HUMBOLDT STATE UNIVERSITY

GEOSPATIAL STUDIES

GSP 270 - INTRODUCTION TO GIS

Final Project
Wastewater Treatment Facility

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Introduction

As the population in a region expands, there are environmental impacts associated with this expansion. One of the impacts of population expansion is the increase of wastewater, to address this issue an ideal location in Eureka California was identified for a wastewater treatment facility. While Humboldt County is not currently experiencing a population explosion the methodology followed in this report could be applied to developing countries where wastewater generation and population expansion are currently issues. The city of Eureka has 26,913 inhabitants (US Census 2013), based on projects done in an Engineering Natural Treatment Systems course, the minimum area required to treat the wastewater of this population is 20 acres.

Constructed wetlands (CW) are treatment systems that use natural processes involving wetland vegetation, soils, and their associated microbial assemblages to improve water quality. Constructed wetlands offer a lower-cost alternative technology for wastewater treatment; however, this technology has certain requirements. In order to ensure the least opposition for the project commercial and industrial vacant parcels or public land were the parcels used. Also to keep costs and the amount of infrastructure minimum an area with a maximum slope of five degrees as close to the sea as possible will be selected. The goal of this project is to find an area to install a wastewater treatment facility, following the required criteria.

Methods

To define the optimal area for a wastewater treatment plant we used the data from United States Census Bureau. For the city of Eureka and Eureka Sphere digital elevation models for Eureka and Fields Landing, the area that encompasses the Eureka Spheres, were downloaded from the Humbldt County GIS web site. These raster files were mosaicked together in ArcMap. The resulting file was used to determine the slope for the three potential sites. Land use data and the boundary for Humboldt County were also acquired from the Humbldt County GIS portal. To identify potential sites the parcel had to occupy an area of at least 25 square acres, have the most gentle slope possible, and be as close to the ocean as possible. Also these parcels needed to fall into the public land, vacant industrial, or vacant land use categories.

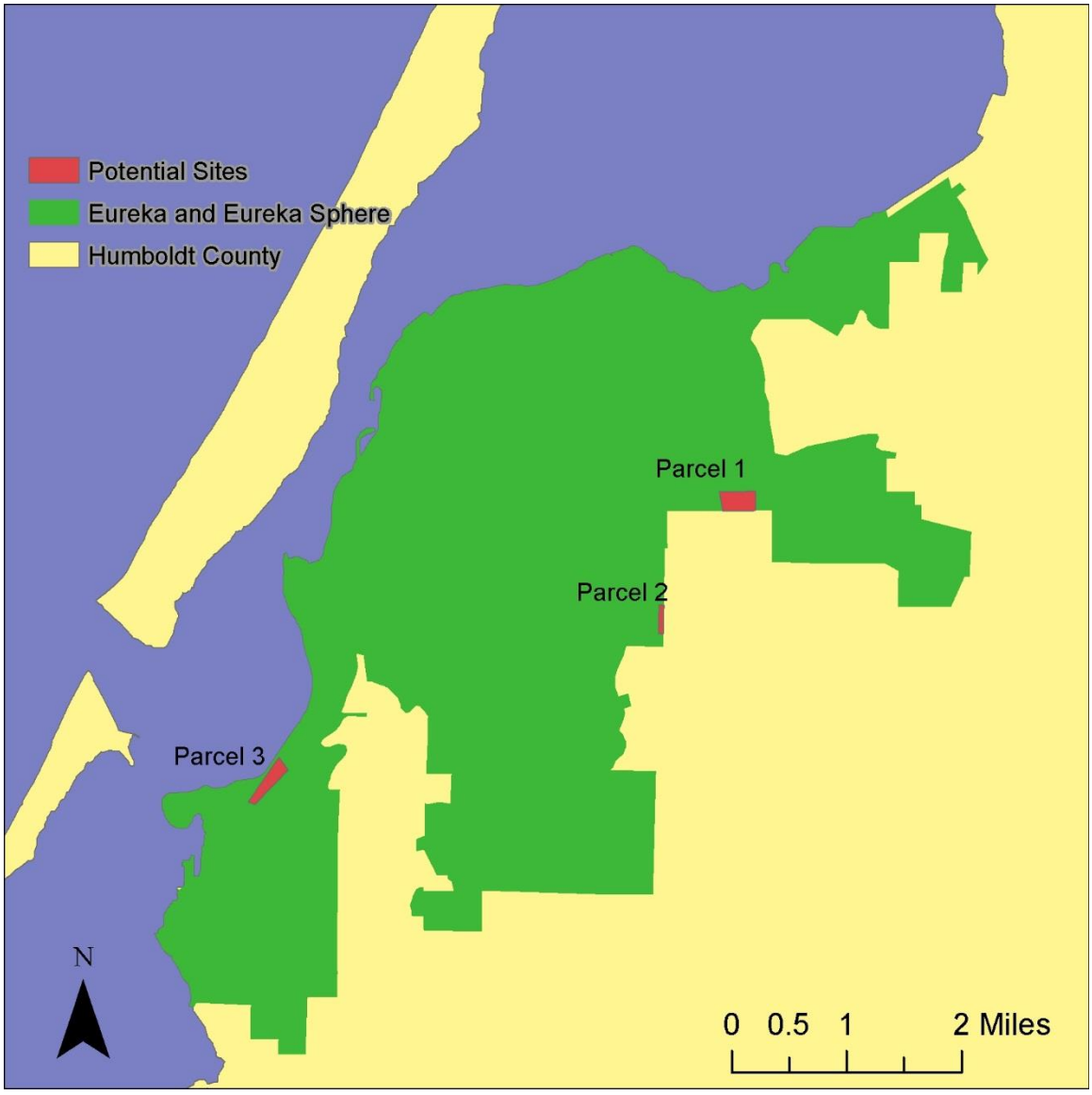

Figure 1- Possible areas

Table 1- Possible areas

Parcel	Land Use	Slope (degrees)	Area (acres)
1	public	15.71	40.6
2	public	0.4	27.7
3	vacant	1.43	27.5

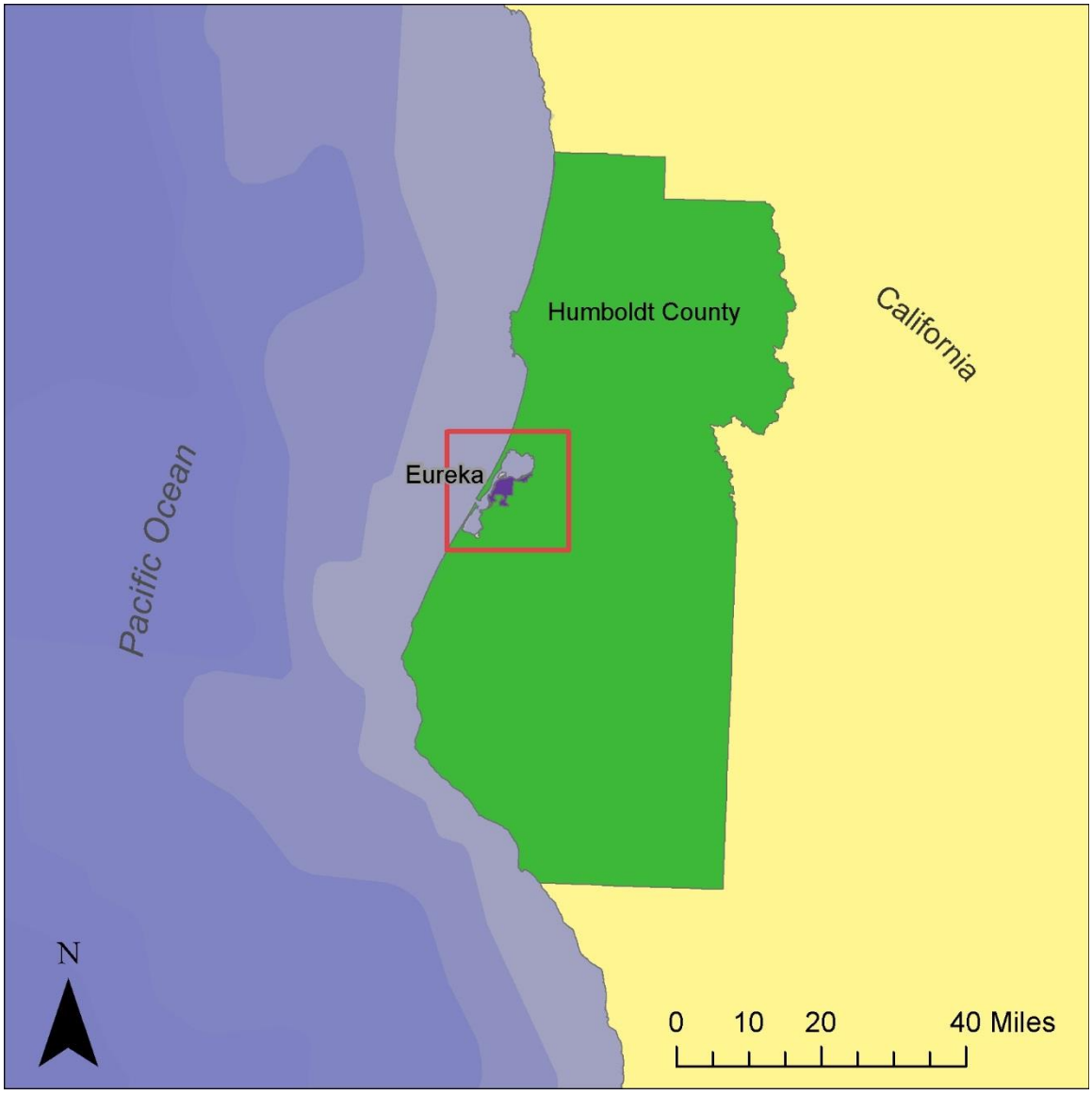

Figure 2- Locator map showing general location of final parcel

Results

Based on the slope of the parcel, the total area, and its proximity to the sea Parcel 3 was chosen as the final site. Parcel three was the parcel that matched the criteria the best with an area of 27.7 acres, a slope of 1.43 degrees, and based on visual analysis is clearly the closest to the sea (Figure 3). Parcel 3 is located in the Eureka Sphere of influence, just south of the city of Eureka near Humboldt bay. Knowledge obtained in Environmental Engineering courses and GIS skills acquired through the completion of various labs made the identification of an ideal wastewater treatment facility possible. While a wastewater treatment facility is not a pressing need in Eureka the application of GIS to environmental issues is demonstrated in this project and the methodology can be used in areas of the world where there is a need for new wastewater infrastructure.

Figure 3- Final Parcel location

References

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