AMERICAN UNIVERSITY OF BEIRUT

ARCHAEOLOGY OF THE MTEIN AND KFAR SELOUAN ROAD: A GIS AND LANDSCAPE ANALYSIS

by
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This thesis is written in memory of Christopher Tilley.

ABSTRACT
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Title: Archaeology of the Mtein and Kfar Selouan Road: A GIS and Landscape Analysis

Due to increased urbanization and development in the 21st century, archaeological evidence of road networks has grown more difficult to acquire. Landscape archaeology has tools to continue investigating routes and road networks, such as by using GIS' Least-Cost Path Analysis. A Least-Cost Path was done with ArcGIS Pro between Berytus and Heliopolis, with Mtein as a midpoint. A survey then determined that the Least-Cost Path's results were accurate and 1.65 km of road remains were located. The study succeeded in determining that Least-Cost Path Analysis is a practical tool for researchers in the field of landscape archaeology.

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CHAPTER 1

INTRODUCTION

1.1. Introducing Roman Roads

Roads were the nervous system of the Roman state, as they similarly are today. In the Modern age, other modes of communication and transportation have markedly increased globalization through the use of trains, planes, container ships, and of course the Internet. The Romans did not have such technology but excelled with the tools and materials accessible to them. Roads stretched all across the Roman world from Britain to Egypt, connecting cities and towns through major road networks and secondary routes. As the Roman state grew larger, it was imperative that its infrastructure did not lag behind – messages still had to be received rapidly and supplies could not be cut for Rome's expanding armies. Even during the early days of the Roman Republic, massive building projects across Italy were undertaken to keep communications and supply lines in an efficient state. Livy (39.21.5) records that a messenger took four days to reach Luni from Rome in 181 B.C.E. covering 93 km per day. Other sources point to messengers achieving speeds of 117 km per day on journeys from Brindisi to Rome (Laurence, 1999, 81). Such statistics highlight the significance that the Roman state held for connectivity. Rome didn't carve out a massive empire by only moving borderline, but by unifying their growing territories to one another and the capital, thus centralizing the state after each conquest.

1.2. The Creation of ORBIS

By the time the Roman Empire had expanded into all of the Mediterranean world and portions of northern Europe, the road networks had stretched across all corners of the state like the nervous system of the human body. In 2012, scholars from the University of Stanford devised a way to calculate the time needed to traverse Roman roads. Their objective was to create a map system that primarily takes cost into account to study Roman land and sea routes. The project wanted to shift away from the reliance on conventional maps that were primarily defined by distance between locations instead of the cost of traveling between regions. The Stanford project, known as ORBIS, created a geospatial network model of the Roman world. It maps out the whole Roman empire's cities, major roads, and sea lanes and calculates the distance between the cities and the time needed to traverse the distance. The model allows users to specify which months and seasons to travel; whether to take the fastest, cheapest, or shortest route; the mode of transport, such as on foot or by oxcart; and which natural features to use for traversal, for example open seas and rivers. Thus, by using ORBIS, one can discover that a journey by ship from Rome to Carthage, in September would take 4.2 days to complete and would cover a distance of 632 km (Scheidel et al. 2012, 3-7).

While ORBIS has been very helpful in simulating the life of a Roman period traveler, it still has its shortcomings. ORBIS only uses major land and sea routes as well as principal rivers and lakes to calculate the time and distance covered by journeys. Thus, if ORBIS calculates a journey from Berytus to Heliopolis on foot and in summer, the fastest and shortest journey would take 11.3 days and cover a distance of 504 km (see Figure 1.1). The ORBIS route takes the traveler by ship south to Caesarea Maritima and then sends the traveler on foot by way of the Via Traiana Nova eastwards then

northwards through modern-day Jordan and Syria before reaching the Beqa'a valley and finally Heliopolis, modern day Baalbek.

Berytus and Heliopolis are 68 km apart from each other, thus a journey of 504 km is impractical and inefficient. The issue here is that ORBIS does not provide any information on secondary roads nor takes them into consideration, these roads were just as important as the major routes – the highways of the Roman world. ORBIS only uses the Via Maris that ran along the coastline from Ptolemais to Antioch (Mouterde 1907, 336) and the Via Traiana Nova which traversed the province of Arabia from Aqaba, on the Red Sea to the capital Bostra, far inland. These were the only major roads, known as *via*, in the Roman Near East, but that does not mean that the peoples living in the Roman province had no other options.

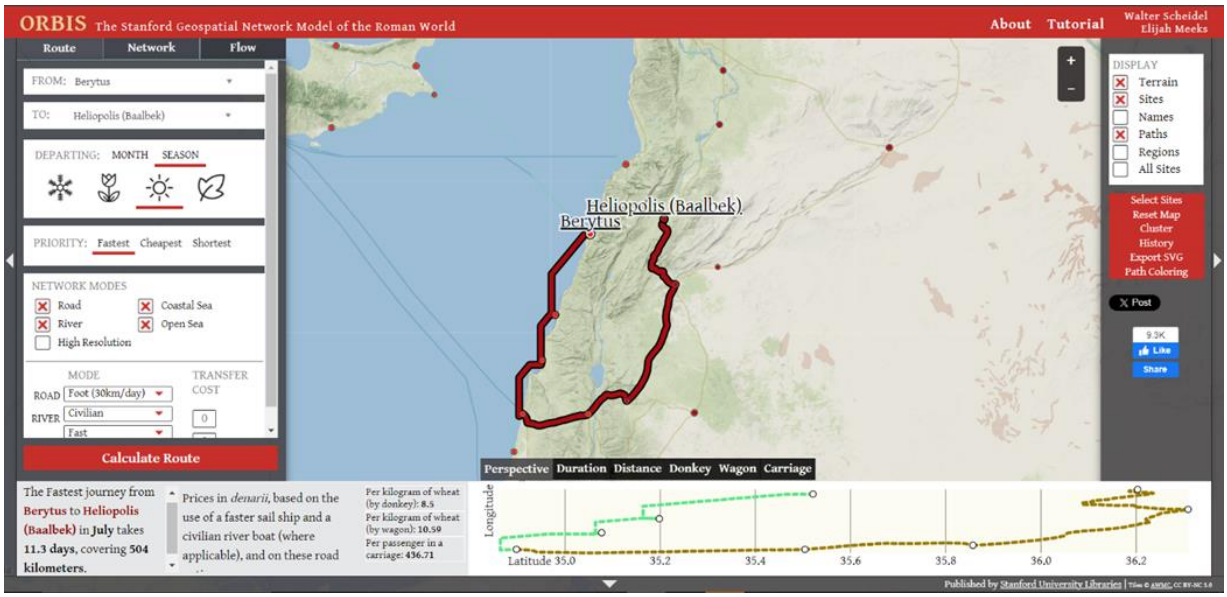

Figure 1.1: Journey from Berytos to Heliopolis calculated by ORBIS. The journey begins by ship to Caesarea and then a land route eastwards.

While ORBIS has made the study of Roman travel more accessible, there is still a lack of secondary roads, thus more can be done to further optimize the study. The

agricultural surveyor, Siculus Flaccus, points out that there were three types of road: the public roads (*viae publicae*), the local roads (*viae vicinales*), and private or estate roads (*viae privatae*). It is uncertain when Flaccus was alive, but his work was used in a collection of land survey treatises from the 6th century C.E. (Campbell, 2003, 1403). Most crucial for this conversation are the *viae vicinales*. These were public roads under the jurisdiction of local settlements and communities, thus their responsibility to maintain them. Due to a shortage in public roads, it is likely that secondary roads stretched across Roman Lebanon to connect the naturally divided citizens if the Berytus colony (Laurence, 1999, 59).

1.3. Circumstances of Lebanon in the Roman Period

Before continuing, we must understand the political background in the Roman Near East. What we label the Roman Near East is a term used to describe all regions from Antioch to the Negev and even as far as Mesopotamia (Foss, 1995, 213). While these regions did not see uninterrupted Roman dominance, specifically Mesopotamia, they do still make our concept of the hybridization of Graeco-Roman and Near Eastern cultures. The Roman Near East was divided into the two provinces of Syria and Judaea, see Figure 1.2. The provinces were annexed from the withering Seleucid empire in a rapid campaign by Pompey in 64 B.C.E. The states that made up the provinces were made into semi-autonomous client kingdoms so these regions could carefully Romanize under local leadership before the Roman Empire could later take full control of what they considered as familiar Graeco-Roman provinces. The client kings of these semi-autonomous states were characterized as graecophiles who had received a Greek education or had been held as hostages in Rome, thus they returned to their kingdoms

influenced by Graeco-Roman culture and invested in public projects to bring their territories closer to the Graeco-Roman world. Only one area was kept by the Roman government; an undetermined area stretching from Berytus to the Beqa'a valley was made into the Roman colony of Berytus in 14 B.C.E. The colony was made of three separate geographical regions: the coastal plain surrounding Berytus, the Lebanese Mountain Range, and the Beqa'a Valley. The two major population centers were Berytus and Heliopolis (in the Beqa'a Valley); Heliopolis, in fact, had become such a burgeoning polity that Septimus Severus made it its own colony separate from Berytus in 193 C.E. For 207 years, the two cities and their surrounding territories were part of one administrative body, thus even with the natural boundary of the Lebanese Mountain Range between them, roads must have been constructed to make rapid communication lines and short trade routes without the need to travel around the southern half of the province of Syria (Sartre, 2005, 24-52).

Figure 1.2: The Roman Near East after Trajan's eastern campaigns (115–116 C.E.). Photograph: Bryce (2016:276).

1.4. Using Least-Cost Path Analysis in Lebanon

Finding a road through Mount Lebanon that connects the coast to the Beqa'a Valley is no easy matter and requires detailed research and the use of computing programs such as GIS. While in the last century, some significant studies have been

done on Roman roads in Lebanon, the rapid urbanization of the country has impeded further discoveries of ancient road networks. In 1907, Mouterde only identified the Via Maris, which runs along the entire Lebanese coastline, through 5 Roman period milestones which gave proof to the physical existence of the coastal highway (1907, 344). While this is evidence of a major road running through the Roman province of Syria, it remains unclear if roads in the eastern Mediterranean were built differently from the rest of the empire or what building materials were used in construction. With time, scholars have adopted new tools to identify more ancient roads. The most recent among the investigations in Lebanon is Abou Diwan and Doumit's least-cost path model calculated using GIS (2017). A geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. By relating seemingly unrelated data, GIS can help individuals and organizations better understand spatial patterns and relationships. In archaeology, it allows scholars to add various layers of data over each other to better understand the ancient past and simulate what it may have looked like. A GIS is very useful in landscape archaeology. Global Positioning Systems (GPS) points of archaeological features and artifacts taken on survey can be entered into GIS and added as another layer over already existing layers of data and any new data calculated through the GIS software, thus making GIS a practical instrument of mapping. Least-cost path is a GIS tool that finds the most efficient route relative to the cost units defined by the original topological map and its cost raster. Cost is a value given to each layer of data which determines the ease or difficulty of traversing that space according to the data given. The advantage of this tool in archaeology is that it builds a cost-efficient model that archaeologists assume is similar to building projects conducted by

ancient engineers who had to consider the limits of their budget and the energy efficiency if the road for armies and travelers. Lebanon's geography is defined by steep mountain slopes, sharp promontories, and high-altitude valleys which make traversal in this region initially difficult. One cannot take a straight line from the coast to the Beqa'a Valley without being halted by a mountain peak. The least-cost path tool takes into consideration the slope of the terrain before calculating whether to directly continue or find a route around any steep surfaces.

Abou Diwan and Doumit's article proposed a route connecting Berytus to Heliopolis according to a least-cost path model constructed using ArcGIS. This approach to Roman roads in Lebanon has highlighted the potential of such concepts in understanding the development of road networks. The authors' study was sound; all natural features such as ancient water bodies, rivers, and steep mountain slopes were taken into consideration. The article determined that a Roman period Berytus-Heliopolis road began at Berytus, ran eastwards through the mountainous Shouf region, crossed the Daher-el-Baydar mountain pass, then descended to the modern town of Chtoura, before continuing north through the Beqa'a valley to Heliopolis - similar to the modern Daher-el-Baydar road which connects the Beqa'a valley to the coast today. Unfortunately, other than three milestones located tens of kilometers apart across the route, no evidence of a road network could be found. The lack of evidence does not make the study a failure but rather a sign of potential. Abou Diwan and Doumit's route traversed some of the most urbanized parts of Lebanon, according to the authors, if there ever was a Roman period road, it has disappeared with likely a few short segments of it buried under layers of modern road or other forms of infrastructure (2017, 226-238).

1.5. The Study's Purpose

To further prove the practicality of GIS' least-cost path tool, this study will aim to locate a Roman period road in the Mount Lebanon region. The reconstruction of ancient road models by archaeologists using least-cost path analysis requires validation through archaeological evidence given the limitation of standard GIS software capacities and the resolution of geographic data (Herzog 2013, 204-205). To differentiate from previous studies, this thesis tests the practicality of Least Cost Path Analysis in remote regions where archaeological features are far better preserved than in urbanized regions. The study area will be a mountainous, marginal region of the nation where urbanization has not yet taken complete dominance. The Mtein region, in the province of el-Metn, will be the main focus of this study. Mtein is a historical town that flourished in the Ottoman period and was a seat of power for the emirs of the Lebanese, Druze Abi-Lama dynasty. As will be discussed in the following chapter, an ancient, preserved road also exists on the slopes under the town, as if the road climbs towards Mtein to connect it with the rest of the state. This road appears to be far older than the Ottoman architecture that sits alongside the ancient path. The ancient road measures a distance of 1139 m. It ends at the outskirts of Mtein where urban development is high, and suddenly vanishes in the hillside forest south of the town.

This study aims to use Mtein as a midpoint and a link in a route between Berytus and Heliopolis. The town of Mtein is only 16 km from the Tarshish Pass which connects to the Beqa'a Valley – a strategic point for modern travel between the coastal plain and the Beqa'a Valley. Furthermore, Mtein is in close proximity to the two Roman period sites of Ej-Jaouze (Nacouzi, 2018, 79-81), found 7 km to the north, and the Aintoura temple (Taylor, 1967, 121), located 3 km to the east. The existence of

plantations, temples, and small polities in such close proximity does not simply presume that dirt tracks were connecting these sites to each other or the port cities, rather they illuminate the development of a region with a durable road running through that saw the movement of goods and people. In the Roman period, heavy products such as timber or stone could only be dragged on durable roads. If a track (*actus*) was built with material to withstand the movement of such heavy products, it was classified as a road (*via*) (Laurence, 1999, 58). As will be explained in the following chapter, the sites Aat Ej-Jaouze and Aintoura both include the use of imported decorated stone, thus a proper *via* was needed to transport these products. Besides connecting local settlements to each other, a *via vicinale* facilitated the export of local produce, the import of exotic luxuries, and the travel of pilgrims.

The objective of this study is to create a GIS-calculated least-cost path between Mtein and Berytus and between Mtein and Heliopolis, and finally to connect the two paths together into one calculated route that theorizes a bypass route through the rugged terrain of Mount Lebanon to connect the inland valley to the coast. The study chiefly aims to verify the practicality of GIS in landscape archaeology. This study's success highlights Least Cost Path Analysis as an efficient tool for archaeologists all over the Near East to use, rather than systematically surveying massive swathes of land in search of a road network. Upon the attainment of a GIS-calculated path, it was surveyed for any archaeological evidence that points toward the existence of a road. Finally, the survey results were analyzed with the assistance of historical and archaeological sources from across the Roman world to verify the ancient Roman route and to speculate on the significance of a possible road.

The study is divided into five more chapters: ‘History and Geography of Mtein and Neighboring Regions’, ‘The Methodology of GIS’, ‘Surveying for Evidence of a Road Network’, ‘A Comprehension of the Study’s Results’, and ‘Conclusion’. The second chapter introduces the readers to the polities and countryside that make up the study area. This chapter includes a dive into Mtein’s Ottoman heritage, the ancient infrastructural features that dot the rural landscape of Mcheikha, and an investigation into the little-known temple in Aintoura. The third chapter focuses on the technical side of the study, the GIS, and how a least-cost path analysis can be performed. This chapter ends with early remarks on the GIS-calculated route. The fourth chapter is an analysis of all results gathered from both the GIS and survey work. This chapter delves into the implications of a local route crossing through the Lebanese Mountain Range and of possible branches linking more archaeological sites together. The final chapter is comprised of a short review proving the practicality of GIS in landscape archaeology, followed by concluding remarks on the advancement of the field in Lebanon and how we may proceed as an academic community.

CHAPTER 2

HISTORY AND GEOGRAPHY OF MTEIN AND NEIGHBORING REGIONS

2.1. The Geography of the Study Area

The thesis' objective is to prove Least-Cost Path Analysis by finding a route through Mount Lebanon. Before starting any GIS analysis, a study area that included Roman archaeological sites, a road network, and multiple archaeological features was chosen. The focal point of this study area is Mtein. Due to its central position, nestled in the Lebanese Mountain Range, its historical significance, and the archaeological evidence of road infrastructure on its outskirts (see section 2.3) the town is ideal to test the practicality of GIS' Least-Cost Path. The town of Mtein is situated at the center of Lebanon in the province of El Metn. It is located 37 km east of Beirut, and has an altitude of 1100 m. Mountain slopes, high-altitude river valleys, and pine forests characterize the region of El Metn where Mtein lies. The town sits on a mountaintop; the western and southern faces of the mountain are steep and only fit for marginal agricultural development, and the hilltop continues to stretch northwards until it arrives on the small plateau where the town of Mrouj presides. The eastern face features a gentle slope where a tributary river of the Beirut river runs southwards towards Mcheikha. The town grows mostly olives and grapes, which is ideal for their altitude, furthermore, a distillery was recently constructed to make wines and other alcoholic beverages such as arak. The regions around Mtein are also significant to this study. Two kilometers to the east lies the Roman temple site of Aintoura; the Roman period archaeological site of Ej-Jaouze is 4.85 km northwest; and directly southeast of Mtein is

the countryside of Mcheikha where ruined infrastructure such as roads, bridges, presses, and mills are located. All these locations will be explored further in the chapter and can be seen in Figure 2.1.

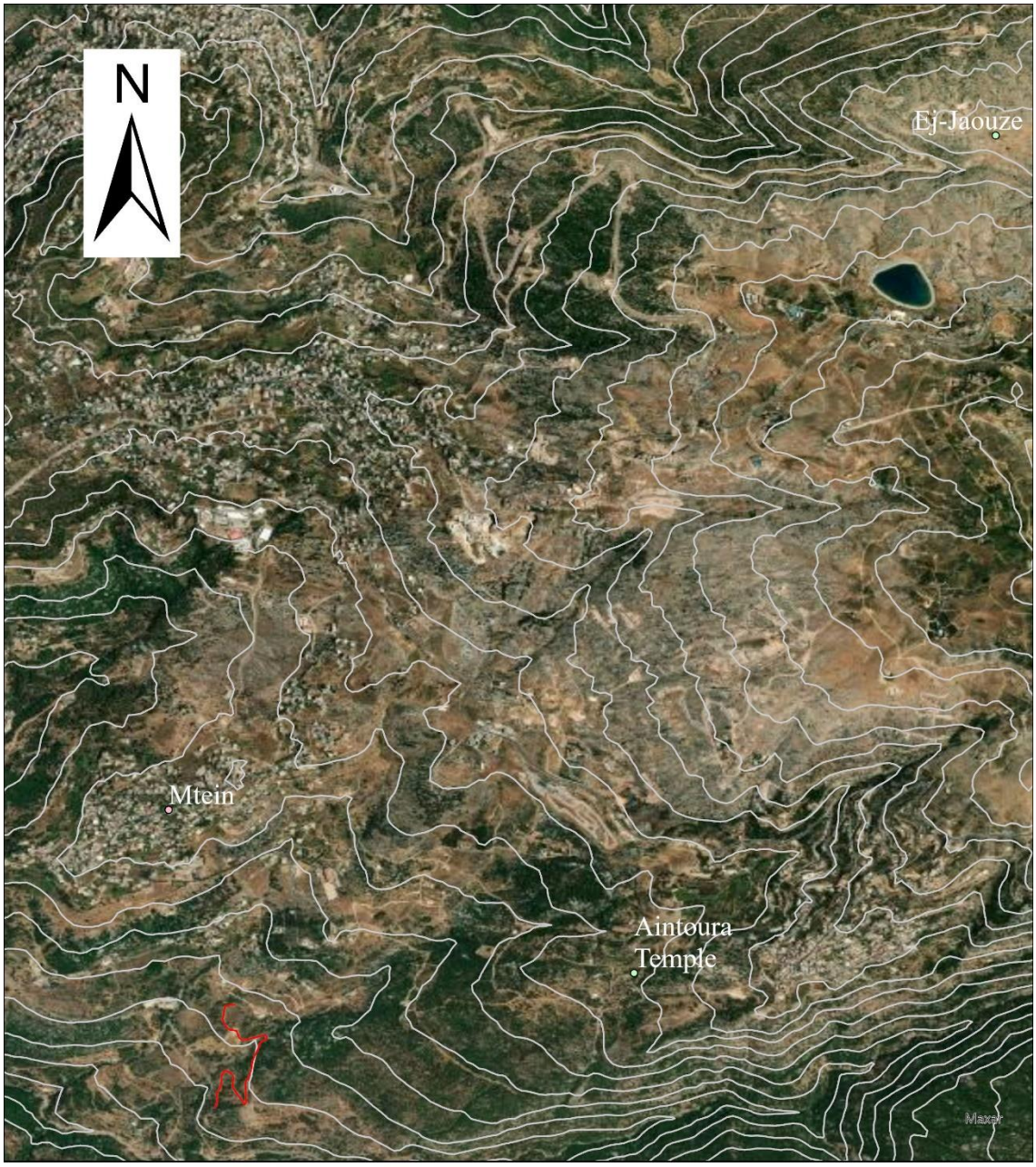

Figure 2.1: Study area map of Mtein, Ej-Jaouze, Aintoura, and Mcheikha

2.2. Mtein's Historical Significance

To better understand the archaeology of the region, a short history of the dominating town of Mtein is in order. Mtein's historical significance centers on its Ottoman legacy, as is visible in the town square by the presence of four ornately decorated palaces. Mtein's historical significance began with the Abillama reign over the province of el-Metn. At the battle of Ain Dara, in 1711 in the Shouf region, the Alam ed-Din dynasty was defeated by the Shehab dynasty and its allies. Since the Druze Abillama family assisted Emir Haidar Shehab (1707-1732), the de facto ruler of Mount Lebanon under Ottoman supervision, at Ain Dara, the family was given the right to call themselves emirs and awarded the district of el-Metn. El-Metn was divided into three territories, each governed by an Abillama emir; Emir Mourad became the first Abillama ruler of Mtein (Fawaz, 1994, 17).

During the Abillama reign, Mtein and its surrounding regions continued to be an important polity in Mount Lebanon, and the seat of Abillama power. The Mtein town square represents the Abillama legacy; originally known as the Square of Princes, the town square housed four palaces that were built in the 18^{th} century C.E. and dominated an area of 5000 m^2. The square's initial purpose was not to be a gathering place for local residents, but rather it was the site of Abillama emir reunions. These reunions were occasional meetings of all the heads of the Abillama dynasty who traversed across the province of el-Metn to gather with their kin. Most of the houses were not used all year long since they were owned by other Abillama emirs whose seats of power were in other parts of el-Metn. The square was also used for military parades and horse races. All these activities and purposes illuminate the feudal grip that emirs held on the Lebanese countryside in the Ottoman period. Due to the investment of resources into

the town of Mtein, it can be determined that similar funding was put into the town's countryside and agricultural sector. As is explained in the next section, evidence of restored bridges, a watermill, and the Mcheikha old road points toward an Ottoman period resurgence of the hinterland where the Abillama dynasty was restoring the infrastructure (Mtein and Mcheikha Municipality, 2018).

After the abolition of Mount Lebanon's feudal regime in 1860, the Abillama family could no longer finance their massive agricultural production due to the new lack of peasant employment. The Abillama emirs found themselves selling off land to the general population to avoid bankruptcy, including their properties in the Square of Princes. Eventually, all Abillama land was purchased and the unused areas in the square were used to construct humbler structures than the neighboring palaces. Finally, the square became public property and was renamed to its popular name today - the Midan. Although the Lebanese Civil War caused detrimental damage in Mtein and neighboring towns, the Midan's architecture remained preserved, one may even take a tour through one of the privately owned Ottoman period palaces today (Mtein and Mcheikha Municipality, 2018).

The history of Mtein is one of agricultural prosperity and feudal dominance. The polity was able to invest in the restoration of its countryside to further serve the local economy and link the regional seat of power with the rest of Lebanon. The following section illustrates the archaeological feature that saw a period of restoration in the 19th century C.E. that the town of Mtein is responsible for.

2.3. Archaeological Evidence in Mcheikha

Returning to the Roman period, the region includes a plethora of sites and features that are traced back to Roman governance. The temple in Aintoura and the site of Ej-Jaouze are some neighboring examples, but structures located in Mcheikha are the closest archaeological features with Roman origins. The area south of Mtein, known as Mcheikha, includes a variety of ancient landmarks, as can be seen in Figure 2.2. Mcheikha is a region characterized by its gentle slopes and pine tree forest, the region is used by the town of Mtein as an agricultural hub due its extensive terraced fields. Among the archaeological features are two presses, two bridges, a mill, and an ancient road with a length of 1.14 km.

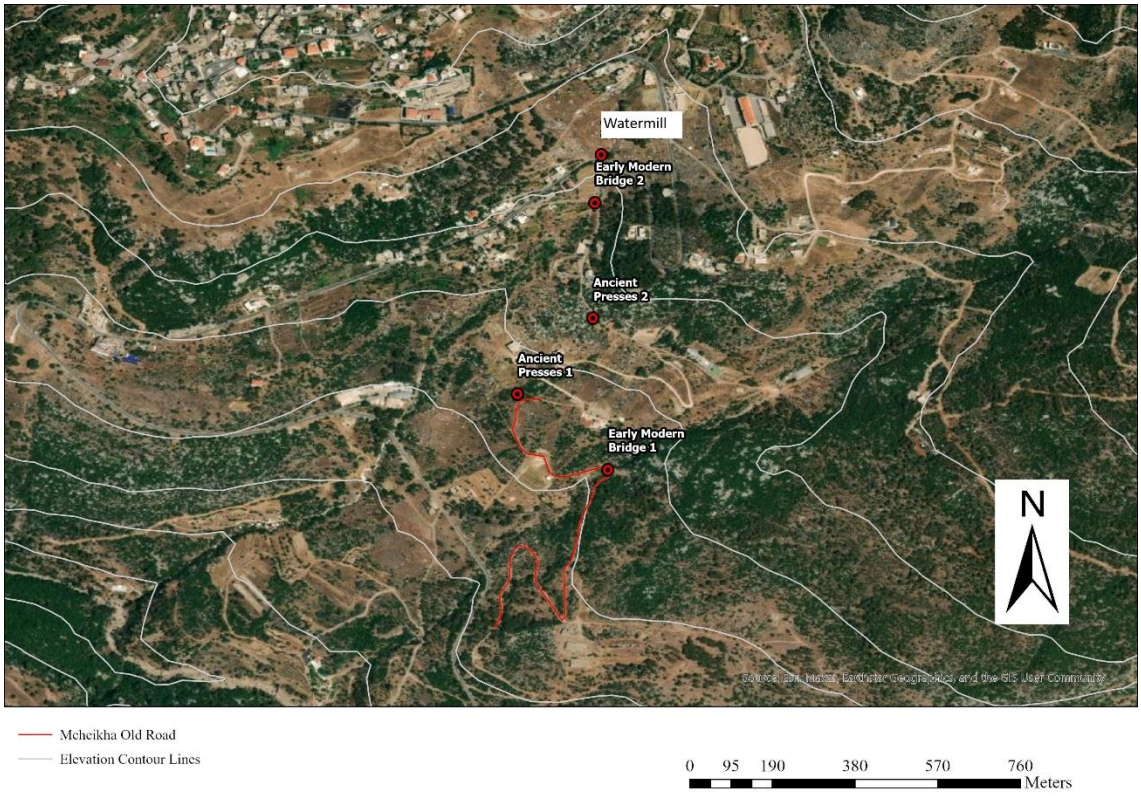

Figure 2.2. Archaeological features in Mcheikha.

A survey conducted by the AUB Archaeological Museum, in collaboration with the Lebanese Mountain Trail Association, documented the visible archaeology to the south of the town. Directed by Dr. Nadine Panayot, this survey was part of a larger project across Lebanon that had the objective of documenting and creating 3D models of different heritage sites located on the Lebanese Mountain Trai. Other sites investigated include the Roman passageway in Aaqoura and the early Christian churches in Mar Chalita

The 1.14 km ancient road starts 1 km south of the town. It has a width of 2.5 m and is built out of limestone (see Figure 2.3). The parallel boundaries of the road are constructed with limestone with an average diameter of 30 cm that were cut into rectangular shapes. A 50 cm wide line of limestone runs through the center of the road and forms a hump shape – partly due to the weight of cars which pushed the pavement on the right and left sides of the road down into the earth. The central line is made of unworked limestone with an average diameter of 30 cm. On the left and right portions of the road, the pavement is characterized by limestone with diameters ranging between 10 cm and 20 cm. No artifacts could be found on the surface to discern the age of the road. According to the width of the road, it could date to the Roman period since the road follows the Roman law that a *via* (road) must have a minimum width of 2.4 m to allow two carts to pass each other (Laurence, 1999, 58-59). Furthermore, the road is paved in limestone, one of the Romans' preferred stones for road pavement (Laurence, 1999, 67). Where the road nears cliffsides, support walls and platforms made of limestone were built to keep the road buttressed (see Figures 2.4 and 2.5)

Figure 2.3. Stretch of the limestone-paved old road south of Mtein.

Figure 2.4. The old road's retaining wall photographed from the west.

Figure 2.5. The old road with its retaining wall to the left.

After traversing 344 m of the ancient road from the northern starting point, one reaches a stream where a bridge (MC01) has been constructed (see Figure 2.6). This bridge illuminates the road's practicality and sturdiness to the degree that it was maintained, and further infrastructure was added to the route. Another similar bridge (MC02) is located 500 m north of the northern starting point and is still in use for traversal and is paved with modern gravel and asphalt (see Figure 2.7). Although there is no evidence of an old road at MC02, it hints at the route that the road once took to the town of Mtein. The survey found no way to date these bridges, but to speculate, these bridges share similar features to the Roman bridge near Ma'amlatayn, near Jounieh. All three bridges are made of a single large arch and abutments on either side of the bridges all built from large limestone blocks. The bridge in Ma'amlatayn was restored in the

Mamluke and Ottoman periods, and likely similar restorations were done on the bridges in Mcheikha (Peterson, 2020, 195).

Figure 2.6. Bridge (MC01) that is part of the old road network.

Figure 2.7. The northern bridge (MC02), currently used as part of the modern road network.

Mcheikha is also home to two undated press installations, one located near the northern starting point of the road (MC03) and the other 220 m northeast of said starting point (MC04). MC03 sits on a monolithic piece of limestone bedrock. The press is characterized by three 1 m by 0.5 m basins and a two-course, 3 m long wall of cut limestone on the northeast side of the bedrock (see Figure 2.8). Also found by MC03

was a worked limestone block (see Figure 2.9). The stone block measures 65 cm by 43 cm with a cylindrically carved space at its center with a width of 6 cm. The purpose of the worked stone is unclear but likely was part of the neighboring press. MC04 was also carved into the limestone bedrock lying on the surface. This press is made of two square-shaped basins that are approximately 1 m^2 in area each (see Figure 2.10). Also included is an open chamber of three walls with two courses of stone and a niche carved into one of the walls – the building technique is identical to the two-course wall of the MC03. The purpose of these walls is unclear but could be the remains of a shed built to store any materials or tools needed for the press. A circular pit was also located; it is lined with fist-sized limestones and has a diameter of 1.3 m (see Figure 2.11). Due to a lack of artifacts found around the presses, what was being produced in these facilities cannot be discerned, but the local inhabitants of Mtein believe these to presses for molasses production. There exists little evidence of molasses presses, but molasses pressing appears to have been done in wine presses. Wine-pressing installations exist on the outskirts of Heliopolis, but photographic evidence from the late 19th century depicts a Turkman camp using these installations to press molasses, thus giving evidence to the multi-purpose use of these pressing installations (Fischer-Genz, 2008, 67-69).

Figure 2.8. Press (MC03) found by the ancient road, sitting on massive limestone bedrock.

Figure 2.9. Worked stone found near MC03.

Figure 2.10. Basins and walls of MC04.

Figure 2.11. Pit feature found in MC04.

The final archaeological features found in the area are two large wall structures that are the remains of a watermill (see Figure 2.12). The northern structure (MC05) is comprised of the remains of one 5 m-tall tower used to extract water from the stream to the send into two single-chamber buildings that likely housed the millstones (see Figure 2.13). The southern gargantuan wall (MC06) has a length of 20 m and a width of 2.5 m at its base and 1.2 m at its highest course and a height of 6.6 m. The mill structure stands alone 250 m south of the town of Mtein. The mill takes advantage of the stream running adjacent to it. At the top of MC06, a channel with a width of 20 cm runs the length of the wall-like structure before dropping directly downwards into the wall and disappearing (see Figure 2.14). The structure's purpose is to release the water, used to power the mill, back into the stream further downhill. The two tower structures are

penstock towers used to regulate the flow of water between the watermill and the river; the use of penstock towers in the Near East is well documented, such as at the Ottoman period watermills in Mosul, Iraq (Usta and Tonghini, 2023, 271) and the Jawz Valley, Lebanon (McPhillips, 2019, 208). MC05 includes the remains of a ruined channel, while MC06 features a channel clearly built in a different style of masonry. It can be determined that MC06 was restored in a period later than its origin to mill grain from the surrounding landscape. The fact that only one watermill was restored points to a decrease in agricultural production, as Usta and Tonghini describe "any increase or decrease in the number of such watermills should be interpreted in relation not only to changes in grain production but also to the efficiency of the present irrigation network" (2023, 278). Nevertheless, due to the restorations done on the water-powered structures, the watermills are quite old and could predate the Abillama reign and investment into the infrastructure of Mtein and Mcheikha.

Figure 2.12. The southern wall-structure of the mill (MC06).

Figure 2.13. The northern structures of the watermill (MC05). The two single chamber buildings are visible to the left of the tower.

Figure 2.14. The channel at the top of MC06.

No dating on the bridges or presses across the Mcheikha ancient road has been done, thus it is difficult to discern whether the features have a Roman origin or were all constructed in the Ottoman period.

2.4. The Temple in Aintoura

To the north of Mcheikha lies a ruined Roman site, that has been hardly studied by archaeologists. The temple in Aintoura showcases a sanctuary complex of Roman period archaeological evidence. Situated 2.37 km east of Mtein, the temple lies within the boundaries of Mtein. The area around the temple is characterized by a hilly landscape occupied by small forests and old terrace fields that are no longer agriculturally used. The Aintoura site forms a temple/sanctuary complex including a *propylaeon*, a *temenos*, and a temple built on a podium. Only one archaeologist has directly documented the temple in Aintoura. Unfortunately, Taylor's book only included three images of the temple complex in 1967, with scant information under each image and no measurements, thus I surveyed the temple in March 2024 to find the dimensions of the complex (Taylor, 1967, 121-124). The complex has a length of 86.5 m and an approximate width of 21.5 m. The *temenos* travels in a curved line between the gateway and temple proper, furthermore, it disappears from place to place making it difficult to calculate the area of the temple complex. The height of the temenos at its most preserved point is 3.5 m (see Figure 2.15); due to the height of the *temenos*, the Roman period ground level might be much deeper than the current surface level, thus an excavation to further uncover the architecture of the complex would be quite fruitful. The *propylaeon* is preserved by three pillars and a row of rectangular large stone

blocks. Two pillars form the door frame and have a height of 3.2 m, while the third pillar lies further north in situ with a height of 1.9 m (see Figure 2.16). Both the gateway and the temple face east, as is typical of most Roman temples in the Near East (Aliquot, 2008, 80).

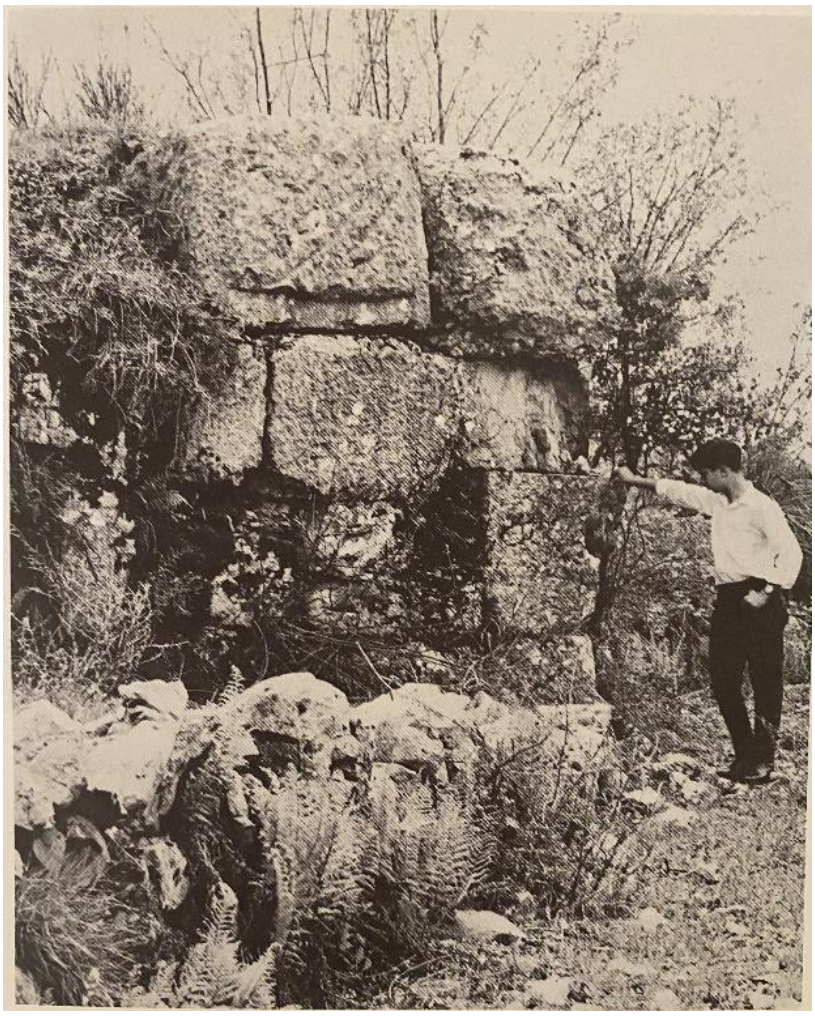

Figure 2.15. Part of the *temenos* of the temple in Aintoura. Photograph: Taylor (1967:122).

Figure 2.16. The gateway at the temple in Aintoura.

The 40 m-long courtyard includes some architectural features of the temple, including the only remaining column base (see Figure 2.17) and a poorly preserved press weight (see Figure 2.18). The temple is made of a limestone podium with a length of 21.7 m and a width of 17.7 m. Sitting roughly at the center of the podium is the temple with a length of 17.7 m and a width of 9.7 m. It is unclear how many chambers constitute the temple since no partition walls are visible within the structure. Furthermore, only one column base remains, which is not in situ, thus it is unknown how many columns lined the face and sides of the temple.

While today the region has been agriculturally developed with orchards and fenced-off properties, images taken in 1967, when Aintoura had still not modified for modern agricultural practices, illuminate what the complex may have appeared as in the Roman period (see Figure 2.19). It is unknown which deity the temple was dedicated to since no archaeological investigations have ever occurred, and neither is there any

epigraphical evidence of the sanctuary's visible architecture. Nevertheless, the sheer amount of effort put into the construction of a temple complex in an area with a marginal impact on the rest of the colony of Berytus speaks volumes of Rome's determination to link its empire together and to expand and develop in regions categorized as remote due to natural circumstances. Rome has a well-documented history of developing marginal regions into populous and prosperous zones. The dry and mountainous region of the Hauran was improved with irrigation systems and roads; and the arid steppe region of Chalcidice was also developed using irrigation systems, the introduction of rectilinear field fencing subsidies from Rome, and new roads constructed by the Roman garrison that patrolled the desert border in the Syrian desert (Butcher, 2003, 153-160).

Figure 2.17. The remaining limestone column base at the temple in Aintoura.

Figure 2.18. Worked stone used as a press weight.

Figure 2.19. The temple’s podium viewed from the northeast. Photograph: Taylor (1967:121).

2.5. The Roman Site of Ej-Jaouze

The temple in Aintoura is not the only Roman period site, a large settlement site exitsts farher to the north. Ej-Jaouze is an archaeological site located on the Zaarour plateau to the west of the Sannine mountain. The site was first a Byzantine period residential settlement that included a wine press, inferring the cultivation of grapes and the manufacturing of wine (Nacouzi, 2018, 82). Monumental architecture in the Byzantine levels dates the settlement between the 5th and 7th centuries C.E (81). The Byzantine settlement boasts many imported ceramics and glassware, decorative marble, and large sarcophagi seated on colossal platforms. Evidence from the settlement shows that both luxury and coarse good were imported (142), thus there was a trade route that at least led to Ej-Jaouze. Due to Ej-Jaouze's close proximity to Mtein and Mcheikha, it is plausible that a road connected the two regions. Ej-Jaouze's second settlement phase was in the Mamluke period, between the 13th and 15th centuries C.E. This medieval site focused on the extraction of iron ore. Iron is present in and around the archaeological site, and an ore reduction furnace, dating to the Mamluke period, was also present. There is no evidence that iron was mined or refined in the Byzantine period (182).

2.6. Discussion of the Sites and Landscape

As shown in the previous two sections, the sites of Aintoura and Ej-Jaouze are evidence of Roman settlements in the area that were actively participating in trade, therefore there must have been a functioning road network that could transport imported products to mountainous settlements in the Lebanese hinterlands. Such a road network would have had to be connected to a port city such as Berytus where goods could be imported and exported. Conclusively, upper el-Metn Roman sites benefitted from an

east-west road network, since such a network connected these distant sites to foreign markets and allowed for the purchase of imported items. Furthermore, such a road network allowed for accessibility to local resources such as limestone that required a paved road to be transported. After Abillama ascension to power, the infrastructure would have been improved, similarly to how the Midan was. New bridges were constructed to ease traversal to and from Mtein, while the road could have been improved or continued to be maintained. This overhaul to the road network would have encouraged industrial development in the region, such as the existing presses and watermills among other manufacturing facilities in the area. We cannot be certain if the presses date to the Ottoman period, but a phase of reconstruction is apparent due to the limestone walls that are made of large but thin stones, unlike the Roman preference for larger limestone blocks, as was done in the Limestone Massif of northern Syria (Tchalenko, 1953, 67). The watermill paints a new landscape in Mcheikha, one of agricultural development that was augmented with secondary facilities such as a building complex for the milling of grains. Furthermore, the two apparent periods of construction illustrate that Mcheikha's infrastructure was not a product of Abillama suzerainty but a much older prosperous agrarian community, that was likely active in parallel to the temple in Aintoura and Ej-Jaouze. Nevertheless, the ancient road in Mcheikha is a suitable location to begin investigating the continuation of the ancient Roman road.

CHAPTER 3

THE METHODOLOGY OF CALCULATING A ROAD

3.1. Introducing GIS and Least-Cost Path Analysis

After understanding the history, geography, and archaeology of the study area, a GIS analysis began. This chapter documents how one can create a systems-calculated road using the ArcGIS Pro software. GIS is already commonly used by landscape archaeologists in all manners of tasks from the research of future survey areas to the documentation of findings from past investigations that cover entire regions.

ArcGIS Pro is the latest GIS software by Esri, launched in 2015. It is a full-featured professional desktop GIS application that one can use to explore, visualize, and analyze data; and create 2D maps and 3D scenes (Esri, 2015). For this study, ArcGIS Pro was utilized to create maps of the study area after survey work has been completed and additionally, to calculate a possible ancient route through Least-Cost Path Analysis.

As explained in the introductory chapter, the Least-Cost Path tool calculates the most cost-effective route for an individual to traverse. This tool is helpful for recreational activities such as finding new hiking trails, or humanitarian efforts such as finding new routes to get aid to remote regions in post-disaster zones (Holguín-Veras et al., 2013, 262). The Least-Cost Path tool takes topography into account but also other sorts of data. Any layer of data, such as rivers and modern roads, can be reclassified by GIS so that the user attains a realistic understanding of what will be faced on the calculated route. Since the software can take a plethora of variables into account, the tool is very practical for civil engineers who work in traffic and transportation sectors. Mapping a cost-efficient route does not only improve energy consumption but also

budgetary concerns, thus one may design an entire nation's road network while making it as cost-effective as possible. Roads in the Roman period were built by either local laborers, members of the Roman military, or professional contractors who methodically compacted layers of stone and gravel (Laurence, 1999, 59). Such projects were time-consuming and costly in energy and funds, thus it is likely that authorities managed these projects to make them as cost-efficient as possible. If an archaeologist reasons that ancient roads had to be cost-efficient to stretch over entire regions, without the use of modern technology, the least-cost path tool is a practical technique to calculate the possible routes used in ancient periods. However, it must be noted that Least-Cost Path Analysis takes into account the most energy-efficient route for the traveler not the road builders. It is not the case that budget and energy efficiency always align, but Least-Cost Path Analysis calculated routes that attempt to avoid natural barriers, thus the cost of bridges for instance is cut by finding a path that crosses the least amount of streams and rivers.

3.2. Using Least-Cost Path Analysis

The Least-Cost Path Analysis is done through three separate tools: Reclassify, Cost Distance (to form Cost Distance and Backlink rasters), and Cost Path; topographical data is also required to run the calculation. The cost for this study is the difference in elevation, so the Least-Cost Path Analysis calculated a route with the fewest steep inclines. Using public topological data of Lebanon, a slope function was run to organize the topological layer of data onto the software's map. The second step was to use the Reclassify tool; its function is to categorize the different slope elevations into different classes of weighted value. The tool works so that the higher the value of

the slope, the costlier it is to traverse. This does not mean that high-altitude regions are generally difficult to move through, rather it is the sudden change of slope that increases energy cost. This is the most crucial step and can branch the least-cost path calculations in different ways. The GIS user must fill in the weighted value of each slope class as they see fit. The weighted values used in this study's least-cost path analysis are similar to Abou Diwan and Doumit's values since their study area overlaps with this thesis' study area (2017, 230). The slope classes and their weighted values can be seen in Table 3.1 below. River data was also reclassified to a weighted value of 5. Some river crossings were in ancient times a difficult ordeal, the Nahr el Kalb crossing was famously treacherous in Lebanon (Zumoffen, 1926, 3). Though we cannot be certain if any bridges existed to ease travel, we must account for no such infrastructure. Once both river and slope data were reclassified, the weighted overlay spatial analyst tool was used to combine both sets of data with the slope as the more influential factor, 70%, and the river data as an influential factor of 30%. This is done so that the least-cost path analysis does not completely dismiss river crossings if they are still more efficient than certain slope traversal.

Table 3.1. Slope classes and their weighted values.

Slope Degree	**Weighted Value**
0-5	1
5-10	2
10-20	3
20-30	4
30-40	5

40-50	6
50-60	7
60-70	8
70-80	9

After the data was combined, the Cost Distance tool was used to enter the route's starting point, Mtein. Specifically, the road in Mcheikha was used as the starting point to best identify how the road continued and if any more remains of the road could be located. The road in Mcheikha is one of a few examples of paved roads in the Lebanese Mountain Range – the Roman stairs of Jabal Moussa also springs to mind (Fischer-Genz et al., 2018, 245). The Cost Distance tool inputs reclassified river and slope and the starting point into a Cost Distance and a Backlink raster. These two rasters are then used, in addition to the calculated route's endpoint, in the Cost Path Spatial Analyst tool to finally run the least-cost path analysis. The endpoints are Berytus, modern-day downtown Beirut, and Heliopolis, the archaeological site of Baalbek. Only one endpoint can be input at once, thus the Cost Path Spatial Analyst tool was run twice, each time with a different endpoint. Once the calculated least-cost paths were complete, they were added together on a map (see Figure 3.1).

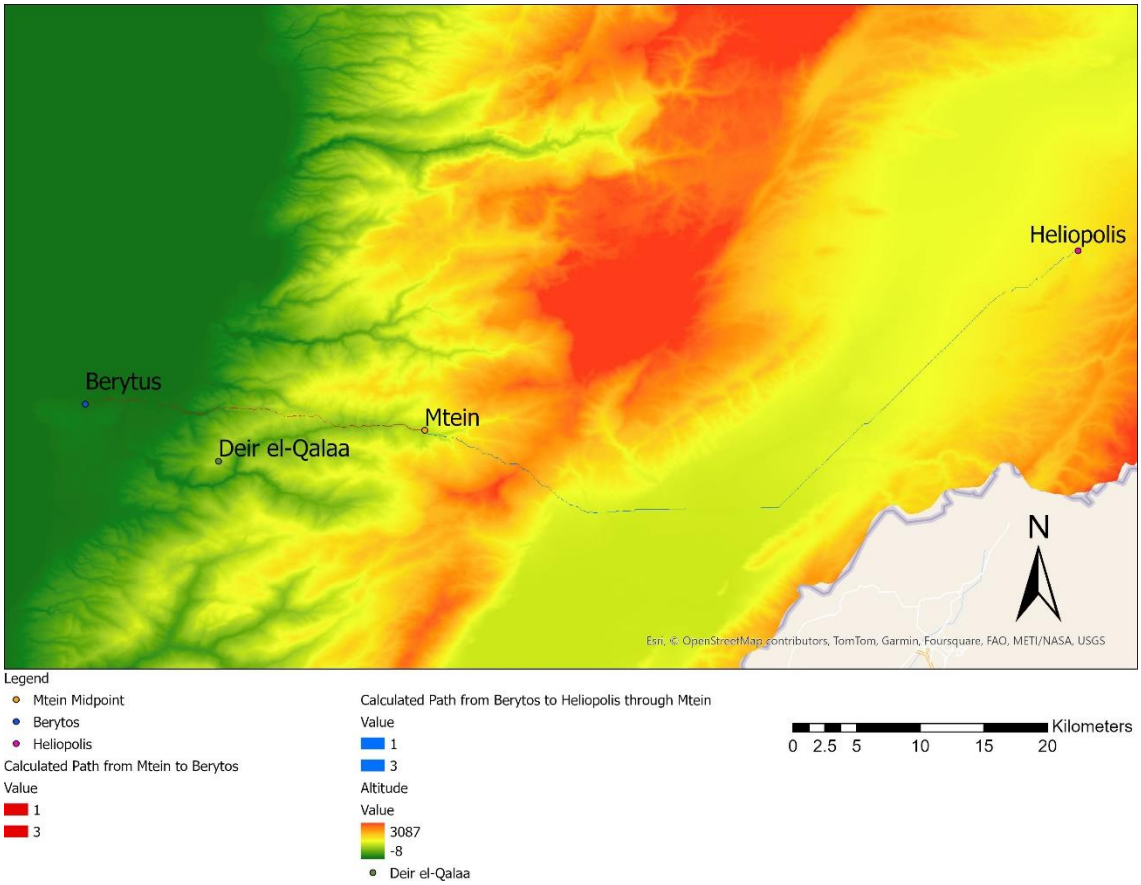

Figure 3.1. Least-cost path route from Berytos to Mtein to Heliopolis.

3.3. Remarks on the Least-Cost Path Analysis Results

With a completed route calculated by ArcGIS Pro, the results require a moment of contemplation. The least-cost path route begins in Berytus and moves eastwards through the el-Metn provinces until it reaches Mtein. The site of Deir el-Qalaa is worth noting since it is located 4.2 km south of the calculated route, furthermore both Mtein and Deir el-Qalaa land on the same side of the Beirut River. If this is a Roman road, it could be traversed by Roman period travelers in approximately one to two hours, since the minimum speed of Roman period inhabitants was 32 km per day on local roads in Roman Italy (Laurence, 1999, 82). After Mtein, the route crosses the Beirut River at the eastern boundary of Mcheikha, then continues with a steeper elevation climb into the

town of Kfar Selouan and finally reaches the mountain pass at Tarshish. Figure 3.2 shows a more detailed Least-Cost Path Analysis route between Mtein and Heliopolis. After the Tarshish pass is traversed, the route descends into the Beqa'a valley, by way of the modern city of Zahle. The route finally reaches flat terrain at the outskirts of Zahle, where it then travels north then northeast through the Beqa'a valley until it reaches Heliopolis.

The most difficult part of the route is the Tarshish region where a river and the steep slopes create formidable obstacles to cross, , as can be seen in Figure 3.2 where between Mtein and Kfar Selouan there is a sudden change in elevation. But this same area has the best potential for an archaeological survey due to its remote and undeveloped - compared to the rest of Lebanon – nature. Thus, if a road can be found in the high-altitude region of Kfar Selouan, it would confirm that GIS is a practical tool in the investigation of ancient roads.

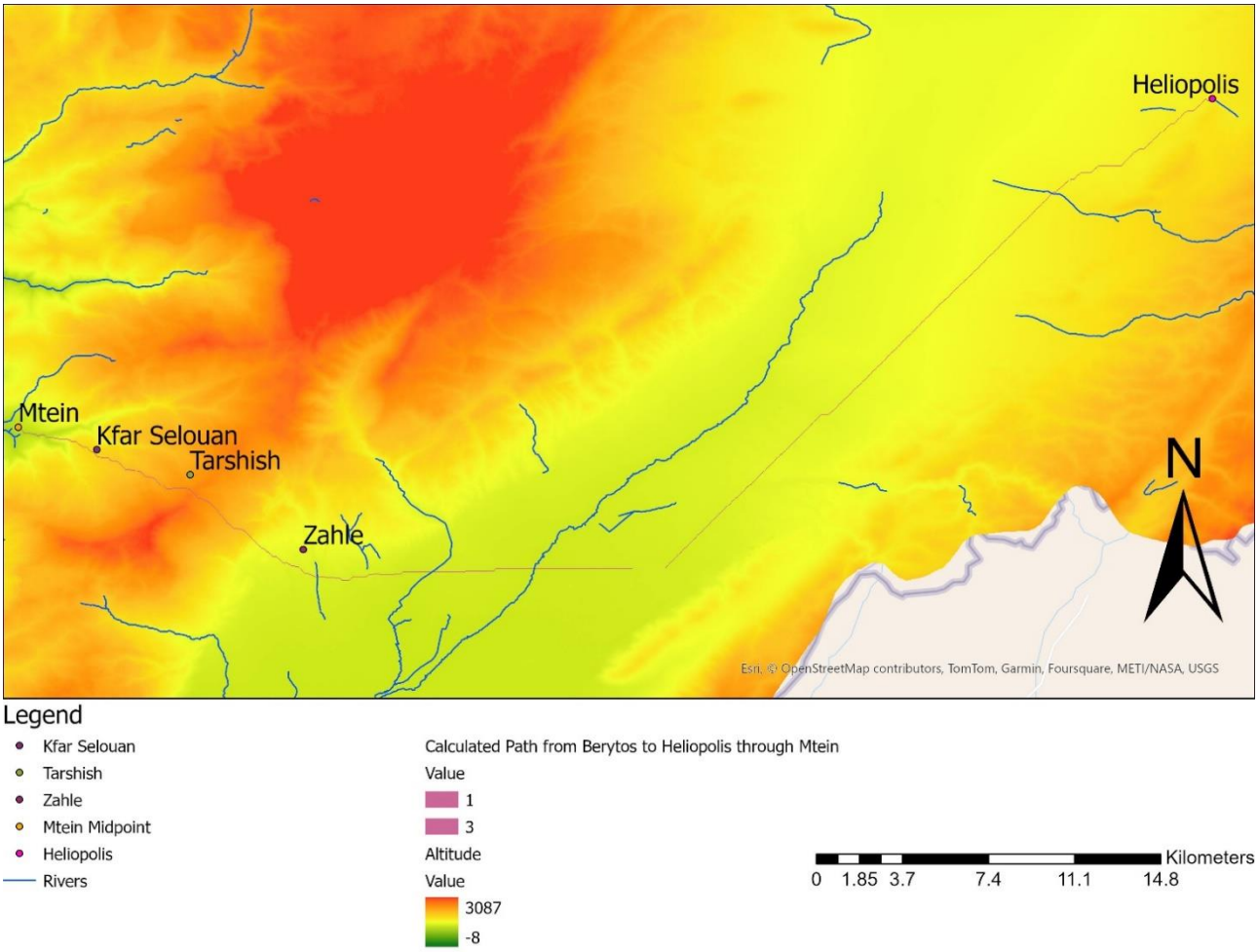

Figure 3.2. The Least-Cost Path between Mtein and Heliopolis.

CHAPTER 4

THE RESULTING SURVEYS OF KFAR SELOUAN AND MCHEIKHA

4.1. The Survey Area

After the completion of a Least-Cost Path Analysis route, survey work could begin in earnest. Fieldwork to locate the Least-Cost Path Analysis route commenced in March of 2023. A path of approximately 5 km between the towns of Mtein and Kfar Selouan was chosen as the research area. This region was picked since it was found to be one of the most remote areas across the path. The area consists of mountain slopes cut apart by the Beirut River which passes through the route. To add to the geography of the area, these slopes are home to high-altitude trees such as pine and walnut that stretch across the mountainside. While Mtein and Kfar Selouan are quite populous villages, the area between the two polities lacks any urbanization and rather facilitates small-scale agriculture, forestry, and herd-grazing. Such an environment holds the best chances for locating archaeological features in a preserved state.

4.2. The Kfar Selouan Survey

The first survey was conducted in the outskirts to the north and northwest of Kfar Selouan by a team of five participants. A map of the route taken, and all features located can be found in Figure 4.1. The town of Kfar Selouan is located on a plateau; to the west of the village is a downward slope that gradually steepens until one descends into the valley of the Beirut tributary river, and to the east is a steep upward slope towards the Tarshish mountain pass. This region of mostly even ground has made the

town ideal for terraced agricultural activity. The survey's objective was to walk northeastwards and downslope towards Mcheikha to locate any road remains. The 500 m from our set starting point at the northern periphery of the village was characterized by farmland and large enclosed properties; due to the developed nature of this area, a decision was made to move around any enclosed property to not risk trespassing. Afterward, all modern buildings disappeared except for one shepherd's hut – evident by the modern sheep pen attached to the hut. Older and less preserved enclosure walls began to appear after 1 km of traversal, see Figure 4.2. Also noteworthy was the increasing amount of limestone bedrock appearing on the ground surface (see Figure 4.3). The layer of bedrock appears to be quite smooth on the surface likely due to traversal over many decades by humans and domesticated animals, if not centuries. This bedrock pavement varies in widths between 4 m and 10 m and continues down the slope for 1km before the mountain begins to slope suddenly. Along this bedrock trail was located a worked stone block (see Figure 4.4). The stone block measures 85 cm by 43 cm with a cylindrically carved space at its center with a width of 6 cm. The stone block was located by the bedrock pavement, but no other modern or ancient structures appeared nearby. Interestingly, an almost identical worked stone was located at the southern ancient press by the ancient Mtein road, see Chapter 2 and Figure 4.7 for more information. More terraces with larger stones, averaging at 40 by 20 cm, appear in the area. All four terraces groups use limestone as the sole building material.

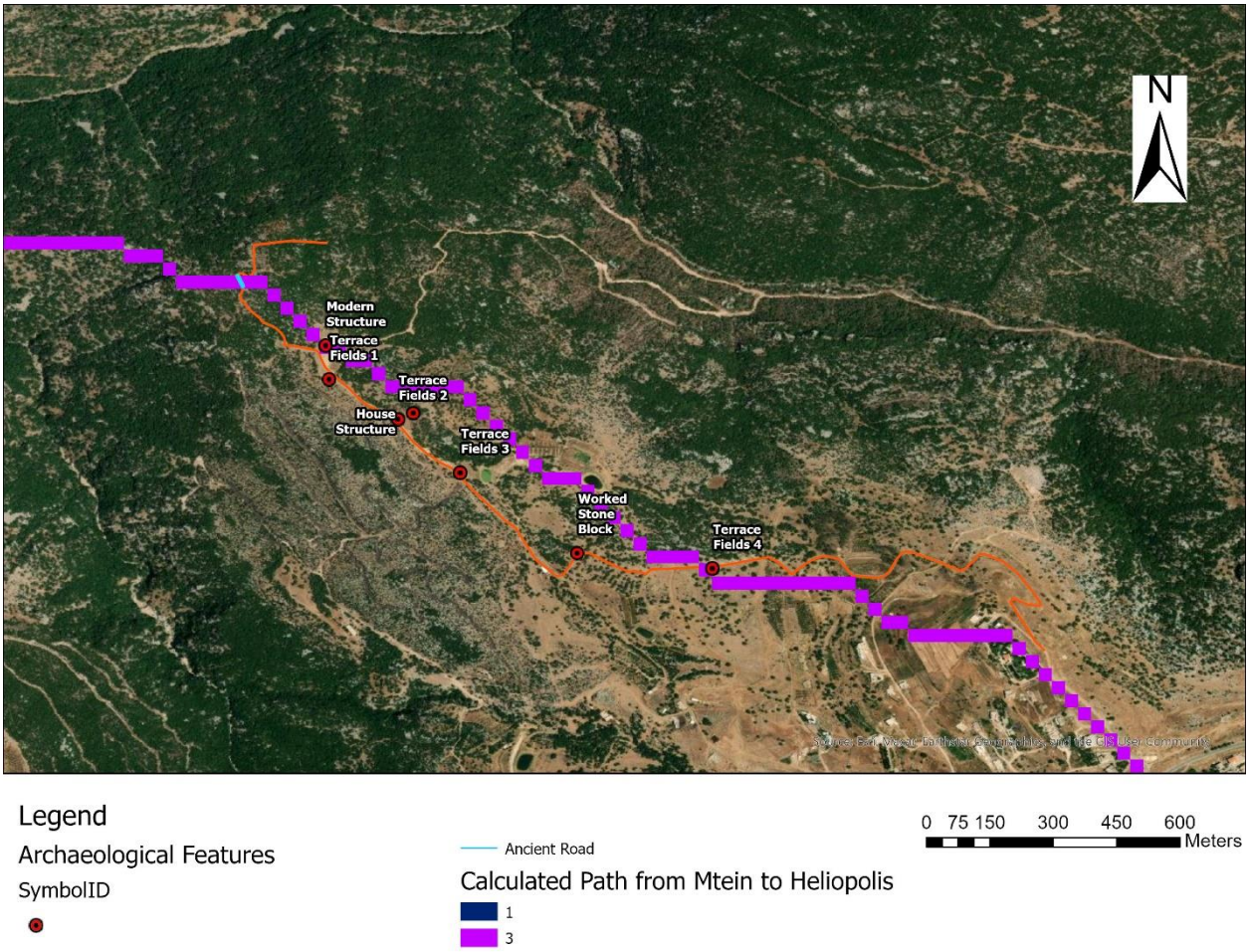

Figure 4.1. Map of the Kfar Selouan survey area. The survey route is marked in red.

Figure 4.2. Stone enclosure wall of an abandoned terraced farmland.

Figure 4.3. Bedrock faintly appears on the surface.

Figure 4.4. Worked stone block identical to the stone block found in Mcheikha.

An abandoned house structure is located by one of these terrace groups (see Figure 4.5) The limestone-built house has a rectangular shape and measures 18.5 m by 9 m. There is a partition wall that divides the structure into two rooms. The rooms are very similar in size; the southern room measures 74 m^2, and the northern room measures 70 m^2. The house's entrance is on the southern wall and directly leads to the southern room. The house's walls have a width of approximately 75cm and are made out of two rows of large irregular limestones with a layer of rubble in between. The house walls have been preserved at heights ranging between 0.5 m and 1.7 m with no other notable architectural features such as door lintels or vaulted arches.

Figure 4.5. House structure located by ancient terraces.

Continuing eastwards in close proximity to the calculated route, a final set of terraced fields appears. These fields are enclosed with limestones by far the largest compared to the other terraced fields (see Figure 4.6). The area surrounding these fields shows no signs of modern human use, with the exception of one modern structure. The structure's purpose is unclear, it has a circular shape with a diameter of 13.5 m, which is attached to a rectangular structure measuring 17.4 m by 4.6 m. The irregular structure is made of concrete and steel and appears to have a subterranean floor whose entrance could not be located. Chambers flank the central circular room but have been flooded due to the winter rains and could not warrant exploration. The circular room lacks any roofing, it is unclear if this was purposeful or if the structure was never completed. While the structure's purpose remains a mystery, I theorize that it was a sort of military

installation dating to the Lebanese Civil War. The upper region of the province of El Metn experienced years of destruction and warfare and the frontlines stretched through the towns of Dhour Chweir, Bolonia, Douar, and crucially Mtein (Hanf, 1993, 250). Thus this structure was near to the battlegrounds in an area with minimal development – a perfect hiding spot for military equipment. Therefore, it is possible that due to the remoteness of this area in which the calculated route passed through, it was found to be an ideal location to construct a military storage depot, barracks, or bunker. Due to the complete lack of modern garbage or any other sign of land use, it would seem this portion of the route appears to not be traversed by any of the locals from Kfar Selouan, except for shepherds.

Figure 4.6. Easternmost terraced fields in Kfar Selouan.

At the location of the last set of terraced fields, the gentle slope abruptly ends and there begins a sharp elevation change towards the mountain valley where sits the Beirut River. The terrain of this area is composed of clustered high-altitude walnut trees and limestone bedrock that make travel impossible, except for a 5 m wide cleared pathway through the mountainous forest. This pathway continues down the mountainside with various winding twists and turns, and shows the first evidence of an ancient road. The pathway is filled with roughly 30 cm-diameter limestone embedded into the ground and large limestone boulders that form two lines on each side of the path as if to bar the forest from expansion (see Figure 4.7). Further down the trail, a preserved road is found (see Figures 4.8 And 4.9). The road is composed of two winding parallel lines of boulder-sized limestone with a space of 2.7 m between them. The space in between constitutes a scatter of limestone with diameters varying between 10 and 30 cm embedded into the ground and forming a stone pavement. This road stretches on for 30 m before the limestone pavement and barriers disappear into the ground and forest. With the exception of some weeds and grass, no vegetation was entrenched within the road, concluding that the parallel lines' role was to both support the weight of the pavement and stop the encroachment of the forest, which it continues to do after centuries of disuse. No pottery or other type of artifact could be found while surveying this ancient road. Part of the terrain even uncovered a lower level of what appeared to be rectilinear, worked stones (see Figure 4.10). This layer of carved stone was uncovered where the boulder-sized limestone barrier should continue. Without properly excavating the road, it is unclear if this lower course of carved stone ran under the entire road as its foundation. The winding path continued downwards with more twists and turns, while the cleared pathway remained with a width ranging between 3 m

and 7 m. After another 250 m of walking, the trail is suddenly cut by a wall of trees and overgrown bushes, ending the survey of Kfar Selouan.

Figure 4.7. The path up the mountainside near Kfar Selouan.

Figure 4.8. View of the ancient route while walking uphill.

Figure 4.9. View of the ancient route while moving downhill.

Figure 4.10. Worked rectilinear limestones that are part of the ancient road.

The trail down the mountainside had very low visibility due to the forest of trees on either side of the path, but a vantage point of the mountain valley and adjacent mountainsides was located. This location gave a view of the modern bridge in the valley below, the ancient road leading uphill on the other side of the valley, and the village of Mtein – the road's next considerable settlement (see Figure 4.11). In the valley below were located modern dirt roads that ran parallel to the Beirut River before climbing up their respective mountainsides. While this is not significant evidence, it does give an idea of where an ancient path would have passed through to link with the mountainsides of Mtein and Kfar Selouan together. Old terraced fields could be seen from the vantage point (see Figure 4.12), thus proving that a path was made to reach the farmlands.

Figure 4.11. View from the vantage point at the cliffsides near Kfar Selouan. Mtein appears in the background in the top right.

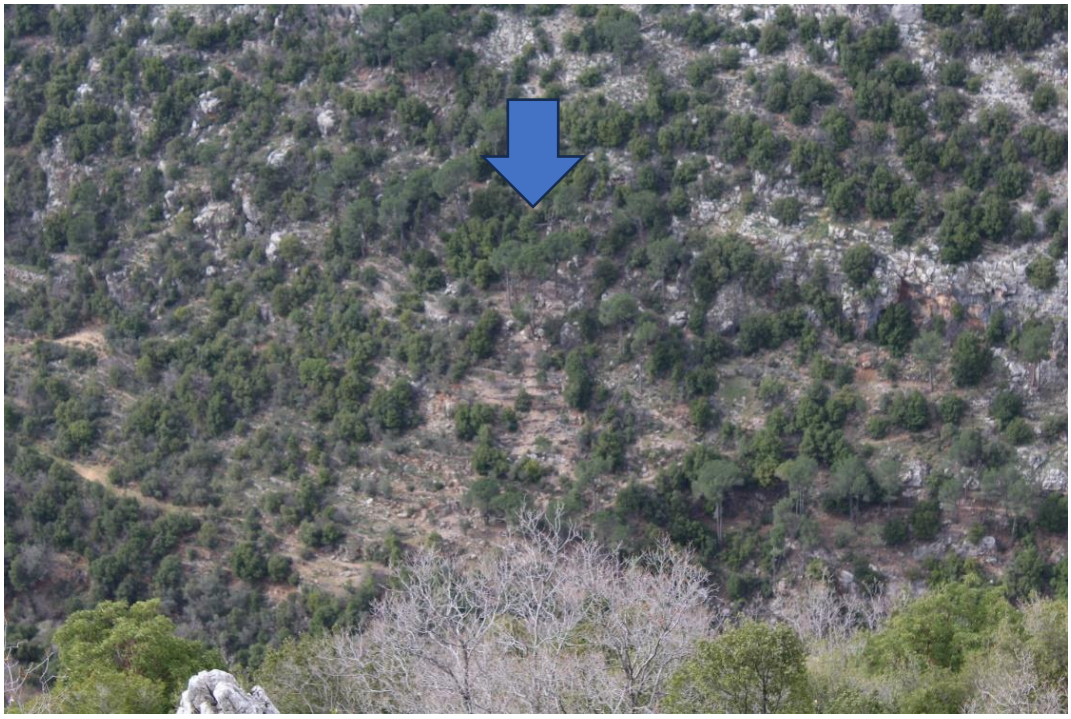

Figure 4.12. Terraced fields in the mountain valley over the Beirut River. Seen from the cliffsides of Kfar Selouan.

The route was taken back to the village of Kfar Selouan to measure how long it would take a group of five people to travel the distance. The route traveled has a length of 2.62 km and the hike uphill from the forested impasse took 35 minutes to traverse. During the journey uphill back to the village, all the archaeological features previously noted down became more visible. The terraces pointed downhill towards the ancient road winding up the mountain, as did the ruined house structure. If one were to travel uphill, the easternmost terrace fields are situated where the terrain transitions from a mildly steep mountainside to a gently sloping mountaintop, and it appears as if past residents of the region took full advantage of flat terrain for dwelling and agricultural cultivation. All the archaeological structures located either faced the valley below or the calculated route that was surveyed.

4.3. The Mcheikha Survey

While the Kfar Selouan survey was quite productive, another survey in Mcheikha aimed to located more of the road network on the other side of the Beirut River. The Mcheikha survey was undertaken by a team of 4 individuals with the objective of descending to the Beirut tributary river and then walking uphill eastwards towards Kfar Selouan, Mcheikha is a hilly region that hugs the northern bank of the Beirut River. Unlike adjacent regions, it isn't categorized by sharp cliffs and mountain peaks, but rather by gradual slopes fit for terrace agriculture. Mcheikha is where the ancient Mtein road is located and already known by the local community. Following near the ArcGIS-generated path, the team was able to uncover a longer stretch of the road than was already clear to the local community. A map of the surveyed area, the known road, the continuation of the road, and all located features can be seen in Figure 4.13.

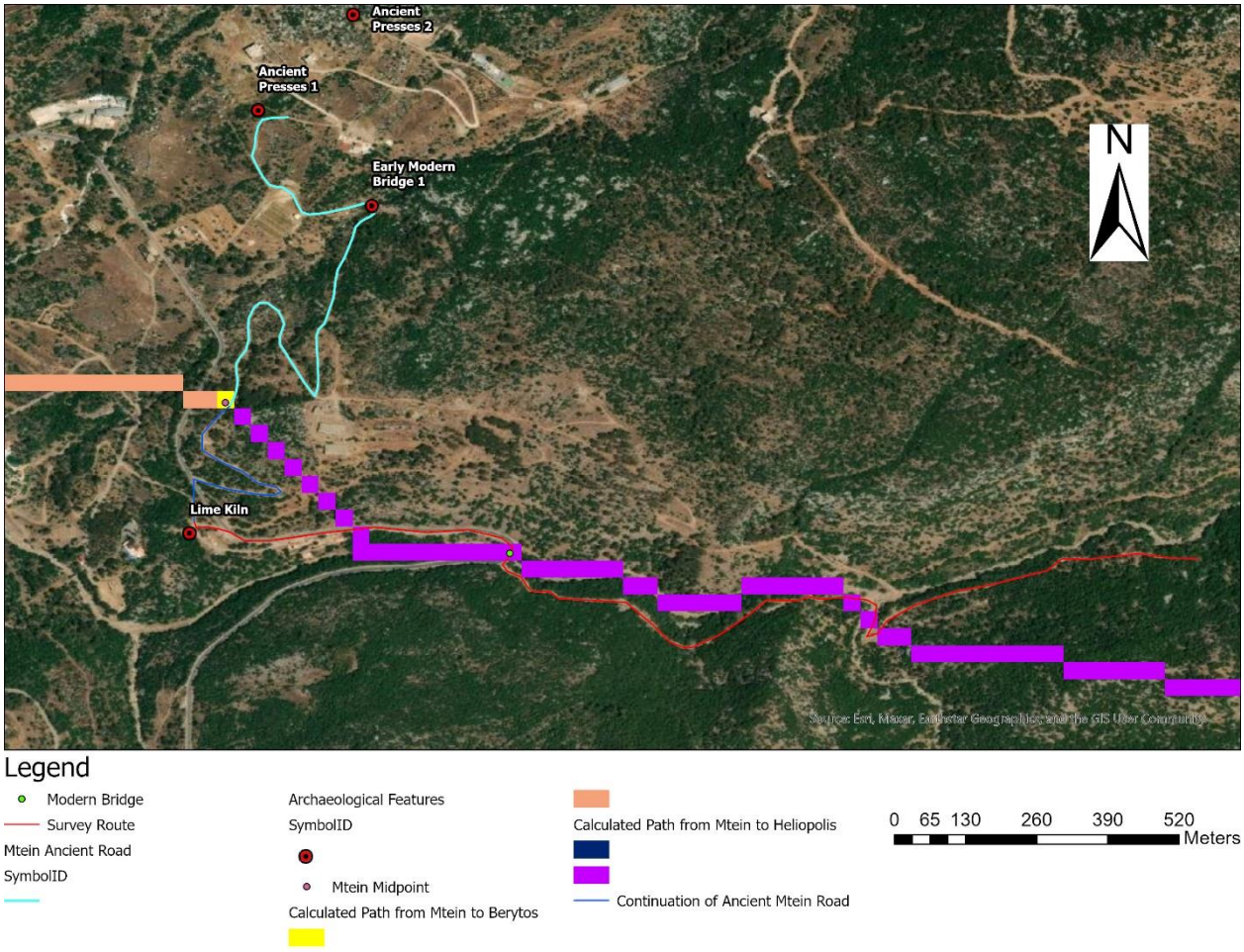

Figure 4.13. Map of the Mcheikha survey areas.

The survey of 4 individuals began at the point where a local guide informed members of the AUB Archaeological Museum, Lebanese Mountain Trail Association, and I of the start of the Mtein road, almost one year ago. This year's Mcheikha survey's goal was to continue downslope and southwards to uncover more of the road network with the assistance of Least-Cost Path Analysis. The ancient road was immediately identified and was followed quite easily through multiple turns and straight stretches. The road, see Figure 4.14, shared the same characteristics as the initial ancient Mtein road: it has a width of 6 m; its surface pavement consisted of limestone; its surface was made of a mix of pebble-sized stones on its center right and center left, and head-sized

stone at its center and edges pressed into the ground by past travel use. After 375 m of traversal, the ancient road was suddenly cut by a modern road that links the towns of Mtein and Bzebdine together, fortunately, the road was relocated to the other side of the modern road. The route continued for another 82 m before it was suddenly lost and replaced by a dirt road of unknown date, but likely from the modern period due to the modern plantations located downhill which are accessed by these dirt tracks. At the end of the ancient route, a lime kiln was found, see Figure 4.15. It has a circular shape, as is traditional for Lebanese lime kilns, a diameter of 5.5 m, and its walls are completely made of large limestones. No artifacts were found around the kiln; thus, it is difficult to date the structure, but due to its somewhat preserved state, it was likely in use during the Ottoman period.

Figure 4.14: Continuation of the Mcheikha old road, this segment includes a bend.

Figure 4.15: Remains of a lime kiln.

While the ancient road was lost, the survey continued following ArcGIS's calculated path and crossed the Beirut River at a modern bridge before taking a dirt path deeper into the mountain valley. The dirt path lies on the river's southern bank and either runs parallel to the river or a few meters away and over the river in hills due to the rugged terrain. After traversing this dirt path for 1 km, it abruptly ended with no archaeological evidence ascertained along the way.

CHAPTER 5

INTERPRETATIONS FOLLOWING THE RESULTS OF THE STUDY

5.1. The Road's Environment

The surveys were quite beneficial since they uncovered a segment of road in the Lebanese Mountain Range. The preserved road has a length of 30 m, but the rest of the cleared path where it was located, contains the same limestone material with sizes of stones similar to those that make up the road, as described in the previous chapter. We can deduce that this cleared passageway from its start near the northeasternmost terraced fields to the end of the preserved road is one segment of paved road with a distance of 205 m. Furthermore, I believe that due to the proximity of the smooth ground surface bedrock to the sets of terraced fields and the ruined house structure, the bedrock was incorporated into a road between Kfar Selouan and Mtein. This theory is reasonable since there is evidence of bedrock being used as a passageway in Lebanon. Specifically, in Aaqoura where a passage was carved out of the limestone mountainside and likely used as a crossing between Byblos and the Beqa'a Valley – an inscription in Domitian's name was also carved over this stone road (Nordiguian, 1999, 579). This evidence would increase the uncovered route to a distance of 1.2 km.

5.2. The Decorated Stone Blocks

The only artifact found during the surveys was an 85 cm by 43 cm stone block with a 6 cm-wide vertical line carved at the stone block's center, located on the outskirts of Kfar Selouan. An identical stone block with the same characteristic 6 cm-wide

central line was found at the southern ruined press in Mcheikha. The style of stonemasonry is identical with only a 20 cm difference in length between the two stone blocks.

The two stone blocks were found in such proximity to the road between Kfar Selouan and Mtein, that deductions can be made. The Kfar Selouan block was located lying on the smooth bedrock that I believe was used as a natural road; the Mcheikha block was found between the southern press and the ancient, paved road. In my opinion, these stone blocks were being transported through the mountains to building projects such as villas, temples, or bathhouses. These blocks could have been mined in high-altitude areas such as Tarshish and brought down the mountain to either the Beqa'a valley to the east or the coastal plain to the west. However, it must be noted that the Lebanese Mountain Range is primarily composed of limestone through the ancient and modern quarries that are found all over Mount Lebanon (Zumoffen, 1926, 17). Ultimately, Tarshish sits in a strategic position to sell stone material to two completely separated regions, this could have encouraged stonemasons to migrate to Tarshish where they could take advantage of this opportunity. The destination of these stone blocks is unclear, they could either be traded locally with sites such as the temple in Aintoura, which likely had dealings with local stonemasons to supply them with stone material, or were hired on to carve decorative features into the building complex. On the other hand, the stone blocks could have been exchanged further downhill on the coastal plain with port cities and towns such as Berytus. The transportation of heavy products assists in differentiating between a *via* and an *actus*. While the former is considered a major and public paved road that can endure heavy loads, the latter is appraised as a narrow track with a poor surface unfit to sustain heavily weighed-down carriages.

Furthermore, the *actus* cannot handle large quantities of stone or timber materials being pulled either by laborers or pack animals (Laurence, 1999, 61). Thus, the exchange of heavy materials such as decorated stone blocks on this route would define it as a *via* during the Roman period.

5.3. The Finances and Financiers Behind Road Building

If this is a local road or *via vicinale* we must deliberate on the economics behind such a road-building project. The empire's resources funded major public roads, but they had little to no responsibility over local roads; this fell under the jurisdiction of local governments centered in local towns and cities. In Roman Italy, local magistrates oversaw the construction and maintenance of local roads. These magistrates were also responsible for the cooperation of different towns and villages in the erection of road networks (Laurence, 1999, 53). Cooperation was required because the funds for these building projects came from the local landowners whose land the proposed road was to run through. Rome did not push for these local roads to be built, thus if landowners wished for a new *via*, then they donated portions of their properties for the road to pass through. According to Siculus Flaccus, the local landowners also had the responsibility of providing their own workforce to repair local roads that passed through their property (Laurence, 1999, 52-54). While it is unclear who these local landowners were, I would like to introduce two theories: Roman veterans and local peoples.

One of the purposes of the Berytus colony was to settle veterans from Augustus' and Marc Antony's armies. After the end of the civil war, Augustus was left with a massive army too large to be financially maintained, thus these veterans were settled across the empire, including Berytus (Sartre, 2005, 32). These new settlers in the area

would likely have brought with them the spirit of euergetism. Either to build a cult of personality or increase a community's prestige, euergetism was incredibly impactful on the Roman world. It motivated the Roman elite to fund public works projects such as bathhouses, city walls, aqueducts, and roads. Laurence believes that the academic community needs to actively consider euergetism as a collective benefit, rather than relating the construction of public monuments to the euergetism of the individual within the context of a local community. This includes not only entertainment and employment, but also the expression of a community's cultural identity in relation to other cities and, in particular, to visitors to the city (1999, 161). Inhabitants of small communities in marginal regions such as Mount Lebanon or the Limestone Massif grew to rely on themselves rather than a larger city. The financially independent towns would have had this desire to be seen by the greater world in the form that they wished to be identified by, and there is no better first step than to build roads to connect to far-flung lands and peoples.

The ancient settlement program in Roman-period Berytus likely had indirect implications that led to the construction of the mountainous route. Veterans were likely given the best properties in the region, forcing the local population to work for large estate owners in the Beqa'a Valley and the coastal plains or attempt to become small landholders in marginal regions. During the period of civil wars before August's ascension to the role of emperor, there is historical evidence of grievances from the public about expropriation from their lands to settle army veterans (Campbell, 1996, 81). Most property was valued by its capacity to grow crops and extract resources. Fertile lands such as in the Orontes and Beqa'a Valleys were the most valuable but also the most populous; these properties over time were absorbed by local elites who

employed a vast number of laborers to toil on their land (Butcher, 2003, 164-166). Many areas due to their climate and geography, could not produce as much as the fertile regions without developing supportive infrastructure such as irrigation systems and aqueducts. These hinterland areas were often difficult to access, thus the towns and villages that sprung in these regions were more independent and self-sustaining than their counterparts in fertile lands who widely depended on larger cities for support. For instance, the Antiochene chronicler Libanius, who lived during the 4th century C.E., admits that the villages situated in the hinterlands surrounding Antioch had little need for the city due to trade among the hinterland villages (165). Furthermore, this populational and economic growth in hinterland regions was encouraged by Rome itself; in the 2nd century C.E. a Roman law was passed that incentivized the settling of marginal areas in the Near East by introducing the layout of new rectilinear field systems (173). Some city residents in the Near East likely viewed these settlements in marginal regions as an opportunity to increase their living conditions.

To summarize, the introduction of army veterans to the region between Berytus and Heliopolis likely led to the expropriation of older residents to less prosperous areas around cities. Rome-sponsored settling in marginal regions likely encouraged individuals to migrate from cities to centralized towns in the countryside in search of a better life. These new settlements were then linked to one another and the cities of Heliopolis and Berytus through a mountainous road network.

5.4. A Branching Road?

It must be asked if such a road dates to the Roman period, did it connect to far-off archaeological sites? Certain sites such as Deir el-Qalaa are situated in close

proximity to the GIS-generated route. Deir el Qalaa is located 4.2 km south of the Least Cost Path and has an uphill slope similar to the continuation of the Least Cost Path east of Deir el-Qalaa, thus the existence of a branching road towards the site is very plausible. Sites farther afield have to be differentiated. Qalaat Faqra is situated 13.75 km to the north-northeast of the road in Mcheikha, but that is the distance before taking topography into consideration. Mcheikha sits at an altitude of 1000 m while Qalaat Faqra has an altitude of 1500 m, furthermore, a river valley, south of Baskinta, that acts as a tributary river to the Dog River is a natural obstacle to a road project. The best road to take would be a north-south route that hugs the Sannine mountainside so that the river valley can be avoided. Such a trail would increase the distance to 23.25 km, but it would pass directly by the Roman site of Ej-Jaouze.

The practicality of a north-south route through the Lebanese Mountain Range is difficult to determine; while Roman period villages did cooperate to become a self-sustainable region, they would be neighboring settlements such as in the Antiochene hinterlands, while Mount Lebanon's geography is a dividing factor between mountain-dwelling communities which makes lines of communication shorter and cumbersome to handle. Further survey projects between Qalaat Faqra and Mtein could uncover more answers to this dilemma.

CHAPTER 6

CONCLUDING REMARKS

The landscape archaeological study that makes up this thesis went through multiple stages. The first was an introductory stage characterized by in-depth research into Mtein, its surrounding regions, and the subject of road building. The first stage illuminated the rich archaeological evidence found between Mtein, Mcheikha, and Aintoura which highlighted the region as a place of growing settlements and infrastructure. This area was able to continue growing through different eras of history, from the sanctuary complex construction in the Roman period to the erection of a square of four palaces in the Ottoman period. Archaeological features such as presses, mills, and stretches of road became quickly apparent and fueled further research into the region. The second stage saw the launch of the Least-Cost Path Analysis, which showcased the implication of a mountain road able to connect completely different regions together. The second stage's results were only confirmed after the third stage's completion, the survey. The survey happened to be quite fruitful; ruined structures, terraced fields, a lime kiln, and multiple segments of road were located by following as close to the Least Cost Path as possible.

Due to the lack of archaeological evidence, we cannot date the road to a period, even though the road does have a plethora of similarities to roads and sites found in the Roman Near East and Roman Italy. What we can affirm is the success of Least-Cost Path Analysis in locating the remains of a road. Between the surveys in Mcheikha and Kfar Selouan, 1.65 km of evident road was located, and these road segments were located 2 to 15 m away from the GIS-generated route – in fact, the best preserved 30 m

segment of road was located exactly on the GIS-generated route. The study has given clear evidence about the practicality of Least-Cost Path Analysis in locating local roads that do not appear in historical sources.

Uncovering a segment of road between Kfar Selouan and Mtein introduces new ideas and perspectives on how the Mount Lebanon hinterlands appeared to be across ancient and modern history. No datable artifacts were found or retrieved from the study's surveys, but excavations of archaeological features, such as the ruined house structure situated by the road, could assist in uncovering datable material that would benefit our understanding of when the road was in active use. Soundings can be done into the road itself to understand how roads were built in the Near East and the rugged region and Mount Lebanon. It is my hope that further research done on this project and other roads and pathways will assist in highlighting different styles of roadbuilding in the Near East.

Several sites dot the Lebanese Mountain Range and have not been properly investigated; the temple in Aintoura is only visible to the academic community in Taylor's 4-page pictorial description (1967, 121). The region requires more investigative projects to uncover its significance in the Near East, such as has been done in the Limestone Massif (Tchalenko, 1953) and the Hauran (Butcher, 2003). Fortunately, scholars are already finding interest in the mountainous archaeology of Lebanon; the work in Chhim (Waliszewski and Wicenciak, 2015, 372) and Nahr Ibrahim (Gatier et al., 2007, 161). It is my hope that this publication will encourage other scholars and academics to further this research and understanding of the history of Mount Lebanon.

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