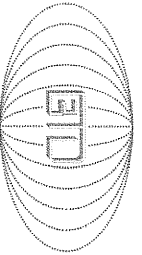


**REPUBLIC OF LEBANON**  
**MINISTRY OF ENERGY AND WATER**

**GEOLOGICAL AND HYDROGEOLOGICAL STUDY  
OF AJALTOUN REGION  
(CAZA OF KESROUANE)**

**Final Report**

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# GEOLOGICAL AND HYDROGEOLOGICAL STUDY OF AJALTOUN REGION (CAZA OF KESROUANE)

## 1 INTRODUCTION

Ajaltoun town is located in Kesrouane Caza at an elevation between 650 and 850 m a.s.l. It is surrounded by Ghosta and Bzoummar villages to the north and Balloune to the south, Kesrouane Caza.

The yearly average rain precipitation on Ajaltoun area is 1500 mm/year and it is characterized by cold weather in winter and nice warm weather in summer.

## 2 GEOLOGY OF AJALTOUN AREA

After having undertaken detailed field studies and investigations, the attached geological map at a scale 1/10000 has been prepared.

This geological map (Fig. 1) and the geological section made give a clear picture of the stratigraphic succession prevailing in the area, as well as the geological structure.

### 2.1 LITHO-STRATIGRAPHY

The study area is covered by the middle Jurassic (J4) Formation.

#### 2.1.1 Middle Jurassic (J4)

The Middle Jurassic Formation consists of dolomitic rocks at its lower part (J4a) and limestones at its upper part (J4b).

- The stratigraphic thickness of the (J4a) is 600 m and consists of pure hard dolomite as well as disturbed dolomites that appear in the form of Dolomitic sands along the Faults that are present in the region.
- The (J4b) consists of limestones and sometimes of dolomitic-limestone rocks with an average thickness of about 200 m.

### 2.2 STRUCTURAL GEOLOGY

The general structure configuration describing the study area is related to the western flexure of Mount-Lebanon. The Jurassic formation dip towards the west direction, with a dip angles that vary between 15 and 20 degrees. This dip increase progressively westward and becomes equal to almost 70-80°, forming what we called a geological flexure.

The study area is crossed by several faults but the over all structure is characterized by a regular aspect since the faults do not have major throws. These faults trend either roughly SE-NW, or SW-NE. These faults were caused by the periodic adjustment during the uplift of the western flexure of Mount Lebanon.

### **3 HYDROGEOLOGY**

The main aquifer in the study area is related to the Middle Jurassic (J4).

#### **3.1 JURASSIC AQUIFER**

This is a karstic aquifer and is characterized by very high secondary porosity and permeability as well as an important thickness.

The limestones and the dolomitic limestones within the Middle Jurassic Aquifer form the biggest reservoir in the study area.

### **4 DESIGN OF THE WATER WELL**

#### **4.1 BOREHOLE LOCATION**

The well is located beside the existing water well at Ouadi el Msailekh locality to the north of Ajloun village, at the following coordinates (Fig. 2):

X = -320486 m  
Y = -19446 m  
Z = 630 m  
(Bikfaiya map, L-5, 1/20.000)

#### **4.2 ACCESS TO BOREHOLE**

The access of the site is easy because of the presence of a secondary road. Some cleaning and excavation for the well site is necessary in order to park the drilling machine.

#### **4.3 DEPTH**

550 m.

#### **4.4 EXPECTED DISCHARGE**

15 l/s (or 1296 m<sup>3</sup>/day).

#### **4.5 STATIC WATER LEVEL**

300 m below ground level.

#### **4.6 LAYERS THAT WILL BE PENETRATED**

The layers that will be penetrated by the drilling are:

- a) Limestones and dolomitic limestones related to the Middle Jurassic Formation (J4).

#### 4.7 SCHEDULE OF DRILLING, CASING AND GROUTING

The Contractor shall present the schedule for drilling in order to have a final casing and screen diameter of 12". The well is to be drilled with a rotary rig and provide for all additional equipment such as water and fuel, as well as treating collapsing rocks at his own expense.

Nevertheless, the schedule of the proposed works could be as follows (Fig. 3):

- Drilling by rotary methods with a 22" bit from 0 to 20m, with samples collection from this depth and onwards.
- Installing 18" I.D. casing (black steel, thickness 5mm)
- Grouting the annular space from the bottom to the surface, then waiting between 36 to 48 hours for the cement to set, and then continue the drilling works.
- Drilling with a 17.5" bit from 20m to the depth of 200 m.
- Installing 15.5" casing (black steel, thickness 5mm):
- Drilling with a 14.75" bit from 200 m to the total depth of 550 m.
- Installing 12" casing and screens as shown below:
  - a) Casing:
    - Diameter: 12" ID
    - Type: Carbon steel
    - Thickness: 6 mm
    - Total length: 450 m
  - b) Screens:
    - Diameter: 12" OD
    - Type: Carbon steel, touch cut 4% void, 15 x 4mm slots.
    - Thickness: 6 mm
    - Total length: 100 m.

The installation of the casing and screens will be in accordance with the general specifications, and in particular, the welding and closure of all openings such that the water only enters the well through the screen openings, in order to minimize the pollution from zones above the SWL.

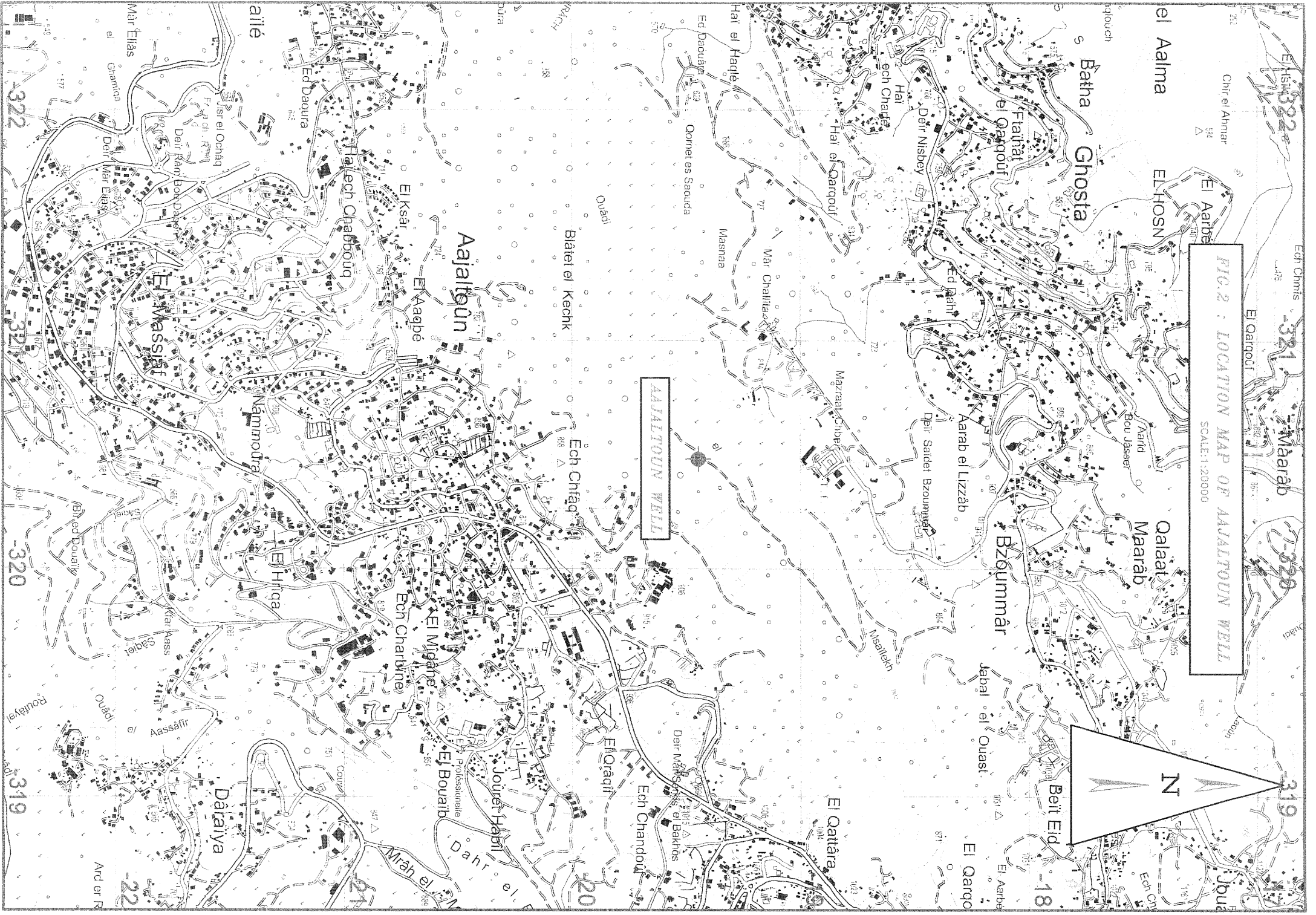


FIG. 2 : LOCATION MAP OF AJAJLOUN WELL  
SCALE:1:20000

# VERTICAL CROSS SECTION OF AAJALTOUN BOREHOLE

FIG. 3

