

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NORTH SINAI DEVELOPMENT ORGANIZATION
MINISTRY OF WATER RESOURCES AND IRRIGATION
THE ARAB REPUBLIC OF EGYPT

THE NORTH SINAI INTEGRATED RURAL DEVELOPMENT PROJECT
(PHASE III)

(DETAILED DESIGN STUDY)

VOLUME I : MAIN REPORT

(VOL. I-3 : DETAILED DESIGN REPORTS)

OCTOBER, 2000

SANYU CONSULTANTS INC.
PACIFIC CONSULTANTS INTERNATIONAL

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PREFACE

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct the detailed design study on the North Sinai Integrated Rural Development Project (Phase III) and entrusted the study to Japan International Development Agency (JICA).

JICA dispatched to the Arab Republic of Egypt a study team headed by Mr. Satoshi Kadowaki of Sanyu Consultants Inc., three times between February 1999 and August 2000.

The team held discussions with the officials concerned of the Government of the Arab Republic of Egypt, and conducted detailed field survey for the main water conveyance systems. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to successful implementation of the project and to the enhancement of friendly relation between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the study team.

October 2000



Kunihiko SAITO

President

Japan International Cooperation Agency

October 2000

Mr. Kunihiko SAITO
President
Japan International Cooperation Agency (JICA)
Tokyo, Japan

Letter of Transmittal

Dear Sir

We are pleased to submit the Final Report for the Detailed Design Study on the North Sinai Integrated Rural Development Project (Phase III). The Report, which contains the Basic Design including stage development plan of the project, Detailed Design and Tender Documents of Water Conveyance Facilities, is compiled reflecting the advises and suggestions for the study by your Agency and Ministries concerned of the Government of Japan as well as the comments and decisions made by the Project Steering Committee and the Project Management Committee of the Egyptian side.

In order to realize expansion of employment opportunities and stabilization of food supply, the Government of Egypt is executing new farm land development of the 400,000 feddans (approx. 168,000ha) area with high priority in the North Sinai Area.


The beneficiary area with 135,000 feddans of the Study is located at north-eastern corner of the North Sinai Area. Main subjects of the Study are the detailed design and preparation of tender documents for the water conveyance canal systems of 46 km length from the point 86.5 KM. The Government of Egypt decided to implement the project dividing into two development stages i.e., Stage I area covering 85,000 feddans under geographic elevation below 90 m by the governmental initiatives and Stage II area of 50,000 feddans between 90 m and 110 m elevation by the private sector, respectively. The scope of the Study through the consultation between both Governments, was finally decided to conduct detailed design and prepare tender documents for the conveyance canal systems of the Stage I sub-project.

The Detailed Design Study consisting of preparation of two stage development plan, basic design and detailed design of the related water conveyance systems and tender documentation (one international tender and three local tenders) was conducted

through fruitful discussions between MWR & I, NSDO and the study team.

Finally, we would like to take this opportunity to express our sincere thanks to the officials concerned of Ministry of Water Resources and Irrigation of the Government of Arab Republic of Egypt, Ministry of Foreign Affairs, Ministry of Agriculture, Forestry and Fisheries of the Government of Japan and the Japan International Cooperation Agency, especially the Advisory Committee of JICA which gave us valuable and useful advices and suggestions as well as close cooperation to the study team.

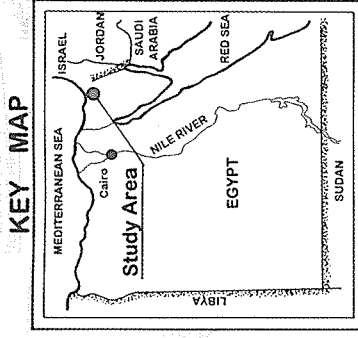
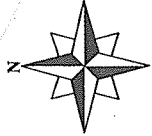
Respectfully yours,



Satoshi Kadowaki

Team Leader of the Study Team

**THE NORTH SINAI
INTEGRATED RURAL DEVELOPMENT PROJECT
(PHASE III)
(DETAILED DESIGN STUDY)
LOCATION MAP**

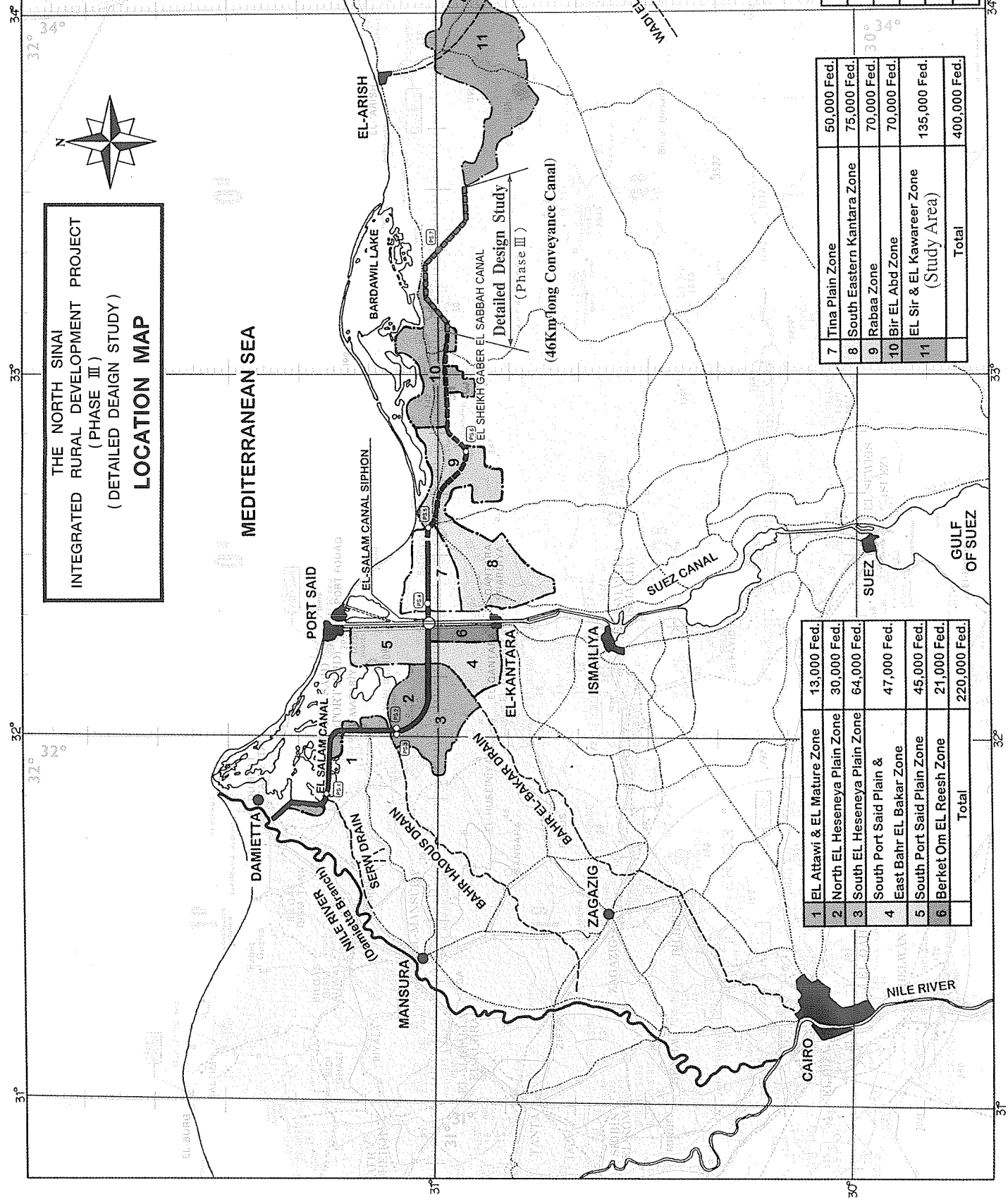
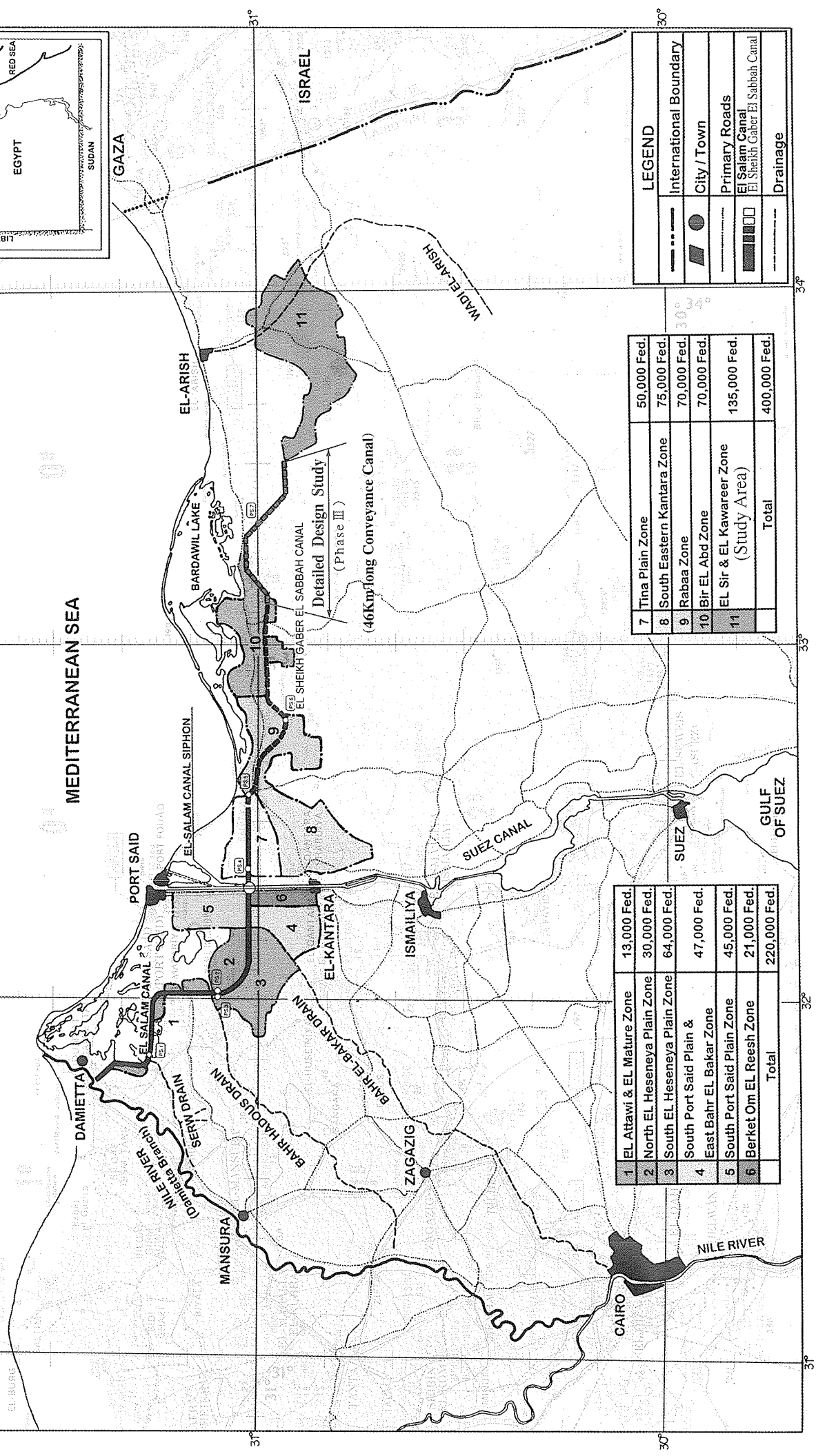


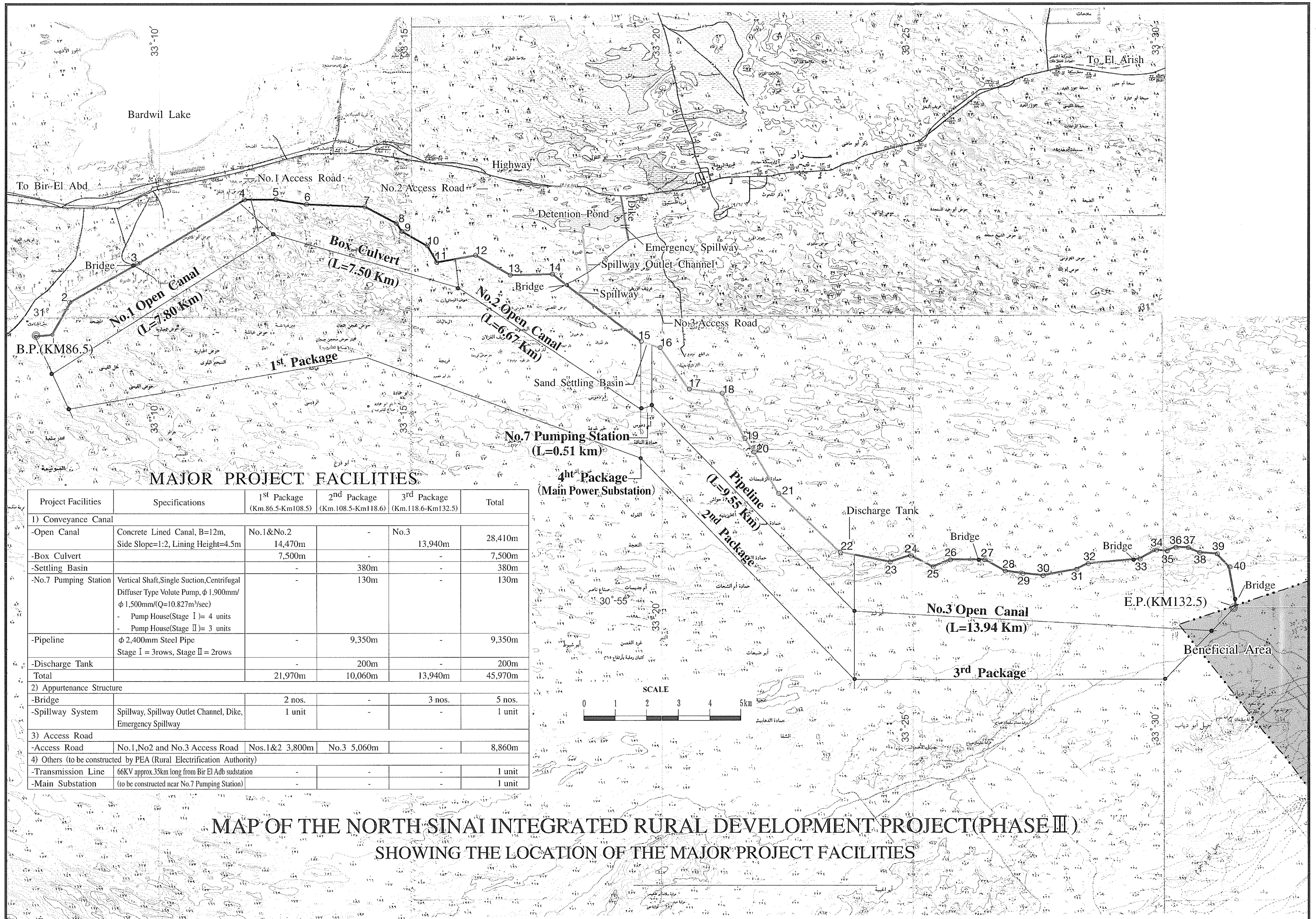
LEGEND

	International Boundary
	City / Town
	Primary Roads
	El Salam Canal
	El Sheikh Gaber El Sabbah Canal
	Drainage

7	Tina Plain Zone	50,000 Fed.
8	South Eastern Kantara Zone	75,000 Fed.
9	Rabaa Zone	70,000 Fed.
10	Bir EL Abd Zone	70,000 Fed.
11	EL Sir & EL Kawareer Zone (Study Area)	135,000 Fed.
Total		400,000 Fed.

1	EL Attawi & EL Mature Zone	13,000 Fed.
2	North EL Heseneya Plain Zone	30,000 Fed.
3	South EL Heseneya Plain Zone	64,000 Fed.
4	South Port Said Plain & East Bahr EL Bakar Zone	47,000 Fed.
5	South Port Said Plain Zone	45,000 Fed.
6	Berket Om EL Reesh Zone	21,000 Fed.
Total		220,000 Fed.





MAJOR PROJECT FACILITIES

Project Facilities	Specifications	1 st Package (Km.86.5-Km108.5)	2 nd Package (Km.108.5-Km118.6)	3 rd Package (Km.118.6-Km132.5)	Total
1) Conveyance Canal					
-Open Canal	Concrete Lined Canal, B=12m, Side Slope=1:2, Lining Height=4.5m	No.1&No.2 14,470m	-	No.3 13,940m	28,410m
-Box Culvert		7,500m	-	-	7,500m
-Settling Basin		-	380m	-	380m
-No.7 Pumping Station	Vertical Shaft, Single Suction, Centrifugal Diffuser Type Volute Pump, ϕ 1.900mm/ ϕ 1.500mm(Q=10.827m ³ /sec) - Pump House(Stage I) = 4 units - Pump House(Stage II) = 3 units	-	130m	-	130m
-Pipeline	ϕ 2,400mm Steel Pipe Stage I = 3rows, Stage II = 2rows	-	9,350m	-	9,350m
-Discharge Tank		-	200m	-	200m
Total		21,970m	10,060m	13,940m	45,970m
2) Appurtenance Structure					
-Bridge		2 nos.	-	3 nos.	5 nos.
-Spillway System	Spillway, Spillway Outlet Channel, Dike, Emergency Spillway	1 unit	-	-	1 unit
3) Access Road					
-Access Road	No.1, No.2 and No.3 Access Road	Nos.1&2 3,800m	No.3 5,060m	-	8,860m
4) Others (to be constructed by PEA (Rural Electrification Authority))					
-Transmission Line	66KV approx. 35km long from Bir El Adb substation	-	-	-	1 unit
-Main Substation	(to be constructed near No.7 Pumping Station)	-	-	-	1 unit

**MAP OF THE NORTH SINAI INTEGRATED RURAL DEVELOPMENT PROJECT(PHASE III)
SHOWING THE LOCATION OF THE MAJOR PROJECT FACILITIES**

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	Pipeline (AP)	AP-01 ~ AP-06	6
El Salaam No.7 Pump Station (B)	Civil Works (BC)	BC-01 ~ BC-13	13
	Buildings (BB)	BB-01 ~ BB-14	14
	Electrical Equipment (BE)	BE-01 ~ BE-06	6
Access Road (C)	Access Road (CR)	CR-01 ~ CR-03	3
Power Supply (D)	Substation (DS)	DS-01 ~ DS-16	16
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Contents of the Report

The Detailed Design Study on the North Sinai Integrated Rural Development Project (Phase III) has been conducted by the JICA (Japan International Cooperation Agency) Study Team in accordance with the Scope of Works, which was concluded between the Government of Egypt and the Government of Japan on 4th August 1998,.

The summarized scope of works is as follows;

- First phase : Basic Design (From February 1999 to September 1999)
- Second phase : Detailed Design (From October 1999 to March 2000)
- Third phase : Tender Documentation (From April 2000 to September 2000)

In the course of the first stage (Basic Design) study, the Government of Egypt has asked the Japanese side to modify the Project Development Plan to the effect that the Plan was divided into two stages of the El Sir & El Kawareer beneficial areas. The revised development plan is described below ;

- First stage development area : Gross irrigation area of 80,000 feddans below the elevation 90 m above mean sea level in the Project area
- Second stage development area : Gross irrigation area of 55,000 feddans between the elevation 90 m and 110 m above mean sea level in the Project area

Following the above, the JICA study works were conducted for full-scale basic design and detailed design and tender documentation for only the first stage development area. The tender documents were further divided into four (4) packages as follows ;

- Package 1 : Conveyance canal and appurtenant structures between KM86.50 and KM 108.47 including two routes of access road
- Package 2 : El Salaam No.7 Pumping Station and appurtenant structures and delivery pressured pipelines between KM 108.47 and KM 118.56 including one route of access road
- Package 3 : Conveyance canal and appurtenant structures between KM 118.56 and KM 132.50
- Package 4 : Main Power Substation for El Salaam No.7 Pumping Station

The reports presented by JICA consist of the following volumes.

(1) Volume I : Main Report

- Vol. I-1 : Basic Design Reports
- Vol. I-2 : Basic Design Drawings
- Vol. I-3 : Detailed Design Reports

- (2) Volume II : Tender Documents of Package 1
 - Vol. II-1 : Invitation for Tender, Conditions of Contract, Technical Specifications and Bill of Quantities
 - Vol. II-2 : Tender Drawings (A3: 150 sheets)
- (3) Volume III : Tender Documents of Package 2
 - Vol. III-1 : Pre-Qualification Documents
 - Vol. III-2 : Invitation for Tender, Instructions to Tenders and Conditions of Contract
 - Vol. III-3 : Technical Specifications and Schedule of Technical Data
 - Vol. III-4 : Bill of Quantities
 - Vol. III-5 : Tender Drawings (A1 211 sheets)
 - Vol. III-6 : Tender Drawings (A3 211 sheets)
- (4) Volume IV : Tender Documents of Package 3
 - Vol. IV-1 : Invitation for Tender, Conditions of Contract, Technical Specifications and Bill of Quantities
 - Vol. IV-2 : Tender Drawings (A3: 48 sheets)
- (5) Volume V : Tender Documents of Package 4
 - Vol. V-1: Instruction to Tender, Conditions of Contract, Bill of Quantities and Technical Specifications
 - Vol. V-2: Tender Drawings (A3: 39 sheets)
- (6) Volume VI : Construction Planning Report
- (7) Volume VII : Operation and Maintenance Report
- (8) Volume VIII : Cost Estimates Report
- (9) Volume IX : Project Implementation Report
- (10) Original Tender Drawings (A1: 448 sheets)

In connection with the use of the above mentioned reports, NSDO shall refer to the concepts of the basic design reports for detailed design of Stage II main facilities i.e., El Salaam No. 7 Pumping Station, Delivery Pressured Pipelines and Main Power Station.

Summarized contents of main reports are incorporated at the front page of respective sub-volumes.

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ABBREVIATION AND UNIT

1. Abbreviations :

ASTM:	American Society for Testing and Materials
AWWA:	American Water Works Association
BM:	Bench Marks
BP:	Beginning Points
DCIP:	Ductile Cast Iron Pipe
EC:	Electrical Conductance
EEA:	Egyptian Electrical Authority
EI:	Environmental Impact Assessment
EIRR:	Economic Internal Rate of Return
EP:	End Points
FRP:	Fiberglass Reinforced Plastic Mortar Pipe
FWSL:	Full Water Supply Level
GIA:	Gross Irrigation Area
GOE:	Government of Egypt
IEC:	International Electrical Commission
IEE:	Institution of Electrical Engineers
IP:	Intersection Points
ISO:	International Standardization Organization
JICA:	Japan International Cooperation Agency
JIS:	Japan Industrial Standard
KM:	Kilo Meter
MCC:	Motor Control Center
MCM:	Million Cubic Meter
MED:	Mechanical and Electrical Department under MWRI
MOAFFJ:	Ministry of Agriculture, Forestry and Fisheries of Japan
MOCJ:	Ministry of Construction of Japan
MSL:	Mean Sea Level
MVA:	Mega Volt Ampere
MW:	Mega Watt
MWRI:	Ministry of Water Resources and Irrigation
NSDO:	North Sinai Development Organization
O/M, O&M:	Operation and Maintenance
P.S.:	Pumping Station
PCCP:	Prestressed Concrete Cylinder Pipe
PMC:	Project Management Committee
PPD:	Project Preparation Department under MWRI
PSC:	Project Steering Committee
PVC:	Unplasticized Polyvinyl Chloride Pipe
REA:	Rural Electrification Authority
RTD:	Resistance Temperature Detector
SP:	Steel Pipe

TDS:	Total Dissolved Solid
USCS:	Unified Soil Classification System
VVVF:	Variable Voltage Variable Frequency

2. Unit :

°C :	degree centigrade
%:	percent
cm:	centimeter
cm/s:	centimeter per second
Fed.:	Feddans
ha:	hectare
hp:	horsepower
hr:	hour
kg:	kilogram
kg/cm ² :	kilogram per square centimeter
km:	kilometer
km/hr:	kilometer per hour
km ² :	square kilometer
kV:	kilovolt
kW :	kilowatt
LE:	Egyptian Pounds
m:	meter
m/sec:	meter per second
m ² :	square meter
m ³ :	cubic meter
m ³ /day:	cubic meter per day
m ³ /hr:	cubic meter per hour
m ³ /sec:	cubic meter per second
m ³ /year:	cubic meter per year
MCM:	million cubic meter
mg/l:	Milligram per liter
m:	millimeter
MSL:	mean sea level
MW:	mega-watt
Nos:	numbers
pH:	poetical of hydrogen
ppm:	parts per million
sec:	second
US\$:	US Doll