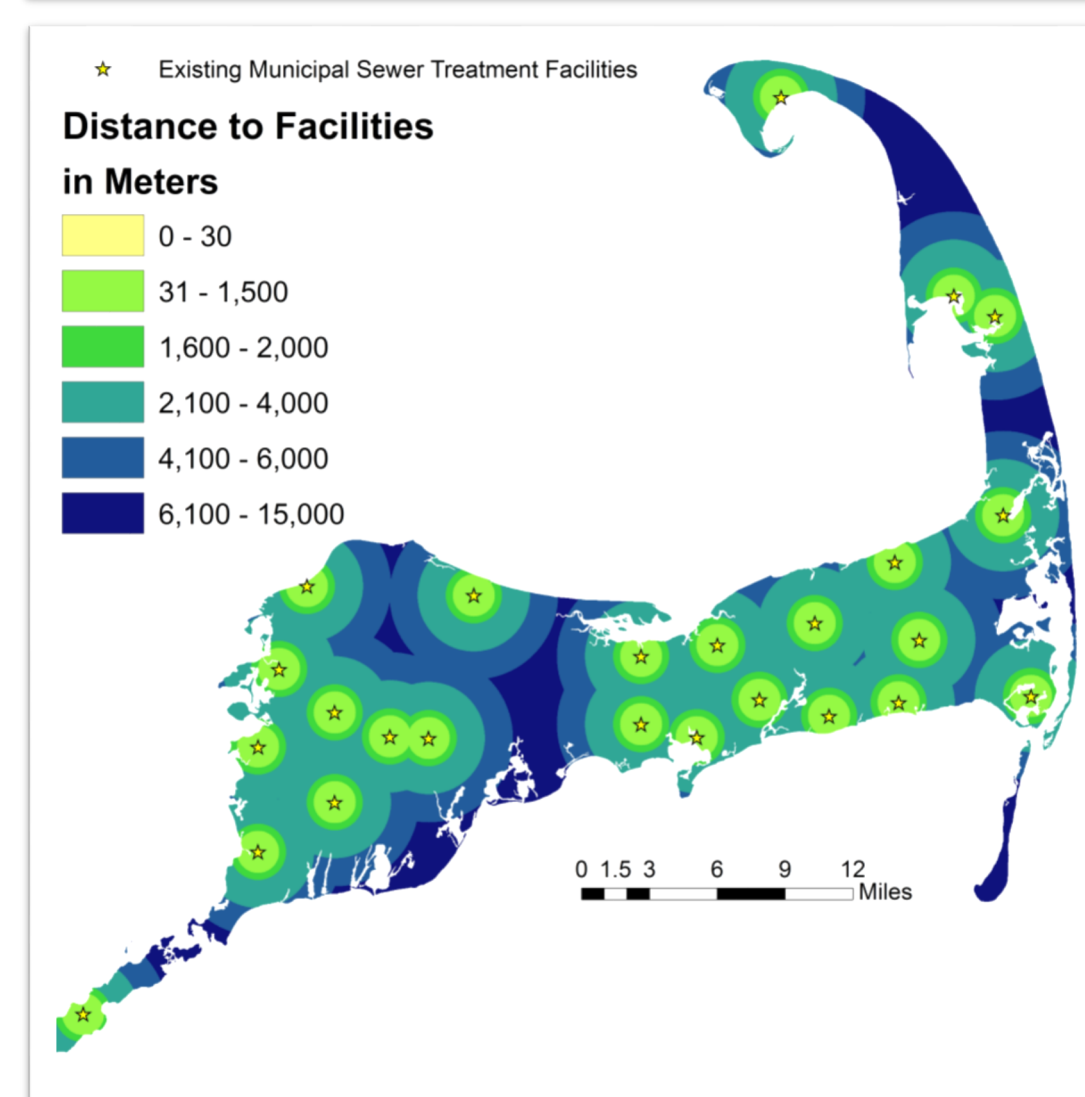
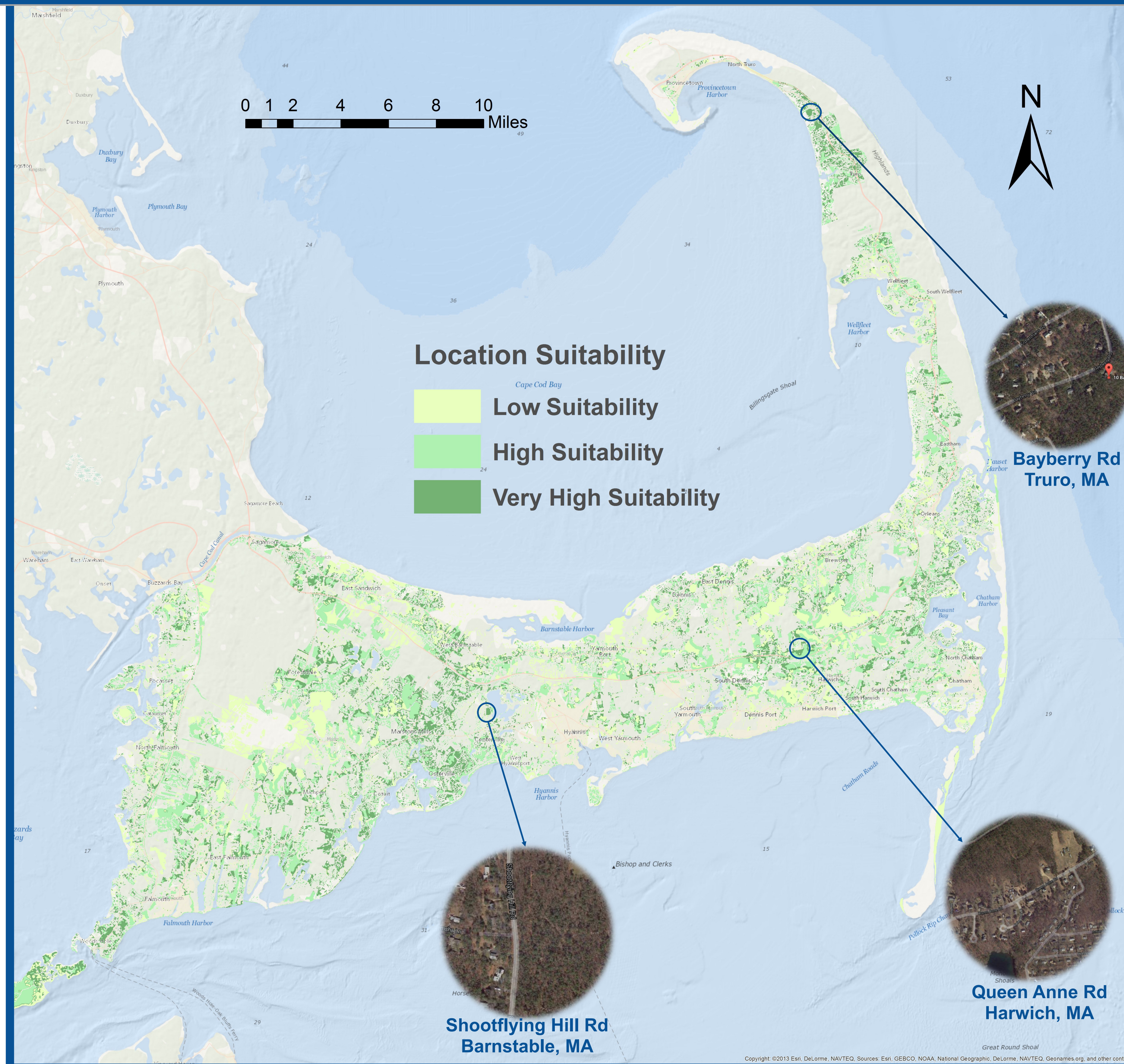
**Goal:** The goal of this project is to use site suitability analysis with GIS to determine whether sites for alternative wastewater treatment facilities, such as the Eco-Machine, exist for implementation on Cape Cod.

## Questions

1. Are there sites that fit the main criteria for these systems: vacant space of at least 200 square feet, in close proximity to a residential area, in close proximity to wetlands, and far from currently installed municipal facilities?
2. Are there suitable sites in each of the main segments of Cape Cod (lower, upper, and outer)?
3. Which of these sites are most suitable? Would it be beneficial to recommend a pilot project take place at each of these sites?

## Methodology

1. All data was retrieved from MassGIS and clipped to the Cape Cod region in ArcGIS.
2. The Euclidean distance tool was then used to calculate optimal distances for sites from dense residential areas, wetlands and the municipal facility layers.
3. That information was then reclassified into a ranking system using the values of 1 through 6. Most optimal sites were rated a 6.
4. The open space layer and road layer were converted to raster data and then reclassified to represent 0 (not developable) and 1 (developable).
5. To determine which sites were most suitable considering the above criteria, the raster calculator was used.
6. Sites were then located using google maps to assure the data was correctly computed and the results were valid.

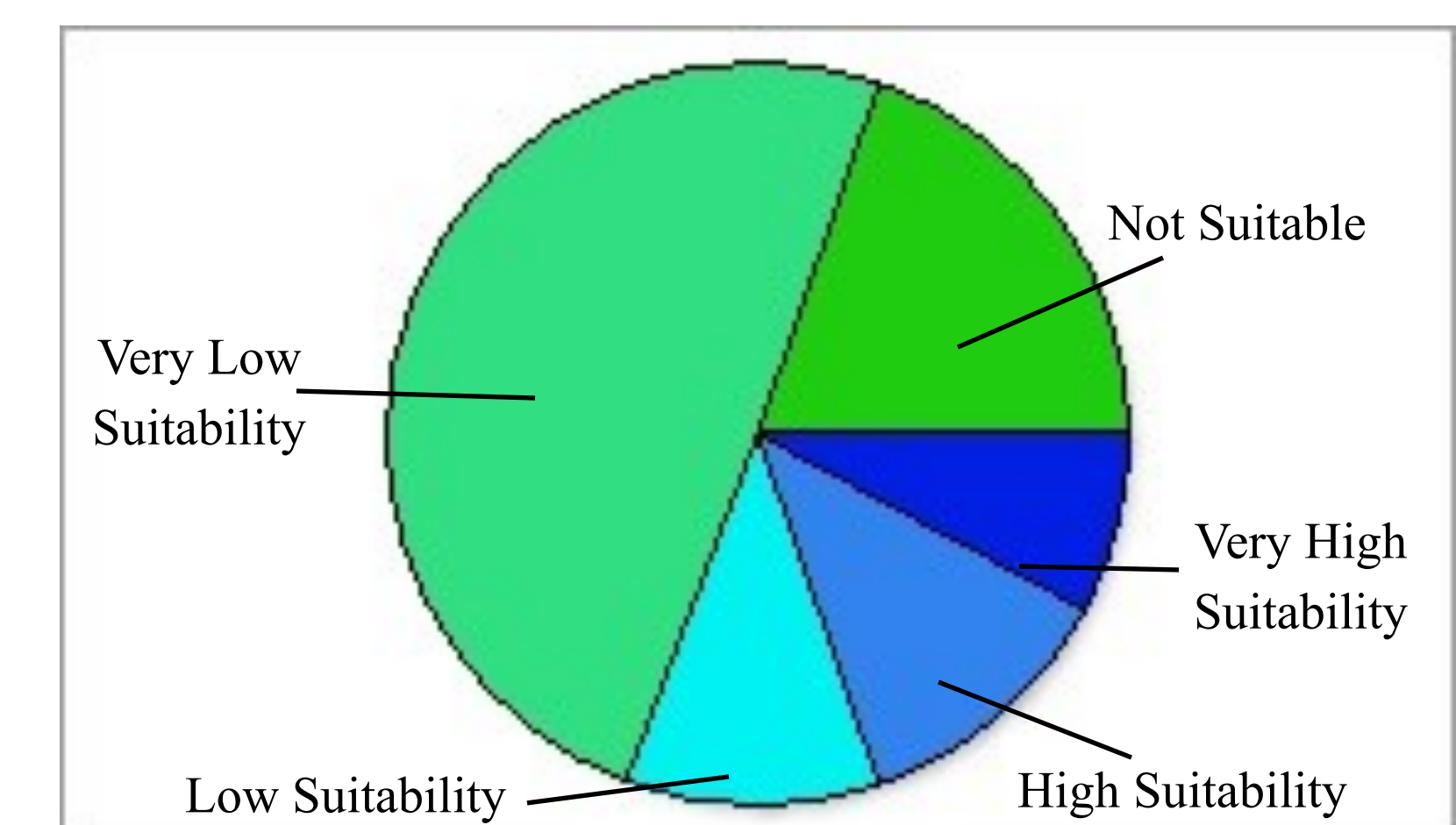


## Conclusion

Cape Cod needs immediate attention regarding the nutrient overloading problems in the region. Alternative wastewater treatment facilities, and the potential benefits they could provide, should be of top priority.



These alternative systems are appealing to look at, less odorous than conventional facilities, and have a positive impact on the land. Other benefits of alternative facilities include: providing jobs, being more cost effective and increasing tourism; all of which would boost the local economy. In this project suitable sites for such facilities were identified in three regions on the Cape (upper, lower, and outer): Shootflying Hill Road in Barnstable, Queen Anne Road in Harwich and Bayberry Road in Truro. These sites are in close proximity to high density residential areas and wetlands, and are also far from currently installed municipal facilities. As identified in the pie chart below, the amount of land left for development of alternative wastewater treatment facilities on Cape Cod is limited. With the projected build-out of Cape Cod showing high levels of development, it is imperative that the wastewater problem on Cape Cod be addressed. This project recommends that now is the right time to bring alternative wastewater treatment facilities to Cape Cod!



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Course: Introduction to Geographic Information Systems  
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Projection: NAD1983 StatePlane Massachusetts Island FIPS 2002  
Lambert Conformal Conic

Data Sources:  
MassGIS (<http://www.mass.gov>)  
Google maps for address overview pictures  
MassDEP (<http://www.mass.gov/eca/agencies/massdep/water/approvals/wastewater-forms.html>)

\*More information available in supplemental paper.