

# Wasting Space

## Finding Suitable Landfill Sites in Lebanon



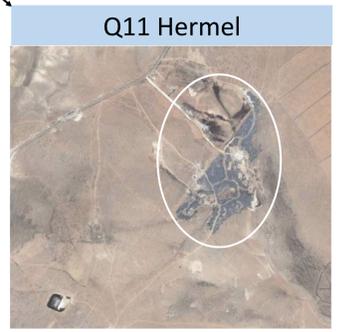
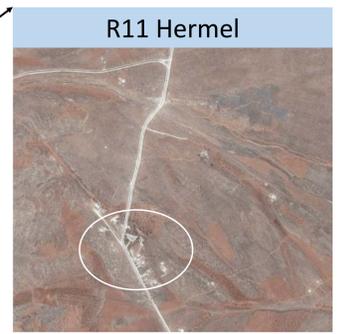
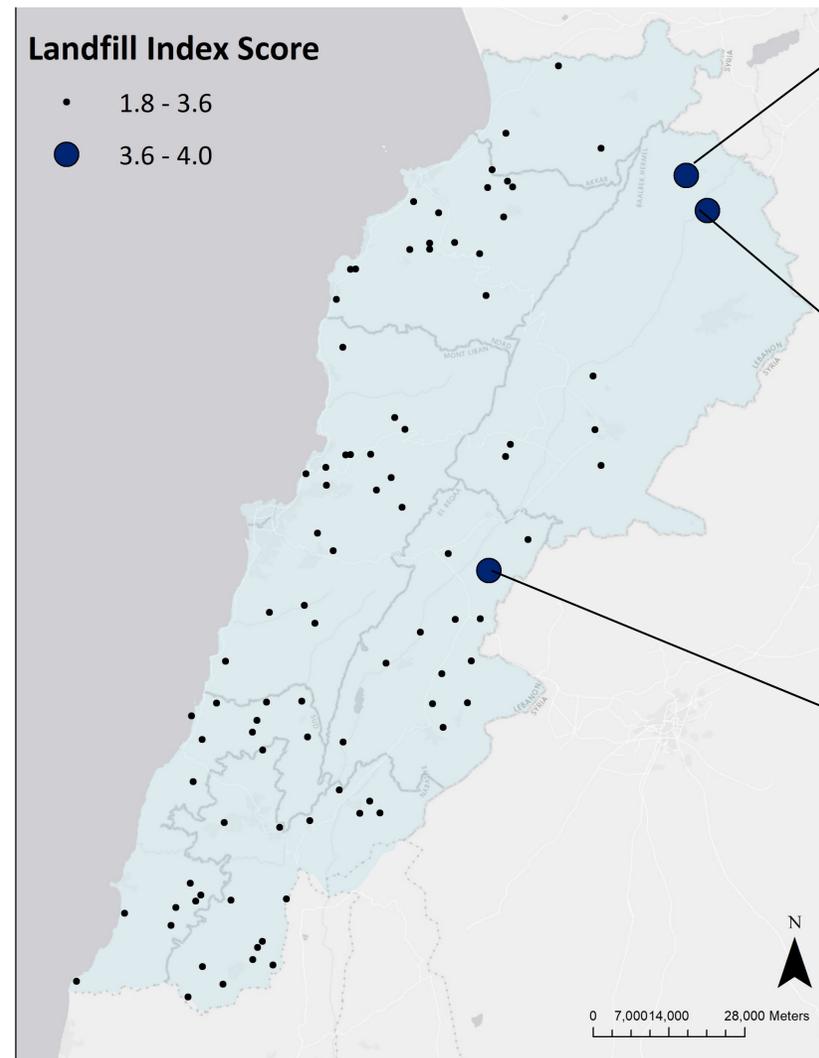
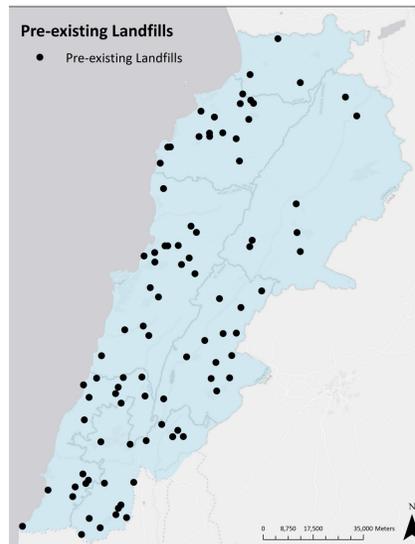
### Introduction

Since The Lebanese Civil War ended in 1990, the government has yet to institute a nationwide waste disposal program. Lebanese people have taken the matter into their own hands, and have begun dumping their waste into various landfills around the country. Some of these landfills damage the beach and sea, detract from the Lebanese tourism market, and endanger local residents. The purpose of this study is to examine landfill locations that have already been created by unorganized groups of Lebanese citizens, and to identify which of these landfill sites is most suitable for continued use in the future.

### Methodology

This study uses 91 different landfills that were located by satellite imagery. In order to identify which of these sites is most suitable for continued waste dumping, landfills were scored using five factors: (1) proximity to infrastructure, (2) distance from population centers, (3) distance from waterways, (4) accessible elevation above sea level, and (5) proximity to the electrical network. Each landfill was scored from 1-5 for each factor. The average score, or overall suitability of each landfill, is derived from taking the average of the five index scores.

Factor	Units	1	2	3	4	5
Infrastructure	Proximity (meters)	7200-	4299-	2499-	1299-	<600
		4300	2500	1300	600	
Population Centers	Surrounding Pop. density	.94-.54	.54-.37	.37-.22	.22-.11	.11-0
Waterways	Proximity (meters)	<2500	2500-3500	3501-5000	5001-7000	>7000
Elevation	Proximity (meters)	1100-1500	800- 1099	<300	300-500	501-799
Electrical Network	Proximity (meters)	38,000-	22,999-	15,999-	8999-	4499-
		23,000	16,000	6000	4500	0

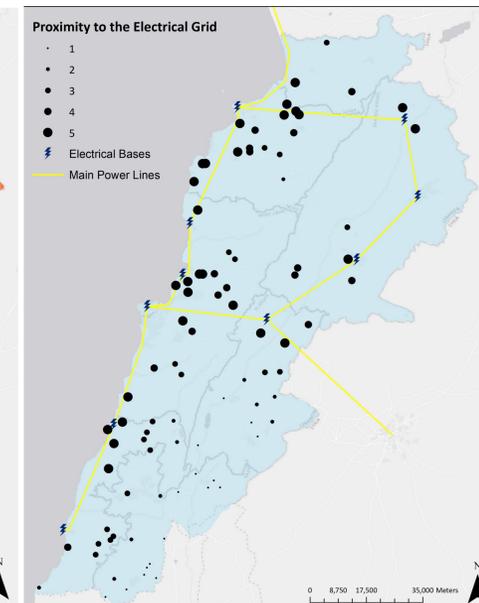
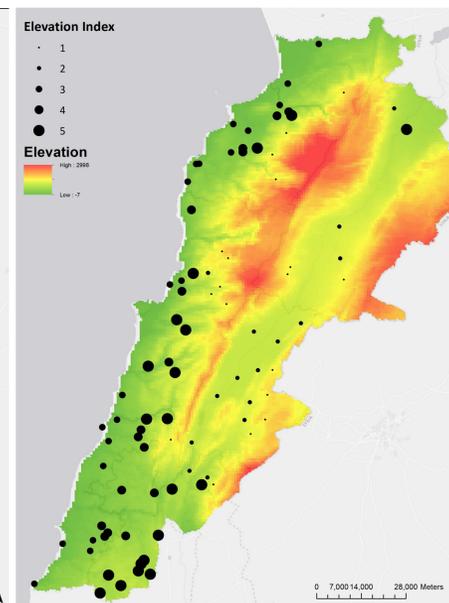
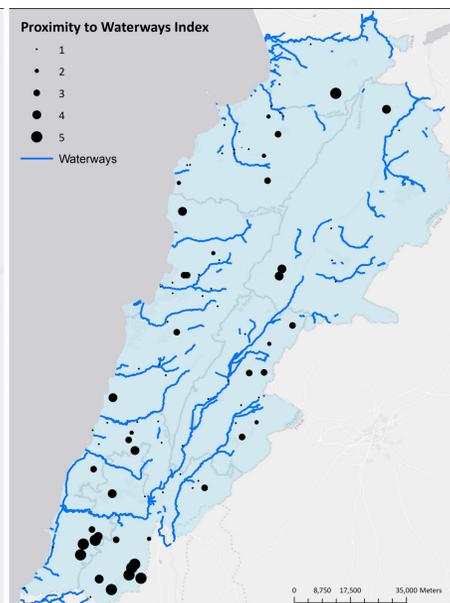
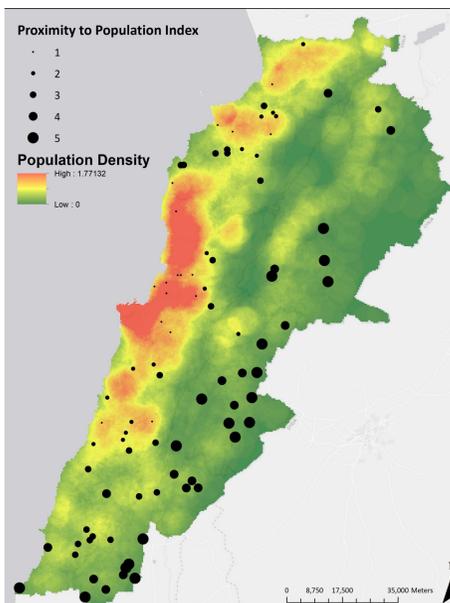
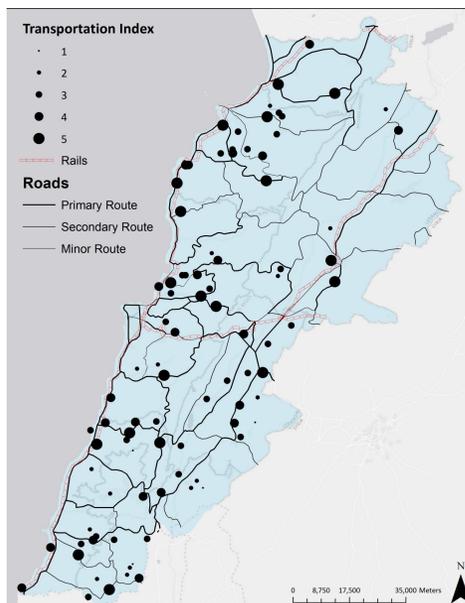


### Limitations

While this study examines a number of important factors that should define a landfill's location, other factors should surely be considered in future analysis, like the steepness of land throughout Lebanon, and the type of soil on which the landfills are located. Both of these datasets are currently unavailable.

### Results

The three landfills to the top right were found to be the most suitable locations for waste dumping in Lebanon. These locations are close to infrastructure, far from population centers and waterways, and are at a moderate elevation, which improves accessibility.



Hillel Maroun  
Cris Perez, GIS 101  
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#### Sources:

Transportation, electric grid, and waterways data provided by **OpenStreetMap**  
Population and elevation data provided by **Diva-GIS**  
Country boundaries provided by **GADM**  
Landfill data provided by **ntropy.ovh**  
Projection: UTM 36N, Ain el-Abd  
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