THE HASHEMITE KINGDOM OF JORDAN

MINISTRY OF PLANNING

IN ASSOCIATION WITH

WATER AUTHORITY OF JORDAN

WATER RESOURCES STUDY OF THE JAFR BASIN

FINAL REPORT

SUPPORTING REPORT

MARCH 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

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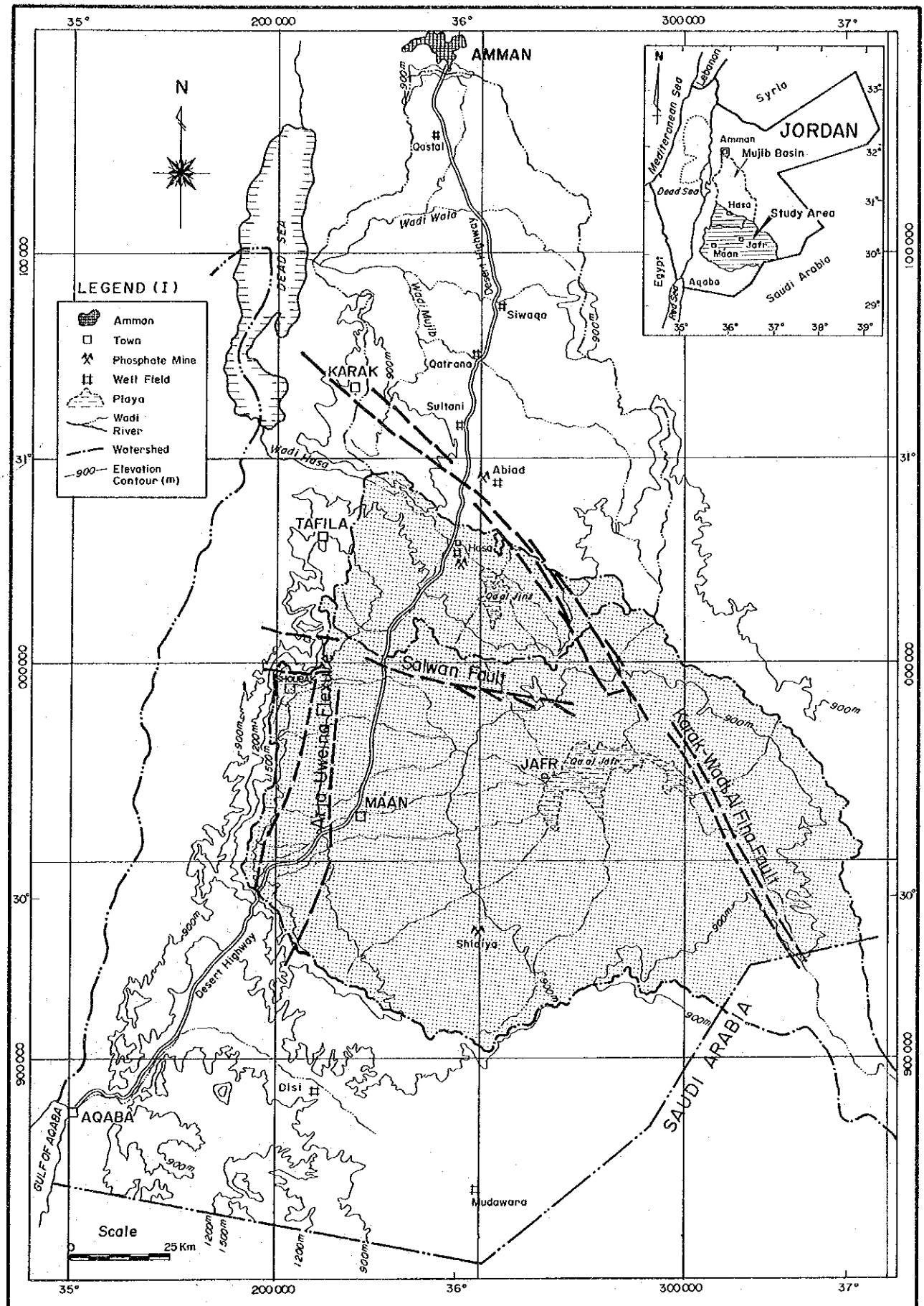

Location Map

THE HASHEMITE KINGDOM OF JORDAN
Water Resources Study of the Jafr Basin

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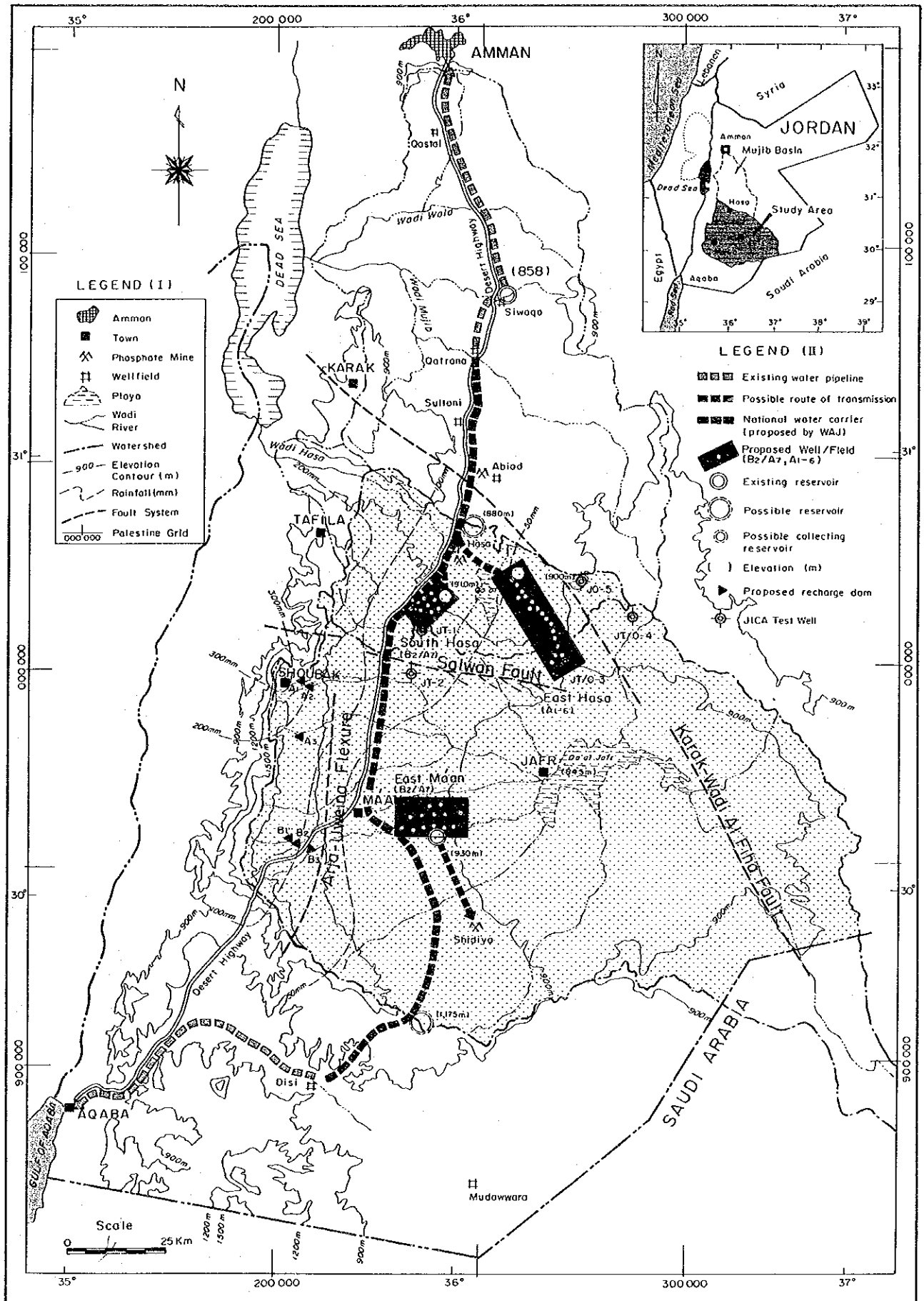

Development Alternative

THE HASHEMITE KINGDOM OF JORDAN

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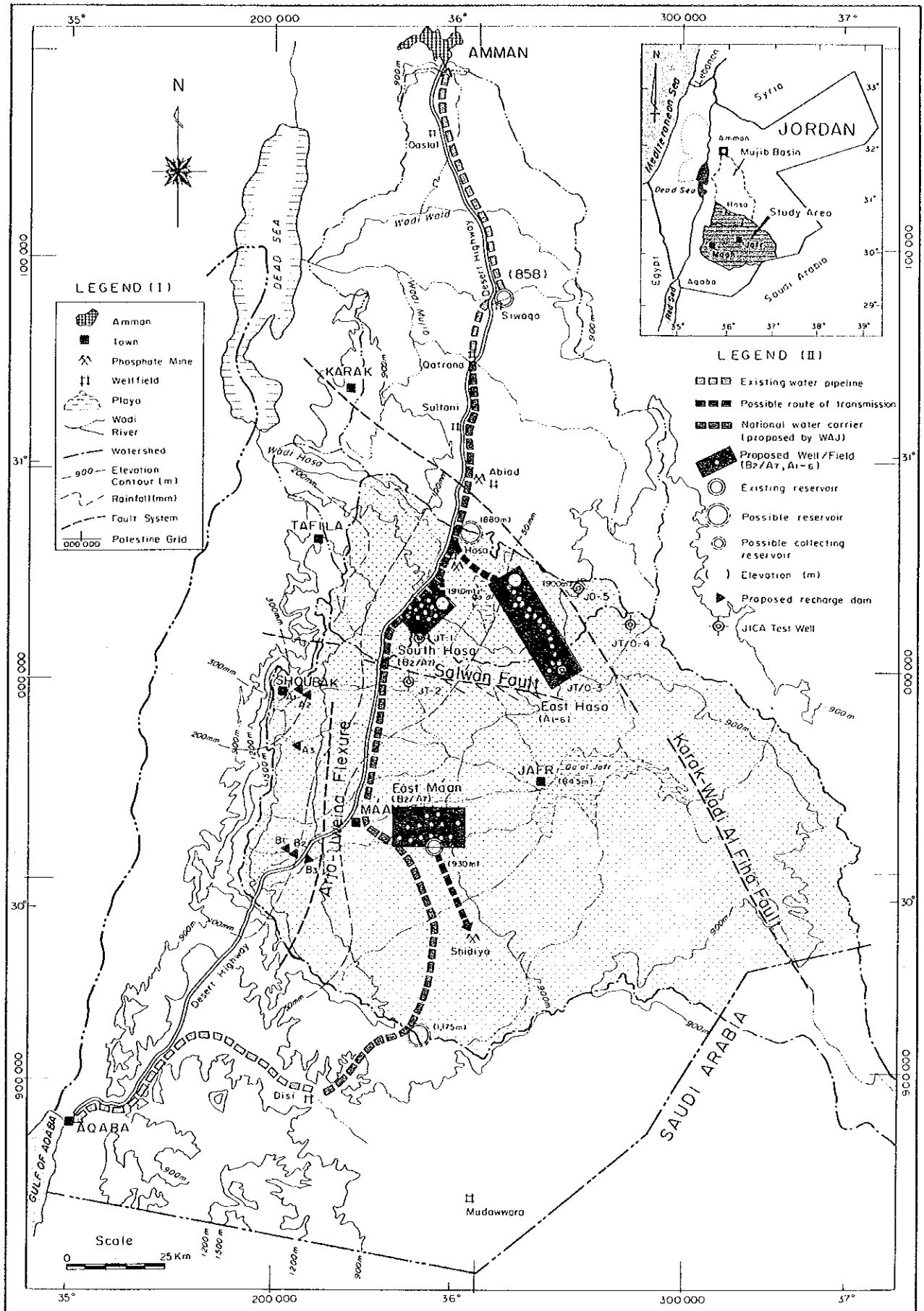
JAPAN INTERNATIONAL COOPERATION AGENCY



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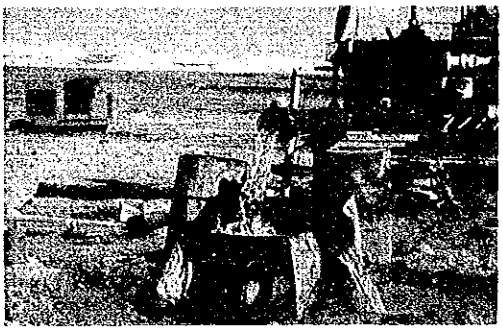
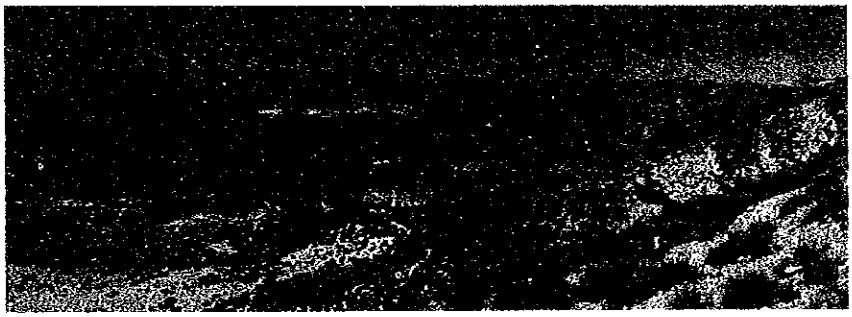


Pumping test at test well JT-3; Excellent quality of pimped water from deep aquifer of Lower Ajlun (A1-6), with T.D.S. of 330 mg/l.(December,1988)

Upper Hasa basin; Southwards view from Hasa town. (July,1988)

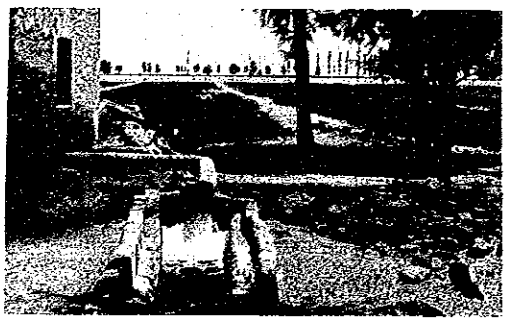
Outcrop of Amman (B2) formation in the Western Highlands; Alternating silicified limestone and chert, with frequent joints, cracks and fissures. (December,1988)



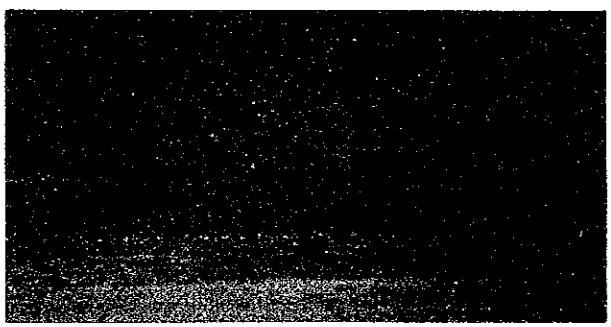
A-2 groundwater recharge damsite; Northwestern part of the Western Highlands in the Jafr basin, where pervious Amman (B2) formation outcrops in and around the damsite. (July,1989)

Wadi Jurdhan at middle reaches; Eastwards and/or downstream view from Desert Highway bridge. (July,1988)

Groundwater recharge area of the Western Highlands, which is covered with snow in December,25,1988. (December,1988)



Groundwater irrigation at Al Jafr; Abstracting from shallow water table aquifer of Rijam (B4), of which water salinity was increased by excessive irrigation return flow and/or deep percolation. (June,1989)



Qa' Al Jafr, end of the wadi course at the center of the playa, ; 10 km northeastwards from Al Jafr town. (October,1988)

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LIST OF ABBREVIATIONS (1/2)

JICA	= Japan International Cooperation Agency
Government	= Government of Jordan
MOWI	= Ministry of Water and Irrigation
MOP	= Ministry of Planning
WAJ	= Water Authority of Jordan
JVA	= Jordan Valley Authority
MOA	= Ministry of Agriculture
NRA	= Natural Resources of Authority
RSS	= Royal Scientific Society
JNGC	= Jordan National Geographic Center
JEC	= Jordan Electricity Authority
JEPCO	= Jordan Electric Power Company
S/W	= Scope of Work
C/P	= Counterpart Personnel
M/P	= Master Plan
Pre-F/S	= Pre-feasibility Study
F/S	= Feasibility Study
KV	= Kilo Voltage
KW	= Kilo Watt
KVA	= Kilo Voltage Ampere
hr/hrs	= Hour/Hours
km^2	= Square Kilometer
ha	= Hectare
l/s	= Liter per Second
m^3/h	= Cubic Meters per Hour
m^3/s	= Cubic Meters per Second
m^3/d	= Cubic Meters per Day
bs/ft	= Pound per Foot
MCM	= Million Cubic Meters
MCM/y	= Million Cubic Meters per Year
MCM/m	= Million Cubic Meters per Month

LIST OF ABBREVIATIONS (2/2)

PG	= Palestine Grid
E.L/G.L	= Ground Elevation
S.W.L	= Static Water Level
ppm	= Parts per Million
mg/l	= Milligram per Litter
T.D.S	= Total Dissolved Solids
E.C	= Electric Conductivity
VLF	= Very Low Frequency
Al/Bslt	= Alluvium/Basalt
O & M	= Operation and Maintenance
M & I	= Municipal and Industrial
API	= American Petroleum Industry
FEM	= Finite Element Method
FDM	= Finite Difference Method
UNISSF	= Unified Normal and Inverse Sub-Surface Flow Analysis Program
Fig.(s)	= Figure(s)
Tab.(s)	= Table(s)
Ref.(s)	= Reference(s)

I. INTRODUCTION

I. INTRODUCTION

1.1 Work Progress

Water Resources Study of the Jafr Basin (hereinafter referred as "The Study) has been carried out from July 1988 through March 1990 including four stages of the investigations 1st through 4th as shown below;

The First Stage Tasks ; (July 1988 - March 1989)

The 1st stage field investigation comprised data collection and field investigations. The data collection and review of existing reports on topography, geology, hydrology, hydrogeology and water resources development, which were performed with close coordination with WAJ, included following;

- Topographical maps (1/50,000), aerial photos (1/50,000) and Landsat imagery (1/750,000)
- Geological maps (1/50,000 - 1/1,000,000) and hydrogeological maps
- Land use map and population data
- Meteorology
- Soil moisture
- Stream flow and suspended solid in the flash flood
- Well inventory
- Test well drillings and pumping test
- Water quality test

After field reconnaissance surveys and examining existing data, the Inception Report was submitted to the WAJ in August 1988.

Geological and hydrogeological mappings were performed prior to geophysical prospecting by VLF (Very Low Frequency) method. The geological mapping was carried out to examine the stratigraphy, micro paleontology and geological structures of the sequences from lower Ajlun (A1-6) formation to alluvial, which includes the survey for the proposed

groundwater recharge dams. The VLF survey was performed to delineate the salt-accumulated areas in the Rijam (B4) aquifer and to examine the effects by faults such as "Salwan" and "Karak - Wadi Al Fiha" on the hydrogeology of the shallow units. After geological reconnaissance, a technical specification was prepared for tendering for test well drillings following WAJ's tender procedure. The test well drillings included four test wells and three observation holes with a total depth of 2,940 m. These were carried out in the area along the "Salwan" fault and "Karak - Wadi Al Fiha" fault where neither geological nor hydrogeological data could be available from the previous studies. The drilling work was carried out by local contractor "Equipment and Sales Co.," under the supervision by JICA drilling expert. The exploratory drilling was aimed to assess the aquifer parameters and the geological and/or the hydrogeological discontinuities in the B2/A7 and/or A1-6 units. During this period, groundwater monitoring, which comprised water level measurements and water samplings and testings, was carried out in cooperation with WAJ's monitoring department and laboratory, including installation of four automatic water level recorders JT-1, JT-3,JO-3 and JO-5.

Prior to hydrogeological analysis, the hydrological analysis was performed to evaluate the potential of surface water. The analysis was based on the existing data, including;

- Runoff analysis by using tank model method
- Flood frequency analysis
- Sedimentation analysis

A seminar on surface hydrology was held in November 1988, to discuss the reliability of the existing data collected and the method of analysis to be carried out. The hydrological data book was submitted to WAJ counterpart team, including the mini-floppy diskettes which store all the raw data such as rainfall and flow discharge by using the IBM-PC compatible data base"Lotus 1-2-3".

The 1st stage analysis compiled the results of the investigation and the analysis mentioned above, and the Progress a Report was submitted to the Jordanian side in March 1989.

The 2nd Stage Tasks ; (May 1989 - September 1989)

The 2nd stage field investigation was initiated by discussing the Progress Report. The hydrogeological analysis was carried out to construct the groundwater simulation models of both B2/A7 and A1-6. The computer program of UNISSF, which was designed for the FEM simulation model,was transferred to WAJ's VAX-8200 computer system. During this period, groundwater monitoring was also continued.

The first seminar on the groundwater model simulation was held in July,1989, to transfer the computer program of the UNISSF which was written by FORTRAN language and its use in the B2/A7 steady state modeling. Prior to transfer of the UNISSF program, a simplified FEM groundwater simulation program, written in BASIC language, was demonstrated to show use of the graphic display (contour mapping) of the IBM-PC compatible micro-computer. The simulation manual version (1.0), which explains the method of the steady state model calibration, was submitted to WAJ counterpart team. The manual (ver.1.0) comprises the method of transferring micro-computer data base (IBM-PC compatible) to VAX-8200 by means of RS-232C data communication system. The mini-floppy diskettes, which store the input data such as mesh grid, boundary conditions, aquifer parameters and geologic conditions, were also handed over to WAJ.

The 2nd stage analysis is carried out to delineate the potential aquifers and well fields. Water demand and frames of the water resources development plans were studied. Potential analyses were carried out by using the simulation models including;

- Steady state calibration of the groundwater simulation models (B2/A7, A1-6)
- Non-steady calibration of the groundwater simulation model (B2/A7)

- Simulations for alternative groundwater development plans
- Hydrochemical analysis and simulation of the B4 aquifer (salt-water balance simulation by using tank model)

The 2nd stage analysis compiled the results of the investigation and the analysis mentioned above, and the Interim Report was submitted to the Jordanian side in October 1989.

Third Stage Tasks ; (October 1989 - January 1990)

The 3rd stage filed investigation comprised discussion on the Interim Report and alternatives of the water resources development plans, groundwater monitoring and transfer of the computer simulation models and the input data.

The second seminar on groundwater model simulation was held in October 1989, to transfer the simulation models of both B2/A7 and A1-6. The simulation manual version (2.0), which explains the method of non-steady state model calibration for the B2/A7, was submitted to WAJ counterpart team. The 2nd seminar also demonstrated the method of using computer plotter (CALCOMP-1043) which is installed on the 7th floor of WAJ computer room. The mini-floppy diskettes which store the input data of i) mesh grid, ii) boundary conditions, iii) aquifer parameters, and ix) geologic conditions were also handed over to WAJ.

The 3rd stage analysis included 1) conceptional design of the water source facility and its preliminary cost estimate for the selected alternatives, 2) water demand and model predictions, 3) master plan study of the water resources development, 4) institutional study on the groundwater monitoring plan for the selected plan and 5) compilation of draft final report.

The Fourth Stage Tasks ; (February 1990 - March 1990)

The Draft Final Report was explained to and discussed with the Government. The 3rd computer simulation seminar was held to transfer

the technology of operating the simulation models. A final report is herewith prepared, scrutinizing the Government's comments.

1.2 Synopsis of This Report

This supporting report includes the results of the sectoral studies as shown below;

Chapter-2; Socio-economy describes the region's position in the socio-economic development in the Hashemite Kingdom of Jordan.

Chapter-3; Hydrology and dam planning describe the hydrology and surface water resources development including groundwater recharge dams.

Chapter-4; Topography and geology describe the general geomorphology, stratigraphy, geophysical prospecting and engineering geology for dams.

Chapter-5; Hydrogeology and groundwater resources development descrive the results of hydrogeological analysis, model simulations and predictions and alternative development study.

In Chapter-6, salt accumulation problems in a part of the Rijam (B4) aquifer is presented to follow with the result of salt-water balance simulation.

II. SOCIO-ECONOMY

II. SOCIO-ECONOMY

2.1 Population Statistics

The population of Jordan was approximately 2.9 million in 1987 and must have exceeded 3 million in 1988. The annual rate of population increase in recent years has been 3.6-3.8%.

Jordan is divided into eight Governorates (Gov.), with Amman Gov. which includes the capital city is the most densely populated with 41.5% of the national population. The three Govs. of Amman, Zarqa and Irbid contain as much as 80.3% of the national population leaving the other Govs. populated sparsely. The population from 1983 through 1987 by Gov. is shown on Table 2-1.

The Study area is located mostly in the Ma'an Gov. and partly in the Tafila Gov. As the Study area belongs to the arid area, the population is very sparse. In year 1987, the populations of the towns and villages in the Study area within the Ma'an Gov. were 15,815 in Ma'an, 1,630 in Jafr, 2,502 in Husseiniya and 195 in Mohamadya. These populations fluctuate considerably since the bulk of the populations are nomads. In the Hasa town, no population statistics are available, yet the population is estimated at some 5,000 in the town and some 2,000 at the Hasa phosphate mine.

2.2 Industries

2.2.1 Agriculture

As the Study area is extremely arid, the land use for agriculture is to be found. In the upper Hasa basin almost no agricultural land use is observed. In the Jafr basin, some oasis agriculture is being practiced near Jafr town, and several scattered farm projects are to be found in the western part of the basin. These projects do not depend on rainfall but the tube wells.

In the northwestern part of the Jafr basin where the ground elevation exceeds 1,200 m, extensive agriculture development is being carried out to take advantage of the higher rainfall of more than 200 - 300 mm per annum and the cool weather. The Abu Makhtoub and Shoubak project, which extends over 633 ha, depends on 17 wells owned privately by 14 farms for irrigating apples and horticulture.

The Husseiniya project (100 ha) and the Mohamadya project (100 ha) located between Hasa and Ma'an towns depend on two and three tubewells respectively for cultivation of the fodder grasses, fruit trees and vegetables. The Al'Qasimya project (117 ha) and the Wuheida projects (171 ha) located to the southwest of Ma'an town depend on two tubewells each for irrigating apples and grapes.

The Al'Jafr project (245-100 ha) located near Jafr town depends on four shallow tubewells in the Rijam aquifer for supplying domestic water to the town as well as for irrigating fodder crops. One of these wells has suffered from salinization, and a study on this phenomenon is treated in Chapter V of this Report.

2.2.2 Manufacturing industry

Near Hasa town, there is the Hasa Phosphate Mine producing more than 3.4 million tons a year of natural phosphate. This is the largest phosphate mine in Jordan, and contributes greatly to hard currency earnings. This mine uses 10 tubewells. The well water is used solely for the self-consumption especially for ore washing.

Near Husseiniya town, there is a factory for bottling mineral water. The water depends on tubewells owned by the bottlers.

In Ma'an town, there are small factories including one glass factory. The water source depends on the city water supply.

The Shidiya phosphate mine, which is located to the southeast of Ma'an

town will be the biggest mine in the Hashemite Kingdom of Jordan, when it starts operation.

2.3 Public Facilities

2.3.1 Road

The Desert Highway which traverses the nation in a north-south direction runs through the western side of the Study area. The King's Highway which has been maintained since historical times lies on the western boundary of the Jafr basin. There is a motorable road from Ma'an town to Jafr town along, and from there to Azraq along a newly constructed road. The above-mentioned roads are all paved with asphalt and maintained reasonably. A few feader roads are available in between these roads and highways.

There is an existing railroad from Hasa mine to Aqaba sea port. This railroad is used solely to transport the phosphate ore for export.

2.3.2 Electricity and water supply

Most of the towns and villages are supplied with electricity from the national grid, and likewise with the domestic water supply.

2.4 Water Demand

2.4.1 Present use and supply

Water resources in Jordan are being exploited for the use of drinking and domestic uses , industry and irrigation. It is said that 96 per cent of the Kingdom's population is now supplied with drinking water from springs and underground artesian wells. A series of water resources development projects have been carried out including 20 MCM/y of Wadi Al Arab groundwater project near Irbid, 15 MCM/y of Qastal groundwater project near Amman, 14 MCM/y of Zarqa groundwater project, 45 MCM/y of Deir Alla (canal) base flow water project, 3.5 MCM/y of

Sultani groundwater project near Karak, 1.5 MCM/y of Shoubak groundwater project, and 17 MCM/y of Disi groundwater project.

Present use in the Study area is preliminarily estimated by WAJ at 18.4 MCM/y, which includes the biggest consumer of Hasa phosphate mine of 7.4 MCM/y and Shoubak irrigation of 3.3 MCM/y

2.4.2 Future water demand

According to an estimate by the Ministry of Water and Irrigation in 1988, Jordan is expected to require nearly 266 MCM of water for annual consumption by the year 2005. This suggests a shortage of 75 MCM per annum and that intensive efforts will have to be made to find new water resources to meet the growing demand on water for different purposes.

Water demand in the Study area is largely dependent on the operation program of the Shidiya phosphate mining development project, which will require 6 MCM/y by the year 1992, and 20 MCM/y for full scale development.

TABLES

Table 2.1 Population by Governorates

Governorates	1987	1986	1985	1984	1983
Amman	1,203.0	1,160.0	1,114.6	1,446.2	1,386.9
Zarqa*	419.1	404.5	389.6	-	-
Amman+Zarqa	(1,622.1)	(1,564.5)	(1,504.2)	(1,446.2)	(1,386.9)
Increase Rate	3.7	4.7	4.0	4.3	-
Irbid	704.1	680.2	656.7	727.9	702.9
Mafraq*	102.0	98.6	95.5	-	-
Irbid+Mafraq	(806.1)	(778.8)	(752.2)	(727.9)	(702.9)
Increase Rate	3.5	3.5	3.3	3.6	-
Balqa	200.6	193.8	187.2	179.6	172.8
Increase Rate	3.5	3.5	4.2	3.9	-
Karak	124.2	120.1	116.1	150.7	145.4
Tafila*	42.8	41.4	40.0	-	-
Karak+Tafila	(167.0)	(161.5)	(156.1)	(150.7)	(145.4)
Increase Rate	3.4	3.4	3.6	3.6	-
Ma'an	101.0	97.5	94.0	90.7	87.3
Increase Rate	3.6	3.7	3.6	3.9	-
National Total	1,896.8	2,796.1	1,693.7	2,595.1	2,495.4
Increase Rate	3.60	3.80	3.80	4.00	-

Remarks:

Unit: Population in 1,000, Increase rate (Annual) in %

* : Became Governorates since 1985

Source: Annual Statistical Booklet, Department of statistics with Study Team's elaboration

III. HYDROLOGY AND DAM PLANNING

III. HYDROLOGY AND DAM PLANNING

3.1 Watershed

The Jafr basin is located in the southern part of the central Jordan plain and lies to the east of the Western Highlands. The basin has an area of 13,500 km^2, most of which is classified as an arid desert with mean annual rainfall of about 50 mm. The basin displays a classic centripetal drainage pattern with all wadis draining from the encircling highlands to the central El Jafr Playa, the largest concave in Jordan. The catchment lies at elevations between 850 m in the El Jafr Playa and 1,750 m in the Western Highlands. (See Fig. 3.1)

The Upper Hasa basin is separated from the northern Jafr Basin by watershed. The catchment area is about 2,200 km^2, and lies at elevations between 400 m at the basin outlet near Tannour and 1,250 m in the Eastern Highlands. The wadis in the Southern-western Highlands are characteristically narrow and moderately incised, while wadis are flat in the eastern part of the basin where the elevation is about 900 m. All the wadis in the upstream reaches drain flushing floods to the central playa named Qa El Jinz. (See Fig.3.1)

3.2 Available Data

3.2.1 Temperature, humidity, sunshine, wind speed and evaporation

There are 6 climatological stations (namely, Hasa, Abur, Shoubak, Udruh, Jafr and Ma'an airport) in the study area, for which climatological data such as temperature, relative humidity, evaporation, sunshine hours, wind velocity and rainfall are available (See Fig.3.2 for their locations). These data are made available for the period between October 1977 and September 1988.

3.2.2 Rainfall

There are 53 rainfall gaging stations in and around the study area which locations are shown on Fig. 3.2, and the gaging type is shown on Table 3.1 together with dates opened and closed. The type of rainfall gaging is divided into automatic recording type, daily reading type and annual totalizer.

Availability of daily rainfall data between October 1963 and September 1986 is shown on Table 3.2 for the 53 stations. No daily rainfall data are available for most upstream areas of the Upper Hasa basin and northeastern, eastern and southern parts of the Jafr basin.

Hourly rainfall data were made available for the following 11 stations located in the western part of the study area.

Id. No.	Station Name
CD 0013	Mazar
CF 0003	Jurf Ed-Darawish
CF 0007	Hasa evaporation station
CF 0008	Hasa gaging station
DA 0005	Uneiza railway station
DB 0002	Abur (Prince Hassan Nursery)
DH 0001	Taiyiba Janoubiya
DG 0001	Wadi Mousa
ED 0002	Ras En-Naqb
G 0003	Ma'an school
G 0010	Wadi Jurdhan gaging station

Availability of hourly rainfall data is poor and insufficient to well characterize rainfall-runoff relationships during storms.

For nine rainfall stations(namely, CF 0007,CF 0008,DA 0005,DB 0002, DG 0001, DH 0001,ED 0002,G 0003,G 0010), depth-duration curves of strong

rainfall are derived (See Table 3.3 and Fig.3.3).

3.2.3 Discharge

In the study area, there exist two water stage gaging stations, one at the Hasa river and the other at the wadi Jurdhan (See Fig. 3.2 for their locations). The former started measurement in October 1963 and the latter in October 1968. Catchment area of the former is 2,200 km^2 and that of the latter 180 km^2.

Availability of daily discharge data is shown on Table 3.4. The Hasa river has absence of daily discharge data for a period from November 1975 to December 1976 while the wadi Jurdhan reportedly claims no absence of daily data to date.

Availability of hourly discharge data is shown on Table 3.5 for the Hasa river and Table 3.6 for the wadi Jurdhan. For the Hasa river, hourly discharge data of 63 floods were collected, among which hydrographs of 12 floods, with peak discharge more than 60 m^3/sec, are shown on Fig. 3.4. On the other hand, hourly discharge data of 30 floods were collected for the wadi Jurdhan. Among them, hydrographs of 9 floods which peak discharge is more than 20 m^3/sec are shown on Fig.3.5.

It was found through an in-situ inspection made in September 1988 that the water stage gaging station of the wadi Jurdhan is installed at a place where riverbed fluctuation seems to happen frequently, without any artificial control while that of the Hasa river near Tannour is furnished with a low concrete weir to maintain stable water rating.

3.2.4 Sediment

Including those quoted from the previous report(Ref.3.1), 111 data of suspended sediment are available for the Hasa river at the water stage gaging station near Tannour (See Table 3.7) and 81 data for the wadi Jurdhan at the water stage gaging station by the Desert Highway(See Table 3.8).

3.2.5 Water quality

Only a result of water quality test is available. Sampling for this test was made at Ghor Safi of the Hasa river on March 19,1973.

3.3 Meteorology

3.3.1 Climate

The whole of eastern Jordan lies within the Mediterranean bioclimatic region and the study area has a Mediterranean Saharian climate of the warm variety (by Long,1957), being classified as arid (by Miller,1951).

Climatological data of the study area ,except rainfall, are summarized for the period between October 1977 and September 1988 (See Table 3.9). According to Table 3.9, the annual minimum temperature is recorded in January, ranging from 3.9° C at Hasa to -2.6° C at Udruh on average, with the annual maximum temperature recorded in July or August, ranging from 35.5° C at Jafr to 27.4° C at Shoubak on average. Relative humidity is as low as 30's or 40's in percent in May to October and as high as 60's or 70's in percent in December to January.

3.3.2 Rainfall

A isohyetal map of annual rainfall of the study area was made from available rainfall data between October 1937 and September 1988. (See Fig. 3.6). From the isohyetal map , it is found that annual rainfall decreases from 300 mm in the western watershed to less than 50 mm in its eastern part.

Annual rainfall of the Upper Hasa basin, wadi Jurdhan and the Jafr basins was estimated by the Thiessen method ,dividing the study area into polygons (See Fig.3.7) and by applying long-term annual rainfall for the period between 1937/38 and 1987/88 of gaging stations within each polygon.

Accordingly, annual rainfall of the Upper Hasa basin, the wadi Jurdhan and the Jafr basin is estimated at 89 mm (Table 3.10), 129 mm (Table 3.11) and 52 mm, respectively.

Monthly rainfall patterns of the following 12 stations are shown on Fig. 3.8.

No.	Id.No.	Station Name	No.	Id.No.	Station Name
1	CF 0003	Jurf Ed-Darawish	7	ED 0002	Ras En-Naqb
2	CF 0007	Hasa evapo.station	8	G 0002	Jafr police sta.
3	CF 0008	Hasa gaging station	9	G 0007	Ma'an railway sta.
4	DA 0002	Shaubak agri. sta.	10	G 0010	Jurdhan gaging sta.
5	DB 0001	Tafile	11	J 0001	Bayir evapo. sta.
6	DG 0001	Wadi Mousa	12	K 0001	Al Mudawwara

As seen from Fig.3.8, a year is divided into two distinct seasons, namely, the rainy season from October to May and the dry season from June to September.

3.3.3 Evaporation

As may be seen from Table 3.9, the annual total evaporation measured by a class-A pan ranges from 1,800 mm at Shaubak to 4,200 mm at Jafr. At all the stations, about 70 % of annual evaporation is recorded between April and September.

3.4 Flood Analysis

3.4.1 Duration of storms

A. Duration of storms of the Upper Hasa basin

Concerning areal distribution of rainfall within the basin, it is observed that floods with large peak discharges are caused by rainfall which is concentrated in limited areas within the basin, as seen from Table 3.5 and 3.6.

Though no data are available to clarify a depth-duration relationship on the hourly basis for areas upstream of the Upper Hasa basin, it seems relevant to apply hourly rainfall data of any of the three stations (namely.CF0007,CF0008 and DB0002) to determine duration of storms of the Upper Hasa basin. This is because most of the runoff at the basin outlet is considered to be caused by rainfall which precipitates in the western half of the Upper Hasa basin as understood from the isohyetal map (Fig.3.6).

On average, the duration of storms is 20 hours for station No. CF 0007 (See Table 3.3(1/9)), 28 hours for station No. CF 0008(See Table 3.3(2/9)) and 32 hours for DB 0002(See Table 3.3(4/9)). This means that the duration of storms tends to become longer in the western part of the basin where more annual rainfall is observed. In this analysis, the duration of storms used in estimation of probable floods is chosen at 28 hours which is the average duration of storms for station No. CF 0008, because this station is intermediate in terms of annual rainfall amount and duration of storms among the three stations.

B. Duration of storms of wadi Jurdhan

There are 4 rainfall stations in and around the wadi Jurdhan. Among these, the stations No. G 0003 and G 0010 which are located near the basin outlet in the eastern part have a shorter duration of 15 to 16 hours(See Table 3.3(8/9) and (9/9)) than stations No. DG 0001 and DH 0001 which are located near the western watershed outside the wadi Jurdhan with storm durations 22 to 24 hours (See Table 3.3(5/9) and (6/9)).

The long-term annual rainfall of stations G 0003 and G 0010 is less

than 50 mm while that of stations DG 0001 and DH 0001 is about 180 mm. From this, it is considered that most of the runoff at the basin outlet is considered to be caused by rainfall which precipitates in the western part of the Jurdhan basin whose rainfall pattern in terms of duration and depth-duration relationship is considered more similar to those of the stations No.DG 0001 and DH 0001.

In this analysis, the duration of storms used in estimation of probable floods is chosen at 24 hours. This is the average duration of storms for station No. DH 0001 because the depth-duration relationship of station No. DH 0001 is obtained for a larger amount of rainfall than station No. DG 0001 though the long-term annual rainfall of these stations is nearly equal.

3.4.2 Probable rainfall

A. Probable rainfall of major rainfall stations

Relationships between rainfall intensity, duration and frequency of 40 rainfall stations in Jordan are tabulated and graphically shown for duration of 5 minutes to 24 hours and return periods of 2 to 500 years(See Ref.3.2). Such relationships of 8 rainfall stations in and around the study area (namely, CD 0013,CF 0007, CF 0008, DB 0001,DC 0002,DG 0001,DH 0003 and G 0003)are available in this study paper(See Table 3.12).

B. Probable rainfall of Upper Hasa basin

Probable rainfall of the Upper Hasa basin is obtained by multiplying probable rainfall of the rainfall station No. CF 0008 with the ratio of long-term annual rainfall between the rainfall station No. CF 0008 and the Upper Hasa basin (See Table 3.10). Long-term annual rainfall between year 1937/38 and 1987/88 is 136 mm for rainfall station No. CF 0008 and 89 mm for Upper Hasa basin.

C. Probable rainfall of wadi Jurdhan

Probable rainfall of the Jurdhan basin is obtained by multiplying probable rainfall of the rainfall station No. DG 0001 with the ratio of long-term annual rainfall between the rainfall station No. DG 0001 and the wadi Jurdhan (See Table 3.11). Long-term annual rainfall between year 1937/38 and 1987/88 is 180 mm for the rainfall station No. DG 0001 and 129 mm for the Jurdhan basin.

3.4.3 Unitgraph

A. Unitgraph of Hasa river

Hydrographs of 4 single-peaked large floods (namely, floods No.H15,H17,H28 and H45 in Table 3.5 and Fig.3.4) are converted to hydrographs caused by 1-mm-rainfall after deducting base runoff. The peak discharge of hydrographs before and after the conversion and the time from start of rise to peak are shown as below.

Flood No.	Peak Discharge (m^3/sec)		Time from start of rise to peak (hr)
	Observed Flood	Flood Caused by 1 - mm Rainfall	
H 15	78	216	3
H 17	71	128	5
H 28	80	130	7
H 45	290	50	7
-	-	-	5 (1)
-	-	-	12 (2)
-	-	-	8 (3)

Note :

(1) Time of concentration is estimated by Kraven's formula.

(2) Time of concentration is estimated by Bayern's formula.

(3) Time of concentration is estimated by the formula derived by

the California Highways and Public Works.

(4) Time from start of rise to peak (T_p) is estimated by $T_p=0.5+0.6 \times T_c$ which is an empirical relationship derived by the Soil Conservation Services of U.S. Dept. of Agriculture. T_c is time of concentration.

A unitgraph, shown on Fig.3.9, to estimate probable floods was constructed from the hydrograph of the flood No. H 45 which has the second largest peak discharge of the 64 flood hydrographs collected by this study.

B. Unitgraph of wadi Jurdhan

Hydrographs of 4 large floods with a single peak (namely, floods No.J3,J8,J21 and J24 in Table 3.6 and Fig.3.5) are converted to hydrographs caused by 1-mm-rainfall. The peak discharge of hydrographs before and after the conversion and the time from start of rise to peak are shown as below.

Flood No.	Peak Discharge (m^3/sec)		Time from start of rise to peak (hr)
	Observed Flood	Flood Caused by 1 - mm Rainfall	
J 3	30	30	2.0
J 8	120	26	1.5
J 21	77	17	3.5
J 24	33	20	1.0
-	-	-	2.1 (1)
-	-	-	3.5 (2)
-	-	-	3.3 (3)

Note :

(1) Time of concentration is estimated by Kraven's formula.

(2) Time of concentration is estimated by Bayern's formula.

(3) Time of concentration is estimated by the formula derived by

the California Highways and Public Works.

(4) Time from start of rise to peak (T_p) is estimated by $T_p=0.5+0.6 \times T_c$ which is an empirical relationship derived by the Soil Conservation Services of U.S. Dept. of Agriculture. T_c is time of concentration.

A unitgraph, shown on Fig.3.10, to estimate probable floods was constructed from the hydrograph of the flood No. J8 which has the largest peak discharge of the 64 flood hydrographs collected this time.

3.4.4 Probable floods

A. Method of estimation of direct runoff from rainfall

The method used for estimation of direct runoff from a given amount of rainfall is taken from Ref.3.3. This method was originally developed by the Soil Conservation Service, the United States Department of Agriculture in 1956.

In this study, for the Upper Hasa basin,the Jurdhan basin and the Jafr basin, the hydrologic soil group is chosen to be "Group B" which is classified as "soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well-drained soils with moderately fine to moderately coarse textures and which have a moderate rate of water transmission". The pattern of land cover is chosen to be fallow. This choice is based on a study of hydrological soil classification in Ref.3.1.

The antecedent moisture condition is chosen to be AMC-II which is quoted as " the average case for annual floods, that is, an average of the conditions which have preceded the occurrence of the maximum annual flood on numerous watersheds" for both the Upper Hasa basin and the Jafr basin.

Other study reports on Jordan estimated the amount of abstraction which principally consists of interception, infiltration and surface storage

as below.

Reference No.	Initial Abstraction (mm)	Abstraction after Initial Abstraction (mm/hour)
4	12	5
5	(Unknown)	5
6	10	4

In this study, initial abstraction and abstraction after initial abstraction are estimated as below.

Return Period (Year)	Initial Abstraction (mm)		Abstraction after Initial Abstraction (mm/hour)	
	Upper Hasa	Jurdhan	Upper Hasa	Jurdhan
2	8.3	8.3	0.27	0.48
5	8.3	8.3	0.54	0.69
10	8.3	8.3	0.65	0.79
25	8.3	8.3	0.77	0.90
50	8.3	8.3	0.84	0.98
100	8.3	8.3	0.88	1.03
200	8.3	8.3	0.93	1.07
500	8.3	8.3	0.98	1.13

B. Probable floods of Hasa river at Hasa water stage gaging station

From the aforesaid unitgraph and probable rainfall, probable floods and runoff coefficients are estimated as shown on Table 3.13 and Fig.3.11.

In a previous study report (Ref.3.6), runoff coefficients vary from about 20 % for short return periods to about 50 % for 100-year probable floods, which shows good agreement with the results obtained by this study. Also, the peak discharges estimated by this study are plotted in Fig.3.13 with estimates by previous study reports of Jordan and actual flood records in the Levant. From Fig. 3.13, the peak discharges estimated by this study are considered reasonable.

C. Probable floods of wadi Jurdhan at water stage gaging station by Desert Highway

From the aforesaid unitgraph and probable rainfall, probable floods and runoff coefficients are estimated as shown on Table 3.14 and Fig.3.12. As described in Sec.3.3.3, the unitgraph of wadi Jurdhan is derived from a historical large flood in March 1966 when the reliability of the water stage record is said to have been still high.

In a previous study report(Ref.3.6), runoff coefficients vary from about 20 % for short return periods to about 50 % for 100-year probable floods, which shows good agreement with the results obtained by this study. Also, the peak discharges estimated by this study are plotted on Fig.3.13 with estimates by previous study reports of Jordan and actual flood records in the Levant. From Fig. 3.13, the peak discharges estimated by this study are considered reasonable.

D. Probable floods at 8 recharge dam sites

By this study, construction of recharge dams is proposed at 8 sites for which location, drainage area and annual rainfall are shown on Fig.3.2 and Table 3.15.

Probable floods of recharge dam sites are estimated by the following equation:

$$Q_x = Q_o \times C$$

$$C = \frac{Al_x^{bx}}{Al_o^{bo}} \times \frac{R_x}{R_o}$$

$$Al = 0.62137^2 \times A2$$

where C : Adjustment factor of probable floods
Q (m^3/sec) : Peak discharge of a probable flood
Al ($mile^2$) : Drainage area
A2 (km^2) : Drainage area
R (mm) : Annual rainfall
Subscript o : Values of the wadi Jurdhan at the water stage gauging station
Subscript x : Values of recharge dams

and

$$b = 0.894 \times A2^{-0.048}$$

Adjustment factors of probable floods are calculated as shown on Table 3.15. Peak discharges of probable floods at 8 recharge dams thus estimated are shown on Table 3.16.

3.5 Runoff Analysis

3.5.1 Estimate of daily rainfall

Estimate of basin rainfall is made by the Thiessen method after estimating missing rainfall data. There are absences of daily rainfall data for a considerable period for some rainfall stations. The absences of rainfall data of a certain station are filled by data of a station with which the best correlation is obtained on a monthly basis. Prior to the correlation analysis, selected rainfall stations in and around the study area were divided into 4 groups with regard to the availability of daily rainfall data, and the amount of annual rainfall and their closeness as follows :

Group No.	Characteristics of Group
1	Located in and near the Jafr basin and annual rainfall of most stations with missing data is more than 100 mm
2	Located in and near the Upper Hasa basin and annual rainfall of most stations with missing data is more than 100 mm
3	Located in and near the Jafr basin and annual rainfall of most stations with missing data is less than 100 mm
4	Located in and near the Upper Hasa basin and annual rainfall of most stations with missing data is less than 100 mm

Simple correlation factors and linear regression formulas thus derived are shown on Table 3.17 for the 4 groups.

3.5.2 Simulation model

A. Basic component of tank model

The tank model is a widely practiced tool to estimate long-term runoff data from rainfall data or runoff data during engaged periods and/or of engaged areas. The tank model is normally composed of three or four tanks connected directly with each other by bottom outlets, thus upper tanks emit and lower tanks receive the amount of water in proportion to the water level in upper tanks. Each tank has side holes, which pass the runoff to rivers. The outflow from each side hole is proportionate to the height between the hole and water surface. Provided that a tank is accommodated with one bottom hole and two side holes, the rule for outflow computation is as follows :

$y = 0$ $(X \leq h1)$

$y = a1(X - h1)$ $(h1 < X \leq h2)$

$y = a2(X - h2) + a1(X - h1)$ $(h2 < X)$

$Z = bX$

$X^* = X - y - Z + I$

where

X : Water depth of i-th day

X^* : Water depth of (i+1)-th day

y : Outflow from side holes of i-th day

Z : Outflow from a bottom hole of i-th day

I : Inflow of i-th day

a1,a2 : Discharge coefficients of side holes

b : Discharge coefficient of bottom hole

h1,h2 : Height of lower and upper side holes

In order to effectively trace hydrological conditions of the study area where there is a dry season regularly and streamflows diminish to a considerably low level or completely dry up in the dry season, the tank model is furnished with a structure to simulate the moisture content in the top tank. This structure is composed of two moisture-bearing zones, which contain moisture up to the capacity of saturation . The moisture contents in two zones are expressed as height, which are called primary soil moisture depth and secondary soil moisture depth,respectively. Between the above two zones, transfer of water contents takes place, as expressed below :

$$T2 = TC\ (XP/PS - XS/SS)$$

where

T2 : Transfer of moisture between primary and secondary zones (if positive, transfer takes place from primary to secondary, and vice versa)

PS : Capacity of primary soil moisture

SS : Capacity of secondary soil moisture

XP : Primary soil moisture

XS : Secondary soil moisture

TC : Transfer coefficient

If the primary soil moisture is not saturated,i.e., XP<PS, water is supplied to the primary moisture zone from the lower tanks as a result of capillary attraction, amount of which is computed as below :

$$T1 = TB\ (1 - XP/PS)$$

where

T1 : Transfer of moisture from lower tanks to primary soil moisture

TB : Transfer coefficient

The basic components of tank model are depicted in Fig. 3.14.

B. Tank model of study area

Based on available rainfall data between October 1937 and September 1988, an isohyetal map of annual rainfall of the study area was prepared (See Fig. 3.6). As seen from the isohyetal map, nearly 70 % of the study area has an extremely arid climate with annual rainfall less than 50 mm.

Topographically, there are wadis where B2/A7 and/or B4 aquifers directly outcrop, causing direct recharge of aquifers along riverbeds by rainfall and there are areas where the aforesaid aquifers form sub-surface layers (See Fig.3.15). The distribution of outcrops and sub-surface layers of such aquifers is not uniform over the study area. Taking the Upper Hasa Basin for example, more than 80 % of B2/A7 and B4 aquifers forming outcrops and sub-surface layers exist in the rainy western half of the basin where long-term annual rainfall is more than 50 mm. For the Jafr basin, about 70 % of such permeable sub-surface layers exist in the area with annual rainfall less than 50 mm.

For the purpose of describing such distribution of rainfall and permeable layers in the study area more accurately, the tank model of the study area is separately constructed for a rainy area and a rain-scarce area, the two areas being bordered by an isohyetal line of annual 50-mm-rainfall (See Fig. 3.16).

The effect of groundwater recharge through riverbeds is estimated by the Wedernikow's formula assuming a steady state unsaturated condition as below :

$$Q = k \times (b + 2h) \times A$$

where

Q : Amount of recharge
k : Coefficient of conductivity
h : Water depth of streams
b : Surface width of streams
A : Area of recharging

It is assumed that the recharge through riverbeds of B2/A7 and B4 formations begins when daily rainfall lasting 1 to 2 days is more than 8 mm. The initial abstraction of 8 mm is estimated by the method developed by the Soil Conservation Service, the United States Department of Agriculture as outlined in Section 3.4.4.

In addition, rainfall with strong intensity which directly precipitated over impermeable riverbeds is assumed to reach the basin outlet without any loss.

3.5.3 Input data

Daily rainfall of areas of interest is estimated by the Thiessen method as explained in Section 2.1.

Evaporation used in the runoff calculation is based on the class-A pan evaporation of the Hasa evaporation station.

The area of B2/A7 and B4 aquifers forming outcrops and sub-surface layers are estimated from Fig. 3.15.

The capacities of primary and secondary soil moisture (PS and SS) are estimated from soil moisture content of a 50-cm-thick surface layer

measured at a farm in Shoubak (See Fig. 3.17). From Fig. 3.17, soil moisture content at Shoubak is estimated at 25 mm at the end of dry season in September and 50 mm at the very height of rainy season in March ,and the difference of the two extremes equal to 25 mm is considered as the sum of PS and SS for Shaubak. The sum of PS and SS is derived for the Upper Hasa and the Jafr basins from the data of Shaubak, assuming that the total sum of PS and SS is inversely proportionate to annual rainfall and that the ratio of PS and SS is one to four. As a result, PS and SS for the Upper Hasa and Jafr basins are estimated as follows.

	PS (mm)	SS(mm)
Upper Hasa basin	17	66
Jafr basin	30	120

It may be noted that, about the sum of PS and SS of western parts of the Jafr basin, Ref.3.9 is quoted as reading that " the average soil moisture deficit at wadi alluvium fans in the basin reaches to 200 mm during Oct. - May"

3.5.4 Calibration

A. Reliability of discharge data of wadi Jurdhan

There are two water stage gaging stations in the study area, one in the Upper Hasa basin and the other in the Jurdhan basin. Based on observed discharge data, runoff characteristics of these two sites are compared with that of the Mujib basin as shown on Table 3.18. As understood from Table 3.18, runoff coefficient of the Jurdhan basin is unreasonably low though annual rainfall of the Jurdhan basin is comparable with that of the Mujib basin.

Observed discharges and runoff coefficients of wadi Jurdhan are tabulated in Table 3.19 for the period from the start of water stage

measurement in 1963/64 to 1985/86. According to Table 3.19, no discharge is recorded due to malfunction of recording apparatus after 1982/83 though a considerable amount of annual rainfall data are available.

According to an on-site inspection made in September 1988, the water stage gaging station of the wadi Jurdhan is installed at a place where frequent scour or a deposition of sediment is likely to take place, resulting in frequent changes of stage-discharge relations(See Fig.3.18) and, hence, maintenance of stable water rating seems difficult unless provided with an artificial control like a low concrete weir constructed at the water stage gaging station of the Hasa river near Tannour.

For the above reasons, reliability of the discharge data of the wadi Jurdhan collected by this study is considered too low to be used for the calibration of the tank model for the study area.

It would be desirable that the water stage gaging station of wadi Jurdhan be equipped with an artificial control or be shifted to an appropriate site to have a more accurate stage-discharge relation.

B. Calibration of tank model

For the aforesaid reason,the tank model for the Jafr basin and the recharge dam sites is calibrated by using rainfall-runoff relations of the Upper Hasa basin which is considered far more reliable than that of the wadi Jurdhan. Calibration of the tank model is made by the comparison of average annual runoff volume and hydrographs of observed discharges and calculated discharges.

Being calibrated by rainfall-runoff relations of the Upper Hasa basin, the final values of parameters of the tank model are calculated as tabulated in Table 3.20. The calculated average annual runoff of the Hasa river is compared with the observed one (See Table 3.21).

3.5.5 Estimated runoff volume

Estimated runoff volume of the Upper Hasa basin, the Jafr basin and the recharge dams is summarized for the period between 1963/64 and 1985/86 (See Table 3.22).

Annual runoff volume of the Jafr basin is estimated at 22.9 MCM (Runoff coefficient = 3.3 %), which is comparable with the estimate by Ref.3.1 (7.18 MCM in dry years, 31.51 MCM in wet years and 14.97 MCM in average years), Ref.3.9(10 to 16 MCM) and Ref.3.10 (16.2 MCM).

Of the Jafr basin, the annual groundwater recharge through the riverbed is estimated at 6.7 MCM for B2/A7 aquifers and 2.0 MCM for B4 aquifers.

3.6 Sediment Analysis

Suspended sediment data on Table 3.7 and 3.8 are plotted as shown in Fig. 3.19 and 3.20 respectively to determine a relation between water discharge and suspended sediment discharge, which are given by:

$$Qs = 5.12\ Q^{1.24}$$ for the Hasa river, and

$$Qs = 5.96\ Q^{1.34}$$ for wadi Jurdhan,

where

Qs (kg/day) : Suspended sediment discharge, and

Q (m^3/sec) : Water discharge

The unit weight of suspended sediment is estimated at 1.04 ton/m^3 based on a sieve analysis of samples collected at Ghor Safi of the Hasa river on January 23,1972.

As no in-situ survey related to the estimate of bed load was conducted, the proportion in volume of bed load to suspended load is assumed to be 30 % the same as that assumed in Refs.3.4 and 3.5

The result of sediment analysis is shown on Table 3.22. The ratio of

annual total sediment load (i.e. suspended load plus bed load) to annual total inflow varies from 0.8 % to 1.9 % , which might be comparable with 0.4 % of the Maqarin dam (Ref.3.5), 1.02 % of the King Talal dam and the Wadi Arab dam (Ref.3.7), 4 % of the Kafrein reservoir (Ref.3.1) and 1.4 % of the Sultana reservoir (Ref.3.8).

3.7 Water Quality

A result of water quality test for which sampling was made at Ghor Safi of the Hasa river on March 19, 1973 is shown on Table 3.23, according to which water is ranked as C2 to S1 as water for use of irrigation.

3.8 Dam Planning

3.8.1 Storage dam

A study of wadis in the Jafr basin was made to identify the best construction sites of dams for the purpose of water supply for irrigation use and livestock husbandry, water supply to local people, a phosphate mine in Shidiya and a stone mine in Ma'an, flood protection of local areas, creation of recreation sites and artificial recharge of groundwater (Ref.3.9).

The wadis for which the construction of a dam is proposed are wadi Jurdhan, wadi Abu Safat, the wadi Usheishat, wadi Matkh, the wadi Fassua, wadi Abyad, wadi Uqeiqa and wadi El Jahdaniya. Among these dams, a dam proposed at wadi Jurdhan and wadi Abu Safat is planned to have their catchment increased by diversion of streamflow from nearby small wadis. The main features of the proposed dams are shown in Table 3.24.

3.8.2 Recharge dams

A. General

Altogether eight recharge dams (A-1,A-2,A-3,B-1,B-2,B-3,and C-1,C-2) are

planned to recharge B2/A7 aquifers by infiltration along riverbeds in the western watershed (See Fig. 3.21).

Contour lines of reservoir areas of recharge dams are shown on Fig.3.22 and distribution of geological formations along a longitudinal cross-section of streams around recharge dams are shown on Fig.3.23 while reservoir- volume and reservoir-area curves on Fig. 3.24.

From the result of the hydrogeological survey conducted by JICA team, the B2/A7 aquifers to be recharged by the recharge dams (A-1,A-2,A-3 and B-1,B-2,B-3) are known to be sustained while all wells existing downstream from the planned recharge dams (C-1 and C-2) are known to be nearly dry with low water table and poor in water quality, which improvement is considered far from attainable even by groundwater recharge by the recharge dams (C-1 and C-2). Therefore, the construction of recharge dams (C-1 and C-2) are considered not feasible and are excluded from further study.

B. Affect on localities and a WAJ's existing study of dam

The recharge dams A-3 and B-3 are planned in adjacent upstream catchment areas of reservoirs conceived by an ongoing surface water resources study (Ref.3.9). Hence, flood flows which are spilt from the proposed recharge dams A-3 and B-3 should be designed to be diverted to the catchment areas of the said surface water resources study to raise the catchment capacity of the downstream reservoir projects.

By the construction of recharge dam A-1, agricultural land and roads are to be submerged and by construction of the recharge dam B-2, roads and railway are to be submerged.

As for water requirement in areas to the west to the Al Jafr town, a sufficient amount of surface runoff is considered still available from the basin downstream from the recharge dams A-1, A-2 and A-3 even after construction of these recharge dams,judging from a water balance calculation of long-term average annual runoff (See Fig.3.21) .

C. Dam type

As for type of recharge dams, two kinds of dam type are generally conceivable for the selected recharge dam sites, namely, a concrete gravity dam and a fill dam. Though more detail site investigation has still to be performed before final selection of dam type, the following informations common to all the recharge dam sites will be very helpful in preliminary selection:

1) Bed rock consisting of silicified or marly limestone, chert and phosphate of the B2 Formation has sufficient bearing capacity for construction of a concrete gravity dam of more than 15 m in height.
2) The alluvial wadi deposits covering a part or whole of the proposed recharge dam foundations is up to 5 m thick except for B-2 recharge dam site where a limited part of the wadi beds is covered by alluvial deposits of 5 to 10 m in thickness and cost for excavation of foundations for a concrete gravity dam might be relatively low.
3) Construction materials for a fill dam such as rock and impervious soil are available sufficiently near the proposed recharge dam sites. Construction materials for a concrete gravity dam such as concrete and gravel are also locally available.
4) Generally, unlike a fill dam which requires the firm rock abutment for a spillway. The spillway of a concrete gravity dam can be integrally with the dam body, which may reduce excavation cost.
5) As shown in a Japanese design standard for dams the requirement for freeboard at the crest of a concrete gravity dam is lower by 1 m than that of a fill dam, since a fill dam would be far more sensitive to overtopping than a concrete gravity dam.

E. Reservoir storage capacity

The reservoir storage capacity of the recharge dams (A-1, A-2, A-3 and B-1,B-2,B-3) was determined from the following relations, using calculated inflow discharges for the 23-year period between 1963/64 and 1985/86.

$$S(i) = S(i-1) + Q(i) - R(i) - E(i)$$

and

$$S(i) = SD(i), \text{ if } S(i) < SD(i)$$

$$SW(i) = S(i) - SD(i)$$

where

S(i) : Gross storage volume including sediment at the end of i-th day

S(i-1) : Gross storage volume including sediment at the end of (i-1)th day

SD(i) : Sediment volume at the end of i-th day

SW(i) : Reservoir water volume at the end of i-th day

Q(i) : Inflow at i-th day

R(i) : Infiltration at i-th day estimated by the Wedernikow's formula in Section 3.5.2. Effective infiltration is assumed to be a half of that estimated by the Wedernikow's formula because of reservoir sedimentation.

E(i) : Evaporation at i-th day which is based on evaporation records of the Udruh climatological station.

The required gross storage capacity is determined as the sum of (1) maximum annual inflow excluding sediment (or effective storage capacity) during 23 years and (2) 50-year cumulative sediment volume so that the largest flood between 1963/64 and 1985/86 can be completely retained by the proposed reservoir. Accordingly, the gross storage capacity is estimated as shown on Table 3.25. It might be worth mentioning that the scale of the recharge dams is determined based on 23-year-long streamflow data in which at least two climatic cycles are considered to be reflected on. Generally, a climatic cycle in Jordan is considered as about 10 years, being affected by the activity of sunspots.

On Table 3.25, also shown are such items as catchment area, annual average inflow into reservoir, evaporation from reservoir surface, effective storage capacity,dam height ,dam concrete volume and cost of concrete dam body excluding cost of land acquisition and relocation of road,railroad and house under assumption that dam type is concrete

gravity dam with vertical upstream slope, downstream slope of 1 vertical to 0.8 horizontal and crest width of 10 m.

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TABLES

Table 3.1 Rainfall Gaging Stations (1/2)

Id. No.	Station Name	Palestine Grid		Altitude	Date Established and Type of Gaging			Date Closed
		North	East	(m)	Automatic Recording	Daily Reading	Totalizer	
a. East Side of Dead Sea								
1	CA 0002 Khanzira	51.800	207.300	1,000		9/1945		
2	CA 0005 Al Aina	42.200	224.000	775		10/1967		
3	CA 0006 Muhai	44.500	231.800	1,000		10/1967		
b. Wadi Mujib								
4	CD 0013 Mazar	52.000	216.500	1,140	10/1963	10/1934	12/1962	
5	CD 0033 Jabel Sakhriyat	26.600	274.000	910			10/1968	
c. Wadi Hasa								
6	CF 0003 Jurf Ed-Darawish	11.800	233.000	940	10/1970	1/1938	11/1962	
7	CF 0005 Hasa Police Station	25.800	243.000	825		11/1962	11/1962	
8	CF 0007 Hasa Evapo. Station	30.600	243.600	900	10/1967	10/1967	10/1967	
9	CF 0008 Hasa Gaging Station	41.600	220.400	380	10/1966	10/1968		
d. Wadi Araba								
10	DA 0001 Shaubak School	992.000	202.000	1,300	10/1977	11/1933		
11	DA 0002 Shaubak Agr. Station	991.500	200.500	1,475		10/1962	1/1963	
12	DA 0003 Beir Ed-Dabbaghat	980.000	198.000	1,600		1/1963		
13	DA 0004 Ifjeij	994.000	209.000	1,275		1/1963		
14	DA 0005 Uneiza Railway Station	989.000	226.500	1,050	10/1967	1/1963		
15	DA 0006 Al Husseiniya School	999.400	226.200	1,062				
e. Wadi Feifa								
16	DB 0001 Tafile	27.500	208.000	1,000	10/1965	1/1963	1/1963	
17	DB 0002 Abur (Prince Hassan Nursery)	23.300	218.200	1,220		10/1967		
f. Wadi Khuneizeer								
18	DC 0001 Buseira	17.000	208.000	1,100	10/1973	12/1934		
19	DC 0002 Rashadiya Police Station	12.500	210.000	1,500	10/1973	10/1969	10/1945	
g. Wadi Feedan								
20	DE 0001 Dana	9.500	208.300	1,230	10/1973	9/1945		
h. Wadi Mousa								
21	DG 0001 Wadi Mousa	970.000	196.000	1,100	10/1963	11/1933		
22	DG 0002 Hay	974.000	197.000	1,500		3/1963		
i. Wadi Howar								
23	DH 0001 Taiyiba Janoubiya	963.000	194.000	300		1/1963		
24	DH 0002 Dilagha	949.300	189.000	1,350		2/1963		
j. Wadi Yutum								
25	ED 0002 Ras En-Naqb	935.000	197.000	1,570	10/1963	10/1951		
26	ED 0003 Ram Police Post	887.500	191.000	950		10/1937		
27	ED 0004 Quweira Evap. Station	914.000	181.000	800	10/1963	10/1967	10/1962	
28	ED 0006 Al Khaldy	896.500	172.000	725	10/1963	10/1968	1/1962	
29	ED 0010 Wadi Yutum Gaging Station	880.600	160.300	350	10/1966	10/1964		
30	ED 0012 Ram(Qa' Disi) Evap. Station	896.000	199.800	790	10/1965	10/1965	10/1968	
31	ED 0015 Fassu'a Station	908.500	236.200	1,150			10/1965	

Table 3.1 Rainfall Gaging Stations (2/2)

Id. No.	Station Name	Palestine Grid		Altitude	Date Established and Type of Gaging			Date Closed
		North	East	(m)	Automatic Recording	Daily Reading	Totalizer	
k. Jafr Basin								
32 G 0001	Udruh School	971.200	207.000	1,300		11/1962	10/1945	
33 G 0002	Jafr Police Station	969.000	269.000	900		10/1947		
34 G 0003	Ma'an School	956.500	221.000	1,080	10/1970	10/1934	9/1967	
35 G 0004	Basta	960.300	201.800	1,450		1/1962		
36 G 0005	Sadaqa	952.500	196.500	1,500		1/1963		
37 G 0006	Qurein	945.300	195.000	1,500		3/1963		
38 G 0007	Ma'an Railway Station	954.000	223.000	1,006		10/1963		
39 G 0008	Jafr Evaporation Station	970.000	267.000	900	10/1965	10/1963	9/1968	
40 G 0009	Udruh Evaporation Station	973.600	206.300	1,350	10/1963	10/1967		
41 G 0010	Jurdhan Gaging Station	965.900	221.900	1,082	10/1970	10/1968		10/1973
42 G 0011	Jabel Quzemeh	995.500	284.300	920			9/1967	(Daily
43 G 0012	Qabr Es-Sawwa	984.000	247.000	945			9/1967	Recording)
44 G 0013	Abu Tarafa	935.000	239.000	990			9/1967	
45 G 0014	Inab	932.200	331.400	950			9/1967	
46 G 0015	Kabid	929.500	296.200	870			9/1967	
47 G 0016	Jabel Batra	924.000	210.000	1,300			5/1967	10/1973 (Totalizer)
l. Eastern Desert Basin								
48 J 0001	Bayir Evaporation Station	20.000	310.500	902	10/1965	10/1947		10/1980
49 J 0003	Wadi Bayir	42.400	359.600	650			9/1967	(Daily
50 J 0004	Qa' Es Siq	972.500	365.400	870			9/1967	Recording)
m. Southern Desert Basin								
51 K 0001	Al Mudawwara	859.000	249.000	820	10/1967	10/1934	10/1968	
52 K 0003	Muheish	866.000	234.000	800			5/1967	
53 K 0004	Wadi Dureiba	866.000	215.000	950			5/1967	

Table 3.2 Availability of Daily Rainfall Data (1/50)

Id. No.	Station Name	Year 1963 / 1964											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	x	x	x	x	x	x	x	x	x	x	x	x
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	0	0	-	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	Tr	-	0	0	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	x	x	x	x	x	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	E	E	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	Tr	0	0	0	0	0	0	-	-	-	-	-
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	x	x	x	x	x	x	x	x	x	x	x	x
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	0	0	-	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	0	0	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	-	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	-	-	0	0	0	0	0	x	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	-	-	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	-	0	0	0	-	-	-	-	-	-	-
26	ED 0003 Ram Police Post	0	0	0	0	0	-	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (2/50)

Id. No.			Station Name	Year 1963 / 1964											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	x	0	0	x	x	x	x	x	x	x	x
33	G	0002	Jafr Police Station	0	-	0	0	0	-	0	-	-	-	-	-
34	G	0003	Ma'an School	-	0	0	0	0	0	-	-	-	-	-	-
35	G	0004	Basta	-	-	0	0	0	0	0	-	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	0	0	-	-	-	-	-	-
37	G	0006	Qurein	-	0	0	0	0	0	0	-	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	-	0	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	0	-	0	0	0	-	0	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	0	-	0	0	0	0	0	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	-	-	-	0	-	0	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (3/50)

Id. No.	Station Name	Year 1964 / 1965											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	-	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	x	x	x	x	x	x	x	x	x	x	x	x
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	0	0	-	0	0	-	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	-	-	0	0	-	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	-	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	-	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	E	E	-	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	x	x	0	0	x	0x	0x	x	x	x	x	x
14	DA 0005 Uneiza Railway Station	-	0	0	0	-	0	0	-	-	-	-	-
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	x	x	x	x	x	x	x	x	x	x	x	x
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	x	0	x	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	0	x	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	-	0	0	-	-	-	-	-
22	DG 0002 Hay	-	0	E	x	-	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	-	0	0	-	-	-	-	-
24	DH 0002 Dilagha	-	0	0	x	-	x	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	-	0	E	-	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	0	-	0	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	-	Tr	0	0	-	0	0	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (4/50)

Id. No.	Station Name	Year 1964 / 1965											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	-	0	0	0	0	0	0	-	-	-	-	-
33 G 0002	Jafr Police Station	-	-	0	0	-	0	-	-	-	-	-	-
34 G 0003	Ma'an School	-	0	0	0	-	0	0	-	-	-	-	-
35 G 0004	Basta	-	0	0	X0	-	0	0	-	-	-	-	-
36 G 0005	Sadaqa	-	0	0	0	-	0	0	-	-	-	-	-
37 G 0006	Qurein	-	0	0	0X	-	0	0	-	-	-	-	-
38 G 0007	Ma'an Railway Station	-	Tr	0	0	0	0	0	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	-	0	0	0	-	0	-	-	-	-	-	-
40 G 0009	Udruh Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
41 G 0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	-	-	0	0	-	0	-	-	-	-	-	-
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	-	-	-	0	-	x	x	x	x	x	x	x
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (5/50)

Id. No.	Station Name	Year 1965 / 1966											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	-	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	x	x	x	x	x	x	x	x	x	x	x	x
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	0	0	-	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	0	-	-	0	0	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	0	-	0	0	0	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	x	x	x	x	x	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	-	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	-	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	-	0	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	0	0	0	-	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	0	0	-	0	0	0	-	-	-	-	-	-
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	-	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	x	x	x	x	x	x	x	x	x	x	x	x
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	0	0	-	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	0	0	-	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	-	0	E	E	0	-	-	-	-	-	-
22	DG 0002 Hay	-	-	-	0	0	0	-	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	-	0	0	0	0	-	-	-	-	-	-
24	DH 0002 Dilagha	-	-	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	0	-	-	0	0	0	-	-	-	-	-	-
26	ED 0003 Ram Police Post	-	0	-	0	0	0	-	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	0	0	-	0	0	0	-	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (6/50)

Id. No.			Station Name	Year 1965 / 1966											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	-	-	0	0	E	-	-	-	-	-	-
33	G	0002	Jafr Police Station	0	0	0	0	-	0	-	-	-	-	-	-
34	G	0003	Ma'an School	0	-	-	0	0	0	-	-	-	-	-	-
35	G	0004	Basta	0	0	-	0	0	0	-	-	-	-	-	-
36	G	0005	Sadaqa	-	0	-	0	0	0	-	-	-	-	-	-
37	G	0006	Qurein	-	-	0	0	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	0	-	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	0	0	-	0	0	0	-	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	0	0	0	0	0	0	-	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	Tr	-	-	-	0	-	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (7/50)

Id. No.	Station Name	Year 1966 / 1967											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	-	0	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	x	x	x	x	x	x	x	x	x	x	x	x
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	0	0	-	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	0	0	0	0	0	0	-	0	-	-	-	-
7	CF 0005 Hasa Police Station	0	0	0	0	0	0	-	0	-	-	-	-
8	CF 0007 Hasa Evapo. Station	x	x	x	x	x	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	0	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	0	0	0	0	0	0	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	0	0	0	-	0	-	-	-	-
14	DA 0005 Uneiza Railway Station	E	0	0	0	0	0	-	0	-	-	-	-
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	0	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	x	x	x	x	x	x	x	x	x	x	x	x
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	0	0	-	E	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	0	0	-	E	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	Tr	0	0	0	0	0	-	0	-	-	-	-
22	DG 0002 Hay	0	0	0	0	0	0	-	0	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	0	0	0	0	0	0	0	E	-	-	-	-
24	DH 0002 Dilagha	0	0	0	0	0	0	0	0	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	0	0	0	0	0	0	-	0	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	0	0	0	-	0	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	0	E	E	E	E	-	E	-	-	-	-
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	-	0	0	0	0	0	-	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	0	0	0	-	0	0	-	0	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (8/50)

Id. No.			Station Name	Year 1966 / 1967											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	0	0	0	0	0	0	0	0	-	-	-	-
33	G	0002	Jafr Police Station	0	0	-	-	0	-	-	0	-	-	-	-
34	G	0003	Ma'an School	-	-	0	0	0	0	-	0	-	-	-	-
35	G	0004	Basta	0	0	0	0	0	0	-	0	-	-	-	-
36	G	0005	Sadaqa	0	0	0	0	0	0	0	0	-	-	-	-
37	G	0006	Qurein	0	0	0	0	0	0	0	0	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	0	-	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	0	0	Tr	0	0	0	-	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	0	0	0	0	0	0	-	0	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	-	-	-	-	-	-	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (9/50)

Id. No.	Station Name	Year 1967 / 1968											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	0	0	-	-	-	-
2	CA 0005 Al Aina	0	0	0	0	0	0	0	0	-	-	-	-
3	CA 0006 Muhai	0	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	0	-	0	0	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	0	0	-	0	0	0	0	0	-	-	-	-
7	CF 0005 Hasa Police Station	0	0	0	0	0	-	0	0	-	-	-	-
8	CF 0007 Hasa Evapo. Station	0	0	0	0	0	0	0	0	-	-	-	-
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	0	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	0	0	0	0	0	-	-	-	-
14	DA 0005 Uneiza Railway Station	0	0	0	0	0	0	0	-	-	-	-	-
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	0	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	0	0	0	0	0	0	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	0	0	0	0	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	0	0	0	0	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	0	0	0	0	0	0	-	-	-	-	-	-
22	DG 0002 Hay	0	0	0	0	0	-	0	0	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	0	0	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	0	0	0	0	0	0	0	0	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	0	0	0	0	0	0	0	0	-	-	-	-
26	ED 0003 Ram Police Post	0	-	-	0	0	0	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	0	0	0	0	0	0	0	0	-	-	-	-
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	0	0	-	0	0	0	0	0	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	0	-	-	0	0	0	0	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (10/50)

Id. No.			Station Name	Year 1967 / 1968											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	0	0	0	0	0	0	0	0	-	-	-	-
33	G	0002	Jafr Police Station	0	0	-	-	-	-	-	-	-	-	-	-
34	G	0003	Ma'an School	0	0	-	0E	0	0	0	0	-	-	-	-
35	G	0004	Basta	0	0	0	0	0	0	0	0	-	-	-	-
36	G	0005	Sadaqa	0	0	0	0	0	0	0	0	-	-	-	-
37	G	0006	Qurein	-	0	0	0	0	0	0	0	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	0	0	0	-	-	-	-
39	G	0008	Jafr Evaporation Station	0	0	-	0	0	0	0	0	-	-	-	-
40	G	0009	Udruh Evaporation Station	0	0	0	0	0	0	0	0	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	0	0	-	0	0	0	0	0	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	0	0	-	-	0	0	0	0	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (11/50)

Id. No.	Station Name	Year 1968 / 1969											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	-	0	0	-	-	-	-	-
2	CA 0005 Al Aina	0	0	0	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	-	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	-	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	0	0	0	0	-	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	0	0	0	x	-	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	0	0	0	-	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	0	0	0	0	0	0	0	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	0	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	0	0	-	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	0	-	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	0	0	-	0	-	0	-	-	-	-	-	-
15	DA 0006 Al Husseiniya School	-	0	0	0	-	0	-	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	E	0	0	x	x	x	x	x	x	x	x	x
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	0	0	0	0	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	0	0	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	0	0	0	0	-	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	0	0	0	0	-	0	0	-	-	-	-	-
24	DH 0002 Dilagha	0	0	0	0	0	0	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	-	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	0	-	0	-	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	0	-	0	-	0	0	-	-	-	-	-
28	ED 0006 Al Khaldy	-	0	-	0	-	0	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	-	0	-	0	-	0	0	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	0	0	0	-	0	0	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (12/50)

Id. No.			Station Name	Year 1968 / 1969											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33	G	0002	Jafr Police Station	0	x	x	x	-	-	x	x	x	x	x	x
34	G	0003	Ma'an School	-	0	-	0	-	0	0	-	-	-	-	-
35	G	0004	Basta	0	0	0	0	-	0	0	-	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	-	0	0	-	-	-	-	-
37	G	0006	Qurein	0	0	0	0	-	0	0	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	0	0	0	-	0	0	0	-	-	-	-
39	G	0008	Jafr Evaporation Station	-	0	0	0	-	0	0	0	-	-	-	-
40	G	0009	Udruh Evaporation Station	-	0	0	0	-	0	0	0	-	-	-	-
41	G	0010	Jurdhan Gaging Station	0	0	0	0	-	0	0	-	-	-	-	-
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	-	0	0	0	-	0	-	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	0	-	0	-	0	0	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (13/50)

Id. No.	Station Name	Year 1969 / 1970											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	0	0	-	-	-	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	0	0	-	0	-	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	0	0	-	0	-	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	0	0	0	0	0	0	-	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	x	0	-	0	-	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	0	0	-	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	0	0	-	0	0	0	0	-	-	-	-	-
15	DA 0006 Al Husseiniya School	0	0	-	0	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	-	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	x	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	-	0	-	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	0	-	0	-	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	-	0	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	0	0	-	0	-	0	0	-	-	-	-	-
22	DG 0002 Hay	0	0	-	0	-	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	0	0	-	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	0	0	-	0	-	0	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	x	0	-	0	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	0	-	0	0	-	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	0	-	-	0	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	0	-	-	x0	-	x-	-	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	0	0	-	0	0	0	0	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	0	0	-	0	0	-	-	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (14/50)

Id. No.			Station Name	Year 1969 / 1970											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33	G	0002	Jafr Police Station	0	-	-	0	0	Tr	0	-	-	-	-	-
34	G	0003	Ma'an School	0	0	-	0	0	0	-	-	-	-	-	-
35	G	0004	Basta	0	0	-	0	0	0	0	-	-	-	-	-
36	G	0005	Sadaqa	Tr	0	-	0	0	0	0	-	-	-	-	-
37	G	0006	Qurein	0	0	-	0	0	0	0	-	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	0	Tr	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	0	-	-	0	0	0	0	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	0	0	-	0	0	0	0	-	-	-	-	-
41	G	0010	Jurdhan Gaging Station	0	0	-	0	0	0	0	-	-	-	-	-
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	0	-	-	0	0	0	0	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	0	-	-	0	0	0	-	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (15/50)

Id. No.	Station Name	Year 1970 / 1971											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	0	0	0	0	0	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	-	0	0	-	-	0	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	0	0	0	-	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	-	x	0	0	0	0	0	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	x	0	0	0	-	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	-	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	-	0	0	0x	0	0	0	-	-	-	-	-
15	DA 0006 Al Husseiniya School	-	-	0	0	-	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	-	0	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	-	0	0	0	0	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	-	0	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0	0	-	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	-	0	-	-	-	-	-
24	DH 0002 Dilagha	-	x	-	0	-	0	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	x	x	x	x	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	0	0	0	0	0	0	-	-	-	-	-
28	ED 0006 Al Khaldy	-	-	0	0	0	0	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	-	-	0	0	0	0	0	-	-	-	-	-
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	-	0	0	-	0	0	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (16/50)

Id. No.	Station Name	Year 1970 / 1971											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33 G 0002	Jafr Police Station	-	x	x	x	x	x	x	x	x	x	x	x
34 G 0003	Ma'an School	0	0	0	0	Tr	0	0	-	-	-	-	-
35 G 0004	Basta	-	0	0	0	0	0	0	-	-	-	-	-
36 G 0005	Sadaqa	-	0	0	0	-	-	0	-	-	-	-	-
37 G 0006	Qurein	-	0	0	0	0	0	0	-	-	-	-	-
38 G 0007	Ma'an Railway Station	-	0	0	0	-	0	0	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
40 G 0009	Udruh Evaporation Station	-	0	0	0	-	0	0	-	-	-	-	-
41 G 0010	Jurdhan Gaging Station	-	x	0	0	0	0	0	-	-	-	-	-
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	-	-	0	0	-	-	x	-	-	-	-	-
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	-	-	-	0	-	0	0	-	-	-	-	-
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (17/50)

Id. No.	Station Name	Year 1971 / 1972											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	0	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	0	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	0	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	0	0	0	0	0	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	-	0	Tr	0	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	-	0	-x	0	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	-	0	0	0	0	0	0	0	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	x	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	-	0	0	0	0	0	0	-	-	-	-
14	DA 0005 Uneiza Railway Station	-	-	0	0	0	0	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	-	0	x	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	0	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	x	x	0	0	0	0	0	0	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	-	0	x	x	0	x	x	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	0	x	x	0	x	x	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	x	0	0	0	x	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	-	0	0	0	0	-	-	-	-
22	DG 0002 Hay	-	0	0	-	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	-	0	0	0	0	0	0	-	-	-	-
24	DH 0002 Dilagha	-	0	0x	x	0	0	x	x	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	0	0	0	0	0	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	0	0	0	0	0	0	-	-	-	-	-
28	ED 0006 Al Khaldy	-	0	0	0	0	0	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	0	0	0	0	0	0	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (18/50)

Id. No.	Station Name	Year 1971 / 1972											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33 G 0002	Jafr Police Station	-	-	-	-	0	0	0	-	-	-	-	-
34 G 0003	Ma'an School	-	-	0	0	0	0	0	-	-	-	-	-
35 G 0004	Basta	-	-	0	0	0	0	0	-	-	-	-	-
36 G 0005	Sadaqa	-	0	0x	0	0	0	0	-	-	-	-	-
37 G 0006	Qurein	-	0	0	0	0	0	0	-	-	-	-	-
38 G 0007	Ma'an Railway Station	-	-	0	0	0	0	0	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	-	-	0	0	0	0	0	-	-	-	-	-
40 G 0009	Udruh Evaporation Station	-	-	0	0	0	0	0	0	-	-	-	-
41 G 0010	Jurdhan Gaging Station	-	-	0	0	0	0	0	-	-	-	-	-
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	-	-	0	0	0	0	0	-	-	-	-	-
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (19/50)

Id. No.	Station Name	Year 1972 / 1973											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	-	-	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	0	0	0	0	-	-	-	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	0	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	-	0	-	-	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	0	0	0	-	-	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	0	0	0	-	0	-	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	0	0	0	0	0	0	-	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	-	0	-	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	0	0	-	-	-	-	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	0	0	0	-	0	-	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	-	-	-	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	0	0	0	0	-	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	-	-	-	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	0	0	0	-	0	-	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	-	0	-	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	-	0	-	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0	-	-	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	-	0	-	-	-	-	-	-
24	DH 0002 Dilagha	0	0	0	x-	-	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	-	-	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	0	0	0	-	-	-	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	0	0	0	0	-	-	-	-	-	-	-	-
28	ED 0006 Al Khaldy	-	0	0	0	-	-	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	0	0	-	-	-	-	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (20/50)

Id. No.			Station Name	Year 1972 / 1973											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33	G	0002	Jafr Police Station	-	0	-	-	-	-	0	-	-	-	-	-
34	G	0003	Ma'an School	-	0	0	0	-	-	-	-	-	-	-	-
35	G	0004	Basta	0	0	0	0	-	0	-	-	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	0	0	0	-	-	-	-	-
37	G	0006	Qurein	-	0	0	x-	-	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	0	0	0	-	-	Tr	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	-	0	0	0	-	-	0	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	0	0	0	0	-	0	-	-	-	-	-	-
41	G	0010	Jurdhan Gaging Station	-	0	0	0	-	-	-	-	-	-	-	-
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	0	0	0	-	-	-	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (21/50)

Id. No.	Station Name	Year 1973 / 1974											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0x	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Nazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	0	0	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	0	-	0	0	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	0	0	0	0	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	-	0	0	0	0	0	0	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	x	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	0	0	0	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	0	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	0	0	0x	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	0	0	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0x	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	-	0	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	0	0	0	0	0	0	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	0	0	0	0	0	0	-	-	-	-	-
28	ED 0006 Al Khaldy	-	0	0	0	0	0	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	0	0	0	0	0	0	-	-	-	-	-
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (22/50)

Id. No.			Station Name	Year 1973 / 1974											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	0	0	0	0	0	0	-	-	-	-	-
33	G	0002	Jafr Police Station	-	-	-	0	0	0	0	-	-	-	-	-
34	G	0003	Ma'an School	-	0	0	0	0	0	0	-	-	-	-	-
35	G	0004	Basta	0	0	0	0	0	0	0	-	-	-	-	-
36	G	0005	Sadaqa	-	x	0	x	0	0	0	-	-	-	-	-
37	G	0006	Qurein	-	0	0	0	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	0	0	0	0	0	0	0	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	-	-	-	0	0	0	0	-	-	-	-	-
40	G	0009	Udruh Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	-	0	-	0	0	0	-	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	0	-	0	0	0	-	-	-	-	-	-
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (23/50)

Id. No.	Station Name	Year 1974 / 1975											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	-	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	0	0	-	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	0	0	0	0	-	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	0	0	0	0	0	-	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	-	0	0	0	0	0	-	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	0	0	0	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	-	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	0	0	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	0	0	-	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	-	-	-	-	-	-
24	DH 0002 Dilagha	-	0	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	x	x	x	x	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	x	x	0	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	-	0	x	x	x	x	-	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	0	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (24/50)

Id. No.	Station Name	Year 1974 / 1975											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	-	0	0	0	0	0	0	-	-	-	-	-
33 G 0002	Jafr Police Station	-	0	0	0	0	-	0	-	-	-	-	-
34 G 0003	Ma'an School	-	0	0	0	0	-	0	-	-	-	-	-
35 G 0004	Basta	-	0	0	0	0	0	0	-	-	-	-	-
36 G 0005	Sadaqa	-	0	0	0	0	0	0	-	-	-	-	-
37 G 0006	Qurein	-	0	0	0	0	0	0	-	-	-	-	-
38 G 0007	Ma'an Railway Station	-	0	0	0	0	-	0	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
40 G 0009	Udruh Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
41 G 0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	-	0	0	0	0	-	0	-	-	-	-	-
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	-	0	0	0	0	-	0	-	-	-	-	-
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (25/50)

Id. No.	Station Name	Year 1975 / 1976											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	0	-	-	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	-	-	0	-	0	0	-	-	-	-	-	-
8	CF 0007 Hasa Evapo. Station	-	-	0	-	0	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	-	-	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	-	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	-	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	-	0	0	0	0	-	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	0	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	0	0	0	0	0	0	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	x	x	x	x	x	x	x	x	x	x	x
g. Wadi Feedan													
20	DE 0001 Dana	-	-	0	0	0	0	-	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	0	-	0	-	-	-	-
22	DG 0002 Hay	-	-	0	0	0	0	-	0	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	-	0	-	-	-	-
24	DH 0002 Dilagha	-	0	0	0	0	0	-	0	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	-	0	-	-	-	-
26	ED 0003 Ram Police Post	-	-	0	-	-	0	0	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	-	0	0	-	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	-	-	0	-	-	0	-	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (26/50)

Id. No.			Station Name	Year 1975 / 1976											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	-	0	0	0	0	-	-	-	-	-	-
33	G	0002	Jafr Police Station	-	-	0	-	-	0	-	0	-	-	-	-
34	G	0003	Ma'an School	-	-	0	-	-	0	-	0	-	-	-	-
35	G	0004	Basta	-	0	0	0	0	0	-	0	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	0	0	-	0	-	-	-	-
37	G	0006	Qurein	-	-	0	0	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	-	0	0	0	0	-	0	-	-	-	-
39	G	0008	Jafr Evaporation Station	-	-	0	-	0	0	-	0	-	-	-	-
40	G	0009	Udruh Evaporation Station	-	-	0	0	0	0	-	-	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	-	-	0	0	0	0	-	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	-	-	0	x	x	x	x	x	x	x	x	x
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (27/50)

Id. No.	Station Name	Year 1976 / 1977											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	-	0	0	0	0	-	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	0	-	-	0	0	-	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	0	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	-	E	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	0	0	0	x	x	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	0	0	0	0	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	0	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	-	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	0	0	-	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	x	x	x	x	x	x	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	-	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	0	0	0	0	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	0	0	-	0	0	0	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	-	-	E	0	0	0	-	-	-	-	-
26	ED 0003 Ram Police Post	x	x	x	x	x	x	x	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	-	-	x	x	x	x	x	x	x	x	x
28	ED 0006 Al Khaldy	-	-	-	0	-	0	0	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (28/50)

Id. No.	Station Name	Year 1976 / 1977											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	0	0	0	0	0	0	0	-	-	-	-	-
33 G 0002	Jafr Police Station	-	-	-	0	-	-	0	-	-	-	-	-
34 G 0003	Ma'an School	-	-	-	0	0	0	0	-	-	-	-	-
35 G 0004	Basta	-	-	0	0	0	-	0	-	-	-	-	-
36 G 0005	Sadaqa	0	-	-	0	0	0	0	-	-	-	-	-
37 G 0006	Qurein	-	x	-	E	0	0	0	-	-	-	-	-
38 G 0007	Ma'an Railway Station	0	-	-	0	0	0	0	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40 G 0009	Udruh Evaporation Station	0	0	0	0	0	0	0	-	-	-	-	-
41 G 0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	-	-	-	0	-	0	0	-	-	-	-	-
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (29/50)

Id. No.	Station Name	Year 1977 / 1978											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	-	0	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	-	-	0	0	0	0	0	-	-	-	-	-
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	-	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	0	0	0	0	-	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	-	-	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	0	0	0	-	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	0	0	-	0	0	0	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	0	0	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	0	0	0	0	-	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	0	-	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0	0	0	-	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	0	0	0	0	0	-	-	-	-	-	-
24	DH 0002 Dilagha	-	0	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	0	0	0	0	0	-	-	-	-	-	-
26	ED 0003 Ram Police Post	x	x	x	x	x	x	x	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	-	0	0	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	-	-	0	-	0	0	-	-	-	-	-	-
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (30/50)

Id. No.			Station Name	Year 1977 / 1978											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	0	0	0	0	0	-	-	-	-	-	-
33	G	0002	Jafr Police Station	-	0	0	0	0	0	-	-	-	-	-	-
34	G	0003	Ma'an School	-	-	0	0	0	0	-	-	-	-	-	-
35	G	0004	Basta	-	0	0	0	0	0	-	-	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	0	0	-	-	-	-	-	-
37	G	0006	Qurein	-	0	0	0	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	-	0	0	0	0	-	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40	G	0009	Udruh Evaporation Station	-	0	0	0	0	0	-	-	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	-	-	-	0	0	0	-	-	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (31/50)

Id. No.	Station Name	Year 1978 / 1979											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	-	0	0	0	0	-	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	-	0	0	0	0	-	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	-	0	0	0	0	-	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	-	0	0	0	0	-	0	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	-	-	-	0	0	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	-	0	0	0	0	0	-	0	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	-	0	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	-	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	-	0	E	0	0	-	0	-	-	-	-
13	DA 0004 Ifjeij	-	-	0	0	0	0	-	0	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	-	-	0	0	0	-	0	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	-	-	0	0	0	0	-	0	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	-	0	0	0	0	-	0	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	-	-	0	E	0	0	-	0	-	-	-	-
19	DC 0002 Rashadiya Police Station	-	-	0	0	0	0	-	0	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	-	0	E	0	E	-	0	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	-	0	E	0	0	-	0	-	-	-	-
22	DG 0002 Hay	-	-	0	E	0	0	-	0	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	-	0	E	0	0	-	Tr	-	-	-	-
24	DH 0002 Dilagha	-	-	0	E	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	-	0	0	0	0	-	-	-	-	-	-
26	ED 0003 Ram Police Post	-	-	-	0	-	0	-	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	-	x	x	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	-	-	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	-	-	x	x	0	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (32/50)

Id. No.			Station Name	Year 1978 / 1979											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	-	0	0	0	0	0	-	0	-	-	-	-
33	G	0002	Jafr Police Station	-	-	0	-	0	0	-	0	-	-	-	-
34	G	0003	Ma'an School	-	-	0	-	0	0	-	-	-	-	-	-
35	G	0004	Basta	-	-	0	0	0	0	-	0	-	-	-	-
36	G	0005	Sadaqa	-	-	0	0	0	0	-	0	-	-	-	-
37	G	0006	Qurein	-	-	0	E	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	-	0	-	0	0	-	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40	G	0009	Udruh Evaporation Station	-	0	0	0	0	0	-	0	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	-	-	-	0	0	0	-	0	-	-	-	-
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (33/50)

Id. No.	Station Name	Year 1979 / 1980											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	0	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	0	0	0	0	0	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	0	0	0	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	x	x	x	x	x	0	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	0	0	0	0	0	0	0	-	-	-	-	-
d. Wadi Araba													
10	DA 0001 Shaubak School	0	0	0	0	0	0	0	0	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	0	0	0	0	0	0	0	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	0	0	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	0	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	0	0	0	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	0	0	0	0	0	0	-	0	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	0	0	0	0	0	0	-	-	-	-	-	-
22	DG 0002 Hay	-	0	0	0	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	0	0	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	-	0	0	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	-	0	0	0	0	-	-	-	-	-	-
26	ED 0003 Ram Police Post	0	0	0	0	0	0	-	-	-	-	-	-
27	ED 0004 Quweira Evap. Station	-	-	0	x	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (34/50)

Id. No.	Station Name	Year 1979 / 1980											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	-	0	0	0	0	0	0	-	-	-	-	-
33 G 0002	Jafr Police Station	-	0	0	0	0	0	0	-	-	-	-	-
34 G 0003	Ma'an School	0	-	0	0	0	0	0	-	-	-	-	-
35 G 0004	Basta	x	0	0	0	0	0	0	-	-	-	-	-
36 G 0005	Sadaqa	x	x	x	x	x	x	x	x	x	x	x	x
37 G 0006	Qurein	0	0	0	0	0	0	-	-	-	-	-	-
38 G 0007	Ma'an Railway Station	0	0	0	0	0	0	-	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40 G 0009	Udruh Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
41 G 0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	-	0	0	0	0	0	0	-	-	-	-	-
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (35/50)

Id. No.	Station Name	Year 1980 / 1981											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	0	0	0	0	0	0	-	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	-	-	0	0	0	-	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	0	-	0	0	0	0	0	-	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	-	0	0	0	-	-	-	-	-	-	-	-
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	0	0	0	x	x	x	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	0	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	0	-	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	0	-	0	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	0	0	0	0	0	0	0	-	-	-	-	-
13	DA 0004 Ifjeij	0	-	0	0	0	0	0	-	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	-	0	0	0	0	0	-	-	-	-	-	-
e. Wadi Feifa													
16	DB 0001 Tafile	0	0	0	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	0	-	0	0	0	0	0	-	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	0	-	0	0	0	0	0	-	-	-	-	-
19	DC 0002 Rashadiya Police Station	0	-	0	0	0	0	0	-	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	0	-	0	0	0	0	0	-	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	-	0	0	0	0	0	-	-	-	-	-
22	DG 0002 Hay	-	-	0	0	0	0	0	-	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	-	0	0	0	0	0	-	-	-	-	-
24	DH 0002 Dilagha	0	0	0	0	x	x	0	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	x	x	0	x	x	x	x	x	x	x	x	x
26	ED 0003 Ram Police Post	x	x	x	x	x	x	x	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	-	-	-	0	0	-	-	-	-	-	-
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (36/50)

Id. No.	Station Name	Year 1980 / 1981											
		10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin													
32 G 0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33 G 0002	Jafr Police Station	x	x	x	x	x	x	x	x	x	x	x	x
34 G 0003	Ma'an School	0	-	0	0	-	0	-	-	-	-	-	-
35 G 0004	Basta	0	x	x	x	x	x	x	x	x	x	x	x
36 G 0005	Sadaqa	0	-	0	0	0	0	0	-	-	-	-	-
37 G 0006	Qurein	x	x	x	x	x	x	x	x	x	x	x	x
38 G 0007	Ma'an Railway Station	0	-	0	0	-	0	-	-	-	-	-	-
39 G 0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40 G 0009	Udruh Evaporation Station	-	-	0	0	0	0	-	-	-	-	-	-
41 G 0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42 G 0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43 G 0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44 G 0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45 G 0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46 G 0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47 G 0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin													
48 J 0001	Bayir Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
49 J 0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50 J 0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin													
51 K 0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52 K 0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53 K 0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (37/50)

Id. No.	Station Name	Year 1981 / 1982											
		10	11	12	1	2	3	4	5	6	7	8	9
a. East Side of Dead Sea													
1	CA 0002 Khanzira	-	0	0	0	0	0	-	-	-	-	-	-
2	CA 0005 Al Aina	x	x	x	x	x	x	x	x	x	x	x	x
3	CA 0006 Muhai	-	0	-	0	0	0	-	-	-	-	-	-
b. Wadi Mujib													
4	CD 0013 Mazar	-	0	-	0	E	E	-	0	-	-	-	-
5	CD 0033 Jabel Sakhriyat	x	x	x	x	x	x	x	x	x	x	x	x
c. Wadi Hasa													
6	CF 0003 Jurf Ed-Darawish	x	x	x	x	x	x	x	x	x	x	x	x
7	CF 0005 Hasa Police Station	x	x	x	x	x	x	x	x	x	x	x	x
8	CF 0007 Hasa Evapo. Station	-	0	x	0	0	0	x	x	x	x	x	x
9	CF 0008 Hasa Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
d. Wadi Araba													
10	DA 0001 Shaubak School	-	0	0	0	0	0	0	-	-	-	-	-
11	DA 0002 Shaubak Agr. Station	-	0	-	0	0	0	0	-	-	-	-	-
12	DA 0003 Beir Ed-Dabbaghat	-	0	0	0	0	0	-	0	-	-	-	-
13	DA 0004 Ifjeij	-	0	0	0	0	0	0	0	-	-	-	-
14	DA 0005 Uneiza Railway Station	x	x	x	x	x	x	x	x	x	x	x	x
15	DA 0006 Al Husseiniya School	x	x	x	x	x	x	x	x	x	x	x	x
e. Wadi Feifa													
16	DB 0001 Tafile	-	0	-	0	0	0	0	-	-	-	-	-
17	DB 0002 Abur (Prince Hassan Nursery)	-	0	-	0	0	0	0	0	-	-	-	-
f. Wadi Khuneizeer													
18	DC 0001 Buseira	x	x	x	x	0	0	0	0	-	-	-	-
19	DC 0002 Rashadiya Police Station	x	0	x	0	x	x	x	0	-	-	-	-
g. Wadi Feedan													
20	DE 0001 Dana	-	0	-	0	0	0	-	0	-	-	-	-
h. Wadi Mousa													
21	DG 0001 Wadi Mousa	-	0	0	0	0	0	0	0	-	-	-	-
22	DG 0002 Hay	-	-	0	E	0	0	-	0	-	-	-	-
i. Wadi Howar													
23	DH 0001 Taiyiba Janoubiya	-	-	-	0	0	0	-	-	-	-	-	-
24	DH 0002 Dilagha	-	-	-	0	0	0	-	-	-	-	-	-
j. Wadi Yutum													
25	ED 0002 Ras En-Naqb	-	-	-	0	0	0	-	0	-	-	-	-
26	ED 0003 Ram Police Post	x	x	x	x	x	x	x	x	x	x	x	x
27	ED 0004 Quweira Evap. Station	-	-	-	0	0	x	x	x	x	x	x	x
28	ED 0006 Al Khaldy	x	x	x	x	x	x	x	x	x	x	x	x
29	ED 0010 Wadi Yutum Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
30	ED 0012 Ram(Qa' Disi) Evap. Station	x	x	x	x	x	x	x	x	x	x	x	x
31	ED 0015 Fassu'a Station	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm

Table 3.2 Availability of Daily Rainfall Data (38/50)

Id. No.			Station Name	Year 1981 / 1982											
				10	11	12	1	2	3	4	5	6	7	8	9
k. Jafr Basin															
32	G	0001	Udruh School	x	x	x	x	x	x	x	x	x	x	x	x
33	G	0002	Jafr Police Station	x	x	x	x	x	x	x	x	x	x	x	x
34	G	0003	Ma'an School	-	-	0	0	0	0	0	0	-	-	-	-
35	G	0004	Basta	-	-	-	0	0	0	-	-	-	-	-	-
36	G	0005	Sadaqa	-	0	0	0	0	0	-	0	-	-	-	-
37	G	0006	Qurein	-	0	0	0	0	0	-	-	-	-	-	-
38	G	0007	Ma'an Railway Station	-	0	0	0	0	0	-	-	-	-	-	-
39	G	0008	Jafr Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
40	G	0009	Udruh Evaporation Station	-	0	-	0	0	0	0	0	-	-	-	-
41	G	0010	Jurdhan Gaging Station	x	x	x	x	x	x	x	x	x	x	x	x
42	G	0011	Jabel Quzemeh	x	x	x	x	x	x	x	x	x	x	x	x
43	G	0012	Qabr Es-Sawwa	x	x	x	x	x	x	x	x	x	x	x	x
44	G	0013	Abu Tarafa	x	x	x	x	x	x	x	x	x	x	x	x
45	G	0014	Inab	x	x	x	x	x	x	x	x	x	x	x	x
46	G	0015	Kabid	x	x	x	x	x	x	x	x	x	x	x	x
47	G	0016	Jabel Batra	x	x	x	x	x	x	x	x	x	x	x	x
l. Eastern Desert Basin															
48	J	0001	Bayir Evaporation Station	x	x	x	x	x	x	x	x	x	x	x	x
49	J	0003	Wadi Bayir	x	x	x	x	x	x	x	x	x	x	x	x
50	J	0004	Qa' Es Siq	x	x	x	x	x	x	x	x	x	x	x	x
m. Southern Desert Basin															
51	K	0001	Al Mudawwara	x	x	x	x	x	x	x	x	x	x	x	x
52	K	0003	Muheish	x	x	x	x	x	x	x	x	x	x	x	x
53	K	0004	Wadi Dureiba	x	x	x	x	x	x	x	x	x	x	x	x

Note 0 : Record available - : No rainfall x : No record E : Estimated
Tr : Less than 0.1 mm