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Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)



MINISTRY OF ENVIRONMENT

Solid Waste Sector

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

POTENTIAL LANDFILL SITES SURVEY

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1-INTRODUCTION

This study provides a preliminary evaluation of the suitability of 6 former quarry sites for the construction of landfills.

A total of six sites were visited (2 sites in Amchit, and one site in each of Fghale, Mounsef, Hbaline, and Quortada area). The approximate location of these sites are presented on figures 1 to 3.

The selected criteria used for evaluation is presented in section 2. The evaluation of each site is discussed in section 3. Our conclusions and recommendations are presented in section 4. Photographic illustration of selected sites are presented in Appendix A.

2-EVALUATION CRITERIA

The preliminary evaluation of the suitability of these 6 sites for potential landfill was based on the following selected criteria:

- 1) Location of the site with respect to residential areas.
- 2) Suitability of the existing local road infrastructure to accept daily trucks required for the transportation of wastes.
- 3) Preliminary evaluation of the geological and hydrogeological settings based on existing available published information .
- 4) Landfill storage capacity

3- SITE EVALUATION

3.1 GENERAL

Based on the evaluation criteria presented above , we recommend that one of the Amchit sites , and the Mounsef site be retained for further evaluation for potential use as landfill site. The remaining four sites should be disqualified .

A brief discussion of the evaluation of each site is presented below . A regional geological map prepared by Dubertret (at a scale of 1/50,000), which shows the location of the 5 sites in Jbail area (i.e. 2 in Amchit , and one in each of Fghale, Hbaline, and Mounsef area) is presented in figure 4. Dubertret's regional geological map of the quortada area is presented in figure 5 .

3.2 Amchit Sites

A total of two sites were visited in Amchit area. The first site (i.e. Amchit 1) which consists mainly of 2 quarries , is located about 1.3 Km from the coast . The second site (Amchit 2) is located further inland within the valley of Wadi Beaachta at approximately 2 Km away from the coast. Amchit 2 was disqualified as a potential landfill site mainly

3.4 Mounsef Site

The Mounsef Quarry site was retained as a potential landfill site pending further evaluation. The site has a potential large storage capacity. The site appears to be located away from residential areas. The existing road infrastructure appears to be adequate. The local road that leads into the site does not appear to pass through residential areas. The groundwater beneath the site appears to be already contaminated by seawater intrusions. Thus, groundwater usage in the downgradient areas appears to be restricted due to seawater intrusions.

3.5 Hbaline

The Hbaline Site is currently being used as an uncontrolled sanitary landfill. It appears that local sanitary waste is currently being dumped on site. We do not recommend the Hbaline site for the construction of the landfill for the following reasons:

The construction of a controlled sanitary landfill on the site would initially require the removal of all existing waste from the site to allow for the proper installation of a liner.

The geological and hydrogeological conditions prevailing on site do not favor the construction of a landfill. The site is located in the Sannine Limestone Formation. This formation is considered to be the only major aquifer in the region. Any potential contaminants that may leak from the landfill will likely contaminate the groundwater beneath Amchit town located downgradient of the site.

The existing local road infrastructure does not favor the construction of a landfill in Hbaline. Access to the landfill is through narrow mountainous roads that pass through small towns. Any increase in traffic load will significantly disturb the traffic along the road.

3.6 Quortada Site

The Quortada quarry site cannot be retained as a potential candidate site for the construction of a landfill mainly due to its unfavorable geologic and hydrogeologic conditions.

The site is located immediately adjacent to the major tributary of Naher Beirut. The proximity of the site to a water body will immediately disqualify the site as a potential candidate for landfill due to the significant risk of water contamination.

Additionally, the site is located within the Jurassic aquifer which is considered to be the main aquifer of the region. Major groundwater withdrawal points are located downgradient and more specifically in the Daichounieh and Hazmieh area. These

due to its limited storage capacity, and unfavorable hydrologic conditions. The site is located in a narrow strip of land at the center of a deep valley.

The surface area is relatively small, thus, the construction of the landfill in the site would require the widening of the site to increase the capacity of the landfill. This would necessitate further quarrying activities which would result in further damaging the environment.

Additionally, it appears that all surface water runoff of the entire catchment basin converge into a perennial stream which cuts along the valley and across the site. The construction of a landfill would necessitate the diversion of the stream. Such diversion could not be implemented given the narrow strip of land available.

Amchit I was retained as a potential landfill site pending further evaluation. The site has a potential large storage capacity. The site is located near the main highway, away from residential areas. Access to the site is relative easy. The local road leading into the site does not pass through residential area.

Last but not least, there does not appear to be many groundwater receptors downgradient of the site (west of the site), that may be contaminated as a result of potential contaminants that may originate from the proposed landfill. However, a comprehensive survey of the area would be required to confirm this statement.

3.3 Fghale Site

Based on our preliminary evaluation, the Fghale quarry does not appear to be a good candidate site for a landfill for the following reasons:

The site is located within the immediate vicinity of residential area. The closest house is located less than 50 m away from the site.

The existing road infrastructure does not appear to be adequate to accept the trucks to transport the waste into the site. The local road that leads into the site is narrow and passes through residential areas.

A major fault appears to be crossing the site in a East West direction. The rock underlying the site may, be highly fractured. Thus, there is a significant risk that any contaminant leaching into the ground will reach the downgradient groundwater receptors located west of the site.

withdrawal points are supplying water for the Greater Beirut area. Any groundwater contaminants that leach into the ground will likely contaminate these areas.

4. CONCLUSIONS & RECOMMENDATIONS

Based on the preliminary evaluation, Amchit site 1, and the Mounsef site are retained for further consideration as potential landfill sites. The other four sites were disqualified based on the selected evaluation criteria discussed in section 3.

Amchit site 2 was disqualified due to its unfavorable hydrological conditions as well as its limited storage capacity. Fghale site was disqualified due to its unfavorable hydrogeological conditions, its proximity to a residential area, and the inadequate existing road infrastructure. The Hbaline site was mainly disqualified due to its unfavorable hydrogeological conditions, as well as the inadequacy of the existing road infrastructure. The Quortada site is not suitable for landfill mainly due to its potential risk of groundwater contamination of the major public water supply wells located downgradient as well as its proximity to a surface water body.

A comprehensive Environmental Impact Assessment study which includes a geological, hydrogeological, and geotechnical investigation should be conducted in order to provide a firm assessment on the suitability of Amchit site 1 and Mounsef site for the construction of a landfill.

Nadim Naayem

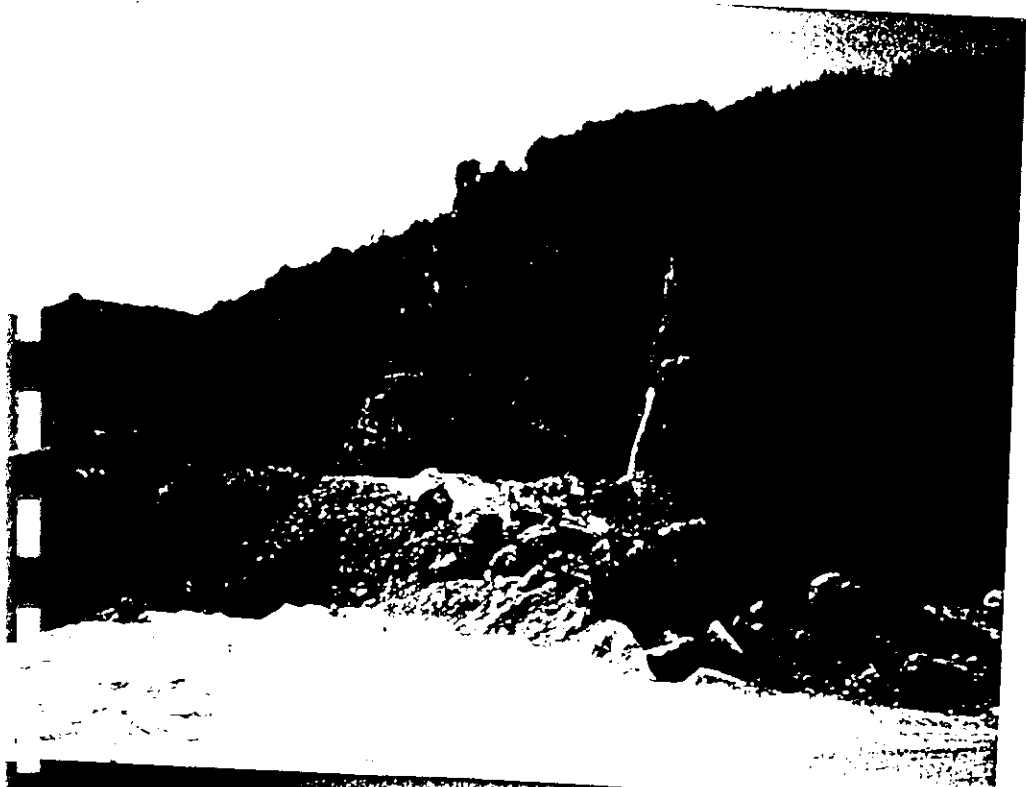


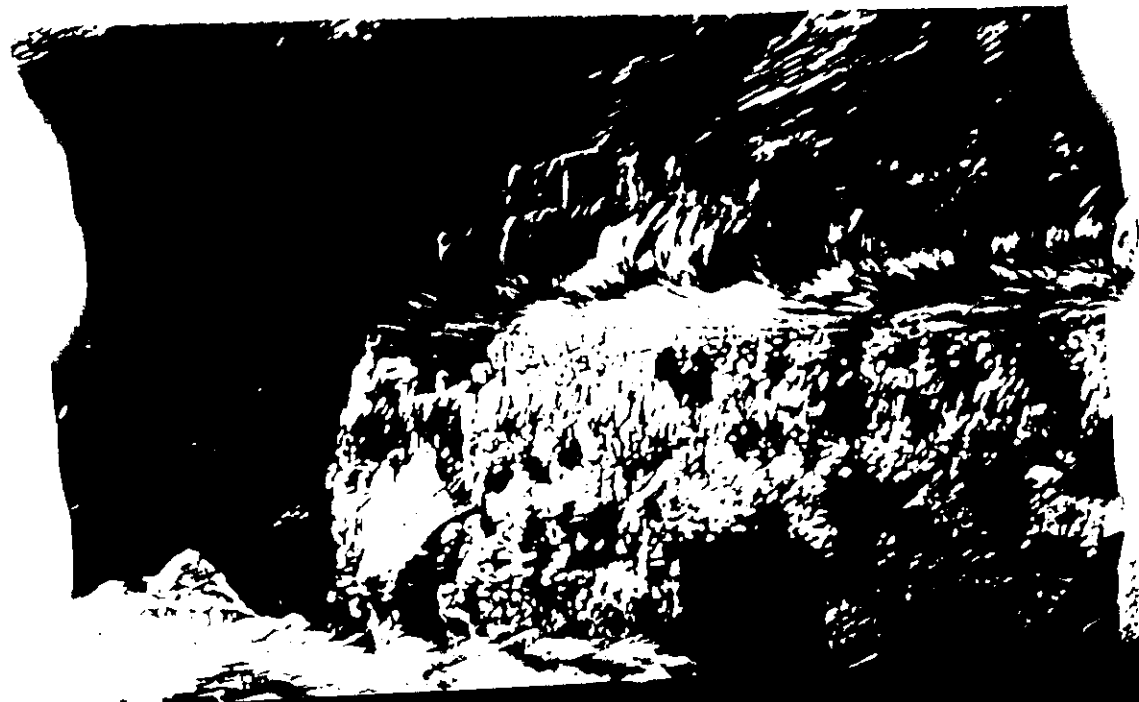


Plate 10
Cyanotype of the Cliff at (University Site)





Plate 7
Abou Mizan Quarry Site





(Location of Mafdal Jewish Quarry Site)

Plate 2



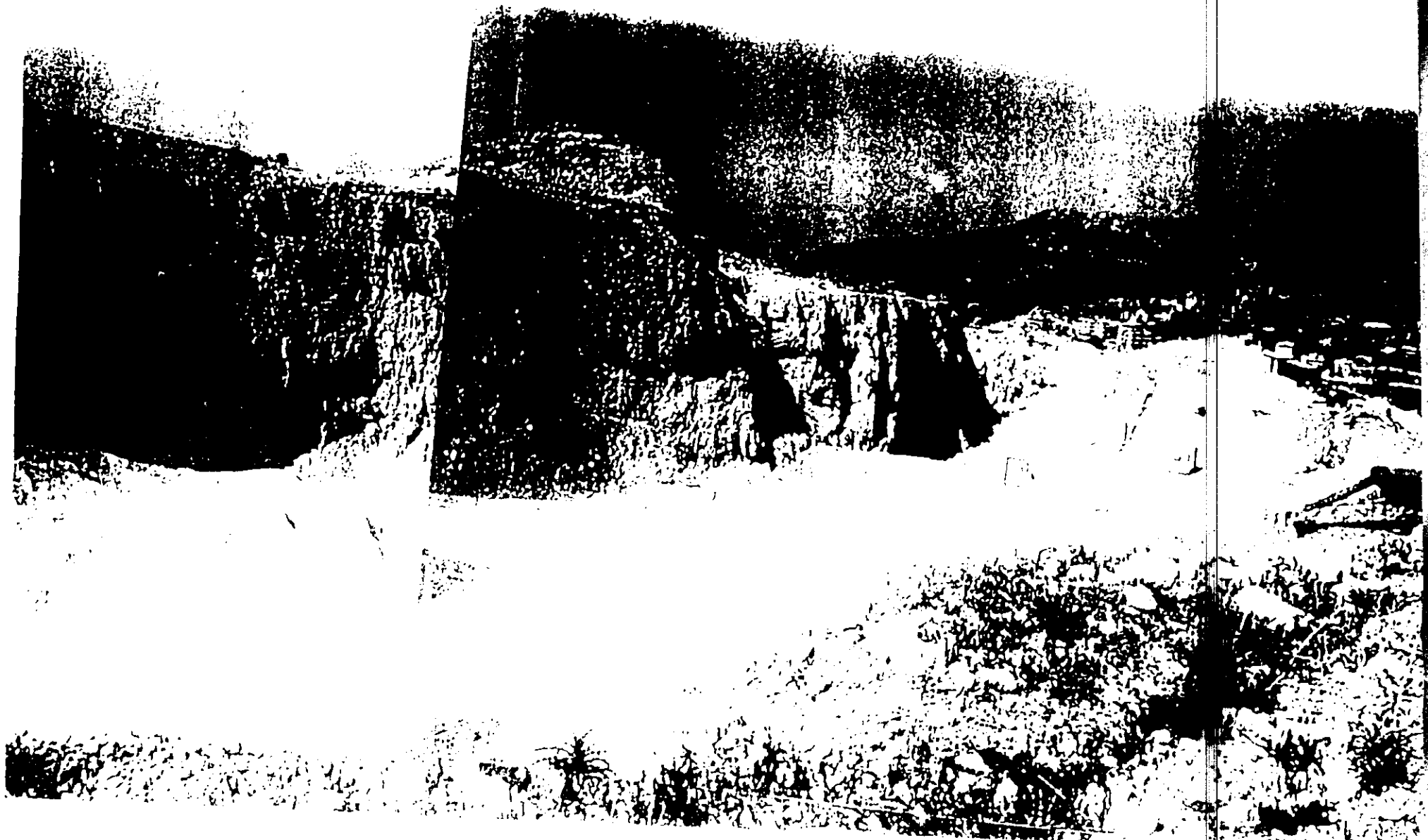
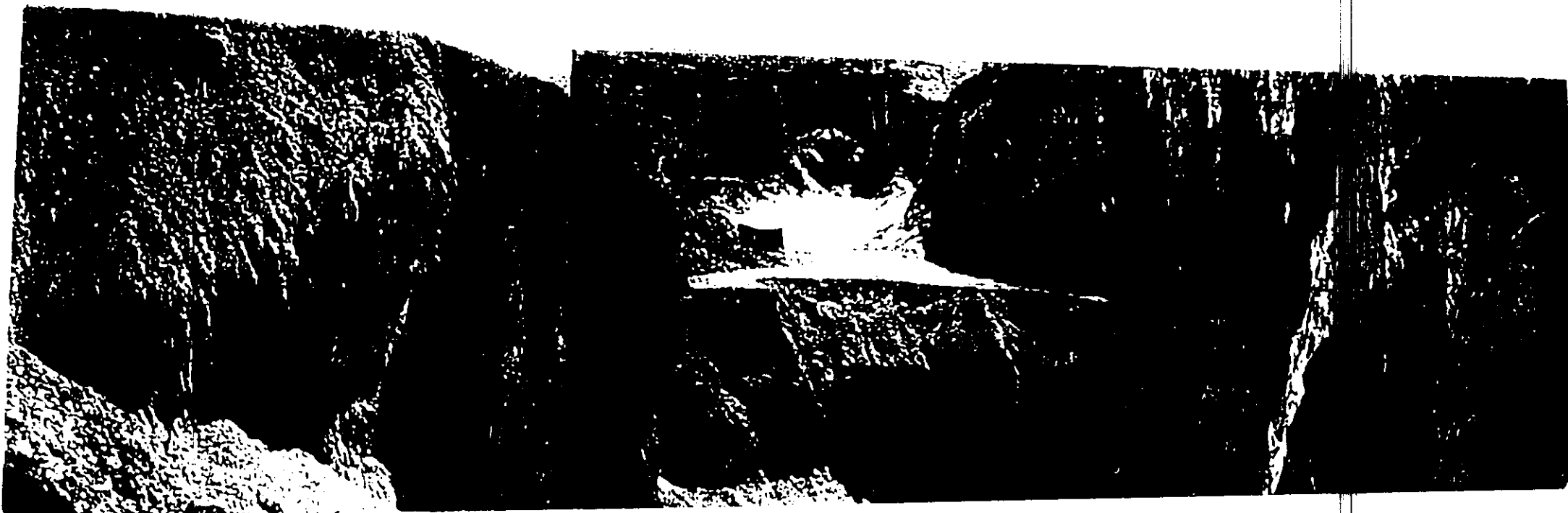
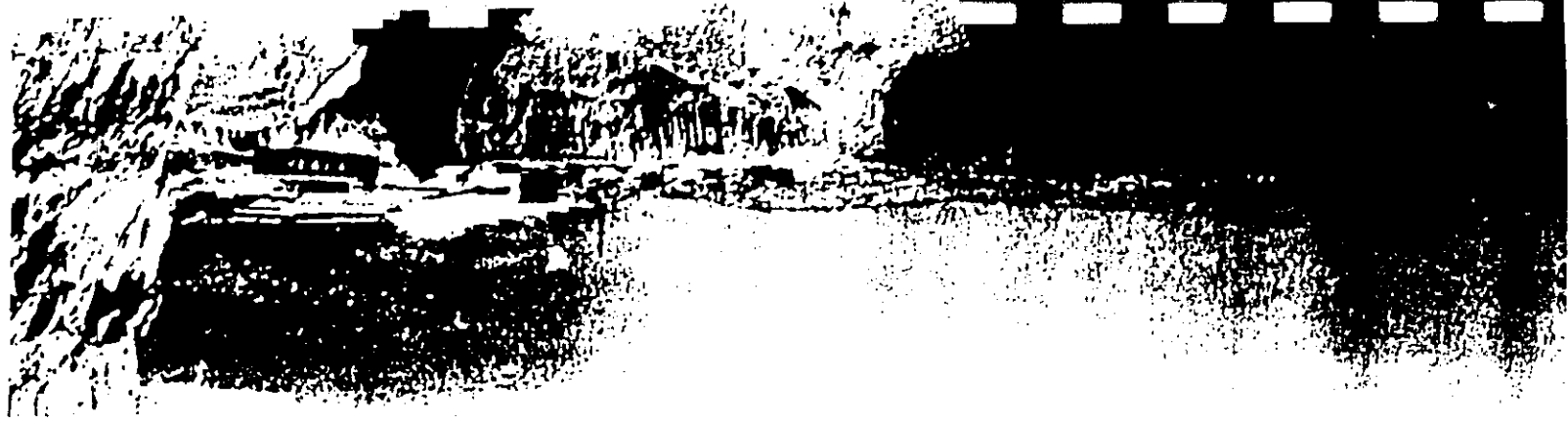


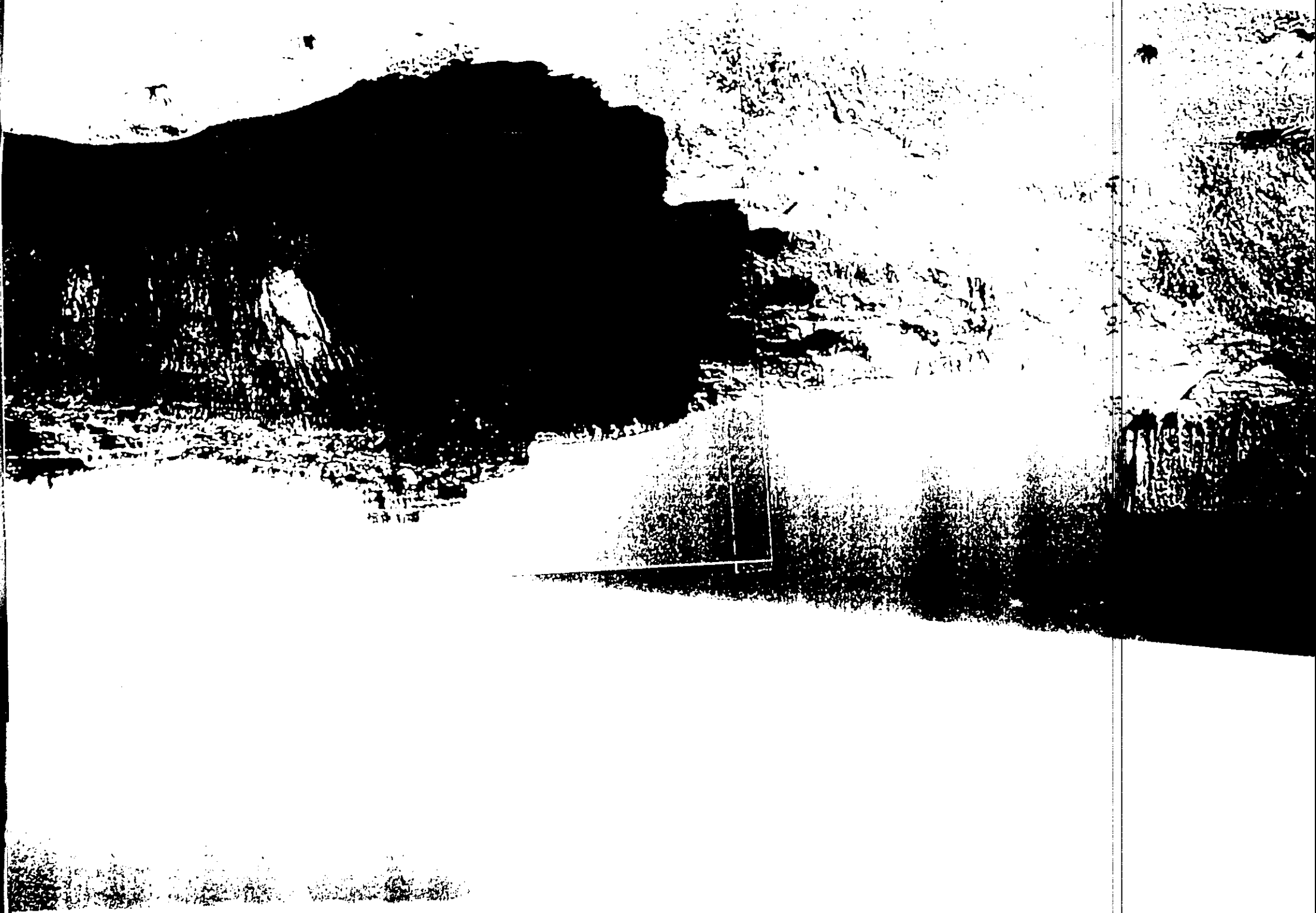
Figure 1. The stone structure at the site of the ...





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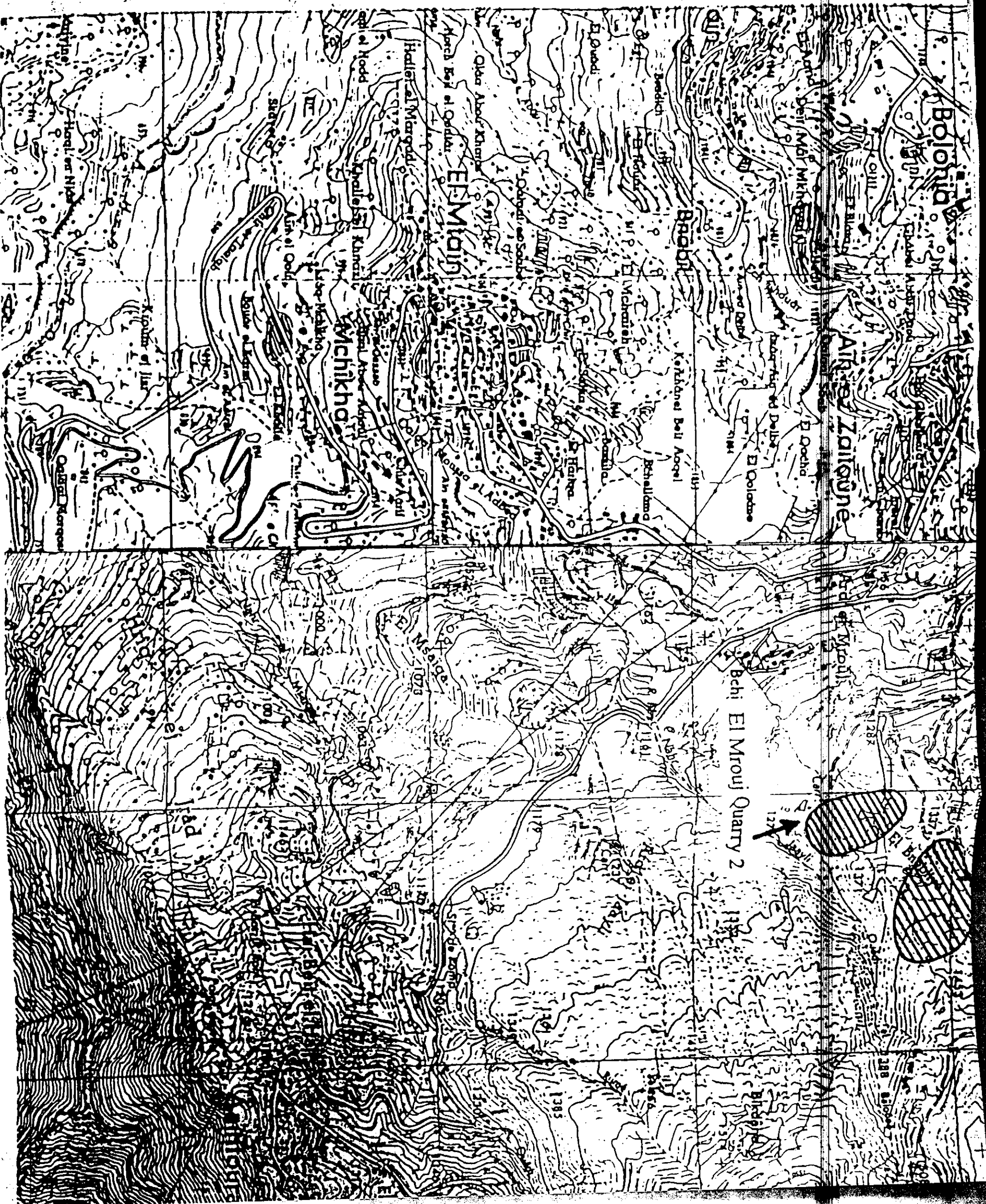


Figure 1 : Site Location



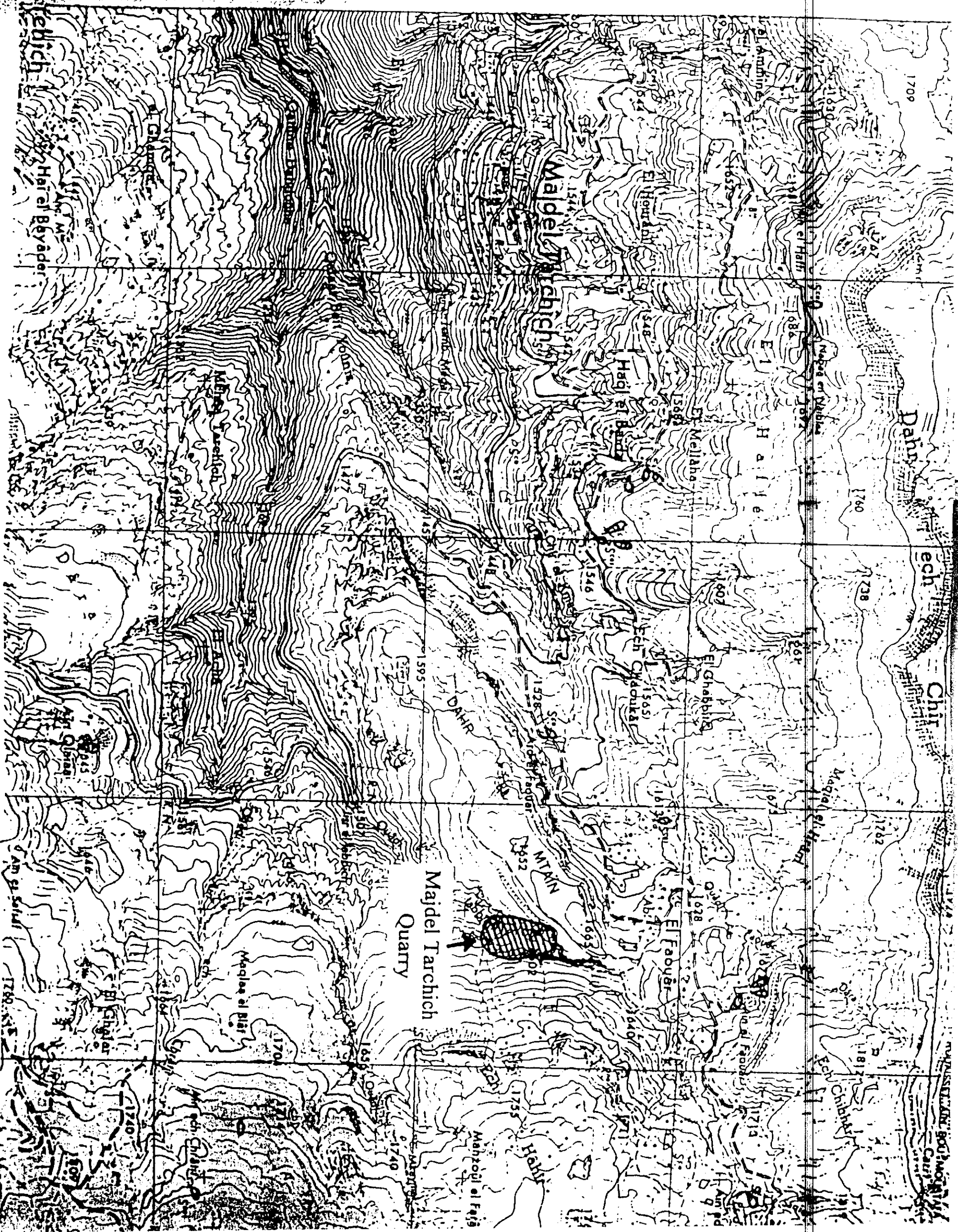


Figure 2 . Site Location

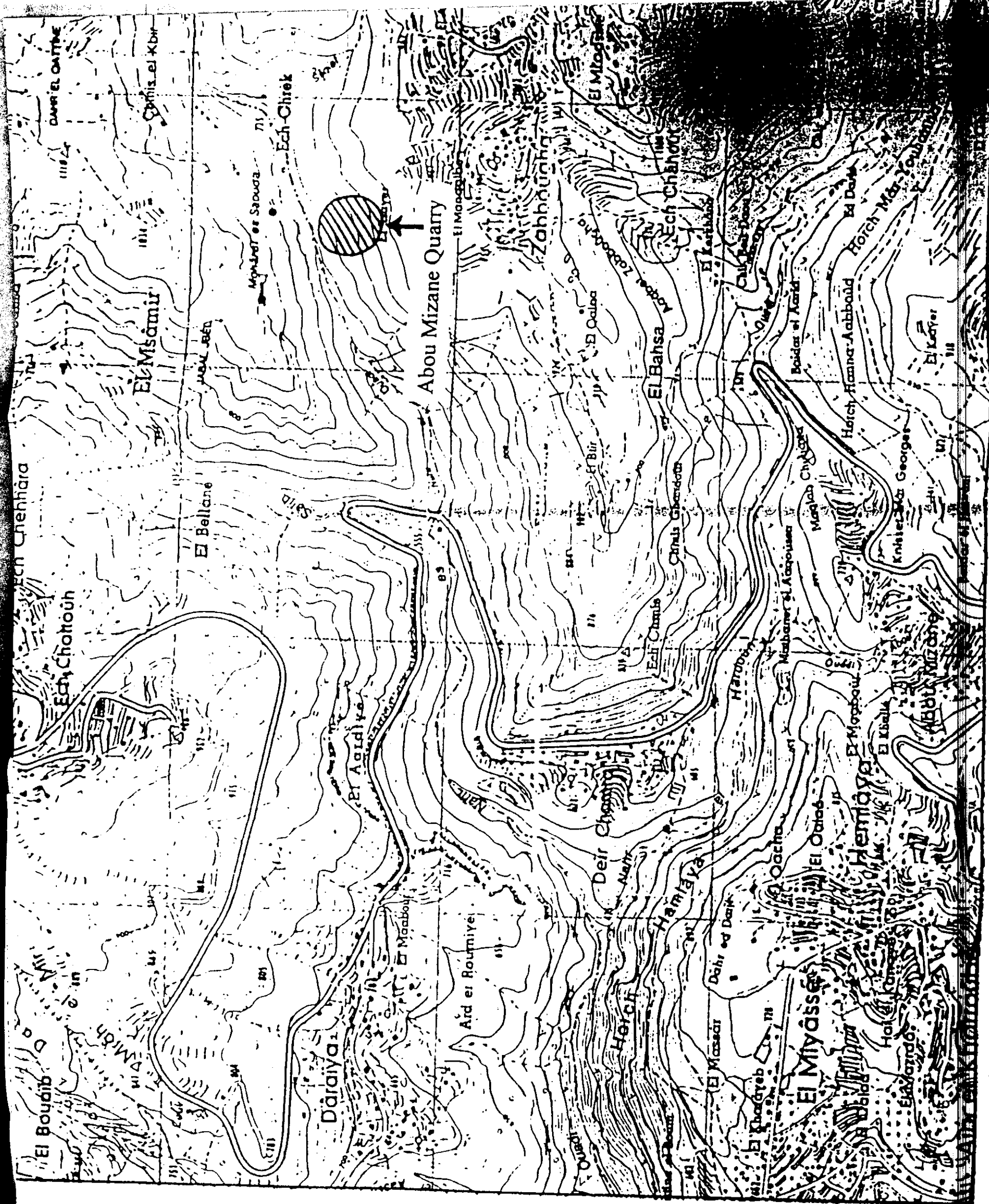


Figure 3 : Site Location



Qurtada



Appendix B



Hbaline



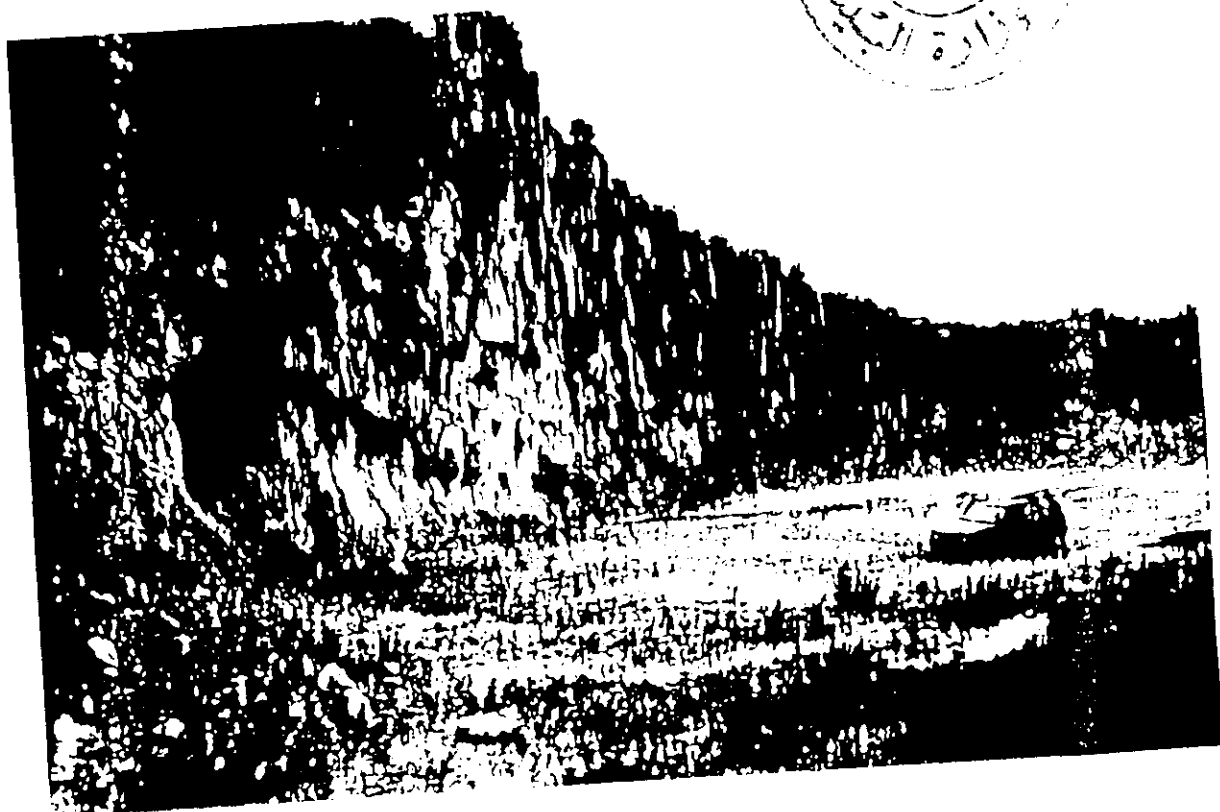
Hbaline

Aamsheet

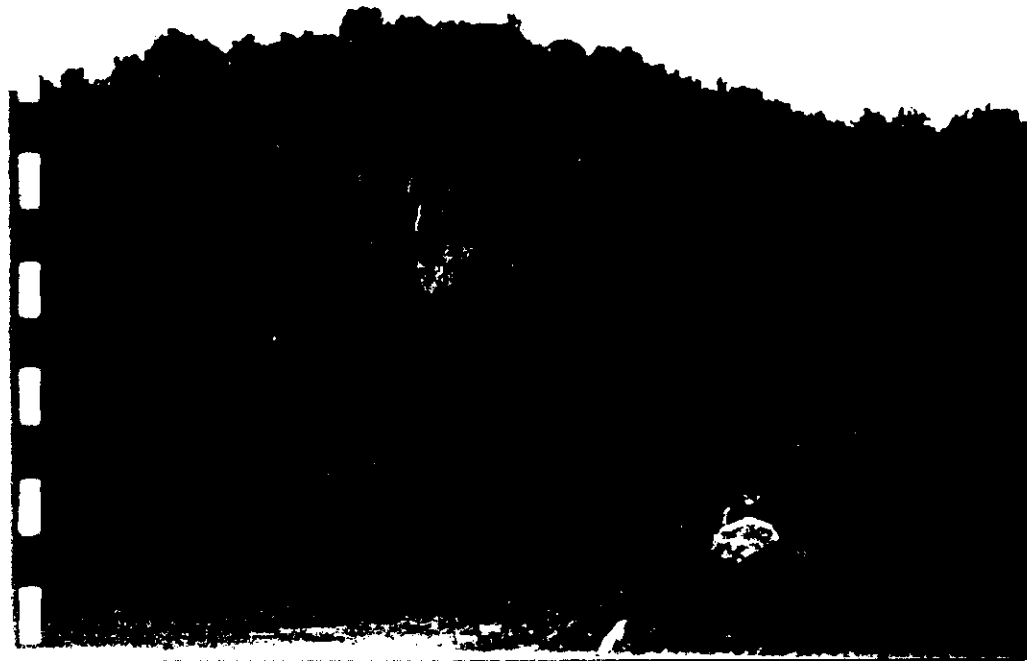




Amcheet Hill



Amcheet Hill



Mounsef

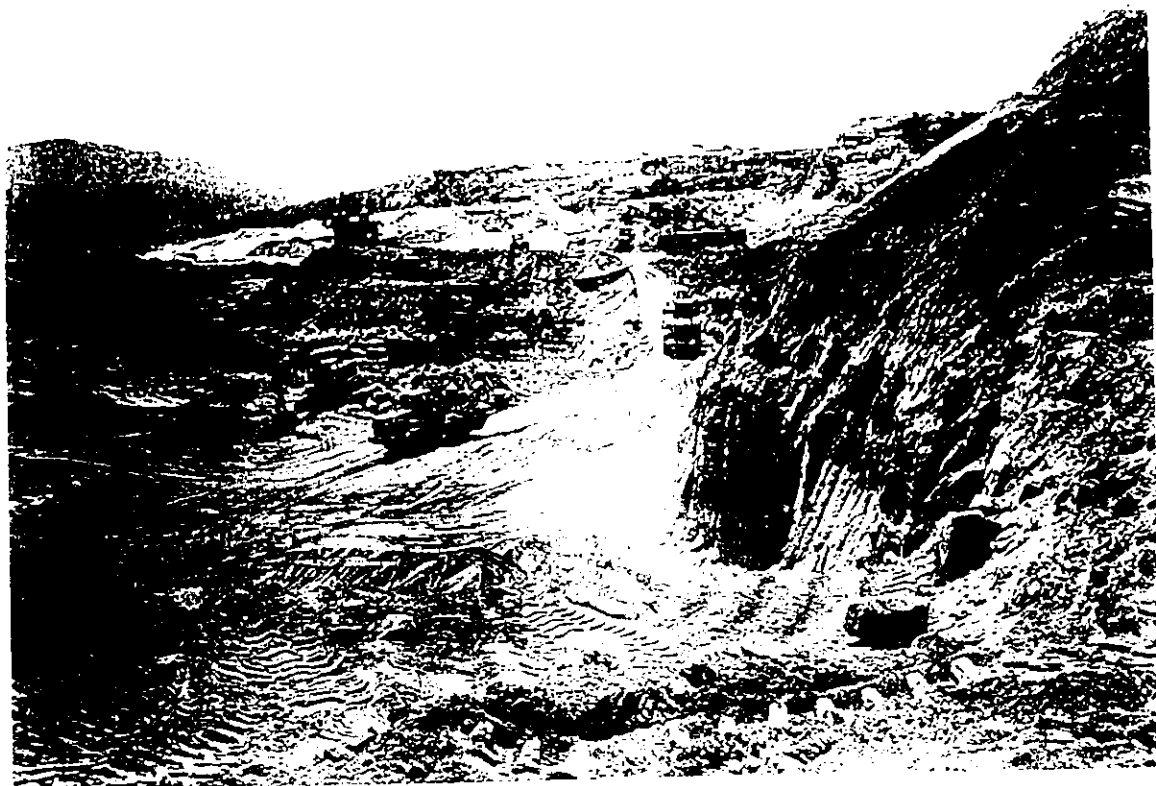


Plate 9

Overview of Mairouba Sand Quarry site.



Plate 10

View of Nearby houses (Picture taken from Mairouba Quarry Site 1)



Plate 11

Overview of Mairouba Quarry Site 2



Plate 12

Overview of Saydet El Hakleh Site

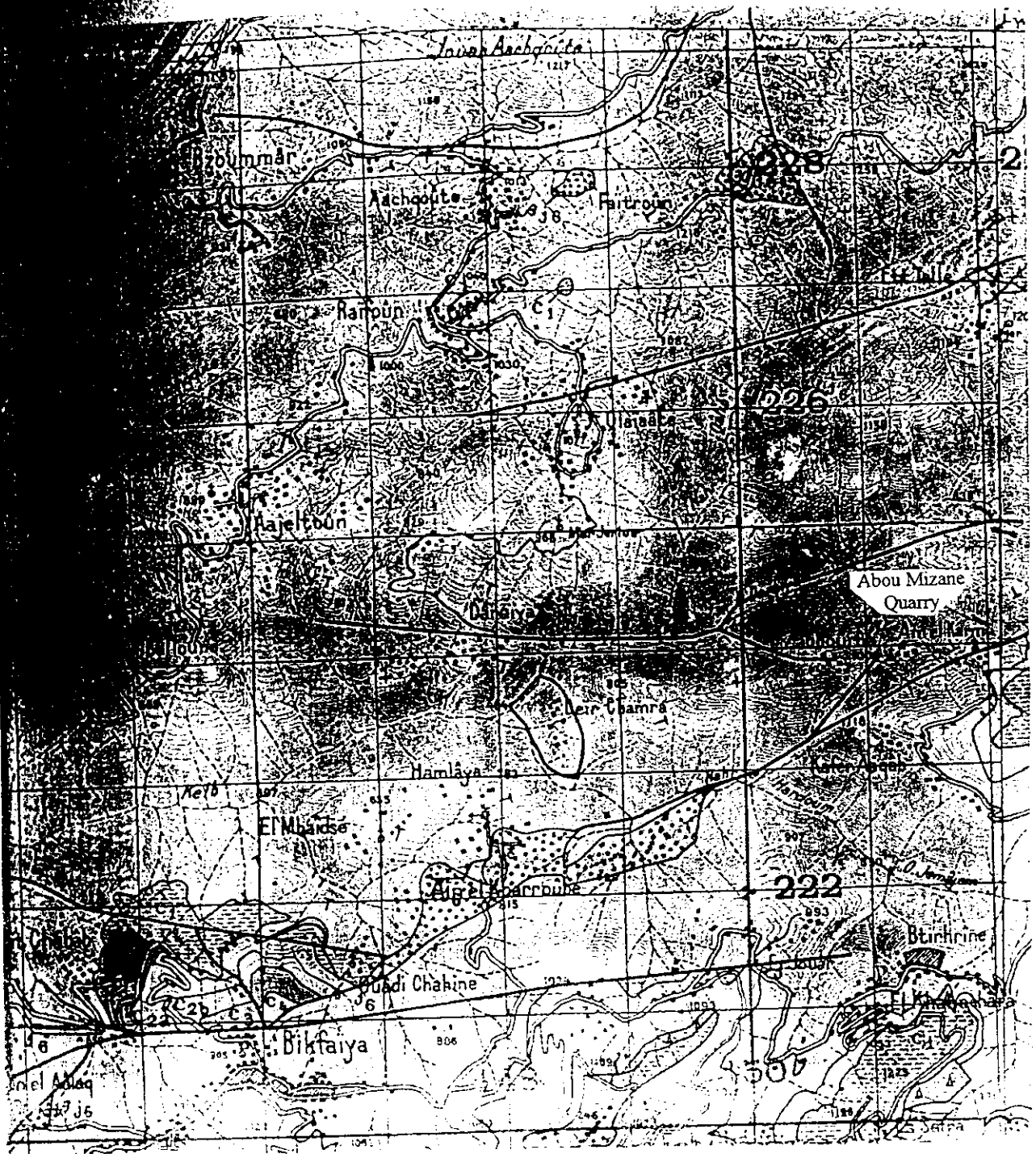


Figure 5. Geological Map
Abou Mizane Quarry



Figure 7 : Geological Map
Mairouba and Ouata ej Jaouz Quarries



Mounsef

Hbaline

Amchit

Jbail

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Plate 11

Overview of Wata El Jouz Quarry Site 3

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