

**JICA Preparatory Survey  
On  
Greater Cairo Metro Line No.4  
In  
the Arab Republic of Egypt**

**FINAL REPORT**

**Volume 3  
(Feasibility Study Report 3/4)**

**2 of 2**

**JUNE 2010**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**NIPPON KOEI CO., LTD.  
JAPAN RAILWAY TECHNICAL SERVICE  
NIPPON CIVIC CONSULTING ENGINEERS CO., LTD**

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<b>10-125</b>

**Ministry of Transport,  
National Authority for Tunnels  
The Arab Republic of Egypt**

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## **CONTENTS OF FINAL REPORT**

**Volume 1 : Feasibility Study Report 1**

*Data Collection, Diagnosis of the Existing Public Transport System  
and Urban Development Hypothesis*

**Volume 2 : Feasibility Study Report 2**

*New Transportation Study, Data Analysis and Alternative Corridors  
for Greater Cairo Metro Line No. 4*

**Volume 3 : Feasibility Study Report 3/4**

*Preliminary design on Greater Cairo Metro Phase 1 and Economic  
Financial Analysis*

**Volume 4 : Drawings**

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## **Preface**

In response to the request from the government of the Arab Republic of Egypt, the Government of Japan decided to conduct “JICA Preparatory Survey on Greater Cairo Metro Line No.4”, and entrusted the study and to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team consisted of Nippon Koei Co. Ltd., Japan Railway Technical Service (JARTS) and Nippon Civic Consulting Engineer Co. Ltd, headed by Mr. Hiroshi Izawa, between February 2009 to May 2010.

The team conducted field surveys at the study area and held discussions with the officials concerned of the Government of the Arab Republic of Egypt. Having completed them, now the team prepared this final report.

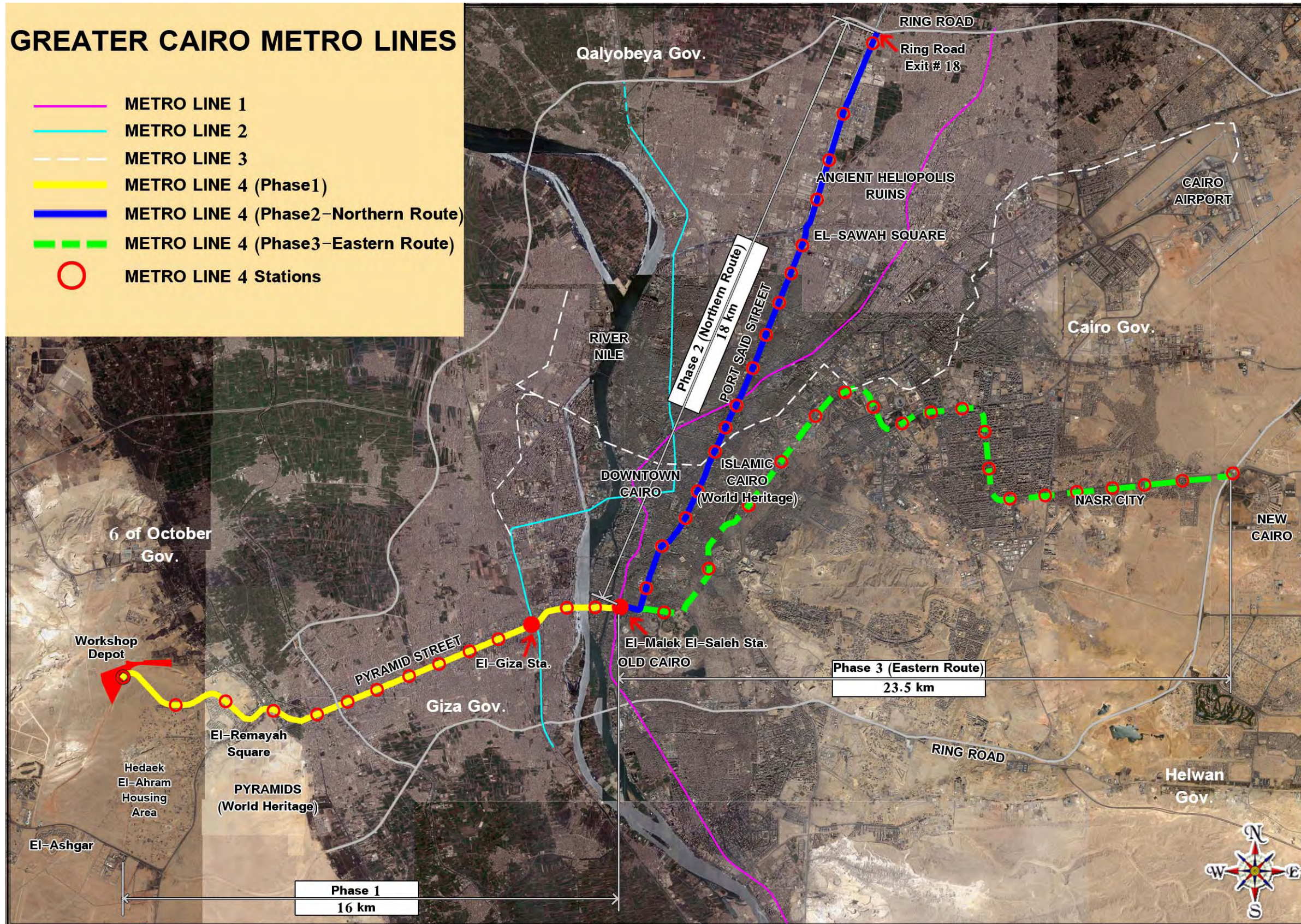
I hope that this report will greatly contribute to the construction and operation of the Metro Line No.4 for the urban transportation in Greater Cairo, as well as to enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation to the project.

June 2010

Kiyoshi Kodera  
Vice President  
Japan International Cooperation Agency

# LOCATION MAP



## TABLE OF CONTENTS

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**JICA PREPARATORY SURVEY  
ON  
GREATER CAIRO METRO LINE NO.4  
IN  
THE ARAB REPUBLIC OF EGYPT**

**Final Report  
Volume 3**

Preliminary design on Greater Cairo Metro Phase 1  
and  
Economic Financial Analysis

**Volume 3 1 of 2**

PREFACE  
LOCATION MAP  
TABLE OF CONTENTS  
LIST OF TABLES AND FIGURES  
GLOSSARY OF ABBREVIATIONS AND MEASURING UNITS  
EXECUTIVE SUMMARY OF VOLUME 3

**TABLE OF CONTENTS**

<b>CHAPTER 1</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
1.1	Background of the Study .....	1-1
1.2	Objective of the Study .....	1-2
1.3	Study Area and Concept of Feasibility Study Report 3/4.....	1-3
1.3.1	Study Area.....	1-3
1.3.2	Concept for the Feasibility Study Report 3/4 .....	1-4
(1)	Route Selection for Phase 2 Section .....	1-4
(2)	Workshop/Depot Location .....	1-4
(3)	Concept for the Feasibility Study on Metro Line 4 .....	1-4
1.4	Remarks toward the Basic Design Stage .....	1-5
<b>CHAPTER 2</b>	<b>Updating Future Demand for Metro Line No.4 .....</b>	<b>2-1</b>
2.1	Methodology of Updating Future Metro Demand.....	2-1
2.2	Summary of Person-Trips by Travel Mode .....	2-1
2.3	Daily Station and Section Passenger Volumes for Metro Line 4 .....	2-1
2.4	Determination of Peak Hour Passenger Distribution and Ratio .....	2-3
2.5	Estimation of Station and Section Peak Hour Passenger Volumes.....	2-7
2.6	Passenger- and PCU-km and -hours for “With” and “Without” Project Cases .....	2-8
2.7	Station Context Planning (Multimodal Interchanges).....	2-10
(1)	Level of Traffic.....	2-10
(2)	Inter-modality.....	2-11
(3)	Urban Context .....	2-11
<b>CHAPTER 3</b>	<b>General Features and Main Characteristics.....</b>	<b>3-1</b>
3.1	General Features of Metro Line 4.....	3-1
3.2	Main Technical Characteristics of Metro Line 4.....	3-1

<b>CHAPTER 4</b>	<b><i>Preliminary Design (Phase 1)</i></b>	<b>4-1</b>
4.1	Alignment Plan	4-1
4.1.1	Design Criteria	4-1
(1)	Outline of Proposed Design Specifications	4-1
(2)	Design Speed	4-1
(3)	Cant and Curve Speed Limit	4-1
(4)	Transition Curves	4-3
(5)	Vertical Curves	4-5
(6)	Gradients	4-6
(7)	Turnouts	4-6
(8)	Platform Length	4-7
(9)	Proposed Structure Gauge and Car Gauge	4-8
(10)	Extension of the Structure Gauge in the Curve Section	4-9
(11)	Design Gauge	4-9
4.1.2	Alignment Plan	4-11
(1)	Alignment Planning Methodology	4-11
(2)	Control Points and Basic Policy	4-12
(3)	Alignment Planning for Metro Line 4	4-14
(4)	Outline of Alignment and Station Location	4-20
(5)	Station Arrangement and Track Layout	4-22
4.2	Train Operating Plan	4-33
4.2.1	Purpose	4-33
4.2.2	Key Operational Data and Parameters	4-33
4.2.3	Basic Policy for Train Operating Plan	4-35
(1)	Target Sections for Train Operating Plan	4-35
(2)	Input and Output Data of the Train Operating Plan	4-35
(3)	Demand in Peak Hour and the Required Number of Trains	4-36
4.2.4	Sectional Demand in Peak Hour	4-36
4.2.5	Track Layout Plan for the Main Stations	4-37
(1)	Basic Train Operating Plan (Phase 1 Section)	4-38
(2)	WN-Sta.1 Station (El Malek El Saleh)	4-38
(3)	W-Sta. 5 Station	4-40
(4)	W-Sta. 9 Station	4-41
(5)	W-Sta. 15 Station	4-43
4.2.6	Train Operation Headway	4-45
(1)	Calculation of the Minimum Headway	4-45
4.2.7	Calculation of Travel Time for Section	4-45
4.2.8	Estimation of Rolling Stock Number	4-47
4.2.9	Estimation of Daily Train Number	4-50
(1)	Hourly Number of Trains of Existing Line	4-50
(2)	Estimated Hourly Number of Trains on Metro Line 4	4-50
(3)	Estimation of Yearly Number of Trains and Train-kilometres	4-52
4.3	Emergency/Disaster Incident Management	4-52
4.3.1	Characteristics of Fire Accident in Tunnel and Underground Station	4-52
(1)	Fire Accident of Metro Tunnel and Underground Station	4-53
(2)	Underground Station Fire in Japan	4-55
(3)	Fire Accident at Road Tunnel	4-55
(4)	Fatal Fire Accident in Dague, South Korea, 2003	4-58
4.3.2	Existing Standard for Fire Fighting and Management of Metro	4-60
(1)	NFPA 130 (USA)	4-60
(2)	Standard in Europe	4-61
(3)	Japanese Standard	4-61
4.3.3	Impact of NFPA 130 Application and Consideration	4-62
(1)	Installation of Cross Passage	4-62
(2)	Evacuation Time for Passengers in Case of Station Fire	4-67
4.3.4	Use of Non-combustible Material	4-72
(1)	Use of Non-combustible Materials for Underground Stations and Tunnels	4-72



(2)	Cone Calorimeter Test for Non-combustible Material (ISO5660-1) .....	4-74
4.3.5	Fire Load and Evaluation of Smoke .....	4-75
(1)	Design Fire Load and Evaluation Method for Evacuation.....	4-76
(2)	Calculation of Evacuation Time .....	4-78
(3)	Calculation of Number of Evacuators .....	4-78
(4)	Study for the Normal Fire .....	4-78
(5)	Study for the Fire by Arson.....	4-83
(6)	Measures.....	4-84
4.3.6	Side Walkway in Tunnel (Inspection Gallery) .....	4-84
4.3.7	Train Operation in Emergency Case .....	4-85
(1)	Principle of Train Operation in case of Fire .....	4-85
4.3.8	Ventilation Operation in case of Fire .....	4-86
(1)	Normal Operation and Ventilation Fan .....	4-86
(2)	Smoke Exhaust in Concourse .....	4-87
(3)	Smoke Exhaust in Platform .....	4-87
(4)	Smoke Exhaust in Station Track (Normal Fire on Rolling Stock).....	4-88
(5)	Smoke Exhaust in Tunnel.....	4-89
4.3.9	Emergency Facilities and Equipment .....	4-90
(1)	Alarm Facilities .....	4-91
(2)	Communication Facilities.....	4-92
(3)	Evacuation Guide .....	4-93
(4)	Smoke Control.....	4-97
(5)	Fire Protection Compartment .....	4-98
(6)	Fire Fighting Facilities.....	4-99
(7)	Emergency Control Room .....	4-102
4.4	Design Concept or Design Criteria .....	4-103
4.4.1	Civil Works .....	4-103
(1)	General.....	4-103
(2)	Civil Engineering Structures to be Designed .....	4-103
(3)	Design Life .....	4-103
(4)	Underground Station Structure.....	4-103
(5)	Bored Tunnel Design.....	4-107
(6)	Cut and Cover Tunnel .....	4-109
(7)	Annex Structures.....	4-111
4.4.2	Architectural Works .....	4-111
(1)	City Planning Viewpoint.....	4-111
(2)	Main Codes and Regulations .....	4-111
(3)	Safety Evacuation Consideration based on NFPA 130 .....	4-111
(4)	Emergency Exit .....	4-112
(5)	Design for the Disabled .....	4-112
(6)	Platform Screen Door (PSD) .....	4-113
(7)	Ease of Maintenance.....	4-113
(8)	Basic Finish Materials.....	4-113
4.4.3	Track .....	4-114
(1)	Basic Requirements .....	4-114
(2)	Basic Stipulations .....	4-114
(3)	Basic Criteria for Track Equipment.....	4-114
4.4.4	Rolling Stock .....	4-114
(1)	Passenger Capacity and Rolling Stock Gauge.....	4-115
(2)	Compression Load and Body Materials.....	4-115
(3)	Operation Performance and Train Formation .....	4-117
(4)	Car Body Design .....	4-117
4.4.5	Signalling System.....	4-122
4.4.6	Telecommunication .....	4-123
4.4.7	Power Supply System .....	4-123
4.5	Rolling Stock Plan .....	4-124
4.5.1	Present Condition of Existing Metro Lines.....	4-124

4.5.2	Design Concept and Proposed System.....	4-125
4.5.3	Comparison and Recommendation .....	4-126
(1)	Bogie .....	4-126
(2)	Traction Motor: Permanent Magnet Synchronous Motor (PMSM).....	4-127
(3)	Auxiliary Power Supply Stand-by Redundant Type SIV .....	4-128
(4)	Air-conditioning Equipment.....	4-129
(5)	Interior and Visual Information System (VIS).....	4-130
4.5.4	Rolling Stock Transport Plan .....	4-131
4.6	Civil Works (Tunnel) .....	4-132
4.6.1	Basic Condition .....	4-132
(1)	Geological Condition .....	4-132
(2)	Cross Section of Tunnel (Construction Gauge) .....	4-136
4.6.2	Study of the Tunnel Structures .....	4-137
(1)	Study of the Segmental Lining.....	4-137
(2)	Study on Waterproofing.....	4-141
4.6.3	Study of the Tunnel Construction Method .....	4-143
(1)	Risks and Considerations.....	4-143
(2)	Countermeasures for Tunnel Construction.....	4-143
4.6.4	Study of the Shield TBM (1): Comparison between Single Track Double Tunnel (STDT) and Double Track Single Tunnel (DTST).....	4-151
(1)	Cross Sectional Area and Excavation Volume .....	4-151
(2)	Volume of Concrete.....	4-151
(3)	Cost of the Shield TBM.....	4-152
(4)	Required Overburden at Nile River Crossing .....	4-152
(5)	Ground Surface Settlement and Neighbouring Construction.....	4-153
(6)	Station Type (Island Platform and Side Platform) and Station Depth .....	4-154
(7)	Ventilation in Tunnel.....	4-154
(8)	Recommendation .....	4-155
4.6.5	Study of the Shield TBM (2): Comparison between Earth Pressure Balanced Shield (EPBS) TBM and Slurry Shield TBM .....	4-157
(1)	Comparison and Recommendation on the Shield TBM.....	4-157
4.6.6	Introduction and Study of EPBS TBM .....	4-159
(1)	Development and Practices of EPBS TBM.....	4-160
(2)	Principles of EPBS TBM.....	4-160
(3)	Study of the Application of the EPBS TBM to Metro Line 4.....	4-163
(4)	Outline of EPBS TBM.....	4-165
(5)	Daily Monitoring and Control of EPBS TBM .....	4-169
4.6.7	Technical Study of the Shield TBM Construction .....	4-172
(1)	Study of the Neighbouring Construction .....	4-172
(2)	Nile River Crossing (Study for Floating of Tunnel) .....	4-177
4.6.8	Tunnel Construction for the ENR Access Line .....	4-179
(1)	Alignment of the ENR Access Line.....	4-179
(2)	Launch Shaft of the ENR Access Line .....	4-181
(3)	Excavation and Driving of the Shield TBM .....	4-181
(4)	Arrival Shaft of the ENR Access Line .....	4-182
4.6.9	Construction Plan of Tunnel .....	4-183
(1)	Advance Speed of Shield TBM.....	4-183
(2)	Procurement and Allocation of Shield TBM .....	4-184
(3)	Study of Launch and Arrival Shaft .....	4-186
(4)	Study of Construction Yard of Launch Shaft.....	4-196
4.7	Civil Works (Station) .....	4-198
4.7.1	Basic Condition .....	4-198
(1)	Geological Condition .....	4-198
(2)	Basic Design Condition and Requirement.....	4-198
(3)	Outline Feature of Stations.....	4-199
4.7.2	Required Clearance and Space .....	4-208
(1)	Structural Gauge and Inner Cross Section of Station.....	4-208

(2)	Distribution of Structural Column.....	4-209
(3)	Width of Escalator and Stairway at Platform .....	4-209
4.7.3	Study of Structure for Standard Station.....	4-210
(1)	Cross-Sectional Structure of the Standard Station .....	4-210
(2)	Plan of the Standard Station.....	4-212
(3)	Comparison of the Three Types of Structure as Standard Station .....	4-214
(4)	Consideration of the Shield TBM Passing for the Standard Station .....	4-215
(5)	Consideration of the Location for Structural Column on the Platform.....	4-216
4.7.4	Study of Structure for Other Stations.....	4-217
(1)	M4W Station No.1 (El Malek El Saleh Station) .....	4-217
(2)	M4W Station No.2 (El Rauda Station) .....	4-220
(3)	M4W Station No.3 (El Nile Station) .....	4-223
(4)	M4W Station No.4 (El Giza Station) .....	4-225
(5)	M4W Station No.12 (El Remayah Station) .....	4-227
(6)	N4W Station No.13 (GEM) .....	4-229
(7)	N4W Station No.15.....	4-229
4.7.5	Planning of Construction Method .....	4-231
(1)	Typical Consideration.....	4-231
(2)	Construction Method .....	4-233
4.7.6	Construction Schedule .....	4-293
(1)	General Condition .....	4-293
(2)	Schedule of Station Construction .....	4-293
(3)	Schedule of Tunnel Construction .....	4-298
(4)	Construction Schedule .....	4-300
4.8	Civil Works (Track) .....	4-303
4.8.1	Specifications of Existing Lines .....	4-303
(1)	Gauge.....	4-304
(2)	Rail .....	4-304
(3)	Sleepers .....	4-306
(4)	Types of Track.....	4-307
(5)	Fastenings.....	4-309
4.9	Architectural Works .....	4-311
4.9.1	Station Locations and Characteristics .....	4-311
4.9.2	Station Design Concept.....	4-314
(1)	Signature Station.....	4-314
(2)	Typical Stations .....	4-314
(3)	Modal Interchange Stations.....	4-315
4.9.3	Design Standard.....	4-319
(1)	Station .....	4-319
(2)	Entrance (Figure 4-285) .....	4-319
(3)	Ventilation Shafts/Cooling Towers (Figure 4-286 and Figure 4-287) .....	4-319
4.9.4	Station Location Characteristics .....	4-321
4.9.5	Stairs .....	4-324
4.9.6	Elevators and Escalators.....	4-324
4.9.7	Access Route to the Ticket Gates .....	4-325
4.9.8	Passenger Access Arrangement.....	4-325
4.9.9	Queuing.....	4-325
4.9.10	Station Facilities .....	4-326
(1)	Station Control Room .....	4-326
(2)	Ticket Sales Room .....	4-326
(3)	Passengers' Toilet.....	4-326
(4)	Supervisor's Office .....	4-326
(5)	Station Master's Room .....	4-326
(6)	Cash and Ticket Handling Room.....	4-326
(7)	Staff Room .....	4-327
(8)	Staff Dormitory Facilities.....	4-327
(9)	Staff Toilets Lockers and Showers .....	4-327

(10)	Station Storage.....	4-327
(11)	Cleaner's Room and Storage .....	4-327
(12)	Commercial Areas and Kiosks .....	4-327
(13)	Station Service Rooms.....	4-327
(14)	Police Room .....	4-327
4.9.11	Annexed Structure.....	4-327
(1)	Ventilation/Air-conditioning Facilities .....	4-327
(2)	Water Supply and Drainage Equipment .....	4-328
(3)	Fire-Fighting Equipment .....	4-328
(4)	Electric Equipment .....	4-328
4.10	System, Facilities and Equipment Plan .....	4-329
4.10.1	Signalling System.....	4-329
(1)	Composition of the signal equipment .....	4-329
(2)	Traffic Control Function .....	4-332
(3)	Remote Control Function (Central Control Point (CCP) Function) .....	4-332
(4)	Train Interval Control Function .....	4-336
(5)	Train Operation Support Device: Automatic Train Operation (ATO) device .....	4-339
(6)	Maintenance Support Function: Signal Equipment Condition Monitoring Equipment .....	4-340
(7)	Signal Cables .....	4-340
(8)	Power Supply Equipment: Rectifier Equipment (Rf), Uninterruptible Power Supply (UPS) Equipment and Emergency Power Generation Equipment.....	4-341
4.10.2	Telecommunication System .....	4-342
(1)	Composition of Communication System.....	4-342
(2)	Communication Trunk System .....	4-342
(3)	Optical Carrier System .....	4-343
(4)	Train Radio Equipment.....	4-343
(5)	Platform Monitoring System .....	4-344
(6)	Video Monitoring System.....	4-344
(7)	PID System .....	4-344
(8)	Station Communication Equipment .....	4-345
(9)	Communication Equipment at Depot.....	4-345
(10)	CCP Communication Equipment.....	4-345
4.10.3	Power Supply .....	4-346
(1)	Overall View of the Power Supply System .....	4-346
(2)	Present Condition of the Existing Cairo Metro Lines .....	4-347
(3)	Design Concept and Proposed System.....	4-347
(4)	System Function and General Specifications .....	4-347
(5)	High Voltage Station (HVS) .....	4-348
(6)	Traction System .....	4-351
(7)	Rectifier Station (RS).....	4-356
(8)	Distribution System for Traction Power Supply .....	4-358
(9)	Overhead Contact System (OCS) .....	4-359
(10)	Distribution System for Station Facilities .....	4-363
(11)	Power SCADA.....	4-363
(12)	Building Automation System (BAS) .....	4-364
(13)	Electromagnetic Interference (EMI).....	4-364
(14)	Stray Current.....	4-364
4.10.4	Platform Screen Door (PSD) .....	4-367
(1)	Present Condition of PSD in Metros .....	4-367
(2)	Proposed System .....	4-367
(3)	System Function and General Specifications .....	4-368
(4)	Estimated Cost of PSD.....	4-375
4.10.5	Automatic Fare Collection (AFC) System .....	4-375
(1)	Present Condition of AFC in Metros .....	4-375
(2)	System Integration .....	4-376
(3)	Proposed System Architecture .....	4-377

(4)	System Concept and Components .....	4-378
(5)	System Function and General Specifications .....	4-379
4.10.6	Air Conditioning .....	4-389
(1)	Basic Design Conditions .....	4-389
(2)	Outline of Air Conditioning .....	4-391
(3)	Design Heat Load of Air Conditioning .....	4-393
(4)	Preliminary Study of Cooling Facilities .....	4-397
(5)	Diagram of Cooling Facilities Flow .....	4-399
(6)	Required Space for the Cooling Facilities .....	4-400
(7)	Method of the Air Conditioning .....	4-401
(8)	Preliminary Study of Air Conditioning Facilities .....	4-403
(9)	Diagram of Air Conditioning Facilities Flow .....	4-405
(10)	Required Space for the Air Conditioning Facilities .....	4-406
4.10.7	Ventilation System .....	4-406
(1)	Outline of Ventilation System .....	4-406
(2)	Requirement of the Ventilation System .....	4-407
(3)	Ventilation Method of Station .....	4-408
(4)	Ventilation Method for Tunnel .....	4-409
(5)	Preliminary Study of Ventilation Facilities .....	4-411
(6)	Diagram of Ventilation Facilities Flow .....	4-413
(7)	Outline of the Ventilation Fans and the Required Spaces .....	4-414
(8)	Required Space for the Ventilation Shaft .....	4-415
4.10.8	Smoke Exhaust System .....	4-415
(1)	Smoke Exhaust for the Platform .....	4-415
(2)	Smoke Exhaust Method for the Concourse .....	4-416
(3)	Smoke Exhaust Method for the Station Office and Other Rooms .....	4-416
(4)	Smoke Exhaust Method of the Tunnel .....	4-416
4.10.9	Water Supply, Sewage/Drain and Fire Fighting System .....	4-417
(1)	Water Supply System .....	4-417
(2)	Sewage/Drain System .....	4-417
(3)	Fire Fighting System .....	4-418
(4)	Outline of Water Tank, Pump and its Required Space .....	4-419
4.11	Workshop and Depot Plan .....	4-420
4.11.1	Introduction .....	4-420
4.11.2	Maintenance Policy .....	4-420
(1)	Maintenance Hierarchy .....	4-421
(2)	Maintenance Periodicity .....	4-423
4.11.3	Existing facilities .....	4-425
(1)	Metro Line 1 Maintenance Depot and Workshops .....	4-425
(2)	Metro Line 2 Maintenance Depot and Workshops .....	4-426
(3)	Outsourcing of Component Repair to Existing Depots .....	4-428
4.11.4	Potential Depot Location .....	4-429
4.11.5	Train Washing Requirements .....	4-430
4.11.6	Stabling Requirements .....	4-431
4.11.7	Berthing for Light Maintenance and Repair .....	4-431
4.11.8	Berthing for Heavy Maintenance and Repair .....	4-432
(1)	Bogie Overhaul .....	4-433
(2)	Wheelset Repair .....	4-434
(3)	Vehicle Overhaul and Repair .....	4-436
4.11.9	Principal Machinery, Tools and Equipment by Location .....	4-437
4.11.10	Typical Examples of Depot Equipment .....	4-440
(1)	Jacking System .....	4-440
(2)	Pantograph Inspection Gentries .....	4-442
(3)	Environmental System .....	4-442
(4)	Depressed Floor Working Areas .....	4-443
(5)	Mobile Access Platforms .....	4-444
(6)	Ground Wheel Lathe .....	4-445

(7)	Carriage Washing Machines .....	4-445
(8)	Pantograph Repair Equipment .....	4-446
(9)	Repair and Testing of Air-conditioning Equipment .....	4-446
4.11.11	Yard Facilities and Equipment for Phase 1 .....	4-446
4.12	Central Control Point (CCP) .....	4-449
4.12.1	CCP Operation Plan .....	4-449
(1)	Roles of CCP .....	4-449
(2)	Location and Organization of CCP .....	4-450
(3)	Facilities Required at CCP .....	4-451
(4)	Required Functions of the ATS .....	4-452
4.12.2	Signalling Component Related to CCP .....	4-453
(1)	Remote Control Function (CCP Function): .....	4-453
(2)	Maintenance Support Function: Signal Equipment Condition Monitoring Equipment .....	4-456
(3)	Power Supply Equipment: Rectifier Equipment (Rf), Uninterruptable Power Supply Equipment (UPS) and Emergency Power Generation Equipment .....	4-456
4.12.3	Telecommunication System Related to CCP .....	4-457
(1)	Communication Trunk System .....	4-457
(2)	Optical Carrier System .....	4-457
(3)	Train Radio Equipment .....	4-458
(4)	Video Monitoring System .....	4-459
(5)	CCP Communication Equipment .....	4-459
4.12.4	Power SCADA .....	4-460
(1)	Function of Power SCADA .....	4-460
(2)	Operator Console .....	4-460
(3)	Information Processing Equipment .....	4-461
(4)	Remote Control System .....	4-461
<b>CHAPTER 5      Outline Design (Phase 2) .....</b>		<b>5-1</b>
5.1	Alignment Plan .....	5-1
5.1.1	Design criteria .....	5-1
(1)	Outline of Proposed Design Specifications .....	5-1
5.1.2	Alignment Plan for Phase 2 .....	5-1
(1)	Alignment Planning Methodology .....	5-1
(2)	Control Points and Basic Policy .....	5-2
(3)	Alignment Planning for Phase 2 .....	5-4
(4)	Outline of the Alignment for Phase 2 .....	5-9
5.2	Civil Works (Underground Section) .....	5-14
5.2.1	Basic Condition .....	5-14
(1)	Geological Condition .....	5-14
(2)	Clearance of Tunnel (Construction Gauge) .....	5-14
(3)	Basic Requirements of Underground Stations .....	5-15
(4)	Outline of Metro Line 4 (Phase 2) .....	5-16
5.2.2	Tunnel Section .....	5-18
(1)	Tunnel Structures .....	5-18
(2)	Tunnel Construction Method .....	5-19
(3)	Countermeasures for Tunnel Construction at SWWT .....	5-20
(4)	Construction Schedule .....	5-33
5.2.3	Underground Stations .....	5-35
(1)	Typical Underground Station (Standard Station) .....	5-36
(2)	Station for Special Requirements (Including Existing SWWT) .....	5-37
(3)	Further Study on the Construction Method for SWWT .....	5-38
5.3	Civil Works (Elevated Section) .....	5-52
5.3.1	Elevated Structures .....	5-52
(1)	Overview of Elevated Section .....	5-52
(2)	Existing Condition Along the Metro Line 4 Route .....	5-52
(3)	Superstructure .....	5-54

(4)	Substructure .....	5-54
5.3.2	Elevated Stations .....	5-54
5.4	Architectural Work .....	5-55
5.5	System, Facilities and Equipment Plan .....	5-58
5.6	Depot and Workshop Plan.....	5-58
5.6.1	General .....	5-58
5.6.2	Depot location .....	5-58
5.7	Preliminary Alternative Route Study for Phase 2 Section.....	5-61
5.7.1	General .....	5-61
5.7.2	Alternative Route Setting.....	5-62
5.7.3	The Condition of Station Locations.....	5-67
(1)	For Alternative Route (AR) 1 .....	5-67
(2)	For AR2 .....	5-70
(3)	For AR3.....	5-72
5.7.4	Comparison Study for the Connection with Metro Line 1 .....	5-74
(1)	Abstract of Each Study Case.....	5-74
(2)	Comparison of Three Location Cases .....	5-78
5.7.5	Comparison of Three Alternative Routes .....	5-80
5.7.6	Location List .....	5-81
<b>CHAPTER 6           Operation and Maintenance Management Plan .....</b>		<b>6-1</b>
6.1	Introduction.....	6-1
6.1.1	Purposes of This Plan .....	6-1
6.1.2	Concept of This Plan .....	6-1
6.1.3	Methodology of Study.....	6-1
6.2	System Operations Plan.....	6-2
6.2.1	General Concept of the Safety of Train Operation in Urban Railways.....	6-2
(1)	Measures to secure safety .....	6-3
(2)	Foreseeable accidents and concrete measures against them.....	6-4
6.2.2	CCP Operation Plan.....	6-5
(1)	Roles of the CCP.....	6-5
(2)	Location and Organization of the CCP .....	6-6
(3)	Facilities Required at the CCP .....	6-7
(4)	Required Functions of Automatic Traffic Supervisor (ATS) .....	6-8
(5)	Degraded Operation Plan.....	6-9
6.2.3	Fire Fighting & Emergency Plan.....	6-12
(1)	Lessons from Accidents .....	6-12
(2)	Principles on Fire fighting and Evacuation in Case of Train Fire Accident .....	6-15
6.2.4	Driver Operation Plan.....	6-18
(1)	Single Driver Operation .....	6-18
(2)	Driverless Operation.....	6-19
(3)	Operation with ATO/ATP .....	6-20
(4)	Shunting at Stations .....	6-21
(5)	Shunting at Depot.....	6-21
6.2.5	Station Operation Plan .....	6-21
(1)	Role of Station Staff .....	6-21
(2)	Train Operation Tasks at Stations .....	6-23
6.2.6	Depot Operation Plan.....	6-24
(1)	Function of Depot .....	6-24
(2)	Track Layout in the Depot .....	6-24
(3)	Route Control and Shunting .....	6-25
6.3	Maintenance Plan.....	6-26
6.3.1	Target of Maintenance Work .....	6-26
6.3.2	Improvement of Facilities .....	6-26
(1)	Contents of facility improvements.....	6-27
(2)	Adoption of new technology and its risks.....	6-27
(3)	Improvement of Maintenance Tools .....	6-29

6.3.3	Improvement of Work System .....	6-30
(1)	Introduction of multi-skilled workers .....	6-31
(2)	Leveling of Maintenance Workflow .....	6-31
(3)	Daily inspection in the daytime .....	6-32
(4)	Securing long time interval for special maintenance works .....	6-33
6.3.4	Outsourcing of Maintenance Works .....	6-33
(1)	Outsourcing of Maintenance Works .....	6-33
(2)	Spare parts .....	6-35
(3)	Securing a sufficient budget for maintenance .....	6-36
6.4	Organization Plan .....	6-37
6.4.1	Existing Organization .....	6-37
6.4.2	Organization Plan for Metro Line 4 .....	6-38
(1)	Reconfiguration of Existing Organization .....	6-38
(2)	Proposal of organization plan for Metro Line 4 .....	6-38
6.5	Estimation of Number of Staff .....	6-40
6.5.1	Preface .....	6-40
6.5.2	Working conditions in Egypt .....	6-40
6.5.3	Estimation of Number of Drivers .....	6-41
(1)	Daily work volume per driver on existing lines of Cairo Metro .....	6-41
(2)	Daily work volume per driver in Japan .....	6-42
(3)	Estimation of driver numbers on Metro Line 4 .....	6-42
6.5.4	Estimation of number of drivers for depot operation .....	6-43
6.5.5	Estimation of number of controllers in the CCP .....	6-44
(1)	Number of Controllers for the Existing Lines of Cairo Metro .....	6-44
(2)	Estimation of controller number for CCP of Metro Line 4 .....	6-45
6.5.6	Estimation of station number of staff .....	6-46
(1)	Station staff allocation on the Cairo Metro .....	6-46
(2)	Number of station staff for metro systems in Japan .....	6-47
(3)	Estimation of number of station staff on Metro Line 4 .....	6-48
6.5.7	Estimation of number of civil and track maintenance staff .....	6-51
(1)	Civil and track maintenance staff on Cairo Metro .....	6-51
(2)	Number of Civil and Track Maintenance Staff of Japanese Metro .....	6-51
(3)	Estimation of the number civil and track maintenance staff for Metro Line 4 .....	6-52
6.5.8	Estimation of rolling stock maintenance staff .....	6-52
(1)	Rolling stock maintenance staff on Cairo Metro .....	6-53
(2)	Rolling stock maintenance staff in Japan .....	6-53
(3)	Estimation of staff requirement for rolling stock maintenance on Metro Line 4 .....	6-54
6.5.9	Estimation of electrical equipment maintenance staff .....	6-54
(1)	Electrical equipment maintenance staff on Cairo Metro .....	6-54
(2)	Electrical equipment maintenance staff in Japan .....	6-55
(3)	Estimation of Required Number of Staff for Electrical Equipment Maintenance on Metro Line 4 .....	6-56
6.5.10	Management Staff .....	6-56
(1)	Management staff in the Cairo Metro .....	6-56
(2)	Management staff in the Japanese metros .....	6-57
(3)	Estimation of the number of management staff for Metro Line 4 .....	6-57
6.5.11	Total number of staff for Metro Line 4 .....	6-58
6.6	Training Plan .....	6-59
6.6.1	Training system for existing lines of the Cairo Metro .....	6-59
(1)	Current scheme for ab initio training on Metro Line 2 .....	6-59
(2)	Training at the Opening of Metro Line 2 .....	6-60
6.6.2	Introduction of Japanese training system for drivers .....	6-61
(1)	Curriculum and duration of classroom lessons .....	6-61
(2)	Curricula and duration of practical training on the mainline .....	6-61
(3)	Examination for Drivers' License .....	6-62
(4)	Issuance of drivers' licenses by MLIT .....	6-62
(5)	Repetitive training of drivers in Japan .....	6-63



6.6.3	Utilization of Human Resources of Existing Line .....	6-63
6.6.4	Proposed Plan for Staff Training for the Opening of Metro Line 4 .....	6-64
<b>CHAPTER 7</b>	<b><i>Project Cost and Packaging .....</i></b>	<b><i>7-1</i></b>
7.1	Initial Capital Cost.....	7-1
7.1.1	Basic Conditions of the Cost Estimation.....	7-1
7.1.2	Composition of the Initial Capital Cost Estimate .....	7-2
(1)	Construction Cost.....	7-3
(2)	Procurement Cost .....	7-4
(3)	GC Service Cost.....	7-4
(4)	Physical Contingency .....	7-4
(5)	Land Acquisition and Resettlement .....	7-4
(6)	Diversion of Public Utilities .....	7-5
(7)	General Administration Cost.....	7-5
(8)	Price Escalation.....	7-5
7.1.3	Initial Capital Cost Estimates.....	7-5
7.1.4	Estimated Cost of PSD.....	7-8
7.2	Estimation of O&M Cost .....	7-9
7.2.1	Preface .....	7-9
7.2.2	O&M Cost of Cairo Metro .....	7-10
7.2.3	O&M Cost of Japanese Metro Systems .....	7-10
7.2.4	Estimation of Personnel Cost for Metro Line 4 .....	7-11
(1)	Average Personnel Cost.....	7-11
(2)	Estimation of the Total Personnel Costs.....	7-12
7.2.5	Power Cost for Metro Line 4.....	7-13
7.2.6	Maintenance Cost for Metro Line 4 .....	7-13
(1)	Foreign Engineers' Cost .....	7-13
(2)	Miscellaneous Cost for Maintenance.....	7-16
(3)	Total Outsourcing and Miscellaneous Maintenance Cost.....	7-17
7.2.7	Estimation of Parts Cost .....	7-17
(1)	Estimation of Rolling Stock Parts Cost .....	7-17
(2)	Estimation of other spare parts cost .....	7-18
(3)	Estimation of total spare parts cost for Metro Line 4 .....	7-19
7.2.8	Estimation of Cleaning Cost .....	7-19
(1)	Estimation of unit cleaning cost for stations.....	7-19
(2)	Estimation of unit rolling stock cleaning cost .....	7-19
(3)	Estimation of cleaning cost for Metro Line 4.....	7-20
7.2.9	The other costs excluding depreciation and tax .....	7-20
(1)	Security Costs .....	7-20
(2)	Other Costs .....	7-21
7.2.10	Total O&M cost for Metro Line 4.....	7-22
7.3	Contract Packaging .....	7-24
7.3.1	Procurement of Contractors .....	7-24
(1)	Design and Build Approach .....	7-24
7.3.2	Packaging for Construction Works .....	7-24
(1)	Coordinated Construction of Tunnel Sections and underground stations.....	7-26
(2)	Construction Works of Tunnel Section by Cut-and-Cover Method .....	7-26
(3)	Railway System (Core System: Electrical and Mechanical Works) .....	7-26
(4)	Rolling Stock .....	7-27
(5)	Utility Diversion and Relocation.....	7-27
(6)	High Voltage Electric Line .....	7-27
7.3.3	Comparison and Recommendation for Contract Packaging.....	7-27
(1)	Comparison of Schemes .....	7-27
(2)	Recommendation .....	7-28
7.3.4	Procurement of Consultant for Management and Supervision of	

Construction Works .....	7-29
(1) Terms of Reference (TOR) of Engineering Consulting Services for Construction Supervision.....	7-29
<b>CHAPTER 8</b> <b>Planning of Project Implementation Program.....</b>	<b>8-1</b>
<b>CHAPTER 9</b> <b>Environmental and social considerations.....</b>	<b>9-1</b>
9.1 Introduction.....	9-1
9.2 Legislative System Related to Environmental Considerations in Egypt.....	9-2
9.2.1 Fundamental Laws and Regulations .....	9-2
9.2.2 EIA System in Egypt.....	9-2
(1) Overview of EIA System in Egypt.....	9-2
9.2.3 Environmental Standards .....	9-4
(1) Air Quality.....	9-4
(2) Water Quality.....	9-4
(3) Noise .....	9-5
(4) Other Standards .....	9-5
9.2.4 Consistency with the JICA and JBIC Guidelines .....	9-6
9.3 Initial Environmental Examination.....	9-8
9.3.1 Site Description .....	9-8
(1) Natural Environment.....	9-8
(2) Social Environment .....	9-15
(3) Cultural Aspects .....	9-19
9.3.2 Relevant Authorities Concerned with Environmental and Social Impacts .....	9-19
9.3.3 Screening and Categorization of the Project .....	9-19
9.3.4 Examination of Potential Environmental Impact and Scoping .....	9-20
9.4 Alternative Analysis .....	9-26
9.5 Environmental Impact Assessment .....	9-26
9.5.1 Baseline of Environmental and Social Conditions .....	9-27
(1) Physical Environment.....	9-28
(2) Biological Environment.....	9-29
(3) Socio-economic Aspects .....	9-29
9.5.2 Impact Identification and Mitigation Measures Proposed .....	9-31
9.5.3 Direction of Environmental Monitoring.....	9-36
9.6 Stakeholder Meetings.....	9-37
9.6.1 First Stakeholder Meeting at Scoping Stage .....	9-38
9.6.2 Second Stakeholder Meeting at Disclosure Stage of Draft EIA.....	9-39
9.7 Proposed Outline for Implementing System for Environmental and Social Considerations of Phase 1.....	9-40
<b>CHAPTER 10</b> <b>Resettlement Action Plan Framework Study .....</b>	<b>10-1</b>
10.1 Introduction.....	10-1
10.2 Legislative System on Resettlement in Egypt.....	10-1
10.2.1 Fundamental Laws and Regulations on Land Acquisition and Resettlement .....	10-1
10.2.2 Procedure for Land Acquisition and Resettlement .....	10-2
(1) Relevant Authorities .....	10-2
(2) Procedure for Land Acquisition and Resettlement .....	10-3
10.2.3 Consistency with JICA & Ex-JBIC Guidelines .....	10-4
(1) Requirements of the Guidelines .....	10-4
(2) Comparison and Verification between Egyptian System and Guidelines .....	10-4
10.2.4 Findings and Actual Practice of Land Acquisition and Resettlement in Egypt.....	10-6
(1) Magnitude of Impact on Affected Properties and Persons in the Metro Line 3 Phase 1 Project .....	10-7
(2) Findings of Compensation in the Metro Line 3 project .....	10-7
10.3 Baseline Information of Social Conditions .....	10-8

10.3.1	Objective and Methodology .....	10-8
10.3.2	Survey of Public Perception of the Project .....	10-8
(1)	Current Situation of Transportation Mode.....	10-8
(2)	Understanding about the Project .....	10-9
(3)	Opinion to Involuntary Resettlement .....	10-9
10.3.3	General Socio-Economic Condition of Public .....	10-9
(1)	Number of Persons in the Average Household .....	10-9
(2)	Average Monthly Income.....	10-9
(3)	Rental Fee.....	10-10
(4)	Property Status.....	10-11
10.4	Policy and Framework of Resettlement for the Project.....	10-12
10.4.1	Basic Policy .....	10-12
10.4.2	Eligibility and Entitlement .....	10-13
(1)	Eligibility .....	10-13
(2)	Entitlement .....	10-14
10.4.3	Overall Procedure .....	10-16
10.4.4	Institutional and Organizational Arrangement.....	10-16
10.4.5	Monitoring and Evaluation .....	10-16
10.4.6	Consideration of Grievance Redress.....	10-18
10.4.7	Assurance of Participation and Consultation .....	10-18
10.4.8	Implementation Schedule .....	10-18
10.5	Preliminary Cost Estimation for Compensation .....	10-22
10.5.1	Objective, Methodology and Limitation.....	10-22
10.5.2	Consideration of Minimizing Resettlement .....	10-22
10.5.3	Estimated Magnitude of Socio-Economic Impacts .....	10-23
(1)	Phase 1 .....	10-23
(2)	Phase 2 .....	10-24
10.5.4	Preliminary Cost Estimation for Compensation .....	10-25
(1)	Condition for Preliminary Estimation of Compensation Cost .....	10-25
(2)	Estimated Cost for Compensation for Phase 1.....	10-26
10.6	Plan of Population Census for Potential PAPs .....	10-27
<b>CHAPTER 11      <i>Archaeological Assessment Study</i>.....</b>		<b>11-1</b>
11.1	Introduction.....	11-1
11.1.1	Scope and Procedure of the Study.....	11-1
11.2	Examination of the Legal System and SCA's Organization .....	11-2
11.2.1	Legal System.....	11-2
11.2.2	SCA Organization.....	11-3
11.3	Work Procedure.....	11-4
11.4	Baseline Information.....	11-6
11.4.1	Phase 1: Giza Area .....	11-6
(1)	G-1: Desert Area near Workshop (Depot) .....	11-6
(2)	G-2: Giza Plateau.....	11-7
(3)	G-3: Near El Remayah Square.....	11-9
(4)	G-4: Dokki .....	11-12
11.4.2	Phase 1: Near El Malek El Saleh Station (G5) .....	11-12
11.4.3	Phase 2: Historic Cairo Area .....	11-12
(1)	Northern Corridor .....	11-12
(2)	Eastern Corridor .....	11-16
11.4.4	Phase 2: Matariya Area .....	11-20
11.5	Soil Observation on the Sample from Boreholes .....	11-22
11.5.1	Aim .....	11-22
11.5.2	Observation Items .....	11-22
11.5.3	Results .....	11-22
11.6	Risk Assessment.....	11-25
11.6.1	Criteria for Risk Assessment .....	11-25
11.6.2	Risk Assessment on the Study Area .....	11-26

(1)	For Buried Archaeological Property.....	11-26
(2)	For Existing Historical Property .....	11-28
11.7	Countermeasure.....	11-28
11.7.1	Previous Cases .....	11-28
(1)	Case for Level A.....	11-28
(2)	Case for Level B.....	11-28
(3)	Case for Level C.....	11-29
(4)	Case for Standing Historical Property .....	11-29
11.7.2	Countermeasure Applied for Each Level.....	11-29
11.7.3	Preliminary Survey in BD Stage .....	11-29
(1)	Work Items .....	11-30
(2)	Schedules.....	11-30
<b>CHAPTER 12</b>	<b><i>Draft Environmental checklist of ex-JBIC guidelines.....</i></b>	<b>12-1</b>
<b>CHAPTER 13</b>	<b><i>ECONOMIC AND FINANCIAL ANALYSIS.....</i></b>	<b>13-1</b>
13.1	Introduction.....	13-1
13.2	Project Costs .....	13-1
13.2.1	Summary of Costs Used for Financial and Economic Appraisals.....	13-2
13.2.2	Other Common Assumptions related to the Economic and Financial Appraisals of Line 4.....	13-8
13.3	Economic Appraisal.....	13-10
13.3.1	Methodology.....	13-10
13.3.2	Estimation of Economic Benefits .....	13-12
13.3.3	Results of Economic Appraisal.....	13-27
13.3.4	Sensitivity Analysis.....	13-31
13.4	Financial Appraisal .....	13-32
13.4.1	Methodology.....	13-32
13.4.2	Assumptions Underlying the DCF Analysis .....	13-33
13.4.3	Passenger Demand Forecasts used as Basis for Cost and Revenue Estimation.....	13-34
13.4.4	Project Capital and O&M Cost Estimates .....	13-34
13.4.5	Project Revenue Estimates .....	13-34
13.4.6	Project Financing Alternatives .....	13-37
13.4.7	Financing Assumptions for the DCF Analysis.....	13-41
13.4.8	Results of Financial Appraisal .....	13-42
13.4.9	Sensitivity Analysis.....	13-45

### **LIST OF ANNEXES**

- Annex 4-1: Calculation of Voltage Drop in Contact Line
- Annex 4-2: Concept of the Separation of Traction and Lighting Network
- Annex 4-3: Overhead Rigid Conductor
- Annex 4-4: Electromagnetic Interference (EMI)
  
- Annex 9-1: List of Fundamental Laws and Regulations on Environmental and Social Considerations in Egypt
- Annex 9-2: Results of the 1st Stakeholder Meetings
- Annex 9-3: Results of the 2nd Stakeholder Meeting
- Annex 9-4: Proposed Outline of Implementation System for Environmental and Social Considerations of the Project [Phase 1]
  
- Annex 10-1: Questionnaire Form for Household Interview Survey
- Annex 10-2: Examination of Potential Impact on Land Acquisition and Property Demolishment
- Annex 10-3: Sample Form for Population Census

### **LIST OF APPENDICES**

- Appendix 1 Preliminary Work and Remarks on Basic Design Stage
- Appendix 2 Preliminary Study for Extension Line Connecting to 6th October City
- Appendix 3 NAT Comments with JST Response on Draft Report 3/4

**LIST OF TABLES AND FIGURES**

Table 2-1	Projected Passenger by Transportation Mode .....	2-1
Table 2-2	Number of Passengers Per Day for Metro Line 4.....	2-2
Table 2-3	Hourly Peak Ratio of the Metro (Boarding Time-Based) .....	2-4
Table 2-4	Hourly Peak Ratio of the Metro (Alighting Time-Based).....	2-5
Table 2-5	Number of Passengers at Peak Hour and PPHPD for Metro Line 4 .....	2-7
Table 2-6	Analysis of “With” and “Without” Project Cases of Metro Line 4 Phase 1 + Phase 2.....	2-9
Table 2-7	Line 4 Phase 1 Station Classification .....	2-11
Table 3-1	Main Technical Characteristics .....	3-1
Table 4-1	Key Features for Alignment Planning.....	4-1
Table 4-2	Proposed Actual Cant and Speed Limit .....	4-3
Table 4-3	Proposed Transition Curve Length.....	4-5
Table 4-4	Proposed Type of Turnout and Speed Limit in Turnout Curve .....	4-7
Table 4-5	Basic Features of Metro Line 4 for Phase 1 .....	4-12
Table 4-6	Considerations for Possible Alignment of Metro Line 4.....	4-15
Table 4-7	Data of the Alignment.....	4-19
Table 4-8	Station Location .....	4-22
Table 4-9	Types of Platform .....	4-24
Table 4-10	Comparison Table on Platform Arrangement.....	4-28
Table 4-11	Key Operation Data and Parameters .....	4-33
Table 4-12	Sectional Passenger Demand during Peak Hour .....	4-36
Table 4-13	Turn-back Time per Train.....	4-39
Table 4-14	Type of Platform and Arrival and Departure of Train.....	4-40
Table 4-15	Turn back Time at Station W-Sta. 5 (In case of Using Turn-back Facility Located at the end of Station W-Sta. 15) .....	4-41
Table 4-16	Turn-back Time for Station.....	4-42
Table 4-17	Possible Minimum Headway .....	4-44
Table 4-18	Calculation of Minimum Headway .....	4-45
Table 4-19	Travel Time from WN-Sta. 1 Station .....	4-46
Table 4-20	Estimation of Required Number of Train-sets .....	4-47
Table 4-21	Calculation of Rolling Stock Requirement and Purchase Schedule - Phases 1 and 2 Combined (Currency Unit: LE million) .....	4-49
Table 4-22	Hourly Number of Trains Operating on Metro Line 2.....	4-50
Table 4-23	Hourly Number of Trains on Metro Line 4 (Working Day, One-way) .....	4-51
Table 4-24	Hourly Number of Trains on Metro Line 4 (Holiday, One-way).....	4-51
Table 4-25	Estimated Daily Number of Trains (Working day, One-way) and Train-kilometres .....	4-52
Table 4-26	Major Fire Accidents with Passenger’s Damage of Metro (Tunnel and Underground Station) of the World since 1980 .....	4-54
Table 4-27	Major Fire Accidents at Road Tunnel of the World.....	4-57
Table 4-28	Use of NFPA 130 in North America (USA and CANADA) .....	4-60
Table 4-29	Use of Cross Passages in Metro of 17 Cities of Europe .....	4-64
Table 4-30	Main Features of Metros in Tokyo City.....	4-65
Table 4-31	Design Fire.....	4-76
Table 4-32	Fire Load Model for Rolling Stock .....	4-76
Table 4-33	Fire Load Model for Kiosk .....	4-77
Table 4-34	Proposed Time Frame Set by NFPA 130 .....	4-112
Table 4-35	Comparison of Compression Load and Train Weight.....	4-116
Table 4-36	Comparison of Body Materials .....	4-116
Table 4-37	Operation Performance and Train Formation.....	4-117

Table 4-38	Main Specification of Rolling Stock (R.S) for Cairo Metro .....	4-125
Table 4-39	Main Specifications of the Rolling Stock .....	4-126
Table 4-40	Geotechnical Soil Parameters.....	4-133
Table 4-41	Comparison of the Tail Void.....	4-144
Table 4-42	Comparison between the Single Track Double Tunnel and the Double Track Single Tunnel .....	4-156
Table 4-43	Comparison between the EPBS TBM and the Slurry Shield TBM.....	4-158
Table 4-44	General Features of the EPBS ( $\phi$ 6.95 m) .....	4-165
Table 4-45	Comparison between the EPBS TBM and the Slurry Shield TBM.....	4-178
Table 4-46	General Feature of the Shield TBM and Segmental Lining.....	4-186
Table 4-47	Longitudinal Dimension of Launch Shaft (corresponding to Figure 4-143).....	4-188
Table 4-48	Transverse Dimension of Launch Shaft (corresponding to Figure 4-144).....	4-188
Table 4-49	Vertical Dimension of Launch Shaft (corresponding to Figure 4-144) .....	4-189
Table 4-50	Longitudinal Dimension of Arrival Shaft (corresponding to Figure 4-145).....	4-190
Table 4-51	Transverse Dimension of Arrival Shaft (corresponding to Figure 4-146).....	4-190
Table 4-52	Vertical Dimension of Arrival Shaft (corresponding to Figure 4-144).....	4-190
Table 4-53	Longitudinal Dimension of Arrival Shaft (Vertical, Corresponding to Figure 4-149).....	4-193
Table 4-54	Transverse Dimension of Arrival Shaft (vertical, corresponding to Figure 4-150).....	4-193
Table 4-55	Vertical Dimension of Arrival Shaft (vertical, corresponding to Figure 4-152).....	4-193
Table 4-56	Longitudinal Dimension of Launch Shaft (vertical, corresponding with Figure 4-151).....	4-195
Table 4-57	Transverse Dimension of Launch Shaft (vertical, corresponding with Figure 4-152).....	4-195
Table 4-58	Basic Requirement for the Structural Planning.....	4-198
Table 4-59	Comparison of Typical Features of Standard Stations .....	4-199
Table 4-60	Outline of Station of Metro Line 4 (1/7) .....	4-201
Table 4-61	Outline of Station of Metro Line 4 (2/7) .....	4-202
Table 4-62	Outline of Station of Metro Line 4 (3/7) .....	4-203
Table 4-63	Outline of Station of Metro Line 4 (4/7) .....	4-204
Table 4-64	Outline of Station of Metro Line 4 (5/7) .....	4-205
Table 4-65	Outline of Station of Metro Line 4 (6/7) .....	4-206
Table 4-66	Outline of Station of Metro Line 4 (7/7) .....	4-207
Table 4-67	Planned Height of Facilities and Rooms in Station.....	4-208
Table 4-68	Comparison of Structures for the Standard Station.....	4-214
Table 4-69	Comparison of Total Cost.....	4-232
Table 4-70	Comparison Table of Soil Improvement Method for Embedded Section of the Diaphragm Wall of Sta. No. 4.....	4-244
Table 4-71	Comparison Table of Soil Improvement Method for Embed Section of the Diaphragm Wall of Sta. No. 3.....	4-253
Table 4-72	Comparison Table of Construction Method for Sta. No. 2.....	4-261
Table 4-73	Comparison Table of Soil Improvement Method for the Embed Section of the Diaphragm Wall of Sta. No. 2.....	4-263
Table 4-74	Comparison Table of Tunnel Construction Method for Turn Back Section Behind Sta. No. 1 .....	4-273
Table 4-75	Comparison Table of Soil Improvement Method for the Embed Section of the Diaphragm Wall of Sta. No. 1 .....	4-274
Table 4-76	Summary of Station Construction Period .....	4-293
Table 4-77	Construction Schedule .....	4-300
Table 4-78	Track Specifications of Existing Lines .....	4-303
Table 4-79	Proposed Track Equipments Specifications for Metro Line 4.....	4-303
Table 4-80	Annual Gross Tonnage .....	4-305

Table 4-81	Basic Physical Properties and Secular Change .....	4-307
Table 4-82	Characteristics of General Tracks .....	4-308
Table 4-83	Classification of Station Characteristics .....	4-312
Table 4-84	Comparison of Track Circuit Type .....	4-338
Table 4-85	Main Features of the Power Supply System in the Existing Lines.....	4-347
Table 4-86	Key Features of the Power Supply System for Metro Line 4 .....	4-347
Table 4-87	Major Assumptions for the Estimation of Power Consumption.....	4-350
Table 4-88	Estimated Power Demand and Transformer Capacity .....	4-351
Table 4-89	Comparison of Traction System .....	4-352
Table 4-90	Permissive Lowest and Highest, and Nominal Voltage in IEC .....	4-353
Table 4-91	Key Assumptions for Determining Capacity of Rectifier (1).....	4-357
Table 4-92	Key Assumptions for Determining Capacity of Rectifier (2).....	4-357
Table 4-93	Estimated Maximum Power per Hour for One RS and Rated Capacity of Rectifier .....	4-358
Table 4-94	Outline of the Two Types of Overhead Catenary System .....	4-361
Table 4-95	Major Characteristics of Catenary Used in Line 1 and ORC .....	4-362
Table 4-96	Examples of control and monitoring items.....	4-363
Table 4-97	Example of Full-height PSD in Tropical Climate Countries .....	4-367
Table 4-98	Current AFC Development in the Metro .....	4-375
Table 4-99	Ticket Media and IC Chip Standards.....	4-379
Table 4-100	Comparison of AG Types .....	4-380
Table 4-101	Design Condition of Outside Temperature and Humidity .....	4-389
Table 4-102	Design Parameter in Station .....	4-389
Table 4-103	Simulation of Power Consumption .....	4-390
Table 4-104	Design Condition of Temperature and Humidity (Inside Station).....	4-390
Table 4-105	Operation Time of Air Condition .....	4-390
Table 4-106	Minimum Air Requirement for Each Location .....	4-391
Table 4-107	Design Heat Load in Each Place.....	4-393
Table 4-108	Design Heat Load from each Passenger and Station Staff .....	4-394
Table 4-109	Design Heat Load from Light.....	4-394
Table 4-110	Design Air Volume Brought by the Train .....	4-396
Table 4-111	Accumulated Design Heat Loads for Cooling.....	4-397
Table 4-112	Selected Cooling Facilities .....	4-398
Table 4-113	Air Conditioning Method .....	4-401
Table 4-114	Required Capacity for Air Conditioning Facilities .....	4-403
Table 4-115	Capacity of the Selected Air Conditioning Facilities .....	4-404
Table 4-116	Minimum Air Volume for Each Place .....	4-407
Table 4-117	Minimum Air Volume for Rooms.....	4-407
Table 4-118	Comparison of Tunnel Ventilation Method .....	4-410
Table 4-119	Required Capacity of Ventilation Facilities .....	4-411
Table 4-120	Capacity of the Selected Ventilation Facilities.....	4-412
Table 4-121	Required Area in Ventilation Shaft and its Opening Area.....	4-415
Table 4-122	Major Roles of Controllers.....	4-451
Table 4-123	Facilities Required at CCP .....	4-451
Table 4-124	Basic Functions of the PTC.....	4-454
Table 4-125	Example of Control and Monitoring Items .....	4-460
Table 5-1	Key Features for Alignment Planning (Phase 2) .....	5-1
Table 5-2	Basic Features of Metro Line 4 (Phase 2) .....	5-2
Table 5-3	Considerations for Possible Alignment for Phase 2 .....	5-5
Table 5-4	Proposed Station Arrangement for Phase 2.....	5-10
Table 5-5	Geotechnical Soil Parameters.....	5-14
Table 5-6	Basic Requirements for Structural Planning.....	5-15
Table 5-7	Material and Structure of the Segmental Lining .....	5-18
Table 5-8	Outline of Metro Line 4 Underground Stations (Phase 2).....	5-35
Table 5-9	Outline of Each Street .....	5-53
Table 5-10	Outline of Elevated Stations (Phase 2) .....	5-55



Table 5-11	Typical Types of Station .....	5-55
Table 5-12	Number of Stations and Intervals .....	5-63
Table 5-13	Comparison of the Three Location Cases .....	5-79
Table 5-14	Comparison of Three Alternative Routes .....	5-80
Table 6-1	Major Roles of Controllers .....	6-7
Table 6-2	Facilities Required at the CCP .....	6-7
Table 6-3	Operation Modes .....	6-20
Table 6-4	Typical Examples of Facility Improvement .....	6-27
Table 6-5	Number of Daily Inspections by Time Interval on Metro Line 2 .....	6-33
Table 6-6	Working Conditions of the Existing Metro Lines .....	6-41
Table 6-7	Yearly Train-km and Number of Drivers of Cairo Metro .....	6-41
Table 6-8	Distance between stations on each line of the Cairo Metro .....	6-42
Table 6-9	Work volume per driver in Japan .....	6-42
Table 6-10	Distance between Stations of Each Line .....	6-43
Table 6-11	Annual Train-km of Metro Line 4 (Unit: 000km) .....	6-43
Table 6-12	Estimated Number of Drivers for Metro Line 4 .....	6-43
Table 6-13	Two-driver Shunting System in the Depot .....	6-44
Table 6-14	Number of Drivers in the Depot .....	6-44
Table 6-15	Staff in the CCP of Cairo Metro .....	6-45
Table 6-16	Major roles of train controllers .....	6-45
Table 6-17	Estimated Number of Staff at the CCP for Metro Line 4 .....	6-46
Table 6-18	Number of station staff on Cairo Metro .....	6-46
Table 6-19	Breakdown of number of staff at typical stations .....	6-47
Table 6-20	Staff per Station of the Japanese Metro Systems .....	6-47
Table 6-21	Current Situation and Conceptual Plan for Metro Line 4 .....	6-48
Table 6-22	Breakdown of Number of Staff at Typical Stations on Metro Line 4 .....	6-49
Table 6-23	Passenger Demand for Individual Stations on Metro Line 4 .....	6-49
Table 6-24	Required Number of Station Staff for Metro Line 4 .....	6-50
Table 6-25	Civil and track maintenance staff on existing Cairo Metro .....	6-51
Table 6-26	Civil and Track Maintenance Staff in Japan .....	6-52
Table 6-27	Required Number of Civil and Track Maintenance Staff for Metro Line 4 .....	6-52
Table 6-28	Rolling Stock Maintenance Staff on Existing Cairo Metro .....	6-53
Table 6-29	Rolling Stock Maintenance Staff in Japanese Metro Systems .....	6-53
Table 6-30	Required Number of Rolling Stock Maintenance Staff on Metro Line 4 .....	6-54
Table 6-31	Electrical equipment Maintenance Staff for the Existing Cairo Metro .....	6-55
Table 6-32	Breakdown of Skilled Staff for Electrical Equipment Maintenance for the Cairo Metro .....	6-55
Table 6-33	Electrical Equipment Maintenance Staff in Japanese Metro Systems .....	6-56
Table 6-34	Required Number of Staff for Electrical Equipment Maintenance on Metro Line 4 .....	6-56
Table 6-35	Number of Administrative and Labouring Staff on the Existing Cairo Metro .....	6-57
Table 6-36	Administrative staff in Japanese metro systems .....	6-57
Table 6-37	Alternative Methods for Estimating the Number of Administrative Staff .....	6-57
Table 6-38	Estimated Total Staff Requirement on Metro Line 4 .....	6-59
Table 6-39	Basic Initial Training Period by Staff Category .....	6-60
Table 6-40	Curriculum and duration of classroom lessons .....	6-61
Table 6-41	Curricula and duration of practical training on the mainline .....	6-61
Table 6-42	Comparison Between Urban and Intercity Railways .....	6-62
Table 6-43	Examination for Obtaining Drivers' License .....	6-62
Table 6-44	Comparison of staff training plans .....	6-63
Table 6-45	Proposed training period by staff category .....	6-64
Table 6-46	Total Proposed Schedule for Training .....	6-65

Table 7-1	Project Implementation Schedule (STEP Loan) .....	7-2
Table 7-2	Project Implementation Schedule (Normal Yen Loan) .....	7-2
Table 7-3	Sources of Estimated Rates/Prices .....	7-4
Table 7-4	Summary of Estimated Initial Cost (STEP Loan).....	7-6
Table 7-5	Summary of Estimated Initial Cost (Normal Yen Loan) .....	7-7
Table 7-6	Estimated Cost of PSD (Phase 1) .....	7-8
Table 7-7	Estimated Cost of PSD (Phase 2) .....	7-8
Table 7-8	Breakdown of O&M Costs of ECM (2008-2009).....	7-10
Table 7-9	O & M Cost of Japanese Metro Systems 2007/2008 .....	7-11
Table 7-10	Comparison of Work Efficiency between Metro Line 4 and Existing Lines .....	7-12
Table 7-11	Estimation of Average Personnel Cost of Metro Line 4.....	7-12
Table 7-12	Estimation of Total Skilled Personnel Costs for Metro Line 4.....	7-13
Table 7-13	Power Cost for Metro Line 4 Operation .....	7-13
Table 7-14	Estimation of Foreign Engineers' Cost in Rolling Stock Outsourcing .....	7-14
Table 7-15	Estimation of Signal Maintenance Outsourcing Cost (Foreign Engineers).....	7-14
Table 7-16	Estimation of Local Staff Number and Cost in the Outsourcing of Maintenance.....	7-15
Table 7-17	Estimation of Yearly Total Outsourcing Cost (Unit; LE '000).....	7-15
Table 7-18	Miscellaneous Maintenance Cost of Japanese Metros .....	7-16
Table 7-19	Estimation of Miscellaneous Maintenance Cost for Metro Line 4 .....	7-16
Table 7-20	Total Outsourcing and Miscellaneous Maintenance Cost for Metro Line 4 .....	7-17
Table 7-21	Modified Estimation of Total Skilled Personnel Costs for Metro Line 4 .....	7-17
Table 7-22	Spare Parts Cost for Modern Japanese EMU .....	7-18
Table 7-23	Yearly Spare Parts Cost of Rolling Stock .....	7-18
Table 7-24	Estimation of Other Spare Parts Cost for Equipment .....	7-19
Table 7-25	Estimation of Yearly Parts Cost.....	7-19
Table 7-26	Estimation of yearly cleaning cost per station .....	7-19
Table 7-27	Estimation of Unit Cleaning Cost for rolling stock.....	7-20
Table 7-28	Estimation of Yearly Cleaning Cost of Stations for Metro Line 4.....	7-20
Table 7-29	Estimation of Yearly Cleaning Cost of Rolling Stock for Metro Line 4 .....	7-20
Table 7-30	Estimation of Yearly Cleaning Cost for Metro Line 4.....	7-20
Table 7-31	Estimation of Unit Security Cost for the Existing Lines.....	7-21
Table 7-32	Estimation of Yearly Security Cost for Stations for Metro Line 4.....	7-21
Table 7-33	Estimation of Outsourcing Cost for Artisans and Laborers for Metro Line 4....	7-22
Table 7-34	Estimation of Other Costs for Metro Line 4 .....	7-22
Table 7-35	Estimation of Consolidated Other Costs .....	7-22
Table 7-36	Total O&M Cost for Metro Line 4.....	7-23
Table 7-37	Breakdown of O&M Cost for Metro Line 4 by Phase.....	7-23
Table 7-38	Scheme of Packaging .....	7-25
Table 7-39	Package Scope .....	7-25
Table 7-40	Assortment and Amount of Each Scheme.....	7-26
Table 7-41	Comparison of Contract Schemes .....	7-27
Table 9-1	Maximum Limits of Outdoor Air Pollutants .....	9-4
Table 9-2	Water Quality Standards for Fresh Water Bodies .....	9-4
Table 9-3	Maximum Limit of Noise Intensity in Different Areas .....	9-5
Table 9-4	Comparison between Egyptian EIA System and JICA/ex JBIC Guidelines .....	9-7
Table 9-5	List of Natural Protectorates in Egypt.....	9-9
Table 9-6	List of Wildlife Protection Areas in Egypt.....	9-10
Table 9-7	Mandate Demarcation on Water Quality Monitoring in Egypt.....	9-12
Table 9-8	Monitoring Results of Noise (dB).....	9-15
Table 9-9	Actual and Forecasted Student Population in the Study Area.....	9-17
Table 9-10	Literacy, Unemployment, and Poverty Rates in the Study Area.....	9-17
Table 9-11	Land Use in the Study Area from 2001 to 2007 .....	9-18

Table 9-12	Area Which Was Converted Into Urban area in 2001-2007 .....	9-18
Table 9-13	Authorities Concerned on Environmental and Social Considerations .....	9-19
Table 9-14	Results of Environmental Scoping .....	9-20
Table 9-15	Scoping Matrix (1/2) .....	9-24
Table 9-16	Scoping Matrix (2/2) .....	9-25
Table 9-17	Environmental and Social Aspects Surveyed as Baseline .....	9-27
Table 9-18	Basic Socio-economic Information of Concerned Districts .....	9-29
Table 9-19:	Impact Identification and Mitigation Measures Proposed (Pre-Construction Stage).....	9-33
Table 9-20	Monitoring Items and Directions Proposed.....	9-36
Table 9-21	Outlines of Stakeholder Meetings .....	9-37
Table 9-22	Summary of 1st Stakeholder Meetings .....	9-38
Table 9-23	Topics Raised in First Series of Stakeholder Meetings .....	9-39
Table 9-24	Summary of Attendees of the 2nd Stakeholder Meeting on EIA .....	9-40
Table 9-25	Major Topics Raised in the 2nd Stakeholder Meeting on EIA .....	9-40
Table 10-1	Responsibility of Relevant Authorities in the Assessment Committee.....	10-3
Table 10-2	Procedure of Land Acquisition and Resettlement .....	10-4
Table 10-3	Discrepancies between JICA and JBIC Guidelines and Egyptian Regulations .....	10-5
Table 10-4	Magnitude of Land Acquisition and Resettlement at Metro Line 3 Phase1 .....	10-7
Table 10-5	Distribution of Household Interview Survey .....	10-8
Table 10-6	Average Number of Persons per Household in the Study Area .....	10-9
Table 10-7	Average Monthly Income in Governorates of the Project Area.....	10-10
Table 10-8	Average Monthly Income by Occupational Category in the Project Area .....	10-10
Table 10-9	Average Weekly and Monthly Wage (for Selected Sectors) in Egypt.....	10-10
Table 10-10	Proposed Monitoring Checklist.....	10-17
Table 10-11	Proposed Schedule of Land Acquisition and Resettlement for Phase 1 .....	10-20
Table 10-12	Proposed Schedule of Land Acquisition and Resettlement for Phase 2 .....	10-21
Table 10-13	Expected Magnitude of Land Acquisition and Resettlement at Phase 1 .....	10-24
Table 10-14	Expected Magnitude of Land Acquisition and Resettlement at Phase 2 .....	10-25
Table 10-15	Estimated Cost for Land Acquisition and Compensation for Phase 1 .....	10-26
Table 10-16	Estimated Cost for Land Acquisition and Compensation for Phase 2 .....	10-27
Table 11-1	SCA Inspectorate Covering the Area of Metro Line 4 .....	11-4
Table 11-2	Level and the Criteria of Buried Archaeological Properties .....	11-25
Table 11-3	Risk Assessment on Study Area .....	11-26
Table 11-4	Countermeasure and the Action.....	11-29
Table 11-5	Schedule of Preliminary Survey .....	11-31
Table 12-1	Environmental Checklists for Phase 1 by ex-JBIC Guidelines (No. 15 Roads and Railways) .....	12-2
Table 13-1	Example of SPF Calculation (Station Civil Works Cost).....	13-1
Table 13-2	Summary of Initial Capital Costs used as Input for the Discounted Cash Flow (DCF) Analysis (STEP Loan).....	13-3
Table 13-3	Summary of initial capital costs used as input for the Discounted Cash Flow (DCF) analysis (Normal Loan) .....	13-4
Table 13-4	Summary of Initial Capital Costs used as Input for the Economic Flow Analysis.....	13-5
Table 13-5	Summary of Rolling Stock Investment Costs used for DCF Analysis.....	13-6
Table 13-6	Summary of Rolling Stock Investment Costs used for Economic Flow Analysis.....	13-7
Table 13-7	O&M Costs – Financial and Economic (LE million) .....	13-8
Table 13-8	Greater Cairo Daily Traffic Circulation “With” and “Without” the Project.....	13-11
Table 13-9	Metro User Passenger Hours “With” and ”Without” the Project.....	13-12

Table 13-10	Physical Characteristics of Vehicle Population.....	13-13
Table 13-11	Estimation of Petroleum Fuel Subsidies.....	13-14
Table 13-12	Unit Prices for VOC Components.....	13-15
Table 13-13	Estimated Unit Vehicle Operating Costs (VOCs) .....	13-16
Table 13-14	Conversion of VOC per Vehicle-km to per PCU-km.....	13-17
Table 13-15	Conversion of VOC per Vehicle-hour to per PCU-hour .....	13-17
Table 13-16	Socio-Economic Framework in the Study Area .....	13-18
Table 13-17	Average Monthly and Hourly Income for Workers in the Study Area .....	13-18
Table 13-18	Weighted Distribution of Commuter Trips by Trip Purpose .....	13-19
Table 13-19	Estimated Value of Travel Time, by Commuter Category, in the Study Area .....	13-19
Table 13-20	Conversion of VOT per Person-Hour to per PCU-Hour (Remaining Road Users).....	13-19
Table 13-21	Estimates of Value of Travel Time for Metro Users.....	13-20
Table 13-22	Calculation of Fuel Consumption per PCU-km.....	13-21
Table 13-23	Weighted Average Rate of GHG Emissions per Litre of Fuel Consumed .....	13-22
Table 13-24	Estimated Emission Factors in Grams per Kilometre .....	13-23
Table 13-25	Conversion of Emission Factors per VKM to per PCU-Km - Noxious gases and Particulate Matter.....	13-24
Table 13-26	Estimates of Air Pollution Damage Costs in Egypt.....	13-25
Table 13-27	Analysis of Net Economic Benefits – Phase 1 Route Section only.....	13-29
Table 13-28	Analysis of Net Economic Benefits – Combined Phase 1 and 2 Routes .....	13-30
Table 13-29	Sensitivity Analysis of Economic Results for Phase 1 only .....	13-31
Table 13-30	Sensitivity Analysis of Economic Results for Phases 1 and 2 Combined.....	13-31
Table 13-31	Escalation Rates Assumed for DCF Analysis.....	13-33
Table 13-32	Passenger Demand Forecasts for Phase 1 Only .....	13-34
Table 13-33	Passenger Demand Forecasts for Phases 1 and 2 Combined.....	13-34
Table 13-34	Cairo Metro – Number of Passengers and Revenue for 2007/08.....	13-35
Table 13-35	Cairo Metro – Quarterly Ticket Fare Concessions .....	13-35
Table 13-36	Revenue Projections – Phase 1 Only Project.....	13-36
Table 13-37	Revenue Projections – Combined Phases 1 and 2 Project.....	13-37
Table 13-38	Terms and Conditions of Loans for Cairo Metro Development.....	13-38
Table 13-39	Assumed Loan Conditions for Cairo Metro Line 4 Project.....	13-42
Table 13-40	Comparison of Financial Results for STEP Loan vs. Normal Loan with Standard Conditions - Financing of Phase 1 project.....	13-43
Table 13-41	Sensitivity Analysis of Financial Results for Phase 1 Only .....	13-45
Table 13-42	Sensitivity Analysis of Financial Results for Phases 1 and 2 Combined .....	13-46

Figure 1-1	Study Area .....	1-3
Figure 2-1	Hourly Distribution of Metro Passengers (Boarding Time-Based) .....	2-5
Figure 2-2	Hourly Distribution of Metro Passengers (Alighting Time-Based).....	2-6
Figure 4-1	Proposed Platform Length.....	4-7
Figure 4-2	Structure Gauge and Car Limit Gauge .....	4-8
Figure 4-3	Shield Tunnel Cross Section .....	4-9
Figure 4-4	Viaduct Cross Section .....	4-10
Figure 4-5	Culvert Cross Section .....	4-10
Figure 4-6	Platform Section.....	4-11
Figure 4-7	Planning Methodology.....	4-12
Figure 4-8	Existing Control Points .....	4-13
Figure 4-9	Outline of Alignment for Phase 1.....	4-20
Figure 4-10	Schematic Plan and Profile .....	4-21
Figure 4-11	Schematic Track Layout.....	4-23
Figure 4-12	Proposed Plan View of Station No. 1 .....	4-25
Figure 4-13	Parameter Study for the Track Layout of El Malek El Saleh Station .....	4-27
Figure 4-14	Proposed Track Layout Plan for El Malek El Saleh Station.....	4-29
Figure 4-15	Proposed Plan View of Station No. 2 .....	4-29
Figure 4-16	Proposed Track Layout Plan for Station No. 2 .....	4-30
Figure 4-17	Configuration of the Platform and Position of the Train Stop.....	4-30
Figure 4-18	Proposed Track Layout Plan for Stations No. 5 and No. 9.....	4-31
Figure 4-19	Proposed Track Layout Plan for Station No. 15 .....	4-31
Figure 4-20	Proposed Track Layout Plan for Station Nos. 3, 4, 13 .....	4-32
Figure 4-21	Proposed Track Layout Plan for Typical Station .....	4-32
Figure 4-22	Workshop/Depot Lead Track Layout Plan.....	4-33
Figure 4-23	Workflow of Train Operating Plan .....	4-35
Figure 4-24	Concept of Calculation Method for Required Number of Train Sets.....	4-36
Figure 4-25	Track Layout of the Phase 1 Section .....	4-37
Figure 4-26	Track Layout for Station WN-Sta.1.....	4-39
Figure 4-27	Track Layout for Station W-Sta. 5 and Turn-back Sequence (In case of Turn-back to Station W-Sta. 15).....	4-41
Figure 4-28	Track Layout for Station W-Sta. 9 and Turn-back Facility .....	4-42
Figure 4-29	Track Layout of W-Sta. 15 (Scissors are redrawn to Single Crossovers for Clear Explanation) .....	4-43
Figure 4-30	Turn-back Time of Train-set at W-Sta. 15 Station .....	4-44
Figure 4-31	Train Operation Curve (From WN-Sta. 1 to W-Sta. 15).....	4-46
Figure 4-32	Fire at Underground Station of Metro in Japan (1999-2001).....	4-55
Figure 4-33	Fire Accident in Road Tunnel (Long Tunnel or Congested City Tunnel) .....	4-56
Figure 4-34	Example of Cross Passages between Main Road Tunnel and Evacuation Tunnel (L = 6.3 km) .....	4-56
Figure 4-35	Fatal Fire Accident at the Dague Metropolitan Subway, 2003.....	4-58
Figure 4-36	Combustible Material in the Rolling Stock of Dague Metro (Polyester, Urethane Foam, FRP, etc. ) .....	4-59
Figure 4-37	Sequence of the Fire that Spread at Dague Metro.....	4-59
Figure 4-38	Requirement of Intermediate Shaft for Passenger Evacuation by NFPA 130 .....	4-63
Figure 4-39	Photo (Singapore) and Image of the Cross Passages between Tunnels .....	4-63
Figure 4-40	Cross Passages for Long Railway Tunnel .....	4-66
Figure 4-41	Image of Normal Fire Load Model.....	4-70
Figure 4-42	Smoke Density and Required Visibility for Smooth Evacuation.....	4-70
Figure 4-43	Image of Fire Load Model by Arson with Fuel.....	4-71
Figure 4-44	Required Space for the Evacuation in case of Fire by Arson with Fuel.....	4-71
Figure 4-45	Use of Non-combustible Material for the Chair in the Station.....	4-73

Figure 4-46	Example of Convenience Store in Underground Station .....	4-74
Figure 4-47	Example of Kiosks in Underground Station .....	4-74
Figure 4-48	Burning Test by Cone Calorimeter (ISO5660-1) .....	4-75
Figure 4-49	Fire Load Model of Rolling Stock .....	4-76
Figure 4-50	Fire Load Model of Kiosk.....	4-77
Figure 4-51	Cross Section Area for Volume of Block at Fire Point .....	4-81
Figure 4-52	Side Walk in Tunnel (Inspection Gallery) .....	4-85
Figure 4-53	Principle of Train Operation in Case of Fire .....	4-86
Figure 4-54	Image of Normal Operation of Ventilation System .....	4-86
Figure 4-55	Centrifugal Fan for Tunnel Ventilation.....	4-87
Figure 4-56	Image of Smoke Exhaust for Fire on Concourse.....	4-87
Figure 4-57	Smoke Exhaust on Platform.....	4-88
Figure 4-58	Exhaust Duct in Platform.....	4-88
Figure 4-59	Ventilation Operation for Fire on Station Track (With Ducts Actually Located Over or Under the Track).....	4-89
Figure 4-60	Exhaust of Smoke in Tunnel .....	4-90
Figure 4-61	Exhaust Duct in Tunnel .....	4-90
Figure 4-62	Fire Detector (Left: Smoke Type, Right: Heat Type; Source: MLIT).....	4-91
Figure 4-63	Fire Detector (Left: Smoke Type, Right: Heat Type; Source: MLIT).....	4-91
Figure 4-64	Closed Circuit Television.....	4-92
Figure 4-65	Telecommunication System and Public Address System.....	4-93
Figure 4-66	Provision of Two Separated Evacuation Passages with Ascending Stairs.....	4-94
Figure 4-67	Provision of One Separated Evacuation Passages with Ascending Stairs.....	4-94
Figure 4-68	Example of Evacuation Passage with Descending Stair .....	4-95
Figure 4-69	Guide Lighting for Exit.....	4-96
Figure 4-70	Example of Direction and Distance Sign Board.....	4-97
Figure 4-71	Smoke Curtain (Shutter).....	4-97
Figure 4-72	Fire Protection Compartment (Screen Type with Door) .....	4-98
Figure 4-73	Fire Protection Shutter .....	4-99
Figure 4-74	Example of Indoor Fire Hydrant .....	4-99
Figure 4-75	Example of Hydrant for Water Outlet in Station (Left) and Siamese Connection for Water Supply on Ground Level (Right) .....	4-101
Figure 4-76	Example of Hydrant for Water Outlet and Water Pipe Connection in Tunnel .....	4-101
Figure 4-77	Example of Emergency Control Room in Station .....	4-102
Figure 4-78	Construction Gauge and Rolling Stock Gauge.....	4-115
Figure 4-79	Train Formation of Type-1 .....	4-119
Figure 4-80	Train Formation of Type-2.....	4-120
Figure 4-81	Typical Layout of Rolling Stocks .....	4-121
Figure 4-82	Permanent Magnet Synchronous Motor (PMSM).....	4-128
Figure 4-83	Roof-mounted Air-conditioning Equipment.....	4-130
Figure 4-84	Interior Design and VIS .....	4-130
Figure 4-85	Typical Particle Size Distribution (from the Data of Station No.9) .....	4-133
Figure 4-86	Tunnel Cross Section in Shallow Overburden (adjacent to Sta. No. 5) .....	4-134
Figure 4-87	Tunnel Cross Section in Deep Overburden (adjacent to Sta. No. 3) .....	4-134
Figure 4-88	Distribution of Fine Material Content and Uniformity Coefficient .....	4-135
Figure 4-89	Cross Section of the Shield Tunnel .....	4-136
Figure 4-90	Outer Diameter-Thickness Relationship of the Segmental Lining .....	4-137
Figure 4-91	Outer Diameter-Longitudinal Length Relationship of the Segmental Lining .....	4-138
Figure 4-92	Thickness-Longitudinal Length Relationship of the Segmental Lining .....	4-138
Figure 4-93	Photo of the Transmission Strip and Shear Strip .....	4-139
Figure 4-94	Outline of the Segmental Lining (Example) .....	4-140
Figure 4-95	Gasket Type Water Stop.....	4-141
Figure 4-96	Performance of Water Stop under the Joint Gap and Offset Condition.....	4-142

Figure 4-97	Residual Stress History .....	4-142
Figure 4-98	Ground Surface Settlement by the Shield TBM.....	4-144
Figure 4-99	Comparison of Hardening Time and Initial Strength (One-Component and Two-Component Types).....	4-145
Figure 4-100	Improvement of the Ground Surface Settlement caused by the Shield TBM .....	4-145
Figure 4-101	Trial Construction Using Shield TBM .....	4-146
Figure 4-102	Procedure for the Trial Construction Using Shield Tunnel.....	4-147
Figure 4-103	Post Injection Through the Grout Hole of the Segmental Lining.....	4-147
Figure 4-104	Image of Soil Improvement from the Cutting Face of the Shield TBM.....	4-148
Figure 4-105	Visualized Fluidity in Excavation Chamber and Measurement Equipment.....	4-149
Figure 4-106	Radar Detector on the Cutting Head of the Shield TBM.....	4-149
Figure 4-107	Man Lock in the Shield TBM .....	4-150
Figure 4-108	FFU at Launching and Arrival Shafts .....	4-150
Figure 4-109	Invert Area of Cross Section .....	4-151
Figure 4-110	Diameter-Weight Relationship of the EPBS TBM.....	4-152
Figure 4-111	Required Overburden at Nile River Crossing .....	4-153
Figure 4-112	Tunnel in the Vicinity of Existing Structures (Left: STDT, Right: DTST) .....	4-153
Figure 4-113	Air Flow and Traffic Flow in Tunnel .....	4-154
Figure 4-114	Photo of the STDT for Metro .....	4-155
Figure 4-115	Application of Different Shield TBM Types in Japan (1998-2007) .....	4-159
Figure 4-116	EPBS TBM (Outer Diameter 6.24m) .....	4-160
Figure 4-117	Design Earth Pressure at Bulkhead and Outline of EPBS TBM .....	4-161
Figure 4-118	Deformation and fluidization of muddy soil in excavation chamber .....	4-162
Figure 4-119	Image of Muddy soil in Excavation Chamber .....	4-162
Figure 4-120	Outline of the EPBS TBM, $\phi$ 6.95 m (Example) .....	4-166
Figure 4-121	Example of Bits on Cutter Head (Left: Pre-Cutting and Tooth Bits, Right: Roller Cutter and Tooth Bits).....	4-167
Figure 4-122	Image of the Extension of the Continuous Belt Conveyor .....	4-168
Figure 4-123	Flow chart of Control of the Cutting Face of the EPBS TBM.....	4-171
Figure 4-124	Major Neighboring Constructions .....	4-172
Figure 4-125	No. 12 El-Nile Flyover .....	4-173
Figure 4-126	No. 53 El-Giza Flyover .....	4-174
Figure 4-127	No. 56 El-Rat Flyover.....	4-174
Figure 4-128	No. 75 Tunnel.....	4-175
Figure 4-129	No.125 Tunnel.....	4-175
Figure 4-130	No.127 Road underpass .....	4-176
Figure 4-131	No. 155 Magra El-Eyoon (Water Supply Viaduct) .....	4-176
Figure 4-132	Sound Survey and Historical Analysis of the River Bed at Nile River Crossing.....	4-177
Figure 4-133	Model of the Study for the Floating of Tunnel at Nile River Crossing .....	4-178
Figure 4-134	Plan and Profile of ENR Access Line .....	4-179
Figure 4-135	Isolation Distance Between ENR Access Line and Mainline Eastbound.....	4-180
Figure 4-136	Launch shaft of ENR access line .....	4-181
Figure 4-137	Ground Improvement at Shallow Overburden .....	4-182
Figure 4-138	Arrival Shaft of the ENR Access Line .....	4-182
Figure 4-139	Risk Area of Collapsible Ground and Plotted Data of Geological Survey.....	4-184
Figure 4-140	Allocation of the Shield TBM .....	4-185
Figure 4-141	The Shifter for the Shield TBM in Station (Ball Slider).....	4-186
Figure 4-142	Plan of Launch and Arrival Shaft.....	4-187
Figure 4-143	Profile of Launch Shaft.....	4-187
Figure 4-144	Cross Section of Launch Shaft.....	4-188
Figure 4-145	Profile of Arrival Shaft .....	4-189
Figure 4-146	Plan of Arrival Shaft .....	4-189
Figure 4-147	Photo of Arrival Shaft (Vertical) .....	4-191
Figure 4-148	Plan of Launch and Arrival Shaft (Vertically Located Tunnels).....	4-192

Figure 4-149	Profile of Arrival Shaft (Vertically-Located Tunnels) .....	4-192
Figure 4-150	Plan of Arrival Shaft (Vertically-Located Tunnels) .....	4-192
Figure 4-151	Profile of Launch Shaft (Vertically Located Tunnels).....	4-194
Figure 4-152	Cross Section of Launch Shaft (Vertically Located Tunnels).....	4-194
Figure 4-153	Layout of the Launch Shaft Construction Yard of Station No. 9 .....	4-196
Figure 4-154	Layout of the Launch Shaft Construction Yard of Station No.14 .....	4-197
Figure 4-155	Outline of Stations of Metro Line 4 (Phase 1).....	4-200
Figure 4-156	Structural Gauge and Inner Cross Section of Station.....	4-208
Figure 4-157	Height of Spaces and Rooms in Station.....	4-209
Figure 4-158	Distribution of Structural Columns and Array of the PSD .....	4-209
Figure 4-159	Minimum Width of Escalator and Stairway .....	4-210
Figure 4-160	Platform Structure Plan of a Standard Station.....	4-211
Figure 4-161	Section of Standard Three-storey Station .....	4-211
Figure 4-162	Section of Standard Two-storey Station .....	4-212
Figure 4-163	Section of Standard Two-storey Station with Atrium .....	4-212
Figure 4-164	Plan of Standard Three-storey Station .....	4-213
Figure 4-165	Plan of Standard Two-storey Station.....	4-213
Figure 4-166	Plan of Standard Two-storey Station with Atrium .....	4-213
Figure 4-167	Elongated Standard Three-storey Station .....	4-215
Figure 4-168	Elongated Standard Two-storey Station.....	4-215
Figure 4-169	Relocation of Columns for Standard Stations.....	4-216
Figure 4-170	Plan of El Malek El Saleh Station.....	4-217
Figure 4-171	Structure of El Malek El Saleh Station .....	4-218
Figure 4-172	Large Opening for the Stairway and Escalator.....	4-219
Figure 4-173	Arrangement of the Supplemental Structural Wall and Column to Support Large Opening on Slabs .....	4-219
Figure 4-174	Turn Back Track Section (Scissors Crossing) .....	4-220
Figure 4-175	Plan of El Rauda Station .....	4-221
Figure 4-176	Structure of El Rauda Station.....	4-222
Figure 4-177	Large Opening for the Stairway and Escalator.....	4-222
Figure 4-178	Plan of El Nile Station .....	4-223
Figure 4-179	Structure of El Nile Station .....	4-224
Figure 4-180	Large Opening for the Stairway and Escalator.....	4-224
Figure 4-181	Support Mechanism in case of Open Slab .....	4-225
Figure 4-182	Plan of El Giza Station .....	4-226
Figure 4-183	Cross Section of El Giza Station .....	4-227
Figure 4-184	Cross Section of El Remayah Station .....	4-228
Figure 4-185	Section of Platform Structure of El Remayah Station.....	4-228
Figure 4-186	Cross Section of Station No. 13 .....	4-229
Figure 4-187	Cross Section of Station No. 15 .....	4-230
Figure 4-188	Existing Traffic Condition.....	4-231
Figure 4-189	Comparison of Traffic Condition During Construction .....	4-232
Figure 4-190	Location of Stations Constructed Through Typical Method.....	4-233
Figure 4-191	Construction Procedure (1) of Typical Method.....	4-234
Figure 4-192	Road Decking.....	4-234
Figure 4-193	Construction Procedure (2) of Typical Method.....	4-235
Figure 4-194	Construction Yard for Diaphragm Wall.....	4-235
Figure 4-195	Construction Procedure (3) of Typical Method.....	4-236
Figure 4-196	Construction Yard for Excavation and Other Related Works.....	4-236
Figure 4-197	Construction Procedure (4) of Typical Method.....	4-237
Figure 4-198	Construction Procedure (5) of Typical Method.....	4-237
Figure 4-199	Construction Procedure (6) of Typical Method.....	4-238
Figure 4-200	Construction Procedure (7) of Typical Method.....	4-238
Figure 4-201	Traffic Management Plan during Implementation of Procedure 1 to 3 of Typical Construction Method.....	4-239
Figure 4-202	Traffic Management Plan during Implementation of Procedure 5 to 7 of Typical Construction Method.....	4-240



Figure 4-203	Complex Location of Sta. No. 4 (El-Giza) .....	4-241
Figure 4-204	Vicinity of Sta. No. 4 (El-Giza).....	4-241
Figure 4-205	Present situation at Location of Sta. No. 4 (El-Giza) .....	4-242
Figure 4-206	Anticipated Completed Section of Sta. No. 4 (El-Giza) .....	4-242
Figure 4-207	Procedure (1) for the Construction of Sta. No.4 .....	4-245
Figure 4-208	Procedure (2) for the Construction of Sta. No.4 .....	4-246
Figure 4-209	Traffic Management Plan during Implementation of Procedure 1 to 3 for the Construction of Sta. No.4 .....	4-247
Figure 4-210	Traffic Management Plan during Implementation of Procedure 5 to 6 for the Construction of Sta. No.4 .....	4-248
Figure 4-211	Traffic Management Plan during Implementation of Procedure 7 to 9 for the Construction of Sta. No. 4 .....	4-249
Figure 4-212	Complex of Location of Sta. No. 3 (El-Nile).....	4-250
Figure 4-213	Vicinity of Sta. No. 3 (El-Nile) .....	4-250
Figure 4-214	Present Situation of Sta. No. 3 (El-Nile) .....	4-251
Figure 4-215	Anticipated Completed Section of Sta. No. 3 (El-Nile) .....	4-251
Figure 4-216	Special Equipment (Portal Frame) for Construction of Diaphragm Wall at Narrow Road .....	4-252
Figure 4-217	Special Equipment, BMX, for Construction of Diaphragm Wall .....	4-252
Figure 4-218	Procedure 1 to 5 for the Construction of Sta. No. 3.....	4-254
Figure 4-219	Procedure 6 to 8 for the Construction of Sta. No. 3.....	4-255
Figure 4-220	Traffic Management Plan during Implementation of Procedure 1 to 3 for the Construction of Sta. No. 3 .....	4-256
Figure 4-221	Traffic Management Plan during Implementation of Procedure 4 to 6 for the Construction Sta. No. 3 .....	4-257
Figure 4-222	Traffic Management Plan during Implementation of Procedure 7 to 9 for the Construction of Sta. No. 3 .....	4-258
Figure 4-223	Complex Location of Sta. No. 2 (El-Rauda) .....	4-259
Figure 4-224	Vicinity of Sta. No. 2 (El-Rauda).....	4-259
Figure 4-225	Present situation of Sta. No. 2 (El-Rauda) .....	4-260
Figure 4-226	Anticipated Completed Section of Sta. No. 2 (El-Rauda) .....	4-260
Figure 4-227	Pre-Shell Method .....	4-262
Figure 4-228	Multi Face Shield TBM .....	4-262
Figure 4-229	JSG Method and Column Jet Grout Method .....	4-263
Figure 4-230	Procedure for Construction of Sta. No. 2: Standard Section .....	4-265
Figure 4-231	Procedure 1 to 5 for the Construction of Sta. No. 2: Underpinning Section .....	4-266
Figure 4-232	Procedure 6 to 9 for the Construction of Sta. No. 2: Underpinning Section .....	4-267
Figure 4-233	Traffic Management Plan during the Implementation of Procedure 1 and 2 for the Construction of Sta. No. 2 .....	4-268
Figure 4-234	Traffic Management Plan during the Implementation of Procedure 3 to 5 for the Construction of Sta. No. 2 .....	4-269
Figure 4-235	Traffic Management Plan during the Implementation of Procedure 6 and 7 for the Construction of Sta. No. 2 .....	4-270
Figure 4-236	Complex Location of Sta. No. 1 (El-Malek El-Saleh).....	4-271
Figure 4-237	Vicinity of Sta.No.1 (El-Malek El-Saleh) .....	4-271
Figure 4-238	Present Situation of Sta. No. 1 (El Malek El Saleh).....	4-272
Figure 4-239	Anticipated Completed Section of Sta. No. 1 (El Malek El Saleh) .....	4-272
Figure 4-240	Procedure for Construction of Sta. No. 1.....	4-275
Figure 4-241	Procedure 1 to 4 for the Construction of Sta. No. 1: Turn Back Section Behind.....	4-276
Figure 4-242	Procedure 5 to 7 for the Construction of Sta. No. 1: Turn Back Section Behind.....	4-277
Figure 4-243	Traffic Management Plan during Implementation of Procedure 1 to 3 for the Construction of Sta. No. 1 .....	4-278
Figure 4-244	Traffic Management Plan during the Implementation of Procedure 4 to	

	6 for the Construction of Sta. No. 1 .....	4-279
Figure 4-245	Traffic Management Plan during the Implementation of Procedure 7 to 9 for the Construction of Sta. No. 1 .....	4-280
Figure 4-246	Location of Sta. No. 12 (El Remayah).....	4-281
Figure 4-247	Vicinity of Sta. No. 12 (El Remayah) .....	4-281
Figure 4-248	Anticipated Completed Section of Sta. No. 12 (El Remayah).....	4-282
Figure 4-249	Procedure 1 to 5 for the Construction of Sta. No. 12 (El-Remayah).....	4-283
Figure 4-250	Procedure 6 to 8 for the Construction of Sta. No. 12 (El Remayah) .....	4-284
Figure 4-251	Traffic Management Plan during the Implementation of Procedure 1 and 2 for the Construction of Sta. No. 12 .....	4-285
Figure 4-252	Traffic Management Plan during the Implementation of Procedure 3 to 5 for the Construction of Sta. No. 12 .....	4-286
Figure 4-253	Traffic Management Plan during the Implementation of Procedure 6 and 7 for the Construction of Sta. No. 12 .....	4-287
Figure 4-254	Location of Sta. Nos. 13-15.....	4-288
Figure 4-255	Vicinity at Sta. Nos. 13-15 .....	4-288
Figure 4-256	Anticipated Completed Section of Sta. No. 13 .....	4-289
Figure 4-257	Staging to Adjust Inclination .....	4-290
Figure 4-258	Procedure for the Construction of Sta. No. 13.....	4-291
Figure 4-259	Traffic Management Plan during the Implementation of Procedure for the Construction of Sta. Nos. 13 and 14 .....	4-292
Figure 4-260	Detailed Schedule for the Construction of Sta. Nos. 1 to 3 .....	4-294
Figure 4-261	Detailed Schedule for the Construction of Sta. Nos. 4 to 9 .....	4-295
Figure 4-262	Detailed Schedule for the Construction of Sta. Nos. 10 to 13 .....	4-296
Figure 4-263	Detailed Schedule for the Construction of Sta. Nos. 14 and 15 .....	4-297
Figure 4-264	Construction Plan of Shield Tunnel .....	4-298
Figure 4-265	Detailed Schedule of Shield TBM Driving .....	4-299
Figure 4-266	Construction Schedule .....	4-301
Figure 4-267	Construction Schedule (Alternative) .....	4-302
Figure 4-268	Shape of the UIC Rails.....	4-304
Figure 4-269	Sample of PSC Sleeper .....	4-306
Figure 4-270	Synthetic Sleeper .....	4-306
Figure 4-271	Resiliently-Supported Track .....	4-307
Figure 4-272	Example of Anti-vibration System .....	4-308
Figure 4-273	Concept of Double Elastic Fastening .....	4-309
Figure 4-274	Typical Types of Fastening System .....	4-309
Figure 4-275	Double Elastic Fastening for Straight and over 800 m Radius Curve Section .....	4-310
Figure 4-276	Double Elastic Fastening for under 800 m Radius Curve Section.....	4-310
Figure 4-277	Outline of Metro Line 4.....	4-312
Figure 4-278	Gallery at the Heart of the Great Pyramid (Khufu) .....	4-314
Figure 4-279	Signature Station El Remayah .....	4-314
Figure 4-280	El Malek El Saleh Station Plaza .....	4-315
Figure 4-281	Need of Redevelopment .....	4-316
Figure 4-282	Section of Redevelopment Area.....	4-316
Figure 4-283	Giza Station Plaza.....	4-317
Figure 4-284	El Remayah Station .....	4-318
Figure 4-285	Entrance.....	4-319
Figure 4-286	Ventilation Shaft .....	4-319
Figure 4-287	Cooling Tower .....	4-320
Figure 4-288	Image of the Short Circuit.....	4-320
Figure 4-289	Station Signalling System.....	4-330
Figure 4-290	Configuration of the Detailed Signalling System .....	4-331
Figure 4-291	Configuration of PTC System.....	4-335
Figure 4-292	Example of the Application of Pjc System (Tsukuba Express in Japan) .....	4-335
Figure 4-293	Comparison of Continuous Control ATP Systems.....	4-337
Figure 4-294	Running Profile of the ATO .....	4-340

Figure 4-295	Configuration of Telecommunication Lines .....	4-342
Figure 4-296	Configuration of SDH Systems.....	4-343
Figure 4-297	Configuration of Train Radio System Using LCX .....	4-344
Figure 4-298	Overall View of the Power Supply System .....	4-346
Figure 4-299	Locations of HVS Options, RS, and LPS .....	4-348
Figure 4-300	Options for Feeding Route from Transmission Line to HVS in Option-1 .....	4-350
Figure 4-301	Proposed Development Corridors in Greater Cairo Region in SDMP .....	4-351
Figure 4-302	Standard Section of Shield Tunnel.....	4-356
Figure 4-303	Cabling between HVS and RSs for Phase 1 Only.....	4-359
Figure 4-304	Cabling between HVS and RSs for Phase 1 and 2 .....	4-359
Figure 4-305	Electrolytic Corrosion Caused by Return Current.....	4-365
Figure 4-306	Decrease by Automatic Return Current Switchgear and Two-pole Disconnecter .....	4-366
Figure 4-307	Drainage Methods.....	4-366
Figure 4-308	General System Configuration for PSD.....	4-370
Figure 4-309	Image of COP .....	4-372
Figure 4-310	Image of SSOP .....	4-372
Figure 4-311	Image of MCS .....	4-373
Figure 4-312	Image of MDB .....	4-373
Figure 4-313	HS .....	4-374
Figure 4-314	System Unification Plan for AFC Development in Lines 1 and 2, and Line 3 .....	4-376
Figure 4-315	Conceptual System Architecture of Integrated AFC System in Metro .....	4-377
Figure 4-316	Image of Air Flow in the Air Conditioner .....	4-391
Figure 4-317	Image of Fan Coil Unit System.....	4-392
Figure 4-318	Image of Packaged Air Conditioning System .....	4-393
Figure 4-319	Ratio of the Braking Heat Load to the Platform .....	4-395
Figure 4-320	Diagram of Cooling Facilities.....	4-399
Figure 4-321	Refrigeration Machine and their Required Spaces.....	4-400
Figure 4-322	Image of El Remayah Station.....	4-401
Figure 4-323	Diagram of Air Conditioning Facilities Flow in the Station .....	4-405
Figure 4-324	Outline of Air Conditioning Facilities and their Required Spaces .....	4-406
Figure 4-325	Ventilation Method for Rooms and Closed Spaces .....	4-408
Figure 4-326	Single Track Double Tunnel (left) and Double Track Single Tunnel (right).....	4-410
Figure 4-327	Centrifugal Fan for Tunnel Ventilation (left) and Saccardo Nozzle (right) .....	4-411
Figure 4-328	Diagram of Tunnel and Track Ventilation Facilities Flow.....	4-413
Figure 4-329	Outline of Tunnel and Track Ventilation Fans and their Required Spaces .....	4-414
Figure 4-330	Outline of Water Tank, Pump and their Required Spaces in the Station .....	4-419
Figure 4-331	Configuration of PTC system .....	4-455
Figure 4-332	Example of the Application of Pjc System (Tsukuba Express in Japan) .....	4-456
Figure 4-333	Configuration of Telecommunication Lines .....	4-457
Figure 4-334	Configuration of SDH Systems.....	4-458
Figure 4-335	Configuration of Train Radio System Using LCX .....	4-459
Figure 5-1	Planning Methodology.....	5-2
Figure 5-2	The World Heritage of Islamic Cairo Area .....	5-4
Figure 5-3	Existing Spine Sewage Tunnels.....	5-8
Figure 5-4	Proposed Alignment Plan View for Phase 2.....	5-11
Figure 5-5	Sketch of Proposed Alignment for Phase 2.....	5-12
Figure 5-6	Proposed Track Layout Plan for Phase 2.....	5-13
Figure 5-7	Clearance of Tunnel.....	5-15
Figure 5-8	Outline of Station Location and Station Type .....	5-17
Figure 5-9	Structure of Segmental Lining .....	5-18
Figure 5-10	Route Overlapped with SWWT .....	5-20

Figure 5-11	Outline of Cross Section of Metro Line 4 and SWWT .....	5-21
Figure 5-12	Daily Waste Water Level Image of SWWT .....	5-22
Figure 5-13	Installation of the Sensor in the Waste Water Tunnel .....	5-23
Figure 5-14	Optical Fibre Sensor .....	5-24
Figure 5-15	Practice of Using Optical Fibre Sensor in Tunnel .....	5-24
Figure 5-16	Procedure (1) for Case 1 of Observation Method for SWWT .....	5-25
Figure 5-17	Procedure (2) for Case 1 of Observation Method for SWWT .....	5-26
Figure 5-18	Procedure for Case 1 of Observation Method for SWWT (3) .....	5-27
Figure 5-19	Movement Sensor in Case 2 .....	5-28
Figure 5-20	Procedure (1) for Case 2 of Observation Method for SWWT .....	5-29
Figure 5-21	Procedure (2) for Case2 of Observation Method for SWWT .....	5-30
Figure 5-22	Estimated Result on Deformation of SWWT .....	5-31
Figure 5-23	Moving Car Type Survey Equipment.....	5-32
Figure 5-24	Boat Type Survey Equipment.....	5-32
Figure 5-25	Construction Schedule for Phase 2.....	5-34
Figure 5-26	Cross Section of Station with SWWT and its Manhole .....	5-38
Figure 5-27	Sections Based on Technical Study .....	5-39
Figure 5-28	Construction Method (1) for the Manhole-affected Section of Station .....	5-41
Figure 5-29	Construction Method (2) for the Manhole-affected Section of Station .....	5-42
Figure 5-30	Construction Method (3) for the Manhole-affected Section of Station .....	5-43
Figure 5-31	Construction Method (1) for the SWWT-affected Section of the Station .....	5-45
Figure 5-32	Construction Method (2) for the SWWT-affected Section of the Station .....	5-46
Figure 5-33	Construction Method (3) for the SWWT-affected Section of the Station .....	5-47
Figure 5-34	Construction Method (1) for Underpinning of Large Manhole.....	5-49
Figure 5-35	Construction Method (2) for Underpinning of Large Manhole.....	5-50
Figure 5-36	Similar Construction Practice (1) with Existing Wastewater Tunnel .....	5-51
Figure 5-37	Similar Construction Practice (2) with Existing Waste Water Tunnel .....	5-51
Figure 5-38	Key Map .....	5-52
Figure 5-39	Example of PC Box Girder Superstructure.....	5-54
Figure 5-40	Description of Elevated Station .....	5-55
Figure 5-41	Typical Types of Station Arrangement .....	5-57
Figure 5-42	Possible Location and Layout of the Depot .....	5-60
Figure 5-43	Study Area .....	5-61
Figure 5-44	Key Map of Alternative Route.....	5-64
Figure 5-45	Route Map (1 of 2) .....	5-65
Figure 5-46	Route Map (2 of 2) .....	5-66
Figure 5-47	M4N Station No. 2 (AR1).....	5-67
Figure 5-48	M4N Station No. 3 (AR1).....	5-68
Figure 5-49	M4N Station No. 4 and M4N Station No. 5 (AR1) .....	5-68
Figure 5-50	M4N Station No. 6 and M4N Station No. 7 (AR1) .....	5-69
Figure 5-51	M4N Station No. 8 (AR1).....	5-70
Figure 5-52	M4N Station No. 3 (AR2).....	5-70
Figure 5-53	M4N Station No. 4 (AR2).....	5-71
Figure 5-54	M4N Station No. 5 (AR2).....	5-72
Figure 5-55	M4N Station No. 4 (AR3).....	5-73
Figure 5-56	M4N Station No. 5 (AR3).....	5-73
Figure 5-57	Existing Condition Around Ghamrah Station .....	5-74
Figure 5-58	Station Location Case 1 .....	5-75
Figure 5-59	Station Location Case 2 .....	5-76
Figure 5-60	Station Location Case 3 .....	5-77
Figure 5-61	M4N Station No. 2 (AR1).....	5-82
Figure 5-62	M4N Station No. 3 (AR1).....	5-83
Figure 5-63	M4N Station No. 4 (AR1).....	5-84
Figure 5-64	M4N Station No. 5 (AR1).....	5-85
Figure 5-65	M4N Station No. 6 (AR1).....	5-86
Figure 5-66	M4N Station No. 7 (AR1).....	5-87
Figure 5-67	M4N Station No. 8 (AR1).....	5-88

Figure 5-68	M4N Station No. 4 (AR2).....	5-89
Figure 5-69	M4N Station No. 5 (AR2).....	5-90
Figure 5-70	M4N Station No. 4 (AR3).....	5-91
Figure 5-71	M4N Station No. 5 (AR3).....	5-92
Figure 6-1	Number of Serious Railway Accidents in the World (More than 20 Casualties) .....	6-3
Figure 6-2	Turn back Operation During Contingency Period.....	6-12
Figure 6-3	Picture at the Hokuriku Tunnel Fire Accident .....	6-13
Figure 6-4	Schematic Diagram of the Central Station in Daegu During the Fire Accident .....	6-14
Figure 6-5	Action of Station Staff in Case of an Arriving Burning Train .....	6-16
Figure 6-6	Action of Station Staff in Case of Burning Train Stopping Between Stations .....	6-17
Figure 6-7	Action of Station Staff in Case of Fire in the Station Premises.....	6-18
Figure 6-8	Design of Depot for Shunting Works .....	6-25
Figure 6-9	Photo, E231 series of JR East .....	6-28
Figure 6-10	Photo of Modern IGBT Developed for Power Control .....	6-28
Figure 6-11	Trolleys for Working at Elevated Metro Line 2 of Cairo Metro .....	6-30
Figure 6-12	Case of Single-skilled Workers .....	6-31
Figure 6-13	Leveling of Work at Workshop of Metro Line 2.....	6-32
Figure 6-14	Vicious Circle of Management.....	6-37
Figure 6-15	Existing Organization of ECM .....	6-38
Figure 6-16	Management Organization Plan of ECM at the Opening of Metro Line 4.....	6-39
Figure 6-17	Comparison of Training Plans .....	6-64
Figure 6-18	Two Steps Instruction.....	6-65
Figure 7-1	Composition of the Project Cost.....	7-3
Figure 8-1	Project implementation schedule .....	8-3
Figure 9-1	EIA Approval Procedure under the Egyptian Legal Framework .....	9-3
Figure 9-2	Location of Natural Protectorates in Egypt.....	9-9
Figure 9-3	Location of Wildlife Protection Areas in Egypt.....	9-10
Figure 9-4	Geological Cross Section of Greater Cairo .....	9-10
Figure 9-5	Air Quality Monitoring Stations in Greater Cairo Region .....	9-11
Figure 9-6	SO <sub>2</sub> Concentration Monitored in Cairo and Giza .....	9-11
Figure 9-7	NO <sub>x</sub> Concentration Monitored in Cairo and Giza .....	9-12
Figure 9-8	PM <sub>10</sub> Concentration Monitored in Cairo and Giza .....	9-12
Figure 9-9	Monitoring Results in the Nile River (Biological Oxygen Demand).....	9-13
Figure 9-10	Monitoring Results in the Nile River (Chemical Oxygen Demand) .....	9-13
Figure 9-11	Monitoring Results in the Nile River (DO).....	9-14
Figure 9-12	Noise Monitoring Locations .....	9-14
Figure 9-13	Population in the Study Area in Census Years 1976-2006 .....	9-15
Figure 9-14	Population Increase in the Study Area (1976-2006) .....	9-16
Figure 9-15	Population Density in Greater Cairo in 2006 .....	9-16
Figure 9-16	Land Use in Greater Cairo in 2006.....	9-18
Figure 10-1	Transportation Mode Used at the Study Area .....	10-9
Figure 10-2	Property Ownership Status in the Study Area .....	10-11
Figure 11-1	Study Items and Procedure.....	11-1
Figure 11-2	Work Procedure of Archaeological Asset Study.....	11-5
Figure 11-3	Map Showing Location of Existing Archaeological Properties at Giza Area .....	11-6
Figure 11-4	Archaeological Map of Giza Plateau (Lehner 1985: Fig.2) .....	11-7
Figure 11-5	Reconstruction Plan at the Time of Pyramid Construction of Khufu	

	(Lehner 1985: Fig.3C) (Red line: Modern Border between Desert and Alluvial Areas) .....	11-8
Figure 11-6	Map of Sewers with Spots of Archaeological Finds (Hawass and Senussi 2008: Plan 6) (Blue: Architectural Remains, Red: Scattered Objects).....	11-9
Figure 11-7	Map with Location of Trench Excavation and Borings (El-Sanussi and Jones 1997: Fig.2) .....	11-11
Figure 11-8	SCA-GIS Map Showing Standing Properties in Historic Cairo Area.....	11-18
Figure 11-9	SCA-GIS Map Showing Standing Properties in Historic Cairo Area.....	11-19
Figure 11-10	Site Distribution Map in the Matariya Area (based on Dodson 2005: Fig.4.5).....	11-21
Figure 11-11	Pavements Uncovered Outside of SCA's Concession .....	11-21
Figure 11-12	Sherds Retrieved from Borehole Soils .....	11-24
Figure 13-1	Distribution of Economic Benefits by Type (2020-2050) for Phase 1 Route Section Only .....	13-26
Figure 13-2	Distribution of Economic Benefits by Type (2020-2050) for Phases 1 and 2 route .....	13-26
Figure 13-3	Key Economic Indicators for Cairo Metro Line 4 Project .....	13-27
Figure 13-4	FIRR and ROE Results for Cairo Metro Line 4 Project .....	13-44
Figure 13-5	NPV Results for CML-4 Project.....	13-44

ANNEXES

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**JICA PREPARATORY SURVEY**  
**ON**  
**GREATER CAIRO METRO LINE NO. 4**  
**IN**  
**the Arab Republic of Egypt**

**FINAL REPORT**

**Volume 3**

**(Feasibility Study Report 3/4)**

**ANNEXES**

- Annex 4-1: Calculation of Voltage Drop in Contact Line**
- Annex 4-2: Concept of the Separation of Traction and Lighting Network**
- Annex 4-3: Overhead Rigid Conductor**
- Annex 4-4: Electromagnetic Interference (EMI)**
- Annex 9-1: List of Fundamental Laws and Regulations on Environmental and Social Considerations in Egypt**
- Annex 9-2: Results of the 1st Stakeholder Meetings**
- Annex 9-3: Results of the 2nd Stakeholder Meeting**
- Annex 9-4: Proposed Outline of Implementation System for Environmental and Social Considerations of the Project [Phase 1]**
- Annex 10-1: Questionnaire Form for Household Interview Survey**
- Annex 10-2: Examination of Potential Impact on Land Acquisition and Property Demolition**
- Annex 10-3: Sample Form for Population Census**



## **Annex 4-1**

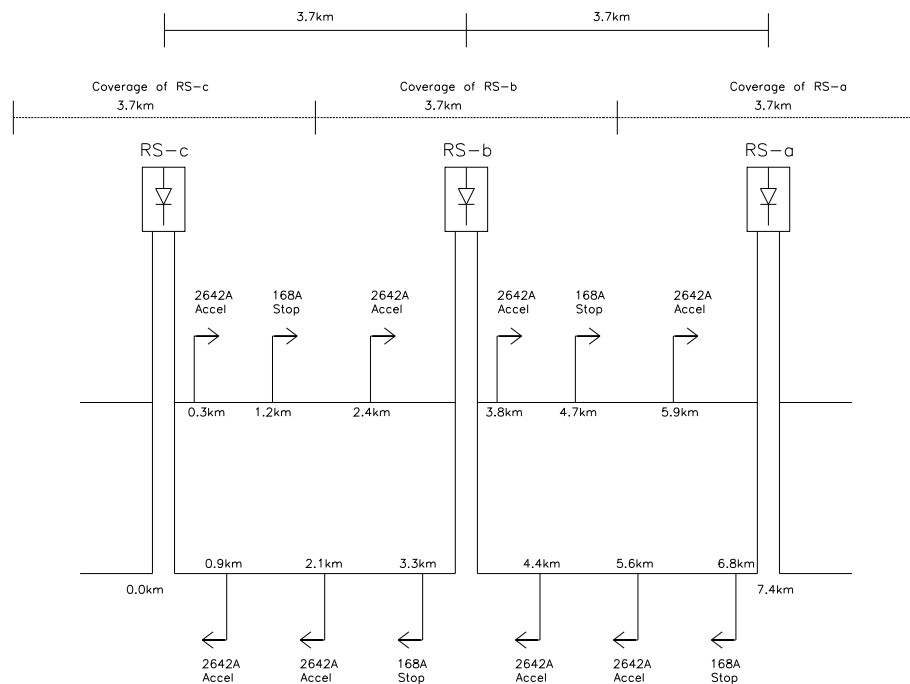
### **Calculation of Voltage Drop in Contact Line**

## Assumptions for calculation

This section describes the process of the determination of the interval of RSs based on the criteria mentioned in Section 4.10.3 (7).

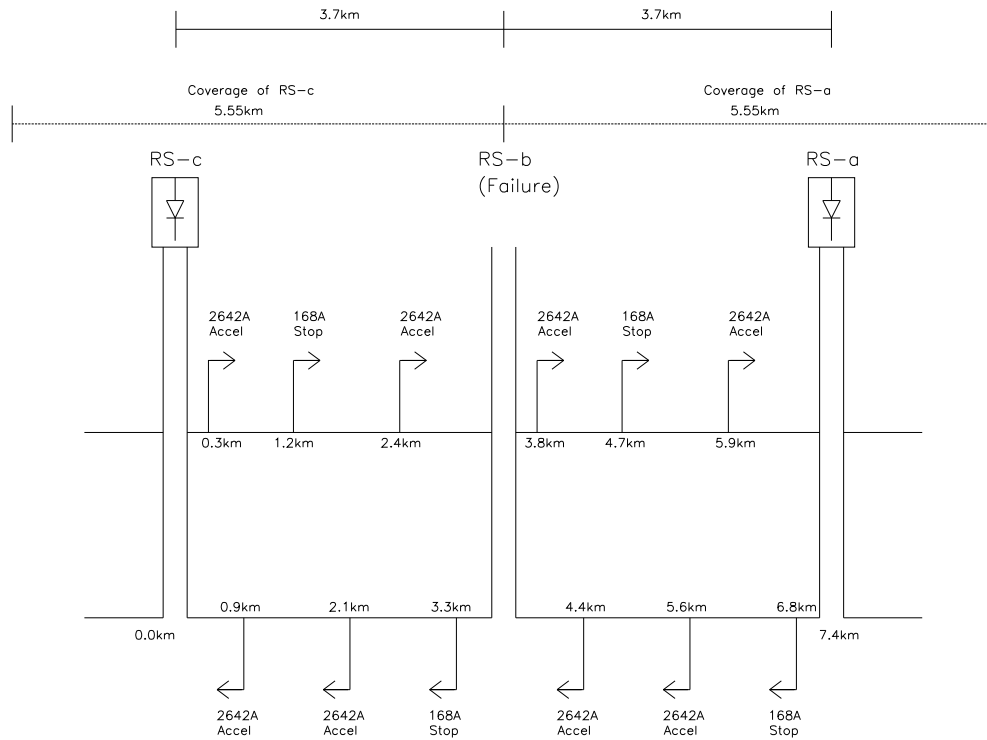
### 1. Current flow and RS interval

A key factor in the determination of intervals of RSs is the voltage drop in contact line. The voltage drop should be calculated by simulation study based on the actual train schedule and RS location and other detail specifications of the line in the Basic Design stage. However, a simplified model including current flow in contact line and RS location introduced in the Feasibility Study stage is deemed sufficient for the outline design of RS locations. Fig. 1a shows the three simplified RS models considering the maximum RS interval of 3.7km and current flow derived from the operation plan in Metro Line 4 under the assumptions of the train operation head way of 2:13 from the year 2027 to 2050. In Fig.1a, each arrow shows the rolling stock's direction and its location from RS-c. The captions on the arrows show that the consumption of current (Ampere) and status of the rolling stocks ("Accel" and "Stop" mean the accelerating and stopping train set, respectively.).



**Fig. 1a Assumptions for Current Flow and RS Interval in Normal Operation**

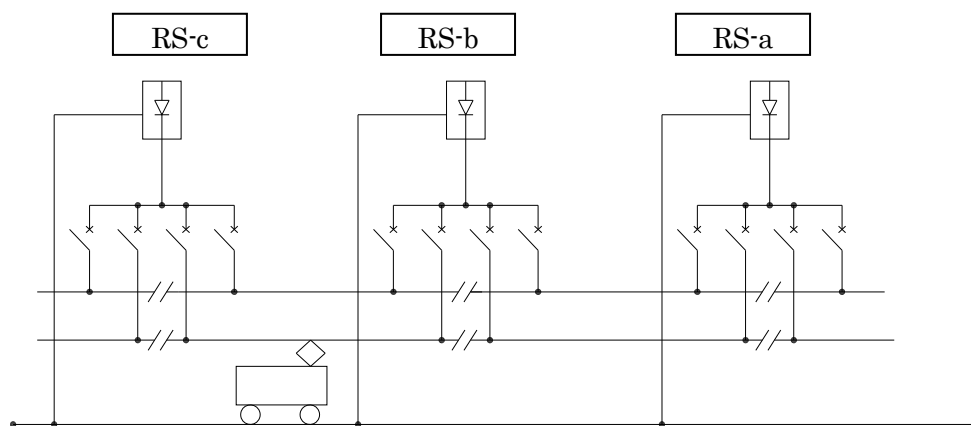
Fig.1b shows the case if RS-b has a failure. The contact line voltage must exceed the permissive lowest voltage for rolling stocks to maintain the normal operation even if one RS has a failure. Although the permissive lowest voltage is 1,000V DC in IEC standard 60850, the recommended contact line voltage should be more than 1,100V DC for more stable operation.



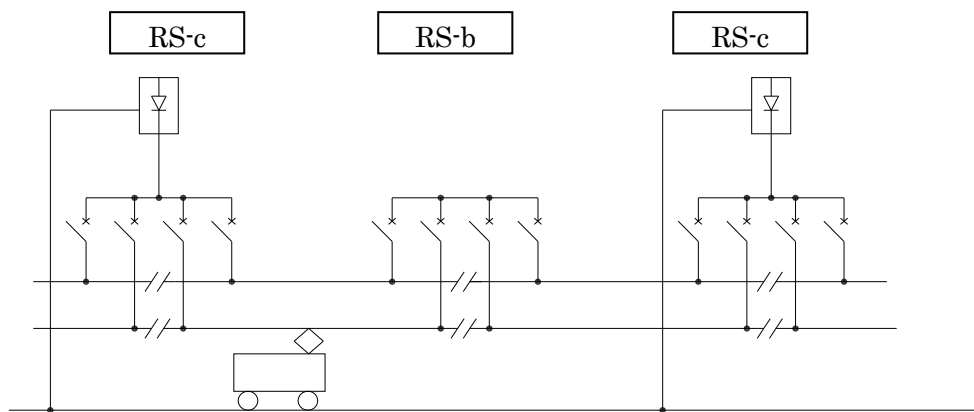
**Fig. 1b Assumptions for Current flow and RS interval in RS failure situation**

## 2. Circuit configuration

Fig. 2a shows the circuit configuration of contact line and RSs in normal operation. This type of configuration works as "Sectioning Post"; so that the contact lines of up and down lines are connected in parallel in the case of RS failure as illustrated in Fig. 2b. This will reduce the electric resistance of the contact line to half of the normal operation, and will contribute to lower voltage drop.



**Fig. 2a Circuit Configuration of Contact Line and RS in Normal Operation**



**Fig. 2b Circuit Configuration of Contact Line and RS in RS-b Failure**

### 3. Other assumptions

The other key assumptions for the calculation of voltage drop in the contact line are summarized in Table 1.

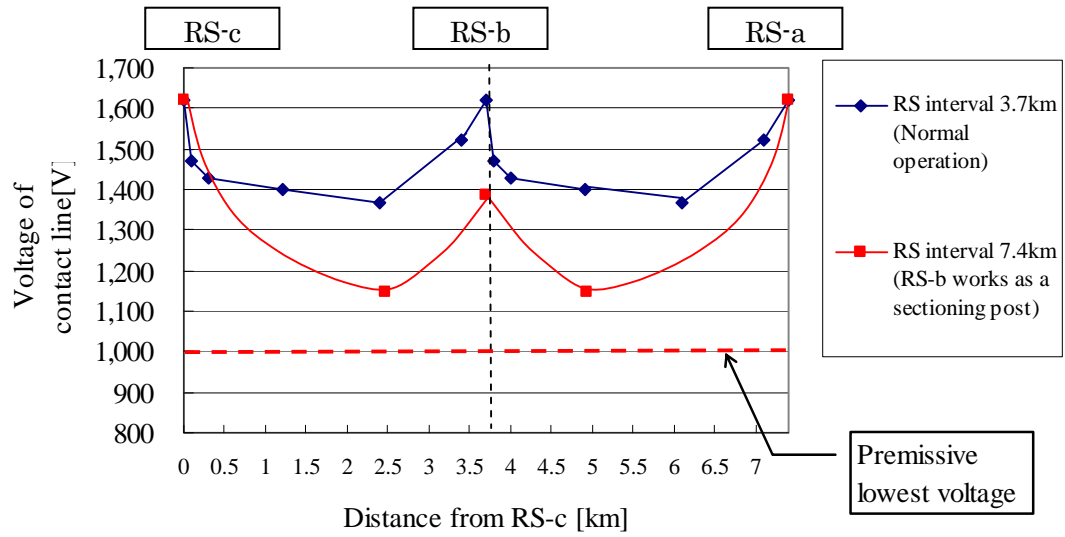
**Table 1 Other Assumptions**

Items	Value
Voltage fluctuation rate of RS	8.0 [%]
Equivalent internal resistance of rectifier	0.023 [ohm]
Resistance of rigid conductor	0.014 [ohm/km]
Combined resistance of two rails	0.015 [ohm/km]
Rate of current leakage into the ground	10 [%]
Total combined resistance of conductor (contact line and rail)	0.040 [ohm/km]
No load voltage at RS	1,620 [V]

Source: Specification in typical railway system in Japan

### 4. Result of the calculation

Fig. 3 shows the result of the calculation of contact line voltage. This figure proves that the contact line voltage exceeds 1,100V at minimum voltage point even if RS-b can not supply power to the contact line.

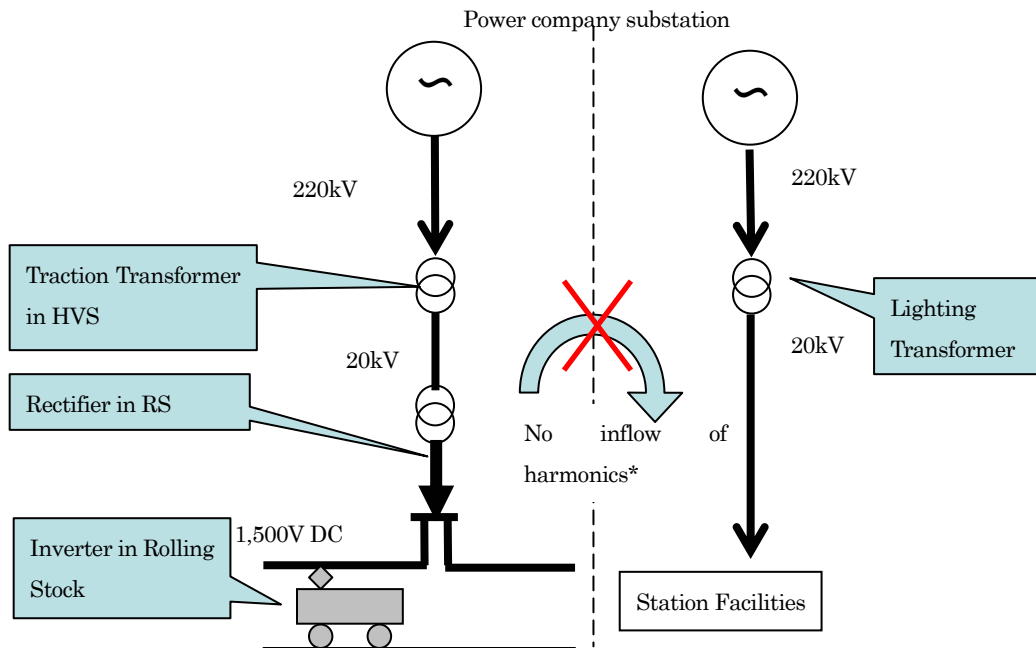


**Fig. 3 Result of the Calculation of Contact Line Voltage**

## **Annex 4-2**

### **Concept of the Separation of Traction and Lighting Network**

In Lines 1 and 2, harmonics current from the rectifier in RSs causes malfunctions of lighting equipment in the passenger stations. In Line 3, the traction and lighting feeding circuit is designed to be separated as shown in Fig. 1 in order to overcome the harmonics problem.



**Fig. 1 Concept of the Separation of Traction and Lighting Network**

## **Annex 4-3**

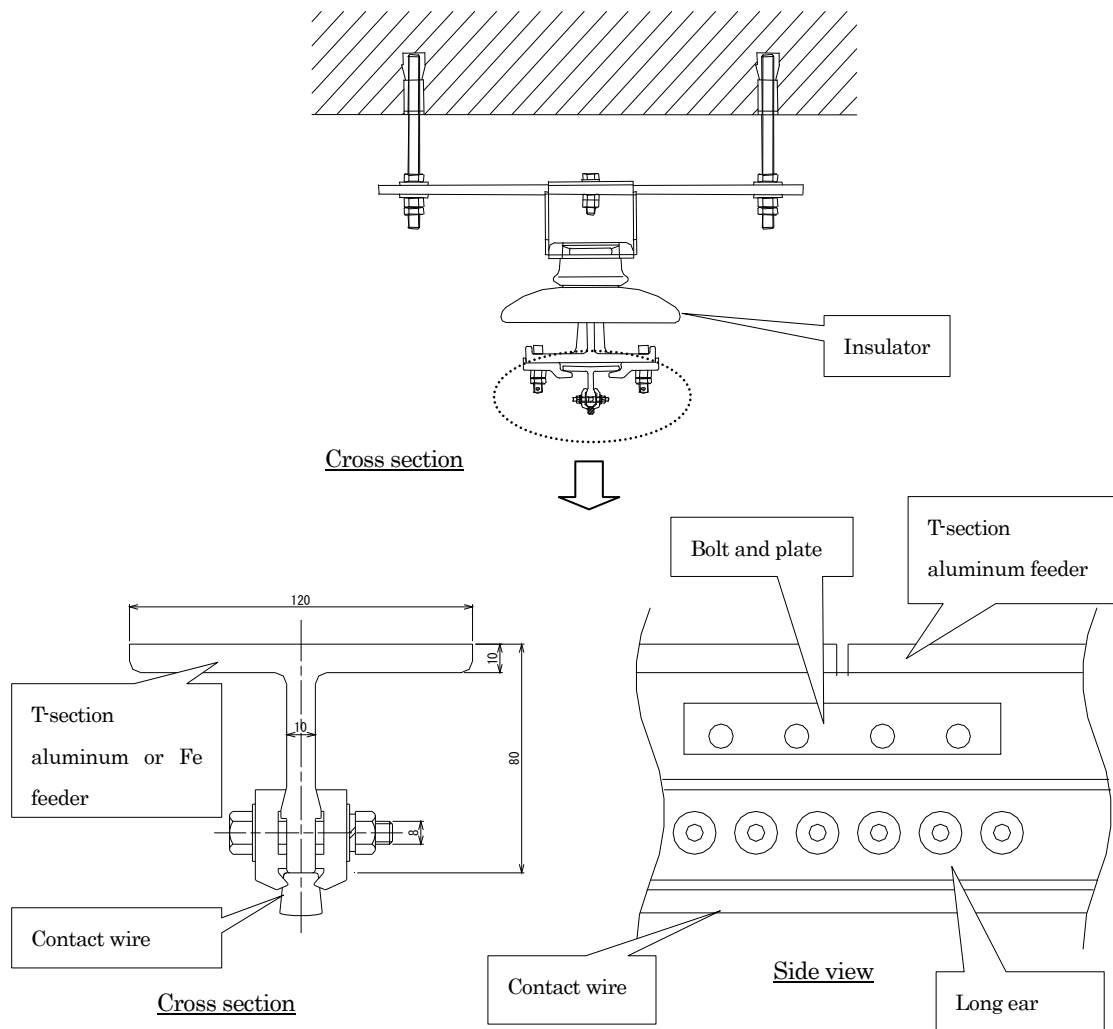
### **Overhead Rigid Conductor**



## Structure of ORC

Overhead Rigid Conductor (ORC) is classified mainly into two types of structure: T-section Feeder with Contact Wire Type and Conductive Rail Type.

### 1. T-section Feeder with Contact Wire Type



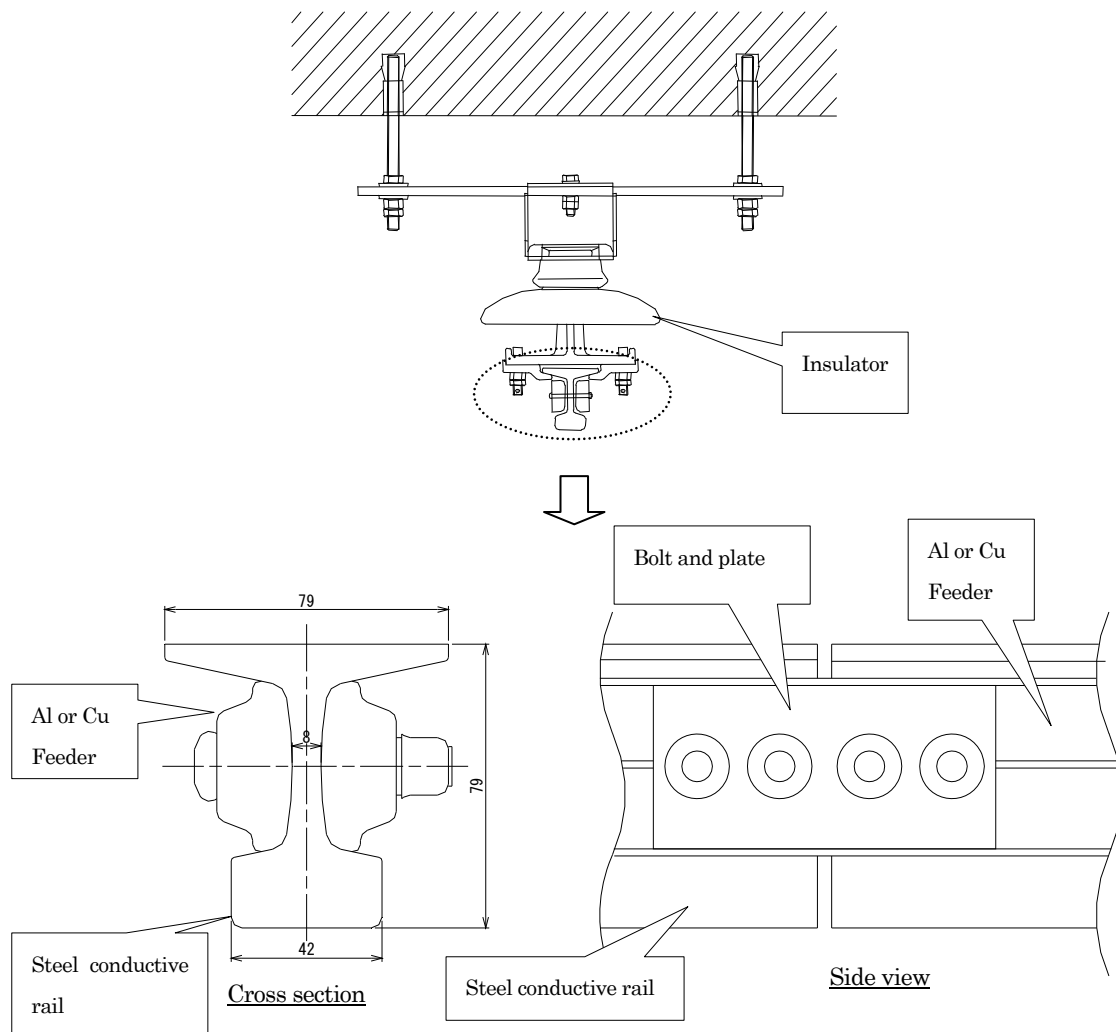
Source: JICA Study Team

**Fig.1 Structure of T-section Feeder with Contact Wire Type ORC**

This is illustrated in Fig. 1 wherein a contact wire (similar to catenary wire) is used as a contact material to a pantograph. This type is developed for mutual operation between Metro and suburban lines using catenary.

The contact wire is mounted on a T-shape aluminium alloy or iron supporting structure that serves as a feeder. Pull-off equipment and steady equipment are unnecessary, making the structure very simple.

## 2. Conductive Rail Type



Source: JICA Study Team

**Fig. 2 Structure of Conductive Rail Type ORC**

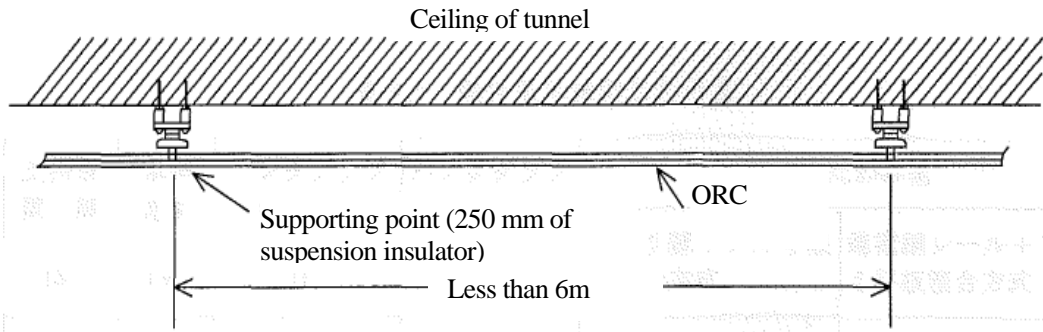
This is illustrated in Fig. 2 wherein a steel conductive rail is used as a contact material to a pantograph. Flat aluminium or copper plates are attached on the side of the conductive rail in order to compensate for the lack of current capacity of the conductive rail. Pull-off equipment and steady equipment are unnecessary same as the T-section Feeder with Contact Wire Type.

The unit length of steel rail is 10 to 12 m and the contact point between rails is fixed by simple bolting or welding in order to improve power collecting performance.

This type is not suitable for high-speed operation due to its structure. It can be used in the lines that have large transportation demand in middle-speed operation.

### 3. Interval of supporting point

The ORC is mounted on the ceiling of a tunnel by suspension insulation as shown in Fig. 3.



Source: JICA Study Team

**Fig. 3 Structure of supporting point of ORC (Side view)**

In Japanese codes, the interval of supporting points is limited to within 6 m in order to prevent excessive deflection due to its own weight which can lead to contact losses.

### 4. Power Collecting Performance of ORC

It is unavoidable for ORC to easily generate contact loss because it is not elastic as compared with catenary.

Generally, contact loss leads to wearing of contact surface. It is necessary to improve the accuracy of construction in order to attain uniform contact surface of the conductor as much as possible. Below are the three common types of ORC:

#### (1) Rigid conductor supported by spring

This type is for high speed operation more than 200 km/h. (Not suitable for Metro)

Measurement condition: Single pantograph, upward force of pantograph: 5.5 kgf, measured in 1977

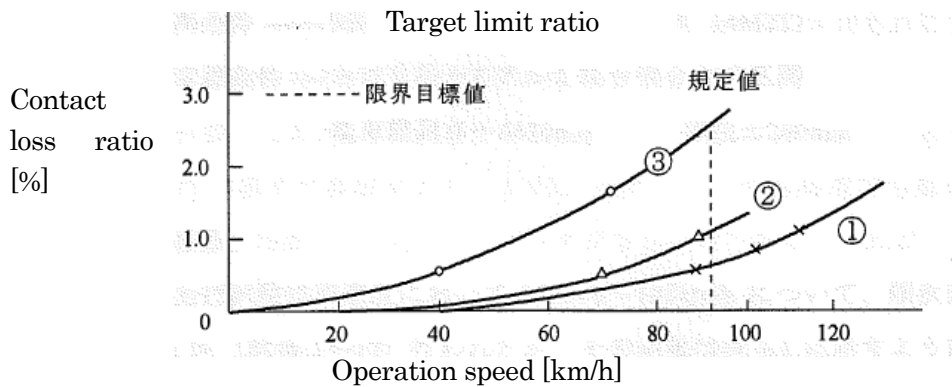
#### (2) T-section Feeder with Contact Wire Type

Measurement condition: Single pantograph, upward force of pantograph: 6.0 kgf, measured in 1970

#### (3) Conductive Rail with Al flat-shaped feeder compound Type

Measurement condition: Single pantograph, upward force of pantograph: 6.0 kgf, measured in 1986

Fig. 4 shows the results of the measurements of the contact ratio of the three types of ORC. The contact ratio of each type is within the target limit ratio of 3.0% if the operation speed is lower than 90 km/h.



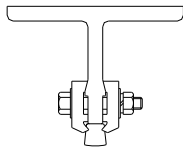
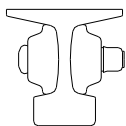
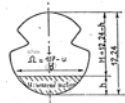
Source: JICA Study Team

**Fig. 4 Relationship between Operation Speed and Contact Loss Ratio**

### 5. Comparison of features of ORC and OHC

The comparison of features of the T-section Feeder with Contact Wire Type and the Conductive Rail Type, as well as the OHC used in Line 1, are described in Table 1 for better understanding.

**Table 1 Comparison of Features of ORC and OHC**

Type of ORC	T-section Feeder with Contact Wire Type	Conductive Rail Type	Overhead catenary used in Line No. 1
Shape of ORC			 (Contact wire only)
Type of contact material	Copper contact wire	Steel conductive rail	Copper contact wire
Type of feeder	Al or Fe T-section	Al flat plate	Unknown
Cross-section area of contact surface [mm <sup>2</sup> ]	Cu 110-170	Fe 1,933	Hard-drawn electrolyte copper E-Cu 57 alloy with 0.1 % silver (107 mm <sup>2</sup> )
Cross-section area of feeder [mm <sup>2</sup> ]	Al 1,500-2,100 or Fe 3,500	Al 1,400 or Cu 480	N/A
Material of contact strip	Copper-based sintered alloy or Carbon	Iron-based sintered alloy	Carbon
Weight [kg/m]	9.4 - 9.6	19.1 (Al feeder), 18.6 (Cu feeder)	0.95
Possibility of conductor disconnection	Very rare because of no tension to contact wire	Not possible	Possible
Margin to wear [mm]	8.5	12.0	3.74

Type of ORC	T-section Feeder with Contact Wire Type	Conductive Rail Type	Overhead catenary used in Line No. 1
Life time of contact wire/conductive rail	5 to 7 years (depending on transportation density)	More than 20 years (depending on transportation density)	More than 30 years (in good condition)
Track record in operation	47 years in Japan	31 years in Japan	22 years in Cairo Metro
Operators using the ORC in Japanese lines	Tokyo Metro, Kyoto Metro, Nagoya Metro, Sendai Metro	Sapporo Metro	-
Uplift force of contact power collector [kg]	5 - 7	6.5	N/A
Tensile strength	0 (No tension)	0 (No tension)	N/A
Collecting performance and suitability of high speed operation	Collecting performance is stable and suitable for high speed operation because no connection point within one feeding section	Lower collecting performance, and not suitable for high speed operation compared with a copper contact wire.	N/A
Workability in construction	High workability of the construction on the ceiling of small tunnel because of light-weight T-section feeder	Lower workability of construction on the ceiling of a small tunnel because the conductor rail is three times heavier than a T-section steel feeder	N/A
Maintenance	<ul style="list-style-type: none"> <li>• Easy replacement of contact wire using connecting fitting for contact wire.</li> <li>• Replacement period is shorter than conductor rail type.</li> <li>• A measure for corrosion may be required if water leakage occurs</li> </ul>	<ul style="list-style-type: none"> <li>• Long life and easy maintenance because of larger permissive wear height compared with contact wire type.</li> <li>• Copper feeder has high corrosion resistance against water leakage.</li> </ul>	N/A
Construction Cost [USD/km]	370,000 (including supporting structure)	420,000 (including supporting structure)	Unknown (Material cost of contact wire: 21,000)

Source: ECMOU and JICA Study Team

## 6. Experience in ORC Operation in Japan

ORC has more than 40 years of history in Japan. It has been used in nine lines in Tokyo Metro and four lines in Toei (Bureau of Tokyo Metropolitan Government) Subway in Tokyo as shown in Table. 2. These lines adopt overhead catenary for above-ground section and ORC for underground section.

**Table 2 Type of Contact line in metro lines in Tokyo and Osaka**

Operator	Line Number	Line Name	Stations Served	Length [km]	Start year of Operation	Type of Contact Line and Voltage
Tokyo Metro Co., Ltd.	Line 3	Ginza Line	19	14.3	1927	600 V DC, Third rail
	Line 4	Marunouchi Line	28	24.2	1954	600 V DC, Third rail
	Line 2	Hibiya Line	21	20.3	1961	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 5	Tōzai Line	23	30.8	1964	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 9	Chiyoda Line	20	24	1969	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 8	Yūrakuchō Line	24	28.3	1974	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 11	Hanzōmon Line	14	16.8	1977	1500 V Overhead Rigid conductor
	Line 7	Namboku Line	19	21.3	1991	1500 V Overhead Rigid conductor
	Line 13	Fukutoshin Line	16	20.2	2008	1500 V Overhead Catenary Overhead Rigid conductor
Toei subway (Bureau of Tokyo Metropolitan Government)	Line 1	Asakusa Line	11	18.3	1960	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 6	Mita Line	27	26.5	1968	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 10	Shinjuku Line	21	23.5	1978	1500 V Overhead Catenary/Overhead Rigid conductor
	Line 12	Oedo Line	38	40.7	1991	1500 V Overhead Catenary/Overhead Rigid conductor

Source: JICA Study Team

## **Annex 4-4**

### **Electromagnetic Interference (EMI)**

## Electromagnetic Interference (EMI)

EMI is a disturbance that affects an electrical circuit due to either electromagnetic conduction or electromagnetic radiation emitted from a power supply system.

In railway power supply system, the causes of electrical disturbance are classified into two kinds of physical phenomena, electromagnetic induction and electrostatic induction.

The amount of EMI that affects other equipment in external systems depends not only on the emission level of the EMI source but also on the distance to the objective external systems and their immunity to EMI effects. Therefore, it is impossible to assess accurately the influence of EMI without the knowledge on the objective systems.

This report describes only the basic principles of the theoretical assessment of the emission level of the power supply system.

### 1. Electrostatic Induction

Electrostatic induction is an electromagnetic phenomenon wherein a charged object is brought near an uncharged, electrically conducting object and the force of the nearby charge causes a separation of these charges.

When a voltage is applied to a contact line or distribution line in a railway power supply system, an electrostatic induced voltage affects the nearby communication lines.

The induced voltage is calculated using the following equation:

$$V_s = \frac{C_1}{C_1 + C_2} V_0 \quad (1)$$

where:  $V_s$  is the induced voltage on communication line [V];  
 $C_1$  is the capacitance between power line and communication line;  
 $C_2$  is the capacitance between communication line and earth; and  
 $V_0$  is the power line voltage [V].

$C_1$  and  $C_2$  are determined by the distance between power and communication line, and communication line and earth, respectively. The induced voltage formula is expanded, as follows:

$$V_s = \frac{V_0}{4.8} \log_{10} \frac{b^2 + (h_1 + h_2)^2}{b^2 + (h_1 - h_2)^2} \quad (2)$$

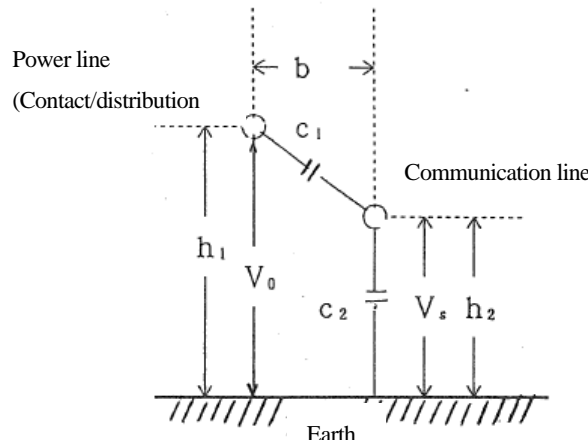
where:  $b$  is the horizontal distance between power and communication line [m];  
 $h_1$  is the height of power line [m]; and  
 $h_2$  is the height of communication line [m].

In the underground section,  $V_s$  will be almost zero since  $h_1$  can be considered 0 m; and hence, there will be no influence due to electrostatic induction from the power supply system in Metro Line 4.



In the elevated section, the induced voltage is calculated using equation (2) with assumed values of  $b = 50$  m,  $h_1 = 6$  m, and  $h_2 = 5$  m as an example.

$$V_s = \frac{20,000}{4.8} \log_{10} \frac{50^2 + (6+5)^2}{50^2 + (6-5)^2} = 84.8[V] \quad (3)$$



**Fig. 1 Configuration of Power Line and Communication Line**

However, the influence on the communication line depends on its conditions. It is not appropriate to suggest that electrostatic induction definitely harms the external systems around the elevated section.

The voltage of the distribution line between HVS and RSs or LPS is 20 kV or low voltage. It is the same voltage as the grid in Cairo where underground cables are buried all over the city. The distribution line in Metro Line 4 will be installed inside the metro tunnels, the depth of which will be deeper than the grid distribution lines. Therefore, the EMI influence to the external world from the distribution lines in Metro Line 4 is deemed equivalent or less than the grid distribution lines.

The induced voltage caused by the contact line would be negligible as the contact line voltage would be quite lower than 20 kV, and the induced voltage would also be lower.

## 2. Electromagnetic Induction

Electromagnetic induction is the production of voltage across a conductor situated in a changing magnetic field or a conductor moving through a stationary magnetic field.

When alternate current flows in a contact line or distribution line in a railway power supply system, an electromagnetic induced voltage manifests on the nearby communication lines.

The induced voltage is calculated using the following equation:

$$V_m = 2\pi f M I I_0 \quad (4)$$

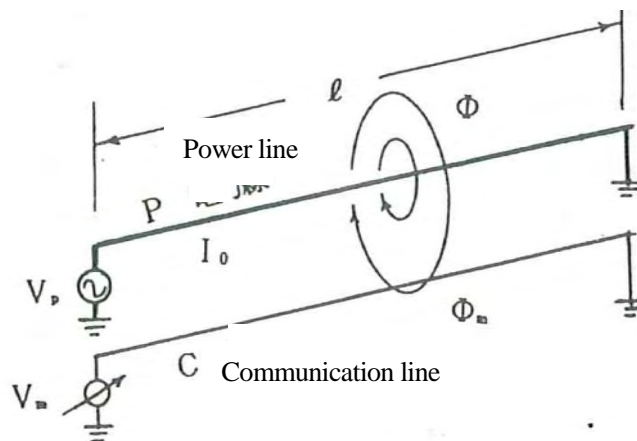
Where:  $V_m$  is the induced voltage [V];

$f$  is the frequency of power line [Hz];

$M$  is the mutual inductance between power and communication line [H/km];

$l$  is the parallel distance of power and communication line [km]; and

$I_0$  is the return current through earth of power line [A] as shown in Fig. 2.



**Fig. 2 Electromagnetic Induction between Parallel Lines**

Since the traction system in Line 4 uses direct current, no induced voltage would appear in principle according to equation (4). In practice, harmonics current generated by the rectifier can cause electromagnetic induction.

Ideally, since the traction current flows in opposite directions in contact line and return conductor (rail), the magnetic field generated by each conductor cancel each other. In reality, however, the return current flows into the ground as leakage current, the magnetic field is imbalanced, and electromagnetic induction can be generated.

Possible mitigation measures for reducing the generation of electromagnetic induction are as follows.

- Reduction of the generation of harmonics current as described in Section 4.3.5 (5) c);
- Reduction of leakage current as described in Section 4.3.5 (11) a); and
- Counter measures on the external system side affected by electromagnetic induction. (The measures to be taken depend on the conditions of the external system.)

## **Annex 9-1**

# **List of Fundamental Laws and Regulations on Environmental and Social Considerations in Egypt**

### List of Fundamental Laws and Regulations on Environmental and Social Considerations in Egypt

<b>Overall</b>		
1	The Constitution of the Arab Republic of Egypt	
<b>Natural Environment Aspects</b>		
2	Law No. 31/1976	Public cleanliness (control of solid waste management, amended Law No. 38 of 1967)
3	Law No. 27/1978	Public water sources
4	Law No. 137/1981	Labour (control of work place safety and environment)
5	Law No. 48/1982	Protection of Nile and its waterways
6	Law No. 102/1983	Natural protection
7	Law No. 4/1994	Protection of environment
8	Law No. 12/2003	Labour Law
9	Law No. 9/2009	Amendment of some parts of Law No. 4/1994
<b>Social Aspects</b>		
10	Law No. 577/1954	Expropriation of the real estates for public interest or for improvement
11	Law No. 27/1956	Expropriation of real estates for public interests and its procedure
12	Law No. 252/1960	Amendment of some parts of Law No. 577/1954
13	Law No. 59/1979	Setting up for the new urban communities
14	Law No. 3/1980	Urban planning law
15	Law No. 10/1990	Expropriation of real estates for public interest and its procedure (Amendment of Law No. 27/1956)
16	Law No. 4/1996	Applying the provision of the Civil Code to places not previously leased, and places with expired or expiring lease contracts without anyone having the rights to remain in them
17	Law No. 12/2003	Labour Law
18	Law No. 94/2003	Establishing the National Council for Human Rights
19	Law No. 137/2006	Amendment of the Law No. 4/1996
<b>Archaeological Aspects</b>		
20	Law No. 117/1983	Cultural heritage

## **Annex 9-2**

### **Results of the 1st Stakeholder Meetings**

### Key Issues Raised in the 1st Stakeholder Meetings

Subject	Issues Raised
General	<ul style="list-style-type: none"> <li>• Recommendation to carry out a scoping meeting and disclosure meeting for each of Phase 1 and Phase 2, separately.</li> <li>• Recommendation to hold PC meetings in the location of each phase. Besides sending invitations to specific stakeholders, a newspaper advertisement is crucial to advertise the PC since the metro line is a national project.</li> <li>• Suggestion to conduct meetings at each governorate with traffic, housing, water, wastewater and other relevant authorities to discuss in details all activities related to Line 4 construction.</li> <li>• Proposal to meet the local councils of the governorates during the scoping stage</li> </ul>
Alignment Alternatives	<ul style="list-style-type: none"> <li>• Alternatives to be discussed in the EIA in case the alignment is finalized to include issues such as location of stations, type of metro line (tunnel, at grade etc.), emergency response plans</li> <li>• Request to put into consideration more alignment alternatives that would not pass by the borders of the Giza Plateau (Fayoum Road section), such as aligning by the Mansouria Canal.</li> <li>• Encouragement on the idea of having a metro line serving 6<sup>th</sup> October City and a proposal to extend the line to Smart Village</li> <li>• The Nile Research Institute could contribute to the change of the metro route and recommend precautions during boring of the tunnel such as the need for backfilling of the Nile bed.</li> <li>• The relation between the alignment and existing tunnels and bridges in El Ahram Street</li> <li>• The possibility of implementing the two alternatives proposed for Phase 2 (Al Sawah and Nasr City) of Metro Line 4</li> <li>• The possibility of expanding the metro network with links to all new cities such as the 10<sup>th</sup> of Ramadan, 6<sup>th</sup> October, Badr and others</li> <li>• The possibility of linking the metro network with the existing Tram lines in Heliopolis.</li> <li>• The reason for the selection of Al Ahram Street instead of Faysal Street for the new metro line alignment</li> <li>• The metro line in El Haram Street could serve the districts that lie on either side such as El Ofraneya and Faisal by feeder lines intersecting two or three stations between El Remaya Square and Giza Square.</li> <li>• The metro line going through El Haram Street will face less "hard points" and from the engineering points of view it is more suitable to go through Giza Square and under the Nile to El Malek El Saleh.</li> <li>• The northern option of Phase 2 of Metro Line 4 is recommended rather than the eastern one which is more feasible due to high demand and the fact that there is no option but having an underground metro line due to the high population density along Port Said Street.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Complaints on dust emission from the construction work of the nearby Metro Station of Line No. 3</li> <li>• Calculation of CO<sub>2</sub> emission reduction as part of the benefits of Metro Line 4</li> <li>• Impacts of dust on neighboring houses and sidewalks</li> <li>• Air emissions are not expected from the operation of the proposed metro line.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Noise pollution during construction</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• All excavation wastes to be transported to official dumpsites</li> <li>• Disposal of excavated soil especially from tunnel boring operations since a large part of it is mud which can be used in agriculture. Contractors usually dispose excavated soil in a random way and there should be strict monitoring program for these activities in the project.</li> <li>• Construction sites attracts illegal dumping of waste</li> <li>• Construction debris outside the fenced construction yards</li> <li>• The general growing problem in Cairo of deteriorating waste management system</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>• Traffic jam problems during construction</li> <li>• Impacts of stations' locations on traffic especially during construction</li> <li>• A committee meeting to be conducted bi-weekly at the district level for the issuance of the different permits and coordination with the traffic department to avert potential traffic jams</li> <li>• Traffic congestion next to construction sites</li> <li>• Traffic diversion to secondary routes</li> <li>• Portion of El Ahram Street to be used for the metro and its impact on traffic</li> <li>• Possibility of using the available drilling resources during the construction of Metro Line 4 for the establishment of underground garages, which will benefit users of the subway and car owners</li> </ul>
Vibrations	<ul style="list-style-type: none"> <li>• Explanation of the safety measures associated with vibrations and their impact on historical monuments will be a priority study item for SCA</li> <li>• Impacts of tunneling on old valuable buildings</li> <li>• Vibrations that may result from the construction and operation should be examined.</li> </ul>
Health Impacts	<ul style="list-style-type: none"> <li>• Health impacts from dust emissions during construction.</li> </ul>

Subject	Issues Raised
Landscape	<ul style="list-style-type: none"> <li>• Visual aspects of stations located near valuable buildings and architectural designs of ground components of Metro Line 4 such as ground stations, ventilation shafts, power generation and other related buildings</li> </ul>
Economic Issues	<ul style="list-style-type: none"> <li>• Business damage to shops during long construction period</li> <li>• Regarding impacts on private sector transportation (microbus and others), it is the responsibility of the Giza Governorate, the Local Council and the Traffic Department to set new routes for affected drivers. Compensations were not recommended since it will be added to the loan.</li> <li>• Nearby businesses may be negatively affected during construction but improvement is expected after operation.</li> </ul>
Social Issues	<ul style="list-style-type: none"> <li>• High density of construction labor</li> <li>• Designs of stations and metro vehicles should consider the needs of handicapped.</li> <li>• The reason for conducting a social survey and impact assessment</li> </ul>
Station Location	<ul style="list-style-type: none"> <li>• A main concern is to ensure that the first station of the line should be far from the planned West-side entrance of the Giza Plateau. The reason is that large numbers of commuters coming from upper Egypt by bus (or other modes) will probably change to Metro Line 4 at the first station. This will eventually occur in the form of informal/unplanned bus stations and crowds such as observed in the last station of Line 2, Shoubra El-Kheima, which services commuters from the Delta area.</li> <li>• Layout design of the stations' entrances and exits and its relation to street and pavement</li> <li>• Proposal to locate stations in Pyramids Street as close as possible to each other due to the high population density in this area</li> <li>• The connection between Metro Lines 2 and 4 and the Railway in Giza Station</li> <li>• Recommendation to use squares and nodes located in El Ahram Street for the proposed stations</li> </ul>
Public Information	<ul style="list-style-type: none"> <li>• Suggestion to provide visual signs such as advertisement boards in the construction areas to explain to the public project details, its benefits, duration and the expected date for completion of the construction works</li> </ul>
Resettlement and Land Acquisition	<ul style="list-style-type: none"> <li>• Book vendors suffered multiple forced eviction and relocations due to the construction of Al-Azhar Bridge ramps, as well as Metro stations of Line No. 2 and Line No. 3.</li> <li>• Land and property should be expropriated for stations and ventilation shafts and people should be compensated or resettled.</li> </ul>
Excavation Method	<ul style="list-style-type: none"> <li>• Information about the excavation technology to be used during construction</li> </ul>
Utility Relocation	<ul style="list-style-type: none"> <li>• All utility relocation to be coordinated with the traffic unit and the work schedule to be provided</li> <li>• Each utility to be handled separately in coordination with the relevant district</li> <li>• For the water sector, pipe network responsibility is will bemanaged by several departments according to pipe diameter. Pipe relocation occurs mainly in areas that intersect passenger and ventilation stations. New drawings and maps have to be prepared with Bill of Quantities, then approved by the water company. All previous issues have to be presented to the project owner "NAT" who funds the process.</li> <li>• Wastewater infrastructure relocation follows the same procedure as that of water.</li> <li>• Electricity is the same as water. Several departments are responsible according to cables capacity (i.e., 66kv and 11kv cables lie under different departments). The new drawings and maps which include the Bill of Quantities are approved by the electricity company and then presented to the project owner "NAT".</li> <li>• Concerning telecommunications, cable relocation falls under the responsibility of Telecom Egypt, while the Army networks are under the responsibility of NSPO. The company's role is to provide requested cables and concrete boxes.</li> <li>• "NAT" has the main role of organizing and coordinating between all project entities. This is carried out through a High Committee composed of the Deputy Governor, NAT, the Company and the Traffic Director. The Committee meets on a monthly basis to discuss the different problems, mainly implementation problems, and to issue excavation permits.</li> <li>• Problems related to districts as they require the restoration of the area falling under their jurisdiction to its original state</li> <li>• The working hours of the gas company are from 9:00 am to 3:00 pm. However, they should be present during excavation works which will be undertaken near gas pipes to intervene in case of any potential emergency.</li> <li>• Some unprotected electric cables are found during excavation works.</li> <li>• Despite all precautions, some accidents may happen such as damaging pipelines or electricity cables.</li> <li>• Broken pipes during utilities diversion</li> <li>• Surveying and handling the underground utility infrastructures may delay construction works</li> </ul>
Impact on Nile River	<ul style="list-style-type: none"> <li>• The Nile Research Institute is responsible for studying the effects of any project on the Nile such as erosion and sedimentation, bed stability, insurance of safety of the waterway and its structures, as well as supervision and monitoring of tunneling and backfilling operations during the construction phase.</li> </ul>

Subject	Issues Raised
	<ul style="list-style-type: none"> <li>The Nile bed stability should be assessed in relation to the proposed metro route and depth through boreholes 20 m deep, bathymetric surveys, Nile bed sampling and study of the bed morphology.</li> </ul>
Archaeological Aspects	<ul style="list-style-type: none"> <li>Impacts of the proposed alignment on the archeological site in Giza Plateau</li> </ul>
Environmental Management	<ul style="list-style-type: none"> <li>Emergency response plans during construction</li> </ul>

Source: JICA Study Team, referring to EIA report by Environics

**Sample of Photos of 1st Stakeholder Meetings (Scoping Meeting) Conducted June ~ August 2009**



Scoping Meeting at Giza Local Council and NGOs  
(17th August 2009)



Scoping Meeting at Students in Free Enterprise NGO (SIFE )  
(7th July 2009)



Scoping Meeting at Cairo Regional Branch Office of EEAA  
(6th June 2009)



## Minutes of Meeting

### **Greater Cairo Metro Line 4**

**Subject:** EIA and PC for Metro Line 4  
**Objective:** The meeting was held in the EIA Unit of EEAA to discuss the requirements concerning EIA and public consultation of Metro Line 4  
**Date:** Tuesday, 5th May 2009  
**Attendees:** **EIA Unit, EEAA**  
Mahmoud Allam  
Heba Hassan  
**JICA Study Team**  
Ahmed El Dorghamy  
**Environics Team**  
Dalia Nakhla

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Engr. El Dorghamy and Engr. Nakhla introduced first the project components to Engr. Allam of the EIA Unit of EEAA. The different phases were explained along with their corresponding alignment alternatives.

#### **General Comments**

The following issues were raised:

- The EIA Unit of EEAA had not done previous EIAs similar to metro line projects since no EIA was prepared for Metro Lines 1 and 2. However, the EIA Unit of EEAA is currently coordinating with NAT to discuss the environmental requirements of Metro Line 3. EEAA and NAT agreed to carry out an environmental audit of Phase 1 and prepare an environmental management plan for Phase 2.
- According to Engr. El Dorghamy, an EIA for an expressway for GARBLT was carried out and a public consultation was held in 2008. The representatives from EEAA said that they were invited and attended the PC meeting but they did not receive the EIA yet.
- A project of similar nature was mentioned which is the natural gas networks that were introduced in the Upper Egypt governorates. Engr. Hassan said that public consultation meetings were held in each of the concerned governorates.

#### **Specific Comments**

The following were discussed with regard to the EIA and PC of Metro Line 4:

- Engr. Allam recommended conducting separate scoping and disclosure meetings for Phase 1 and Phase 2. He even recommended conducting separate EIAs for Phase 1 and Phase 2. He also recommended to finalize first the alignment of Phase 2 whether up to Amireya and Sawah or alternatively Madinet Nasr prior to carrying out the EIA for the said route.
- After finalizing the alignment, the alternatives to be discussed in the EIA include issues like location of stations, type of metro line (tunnel, at grade, etc.), emergency response plans.
- The venues for the public meetings were discussed and Engr. Allam recommended having a PC in each phase. He added that besides sending invitations to specific stakeholders, a newspaper advertisement is crucial to publicly announce the PC since the metro line is a national project.
- It was discussed that the environmental issues to be assessed in the EIA should include air emissions, noise, waste management, rainwater drainage, traffic, vibrations, health and visual impacts.

At the end of the meeting, copies of the draft TORs for the EIA and RAP studies were given by Engr. El Dorghamy to Engr. Allam for his review and comments. Engr. Allam committed to send his comments by 10<sup>th</sup> May 2009.

## **Minutes of Meeting**

### **Greater Cairo Metro Line 4**

- Subject:** Introduction to Line-4 plans and Consultation with regards to the Giza Plateau Development Plan and concerns
- Date:** Monday, 11<sup>th</sup> May 2009
- Venue:** Giza Plateau Administrative Office, Giza Pyramids Premises
- Attendees:** - Kamal Wahid, General Director of Giza Pyramids, Supreme Council of Antiquities  
- Ahmed El-Dorghamy, JICA Study Team
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The project components and alignments were first explained to Mr. Kamal Wahid with illustrations and explanations on environmental and social considerations methodology. Kamal Wahid is the General Director of the Giza Pyramids General Directorate, part of the Supreme Council of Antiquities (SCA), stationed in the Giza Plateau.

#### **Notes:**

1. Mr. Wahid noted that safety measures associated with vibrations and their impact on historical monuments should be a priority study item for SCA.
2. It is requested to put into consideration more alternative alignments that would not pass through the borders of Giza Plateau (Fayoum Road section), such as aligning through the Mansouria Canal. (However, limitations of minimum curvature radius and inconvenience of additional land acquisition were then explained to Mr. Wahid.)
3. It is confirmed that a development plan of the Giza Plateau is under preparation and will be implemented within 2009 which includes the establishment of a West side main entrance (visible in the satellite images and already being used in some events).
4. A main concern is to ensure that the first station of the line should be far from the planned West side entrance of the Giza Plateau. The reason is that large numbers of commuters coming from upper Egypt by bus (or other modes) will probably change to Metro Line 4 at the first station which will eventually occur in the form of informal/unplanned bus stations and crowds such as observed in the last station of Line 2, Shoubra El-Kheima, which services commuters from the Delta area.
5. Plans for the Promenade planned between the Grand Egyptian Museum (GEM) and the Giza Plateau should be confirmed with the main consultant of GEM.

#### **Side Notes:**

6. According to Mr. Wahid, the El-Remaya Club is planned to be removed (date not confirmed).
7. Mr. Wahid appreciated very much the consultation process, mentioning that it is the first time for him to experience this process despite close proximity of implementation of several influencing projects in the past .

## Minutes of Meeting

### Greater Cairo Metro Line 4

**Subject :** Introduction to EEAA Greater Cairo Branch, EMU's directors at 6<sup>th</sup> October, Cairo, Giza Kalyoubia and Helwan Governorates

**Venue :** RBO Greater Cairo office at Tamouh

**Date:** Monday, 6<sup>th</sup> June 2009

<b>Attendees:</b>	Engr. Hussein Moawaad	RBO Cairo
	Engr. Gamal Saleh	Cairo EMU
	Engr. Mohamed Rizk Affifi	Qalyoubia EMU
	Dr. Adel Tawhid Abusreei	Giza EMU
	Dr. Hanaa Abdel Rahman	Giza EMU
	Mr. Mohamed Abdel Gawad	6 <sup>th</sup> October EMU
	Engr. Mohamed Abdel Nabi	Helwan EMU

#### **JICA Study Team**

Norihiko Inoue  
Ahmed El Dorghamy

#### **Environics Team**

Dalia Nakhla  
Mohammed Fangary  
Abdallah El Etribi

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Engr. Nakhla explained to all the attendees the aim of the meeting, which is a scoping meeting as part of the EIA of Metro Line 4. She explained also that the previous Lines 1, 2, and 3 were constructed by French companies using their technology while on the other hand, Line 4 will be financed and constructed by Japanese agency (JICA) using Japanese technology which is different than the French one.

The EMU directors were requested to express their opinions on the proposed construction of Line 4 and its impacts on the neighboring communities and to the environment.

The Helwan EMU director stated that the usual problems or negative effects are experienced during the project construction, mainly traffic jams and noise. He also proposed to consider construction of the stations in Pyramids as close as possible to each other due to the high population density in this area.

Engr. Nakhla was asked about the problems facing Line 3 which is under construction. She also explained to the attendees the methods of construction of the tunnel and stations of Metro Line 3.

The Cairo EMU director prefers to have all questions officially written and he resisted giving feedback prior to receiving the official letter. He also added that there were no complaints in the Cairo Governorate on the construction of Metro Line 3 as the community realizes that this is a national project that will have future benefits on the transportation system and that the negative impacts encountered during construction are only temporary.

Engr. El Dorghamy of JST explained that Phase 1 of Line 4 will be completely under ground starting from El Remaya square to El Malek El Saleh. He further explained that it was decided to construct this phase completely under ground because of the very high population density in Pyramids Road and its derivatives. He also stated that there will be minimal distance between stations and that all project details were already approved at a very high administrative level of the National Authority for Tunnels. The parts that would be over ground using via-ducks will be the 6<sup>th</sup> October section and the 3-km section in Qalyoubia.

Engr. Nakhla mentioned that there will be monitoring for air, noise, soil, surface, and underground water in designated points along the line.

The Giza EMU director suggested that meetings have to be conducted at each governorate with representatives from traffic, housing, water and wastewater authority to discuss in details all activities related to Line 4 construction. He also encouraged the idea of having a metro line serving 6<sup>th</sup> October City and proposed on extending the line to the area of Smart Village.

The RBO Cairo representative suggested on providing visual signs, such as advertisement boards in construction areas, to explain to the public the project details, its benefits, duration and the expected date for completion of construction works. He also proposed to meet the local councils of the governorates during the scoping stage.

Mr. Inoue asked if there will be negative affects on the private transportation sectors (microbus and others) or whether they will oppose the project or not. The attendees said that the positive impacts will surpass the negative impacts as this will lead to competition which will raise the quality of transportation. He also added that JICA supported the metro line construction in Dubai and Tokyo.

## Minutes of Meeting

### Greater Cairo Metro Line 4

**Subject:** EIA and PC for Metro Line 4

**Objective:** The meeting was held in the National Organization for Urban Harmony (NOUH) to discuss Metro Line 4 plans and consultation with regards to the NOUH Plans and concerns

**Date:** Thursday, 2<sup>nd</sup> July 2009

**Attendees:** **NOUH**

Dr. Mohamed E. El Attar (General Manager of Preservation for Protected and Natural Areas Dept.)  
Engr. Reem El Haddad  
Engr. Nermin Abdel Latif  
Engr. Sameh Moussa

**JICA Study Team**

Norihiko INOUE  
Ahmed El Dorghamy

**Environics Team**

Dalia Nakhla  
Mohammed Fangary

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#### General Comments

The National Organization for Urban Harmony (NOUH), established in 2001 by a republican decree and inaugurated in 2004, is under the Egyptian Ministry of Culture. The organization also works in cooperation with the General Organization for Physical Planning (GOPP) and the Ministry of Housing.

NOUH is responsible with all the components of urban spaces in Egypt including streets, squares, gardens, public spaces, and buildings. The organization works in accordance with the Building Law 119/2008 which includes a chapter for Urban Harmony.

NOUH works on preparing a series of guidelines for Urban Harmony to be considered as executive regulations for the Building Law 119/2008. These guidelines are directed on the following:

- Historical areas;
- Roads, squares and pavements;
- Open and Green spaces;
- Environment;
- Coastal areas;
- Billboards;
- Street lightings;

- Protected and natural areas;
- Quality; and
- Slums and informal settlements.

One of the current projects of NOUH is the Value Map Project which aims to identify the values inherent in urban and natural contents and provides a data base and a supporting mechanism using GIS for HOUH's projects. The project started with Giza and El Haram districts which could be beneficial for Metro Line 4 studies.

The following issues were raised regarding the implementation of Metro Line 4:

- Architectural designs of over ground components of Metro Line 4 such as over ground stations, ventilation shafts, power generation and other related buildings;
- Layout design of stations' entrances and exits and its relation to streets and pavements;
- Visual aspects of stations located near valuable buildings; and
- Impacts of tunneling on old valuable buildings.

## **Minutes of Meeting**

### **Scoping for Metro Line No. 4 EIA**

**Subject:** Consultation with Community affected by Metro Line No.3

**Date:** Tuesday, 7<sup>th</sup> July 2009

**Venue:** Conference Room of the French University in Egypt (FUE), Mohandeseen Branch, Cairo

**Attendees:**

*< SIFE-UFE >*

1. Dr. Nicolas Antheaume (SIFE Faculty Advisor, FUE)
2. Dr. Amr Othman (SIFE Faculty Advisor)
3. Ms. May El-Bardisy (FUE Project Team Leader for, SIFE NGO)
4. Ms. Ligene Zamzamy (FUE Project Team member, SIFE NGO)

*< Al-Azbakia Book Vendors >*

5. Mr. Harby Hassan Mohamed (Book Vendor of Al-Azbakia)
6. Mr. Mohy-Eldin Mohamed (Book Vendor of Al-Azbakia)
7. Mr. Mohamed Abdelaal Kasem (Book Vendor of Al-Azbakia)

*< Environics >*

8. Engr. Abdallah El-Etreby (EIA Team, Environics)

*< JICA Study Team >*

9. Engr. Norihiko Inoue (JICA Study Team)
10. Engr. Ahmed El Dorghamy (JICA Study Team)

**Objective:** The meeting was held to meet the community affected by Metro Line No. 3 and a supporting NGO and to consult them in the scoping stage of the EIA and to identify lessons learned with regard to social and environmental impacts.

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**NOTES:**

1. Students in Free Enterprise (SIFE) is an international NGO whose objective is to implement projects which are valuable to the community using business development for sustainability. The team from the French University in Egypt (FUE) represents the Sour-Al-Azbakia Community that has been affected by the implementation of Metro Line No. 3 and other projects.
2. Soor El Azbakia is located downtown between Attaba Square and Opera Square near the ramp of Al-Azhar Bridge. It is one of the oldest and most famous non-official cultural centers in Egypt. It is famous for the book vendors' community originally located in the area which consists of more than 130 bookstores.

3. The vendors suffered multiple forced relocations, the last of which was due to the construction of Metro Line No. 3.
  4. First, in 1983, all shops were forced to evacuate the area without prior notification to clear the way for the construction works of Al-Azhar Bridge ramps.
  5. In response to initial passive resistance, half of the shops were ordered removed or destroyed by bulldozers by the governorate. The vendors suffered an emotional shock, causing severe impact and, in some cases, to the extent of paralyses and death, and their business was damaged for a long transitional period.
  6. The vendors relocated themselves, at their own expense, to makeshift shops in a parallel road (26<sup>th</sup> of July Extension, "Between the Gardens").
  7. In 1992, the vendors were asked once more by the governorate to evacuate their location with only one-week notice to clear the way for the metro station of Line No. 2 (Attaba Station) planned at that time.
  8. After forced evacuation and after complaints from the vendors, the governorate later directed and assisted the vendors to relocate to a relocation site adjacent to Al-Hussein Hospital nearby. However, the relocation was completed only in 1993, after having the vendors suffer one year out of business.
  9. From 1993 until 1997, the new site lacked security from vandalism or safety from fires. It was aesthetically inferior to the original location, and there were less customers due to poor planning.
  10. In 1997, the vendors were once more relocated to Al-Attaba (next to the governorate transportation department) because they were situated above the historical wall of Cairo which will be subject to exploration activities. Again, this was done with only a week's advance notification.
  11. In 2008, the vendors were further shifted 20 metres to give way for the construction works of the planned Metro Line 3 station of Al-Attaba. In this case, the following approach was followed (described only in as much detail as provided):
    - a. LE 22,000 was allocated by the Metro authorities to each of the 130 affected shops to support their relocation.
    - b. The total sum was transferred to Agha Khan Foundation with approval by the shop owners delegating the foundation to set up the new location.
    - c. The vendors were out of business for three months during the transition period.
    - d. The new setting by Agha Khan Foundation is welcomed by the vendors. They explain that it is much better planned, with a culturally sensitive design relating to the historical Fatimid style.
  12. In this present location, the vendors complain about dust being emitted from the construction work of the nearby metro station of Line No. 3. It is covering their shops and affecting their health and business.
  13. Currently, the vendors are uncertain on the possibility of a next relocation since they were informed by the governorate that their location is still considered temporary.
  14. All attempts by the vendors to raise complaints were directed to the district authorities, and they never attempted contacting the project executing agencies.
  15. The vendors do not have a formal representation or institutional structure, which renders them weak when addressing the authorities.
  16. Out of 130 book shops at present, 10% have commercial registers and 50% have tax IDs. However, all of them are registered in the district's records (such records are, therefore, a source to identify vulnerable persons and potential affected vulnerable businesses).
  17. The SIFE-UFE project aims to empower the vendors' business community by institutionalizing them (forming an association) and promoting positive media coverage. It also aims to improve their business performance to ensure financial sustainability and to conserve the cultural heritage they represent.
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## **Minutes of Meeting**

### **Greater Cairo Metro Line 4**

**Subject:** EIA and PC for Metro Line 4

**Objective:** Scoping Meeting on EIA – Traffic Management

**Date:** Tuesday, 14<sup>th</sup> July 2009

**Attendees:** **Giza Traffic - Ministry of Interior**  
General Kamel Yassin (Director)

#### **Environics Team**

Mr. Abdallah Eletreby  
General Wadeed Boutros

#### **General Comments:**

The Giza Traffic Director was introduced to the Metro Line 4 route of Phase 1 which will be established from El Remaya Square to El Malek El Saleh Square. He had the following comments and questions:

- Information about the excavation technology to be used during construction;
- Location of stations; and
- All utility relocations should be coordinated with the traffic unit, and the work schedule should be provided.

The traffic expert, General Boutros, will conduct more exhaustive meetings with the Giza, Cairo and Qualubeya Traffic units.

**Minutes of Meeting**  
**Scoping for Metro Line 4 EIA**

- Subject :** Consultation with Nile Company for Road Construction on relocation of utilities of Line 3
- Date:** Thursday, 16<sup>th</sup> July 2009
- Venue:** Nile Company for Road Construction, El Tayaran St. Nasr City, Cairo.
- Attendees:** **Nile Company**  
Engr. Aly Ayad                      Head of Construction Sector  
Engr. Mohamed Abusreeh        Project Manager
- Environics**  
Mr. Abdallah Eletreby
- Objective:** To acquire the experience of the Nile Company in relocation of utilities during the pre-construction phase
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The following issues were raised:

- Approximately 30% of delivered utility maps are not accurate. This is mainly due to the fact that construction started three years after the preparation of the studies.
- Each utility is handled separately in coordination with the relevant district.
- For the water sector, several departments are managing the pipe networks according to pipe diameter. Pipe relocations occur mainly in areas that intersect passenger and ventilation stations. New drawings/maps have to be prepared with Bill of Quantities, and then approved by the water company. All previous issues have to be presented to the project owner "NAT" who funds the process.
- The wastewater infrastructure relocation follows the same procedure as that of the water company.
- Electricity is similar to water. Departments are responsible according to cable capacity (i.e., 66 kv and 11 kv cables lie under different departments). New drawing maps that include Bill of Quantities are approved by the electricity company and then presented to the project owner "NAT".
- Regarding telecommunications, cable relocation falls under the responsibility of Telecom Egypt, while the Army network is under the responsibility of NSPO. The company's role is to provide the requested cables and to construct the concrete boxes.
- All excavation wastes are transported to official dumpsites.
- "NAT" has the major role in the organization among all project entities. This is carried out through a High Committee composed of the Deputy Governor, NAT, the Company and the Traffic Director. The Committee meets on a monthly basis to discuss the different problems, mainly implementation problems, and to issue excavation permits.
- Another committee meeting is conducted bi-weekly at the district level for the purpose of issuing the different permits and coordinating with the Traffic Department to avoid potential traffic jams.

**Problems**

- The main problem is the restoration of the area falling under each district to its original state.
- The working hours of the gas company are from 9:00 am to 3:00 pm. However, they should be present during excavation works being undertaken near gas pipes which may need intervention in case of any potential emergency.
- Some unprotected electric cables are found during excavation works.
- Despite all precautions, some accidents may happen such as damage to pipelines or electricity cables.

## Minutes of Meeting

### Scoping for Metro Line 4 EIA

**Subject :** Consultation with Dr. Hatem Abdel-Latif, Professor of Transportation and Traffic Engineering, Ain Shams University

**Date :** Tuesday, 28<sup>th</sup> July 2009

**Attendees :** Dr. Hatem Abdel –Latif

**JST Team:**

Engr. . Ahmed El Dorghamy

**Environics Team :**

Mr. Abdallah Eletreby

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Dr. Abdel Latif had the following comments:

1. He had participated in the traffic studies of Metro Line 2 and CREATS 2002.
2. The existing plan for Phase 2 of Metro Line 4 will face some obstacles due to the existence of a main sewage tunnel along the route of the Port Said Street. This is based on experience with the relocation the sewage tunnel during the construction of Metro Line 3 in Bab El Shereya Square.
3. The NAT members are also reluctant to approve the Phase 2 northern route.
4. The relocation of the stations from Mostorod to El Khosous at the other side of Ismailia Canal is recommended to serve the higher population density located at the left bank.
5. High traffic impacts during construction of Phase 1 in the Pyramids Street are expected as the daily traffic load in the area varies from 120,000 to 150,000 vehicles.
6. Environmental impacts during the construction stage are different from the operation stage. More detailed impact studies during the construction phase are recommended to be included in the scoping documents.
7. The positive impacts (in the operation phase) should be elaborated more and highlighted in the scoping document and in the public consultation meetings.
8. Advance planning to develop “transportation centers” at locations that have significant demand over modal interchange is recommended to determine if there is space (for example, at el-Khosous station) in order to avoid chaos that is apparent at El-Marg, as an example. One location where a transportation center is being contemplated is at El-Monib Garage (exit) which might allow interchange between Metro Line 2, the Ring Road, and ENR’s south line.

**Minutes of Meeting**  
**Greater Cairo Metro Line 4**

**Subject:** EIA for Metro Line 4

**Objective:** To discuss the experience of the Nile Research Institute regarding the Nile crossing

**Date:** Tuesday, 4<sup>th</sup> August 2009

**Attendees:** **Nile Research Institute**  
Dr. Kareema Attia

**Environics Team**  
Mr. Abdallah El Etreby

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Mr. Abdallah had a phone conversation with Dr. Kareema Attia, Deputy Head of the Nile Research Institute to set a meeting date to discuss their experience regarding the Nile crossing. She told him that the phone conversation would be enough and that there will be no need to hold a meeting.

Her comments can be summarized as follows:

- The Institute is the research center responsible for studying the effects of any project on the Nile such as erosion and sedimentation, bed stability, and insurance of safety of the waterway and its structures.
- The Nile bed stability is assessed in relation to the proposed metro route and depth through boreholes 20 m deep, bathymetric surveys, Nile bed sampling, and study of the bed morphology.
- The Institute could contribute to the change of the metro route and recommend precautions during boring of the tunnel such as the need for backfilling of Nile bed.
- The Institute is also responsible for supervision and monitoring of tunneling and backfilling operations during the construction phase.

## **Minutes of Meeting**

### **Greater Cairo Metro Line 4**

**Subject :** Introduction to Giza Governorate Roads Authority

**Venue :** Giza Governorate EMU.

**Date:** Wednesday, 12<sup>th</sup> August 2009

**Attendees:** Engr. Amal Farid, Head of Roads and Transport Authority (Giza Governorate)  
Engr. Abdel Samad Helmy, Head of Roads and Bridges Department (Giza City Council)  
Dr. Youssry Abdel Maguid, Head of Giza EMU  
Dr. Adel Tawhid Abusreei, Giza EMU

**JICA Study Team**

Ahmed El Dorghamy

**Environics Team**

Abdallah El Etribi  
Mohammed Fangary

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The Giza Roads Authority works in cooperation with the Giza Traffic Department (Ministry of Interior) and Giza Governorate's traffic consultant Professor Osama Akil (Ain Shams University) in order to improve traffic and to reduce congestions.

Negative impacts are expected during the construction stage of Metro Line 4 and will be limited to station locations. The operation of the new metro line will have several positive impacts on the economy, society, health, traffic, and the environment.

Based on their experience during the construction of Metro Line 2, the impacts were:

- Traffic congestion next to construction sites;
- Traffic diversion to secondary routes;
- High density of construction labor;
- Onsite storage of construction materials and equipments; and
- Broken pipes during utilities diversion.

The attendees had the following concerns regarding Metro Line 4:

- Impacts of the proposed alignment on the archeological site in Giza Plateau. During the upgrading of Remaya Square, the Supreme Council of Antiquities refused two proposed alternatives for construction of a bridge or tunnel in the area.
- The relationship between the alignment and existing tunnels and bridges in El Ahram Street. There is also a plan by the Executive Organization of Greater Cairo Development (Ministry of Housing, Utilities and Urban

Development) to construct three new tunnels crossing El Ahram Street. This plan should also be taken into consideration.

- The connection between Metro Lines 2 and 4 and the railway in Giza Station
- It is important to reduce construction time as much as possible to minimize the impacts.
- All required studies and assessments should be completed before the construction starts.
- The designs of stations and metro vehicles should consider the needs of handicapped persons.
- The contractors are required to restore the street pavement to its original status after the construction works.

Regarding the impacts on private sector transportation (microbus and others), the attendees noted that it is the responsibility of Giza Governorate, Local Council and Traffic Department to set new routes for affected drivers. Compensations were not recommended since it will be added to the loan.

The proposed location of a metro station next to the New Grand Egyptian Museum will serve the museum's visitors and will have a positive impact on tourism.

The attendees recommended the use of squares and nodes located in El Ahram Street for the proposed stations.

One pedestrian tunnel was constructed in El Ahram Street which is not being used efficiently because of poor lighting and stairs design. Construction of another tunnel (El Lebini), which combines motor vehicles and pedestrians, will be more efficient. The proposed metro stations will provide an appropriate alternative for pedestrians to cross El Ahram Street.

## Minutes of Meeting

### Greater Cairo Metro Line 4

**Subject :** Scoping meeting with Giza Local Council and NGOs  
**Venue :** Giza Governorate.  
**Date:** Monday, 17<sup>th</sup> August 2009  
**Attendees:** 19 members of Giza Governorate Local Council  
1 Member of 6<sup>th</sup> of October Local Council  
4 representatives from Giza EMU  
5 representatives from Giza districts  
2 Non Governmental Organizations  
**JICA Study Team**  
Ahmed El Dorghamy  
**Environics Team**  
Dalia Nakhla  
Abdallah El Etribi  
Dr. Hanaa El Gohary  
Mohammed Fangary

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The meeting started with a short speech given by *Dr. Mostafa EL Khatib (Head of Giza Governorate Local Council)* wherein he introduced the project to the attendees.

Engr. Nakhla provided a full presentation of Metro Line 4 project highlighting the objectives of the Environmental Impact Assessment (EIA) study and the role of public participation in the study.

Dr. El Khatib commented on the project's presentation and stressed the importance of expanding the metro network to cover all Greater Cairo. He asked about the possibility of:

- Implementing the two alternatives proposed for Phase 2 (Al Sawah and Nasr City) of Metro Line 4;
- Expanding the metro network with links to all new cities such as the 10<sup>th</sup> of Ramadan, 6<sup>th</sup> of October, Badr, and others; and
- Linking the metro network with the existing tram lines in Heliopolis.

He also added that the project and the EIA study are distinctive, and he encouraged the work towards public participation and the inclusion of the views of interested parties in environmental assessment studies.

Then the attendees started the discussion and presented their suggestions.

*Ms. Nahed El Dafrawy - Chairperson of Al Motahabeen Fi Allah NGO*

Ms. El Dafrawy started by thanking for the invitation to attend this meeting and praised the project. She asked about the reason for the selection of Al Ahram Street instead of Faysal Street for the new metro line alignment.

Engr. El Dorghamy from JICA Study Team responded that Al Ahram Street was chosen following a set of engineering, social, and environmental criteria. Engineering limitations could be summarized in the so-called number of "hard points"

or obstacles such as existing utilities, existing subway lines, tunnels, canals and drainage, etc. The social aspect is to reduce the need to expropriate properties (land and buildings). He also added that different alternatives for the alignment from Remaya Square to Workshop Depot in 6<sup>th</sup> of October are still under study.

*Adly Rashed Heikal - Head of Environment Committee in Giza Governorate Local Council*

Mr. Heikal asked about the disposal of excavated soil resulting from tunnel boring operations especially since a large part of it is mud which can be used for agriculture. He also noted that contractors usually dispose excavated soil in a random way and demanded for a strict monitoring program for these activities during the construction of the project. He also inquired about the impacts of the alignment on the archaeological sites in Giza Plateau.

Engr. El Dorghamy responded that the drilling method to be used in Metro Line 4 will be similar to the methodology implemented in Lines 1, 2, and 3 using a tunnel boring machine (TBM) which operates like a worm. Two tunnels will be bored with a final inner diameter of approximately 6.34 m each. The excavated soil will be mixed with water and transferred to a treatment and separation station. Part of the EIA study is to identify the nature of soil, the quality and characteristics of soil and groundwater before the start of excavation and tunneling works. Different alternatives for the transportation and disposal of excavated soil are being studied.

Dr. El Gohary added that the Environmental Management Plan (EMP) in the EIA study specifies how to deal with waste and the methods of its disposal. Usually, a neutral third party, as well as the implementing company, conducts monitoring and inspection activities on the contractor's performance.

On a side discussion, Engr. Nakhla requested Dr. El-Khatib his comments for the preservation of the archaeological site in Giza Plateau and the Sphinx from rising groundwater.

Dr. El Khatib confirmed that Giza Plateau is of particular importance; the ring road path was changed in order not to pass through the campus of the archaeological site on the basis of UNESCO objections. He asked for a study to examine vibrations that may result from the construction and operation of the proposed metro line. He added that in 1998, a decree was issued to ban construction and/or restoration in Nazlet El Seman. The problem of rising groundwater was solved through the elimination of domestic connections not conforming to specifications. The continuous irrigation of Mena House golf course was stopped, and the playing field was separated from the Sphinx to address the problem of groundwater in the area. The urban sprawl of Hadaeq Al-Ahram will be taken into account in the future to prevent the rise of underground water level to preserve the archaeological site.

*Hajj Mohamed Bady - Member of Giza Governorate Local Council*

He asked about the areas that will be reduced from El Ahram Street for the Metro and the project's impact on traffic later in the operation phase.

Engr. El Dorghamy informed the group that beneath El Tahrir Square, as an example, there will be a multi-storey Metro Station and tunnels on different levels underground. Therefore, the impacts on activities surrounding the station and traffic at the surface are mainly only during the construction of these stations. As for the operation phase, the areas for stations' entrances, exits, and ventilation shafts will be reduced from the pavement and will not have impacts on traffic. Two parallel tunnels will be constructed either horizontally or vertically along side each other. Japanese technologies are proposed for construction, as well as innovative solutions such as temporary steel bridges, to solve the traffic problems during the construction of stations.



Dr. El Khatib commented that the positive impacts of this project surpass the negative ones. From his experience, areas allocated for construction of Metro Line 3 are smaller than areas used in Metro Lines 1 and 2; this is due to the use of new technologies and better construction management.

*Ms. Azza El Sebaa - Head of Red Crescent NGO*

Ms. El Sebaa inquired on the possibility of using the available drilling resources during the construction of Metro Line 4 alignment for the establishment of underground garages, which will benefit users of the subway and car owners.

Dr. El Khatib praised the idea and suggested to propose it to the National Authority for Tunnels (NAT) to evaluate the proposal.

*Dr. Abdel Rahman Hassan - Member of Giza Governorate Local Council*

Dr. Hassan asked about emergency response plans during construction. He also asked about the reasons for conducting a social survey and impact assessment.

Dr. El Gohary replied that the emergency response plan is a part of the Environmental Management Plan (EMP). The objectives of the social component of the study are to identify the social status of the communities living along the proposed alignment and to study the social and economic impacts of expropriation of lands and properties. These studies will be the bases in setting appropriate compensations and resettlement plans. In general, the communities look at the Metro project as beneficial since it will provide employment opportunities and will improve the commercial activities around the new Metro stations.

*Mr. Sayed El Fakharany - Member of Giza Governorate Local Council*

*Mr. Atef Gomaa - Member of Giza Governorate Local Council*

Mr. El Fakharany inquired about the curves in the alignment, and Mr. Atef asked about the expected construction time schedule.

Engr. El Dorghamy answered that the distance between stations will be approximately 1 kilometre, and the minimum diameter for curves will be 250 metres. The construction time will be around six years for each phase and it can start in parallel with the ongoing works for Metro Line 3.

Dr. El Khatib commented that the relocation of utilities will be an important phase and it may take more time than planned since the updated underground utility maps are not always available.

*Mr. Essam Afifi - 6 October Governorate Local Council Deputy*

Mr. Afifi noted that the New Grand Egyptian Museum and Hadaeq El Ahram stations are under the jurisdiction of Giza Governorate. However, these stations will serve the residents of 6<sup>th</sup> of October governorate. He does not encourage extending the metro line inside 6<sup>th</sup> of October.

## Minutes of Meeting

### Greater Cairo Metro Line 4

**Subject:** EIA and PC for Metro Line 4

**Objective:** The meeting was held in the National Authority for Tunnels (NAT) to discuss their requirements concerning the EIA and public consultation of the Metro Line 4

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**Attendees:** **NAT**

Ahmed Abdel Sattar El Neweishy (Head of Planning Department)

Engr. Tarek Abu El Wafa

**JICA Study Team**

Tomoko OTA

Ahmed El Dorghamy

**Environics Team**

Dalia Nakhla

Mohammed Fangary

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General Comments:

Engr. Abu El Wafa has been working with NAT since 1984, and he participated in the implementation of Metro Lines 1, 2, and 3.

Environmental studies are being conducted by SYSTRA only for Metro Line 3.

The following issues were raised regarding on the implementation of Metro Line 4:

- NAT will prepare a letter addressed to the Deputy Interior Minister Major-General Sherif Gomaa to facilitate the issuance of official permits for field work surveys. The letter should contain the names of all the EIA and RAP team members. The team will have to follow-up with the Ministry of Interior for the approval of the permits, as NAT will only be responsible for the preparation of the letter.
- The names of the EIA and RAP team members should be submitted by JST to NAT to get permission and approval to visit the stations under construction of Metro Line 3, Phase 1.
- NAT advised JST and Environics to ensure proper coordination among all teams undertaking the surveys and questionnaires to reduce possible confusion by the interviewees.
- The detailed scope of work and all related activities and procedures (measurements locations, parameters, Public Consultation Plan) of the EIA and RAP have to be submitted to NAT for review and approval prior to their implementation.
- Public consultation meetings should be conducted at a later stage when all project data are available and have been finalized. Individual meetings are preferred for the scoping stage.
- The halls of Cairo and Giza Governorates are recommended by NAT as venues for public consultation meetings.
- NAT stressed that the EIA study should meet all the requirements and standards of EEAA and JICA.

## Minutes of Meeting

### Greater Cairo Metro Line 4

**Subject:** Introduction to construction site of Metro Line 3  
**Date:** Monday, 15<sup>th</sup> June 2009  
**Venue:** Abbaseyya Station & Abdo Basha Station, Metro Line 3  
**Attendees:** - Engr. Mohamed Ali – Construction Team Abbaseyya Station  
- Technician / Mostafa – TBM Machine Abdo Basha Station  
- EIA Team / Envirionics and JICA Study Team

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Envirionics and JST were introduced to the construction procedure of a typical metro station and tunnel. Abbaseyya station is an “end station” for Phase 1 of Line 3. It will also be used for Phase 2 break-in.

#### Pre-construction Phase:

- Land acquisition and clearance of site were the initial steps. Compensatory measures were explained. Compensation was not only monetary, for example, a new four-storey building for an existing orphan house was constructed to replace the old two-storey building that have been demolished for the construction of Abbaseyya Station.
- The neighboring structures were assessed and rated according to their structural integrity during the pre-construction stage and were given color codes (green, blue, yellow and red). These structures are strictly monitored for structural integrity and settlement during all construction phases (30 m tunnel – 50 m stations).
- Utilities such as electricity, natural gas, sewers etc. were relocated in coordination with each concerned entity.

#### Construction Phase:

- The soil of the station area is injected with a special soft gel to decrease its permeability to a k factor of  $1 \times 10^{-6}$ . This will ensure excavation of almost dry soil.
- Retaining walls are constructed along the perimeter of the station (primary and secondary).
- Ready mixed concrete is used throughout the whole construction process. No batch plants are established on site.
- The stations are constructed top down where the first slab is constructed at ground level, excavation then proceeds under that slab. After reaching the level of the 2<sup>nd</sup> slab, it is constructed and so on until the final bottom slab level is reached. Before the final slab is laid, waterproofing and insulation works take place to protect the station from groundwater intrusion. Support steel struts are utilized throughout the station construction process until the slabs reach the required bearing strength. Access openings are left in the slabs for excavation purposes and lowering of equipment and material such as pre-cast tunnel segments that are manufactured in 10<sup>th</sup> Ramadan factories.
- A workshop station was established 600 m away from the Abbaseyya Station to be used to lower the tunnel boring machine (TBM).
- The TBM bored its way to the Abbaseyya Station from the workshop shaft. It then bored its way to Abdo Basha Station.
- The TBM machine excavates the tunnel and establishes its concrete structure simultaneously. Each concrete ring is composed of seven segments and one key segment. The tunnel is 9 m in diameter.
- Bentonite is pumped to the excavation head of the TBM machine and mud slurry formed by a mixture of soil and bentonite is pumped back to the mud separation and treatment station in Salah Salem.
- Ventilation shafts are established in the middle of the tunnel half way between two stations which is the lowest point in the tunnel. During construction, bentonite and slurry booster pumping stations are located at these points.
- The floor of the tunnel will be concreted to a height of 1.9 metres to create the floor on which the two tracks of the metro line will be laid.
- The tunnel is provided with ventilation pipes for air venting and circulation during construction.

## **Minutes of Meeting**

### **Greater Cairo Metro Line 4**

**Subject:** Operation of Soil Treatment Facility of Metro Line 3

**Date:** Tuesday, 30<sup>th</sup> June 2009

**Venue:** Salah Salem Soil Treatment Station, Metro Line 3

**Attendees:** **Contractor**  
Engr. Mohamed Zaeed – Soil Treatment Facility Supervisor

                  Environics  
                  Dalia Nakhla               EIA Project Manager  
                  Mohamed Fangary       EIA Deputy Project Manager

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Engr. Zaeed explained that the soil treatment station separates the soil bentonite mixture resulting from tunnel boring operations. The station should always be located behind the stations as the TBM machine pushes back the resulting mud/soil for treatment.

The treatment facility separates the excavated soil from the bentonite through a series of physical processes. The soil first enters a “traumill” which separates soil size 7 mm. The fine soil is then transferred by belt conveyors to desanding units which separates the soil of 70 µm size using a series of cyclones. The very fine soil consists mainly of bentonite which will be recycled back to the TBM machine after going through material testing and mixing it with fresh bentonite and water, if needed, to maintain its material properties. The waste soil is then hauled (at night) to the designated disposal areas in El Wafaa wel Amal and Makatam disposal sites. The wasted bentonite is also disposed in El Wafaa wel Amal but in a separate designated cell.

Bentonite is purchased from a factory in Alexandria, water is provided from the main local network, and electricity is generated by on-site generators. Other components of the soil treatment facility are the operation room, laboratory, office and workers’ toilets.

## **Minutes of Meeting**

### **Greater Cairo Metro Line 4**

**Subject:** HSE of Metro Line 3

**Date:** Tuesday, 30<sup>th</sup> June 2009

**Venue:** Salah Salem Metro Line 3 Offices

**Attendees:** **Contractor**  
Engr. Ayman El Kadi – HSE Manager

**Environics**  
Dalia Nakhla            EIA Project Manager  
Mohamed Fangary    EIA Deputy Project Manager

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The HSE manager informed the EIA team that construction of a metro line in the Greater Cairo region such as the case of Metro Line 3 is very challenging because the station location is congested with buildings and traffic. He explained that land acquisition is first done through the National Authority for Tunnel. Precautionary measures set by the HSE are important so as not to jeopardize the safety of the workers and the neighboring communities.

A solid and hazardous waste plan was one of the main components of the HSE plan. Transportation of waste is usually done at night so as not to disturb traffic.

Ambient air quality and noise monitoring is done periodically around the stations keeping in mind that the baseline threshold limits is already high due to urban activities and traffic surrounding the stations.

Workplace air and noise monitoring is also done periodically. However, effective ventilation is installed in the tunnels and the workers are equipped with personal protective equipment such as ear plugs.

**Minutes of Meeting**  
**Scoping for EIA of Greater Cairo Metro Line 4**

**Subject :** Consultation with the Egyptian Company for Metro (ECM)

**Date:** Tuesday, 29<sup>th</sup> September 2009

**Venue:** Egyptian Company for Metro (ECM)

**Attendees:** **Egyptian Company for Metro (ECM)**  
Engr. Wael Mahmoud Youssef, Head of Safety Department  
Dr. Abdel Moneim Hamza, Head of Health and Environment Department

**Environics**

Engr. Dalia Nakhla  
Engr. Mohammed Fangary

**JST**

Mr. Norihiko INOUE  
Engr. Ahmed Dorghamy

**Objective:** To acquire the experience of ECM in Metro Operation

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The JST team and Environics introduced the Metro Line 4 project and process of EIA preparation and asked the Egyptian Company for Metro (ECM) to share their experience in the operation of Lines 1 and 2 to aid in the EIA and EMP. The relation between NAT and ECM was also clarified.

***ECM and NAT***

The ECM is the company responsible for the operation and maintenance of Metro Lines 1 and 2. Its role starts after the completion of planning and construction of new metro lines carried out by NAT. Cooperation between the two authorities take place only during the “handover period”; and in special cases such as the introduction of a new ticketing system (Contact less Pre-Paid Cards) awarded to a Spanish company.

In cases of problems faced by ECM related to designs of Metro lines, ECM contacts NAT to solve these problems. ECM is responsible in handling problems related to Operation and Maintenance.

ECM was previously called Cairo Metro Organization (COM) under the Egyptian National Railways (ENR). The company is undergoing a major restructuring - new organizational structure and job descriptions will be introduced by Booz Allen Hamilton and Hazem Hassan consultancy firms. After restructuring, ECM will be separated from ENR and will be directly under the Ministry of Transport (MOT).

***HSE Unit in ECM***

The Environment and Health department in ECM was established in 2005. It is divided into Safety unit and Health and Environment unit.

The HSE unit employs 206 technicians, eight specialists, and three engineers in addition to managers. There is a need to increase the number of staff to meet the workload. The Civil Defense Administration (CDA) required increasing the number of technicians to 4 per shift in each Metro station. Mr. Youssef commented that only two technicians per shift per station will be enough, and the requirement of CDA requires 175 extra technicians.

The department carries out several environmental monitoring activities in cooperation with the National Institute for Industrial Security (El Hegaz) and the Egyptian Environmental Affairs Agency laboratories (EEAA) as follows:

- Electromagnetic fields monitoring (for drivers, passengers, workers);
- Noise monitoring in tunnels and stations;
- Air quality monitoring (O<sub>2</sub> and CO<sub>2</sub>);
- Monitoring illumination levels in office spaces; and
- Dust and gas monitoring in workshop depot.

Monitoring results are compared to national (Law 4) and international standards. Monitoring is not done on a regular basis but upon demand, e.g. due to the issue of H1N1 infection, an air monitoring survey will be conducted within the station to monitor CO<sub>2</sub> and O<sub>2</sub> as indicator of proper ventilation.

During the planning phase of Metro Line 3, the H&E Department of ECM gave recommendations to NAT regarding soundproofing and noise reduction inside the tunnel. However, they are not sure if it was implemented since they were not involved in the planning phase.

To reduce high noise levels in Metro Line 2, ECM contracted an Australian company to provide a special type of brake pads to reduce the noise emitting from friction with wheels.

The department conducts regular health annual check-ups for drivers and workers, and every two years for employees.

There are seven first aid units and additional two units are under construction in Metro Lines 1 and 2 stations.

### ***Solid Waste Management***

Solid waste management in Metro vehicles, stations and buildings is carried out by a private company (Care Service). The Track Engineering Department is responsible for the collection of solid waste from Metro tracks. The accumulation of solid waste in streets outside the stations is not the responsibility of ECM. However, they contact the relevant district authority or the Governorate to remove accumulated waste.

Encroachments of street vendors on entrances of stations and ventilation shafts are monitored through visual observation.

Depot workshops for Metro Lines 1 and 2 are managed by two private companies (Mitsubishi and SAN MASR). The depot workshop for Metro 1 is in Torra and while for Metro 2 is in Shobra. These companies are responsible for the solid waste management of the depot workshop.

### ***Emergency Plans***

The Safety Department conducts regular tests on firefighting equipments, alarms, smoke control scenarios and fire hydrants.

Irregular reports on accidents and security of public buildings are prepared by the Safety Department. The monthly ECM Operation report is the only regular report being prepared.

An emergency response plan was set in coordination with Transport Police Department. A new emergency plan for ECM operation is currently under development by Field Son's Oil Services Company.

### ***Ventilation System***

The Cooling and Ventilation Department is responsible for the maintenance of ventilation shafts and air-conditioning. Some illegal activities of street vendors sometimes causes blockage on the ventilation shafts which could have serious impacts on the system. Regular inspection of the ventilation shafts and maintenance of air pollution control devices and filters are therefore done regularly.

### ***Sanitary Facilities***

Toilets inside Metro stations are only available for staff. No public toilets are available for Metro passengers due to maintenance problems and security reasons. It is recommended to construct public toilets outside the stations to be managed by the district authority or the Governorate.

### ***Impacts from Vibration***

Vibrations resulting from operation of at-grade Metro and its impacts on neighboring old structures are not monitored by ECM. The responsibility of the company is limited to whatever falls between its fences. However, ECM reinforces common walls and fences in impacted areas to protect its metro lines. The company also replaced old timber sleepers with concrete ones to minimize the impact of vibrations. Any damage or repair of buildings outside the metro boundaries is the responsibility of the district.

There were no detected vibration impacts or complaints from structures along the metro underground tunnels. However, there were leaks from a gas station lying on top of the metro station from the gas station underground storage tanks in Metro Line 2 Mazalat Station. ECM is trying to solve this issue through drainage and slab injection but it is still an unsolved problem.

### **Recommendations**

Engr. Mohamed El Shimi, the head of ECM, should be contacted for ECM involvement in the EIA and public disclosure meeting.

The Civil Defense Administration Department should be consulted during the design phase of Metro Line 4 to take its requirements into consideration.

ECM is willing to implement the Environmental Management and Monitoring Plans (EMMP) to be proposed in the EIA report.



## **Annex 9-3**

### **Results of the 2nd Stakeholder Meeting**

## Results of the 2nd Stakeholder Meeting

The 2nd stakeholder meeting on EIA of the Phase 1 Project was held on 28<sup>th</sup> December 2009. The meeting was planned and held as a public consultation meeting at the disclosure stage of the draft EIA report according to the legislative requirement of Egypt related to EIA.

The overall information of the 2nd stakeholder meeting is summarized in 9.6.2 of Chapter 9 in the F/S report, and the following are key issues raised in the meeting, all of the records of the meeting are compiled in a separate report (Report of the second stakeholder meeting at EIA disclosure of the Phase 1 Project).

### Key Issues Raised in the 2nd Stakeholder Meeting

Subject	Issues Raised
Public Consultation	<ul style="list-style-type: none"> <li>List of entities involved in the scoping meetings and a summary of the concerns raised.</li> </ul>
Alignment Alternatives	<ul style="list-style-type: none"> <li>Metro Line 4 will pass in Pyramids (Haram) Street which is mainly touristic and recreational more than being residential, and so this should be taken into account.</li> <li>The proposed line passes through Giza Square which already accommodates El Haram tunnel, railway bridge and metro bridge. Therefore it is a very sensitive spot and can be avoided by passing through Giza Square rightwards to El Monib district.</li> <li>The choice of Haram Street instead of Faisal for location of Metro Line 4.</li> </ul>
Planning Issues	<ul style="list-style-type: none"> <li>Carrying out cumulative impact assessment for all projects established in the same area.</li> <li>Consider making a unified ticket for all public transportation modes.</li> <li>Phase 2 of the project and why it was not included in the present EIA.</li> <li>Parking spaces should be planned for future metro stations even if this entails land and property acquisition.</li> <li>Whether or not there is space in Pyramids (Haram) Street to locate parking spaces next to the metro stations.</li> <li>Whether or not the population growth is taken into account during the design of Metro Line 4 as the present stations of Metro 1 and 2 get very congested with time.</li> <li>The area outside Faisal Station became chaotic due to the activities of the illegal vendors.</li> <li>Stations should contain all services required by the users.</li> <li>Proposal for the establishment of escalators like the one in Sidi Gaber Station in Alexandria to help the metro users to cross the street especially senior citizens.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>Whether or not a mathematical model was prepared to correlate the expected reduction in traffic with impact on pollution such as noise reduction.</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>The method of ensuring the solid waste management (Contractors should dispose of the excavated soil in the assigned place.)</li> <li>Solid waste disposal plans during construction and operation.</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>Haram Street is already suffering for traffic congestion and therefore the situation will get worse during construction of the metro stations.</li> <li>An integrated plan is needed to solve the problem of traffic in Cairo beyond 2050.</li> </ul>
Vibrations	<ul style="list-style-type: none"> <li>The possibility of vibration impacts on the artefacts and archaeological sites due to the construction of the metro and its stations in the area of the Egyptian Museum.</li> </ul>
Health Impacts	<ul style="list-style-type: none"> <li>The impacts of the electricity transformers linked to the metro on the public.</li> <li>Users of Metro Line 2 have been complaining from ventilation problems, and the ventilation of EL Azhar Tunnel is also bad.</li> </ul>
Economic Issues	<ul style="list-style-type: none"> <li>Besides the environmental factors, whether or not the financial and operational factors are included in the feasibility study.</li> </ul>
Impact on Groundwater	<ul style="list-style-type: none"> <li>Whether or not groundwater rise will affect the construction of stations and tunnels.</li> <li>Recommendation for a system of wells to be drilled to monitor the fluctuation of groundwater levels (at varying depths) in some areas where the metro passes through, especially in Masr El Kadima / Ahram/ El Malek El Saleh.</li> <li>The construction of the project in these areas may lead to change the hydraulic borders of existing reservoirs, as well as lock the groundwater flow paths and accordingly higher groundwater levels in the surrounding areas. And the consequent negative impacts on the facilities and residential buildings in these areas.</li> <li>There is a need to prepare a detailed hydrological study along the route of Phase 1 of the Metro line which includes a numerical model to represent the conditions groundwater presence in these areas, the expected scenarios of rising groundwater water levels and the extent of the negative impacts on facilities and residential buildings as well as proposed</li> </ul>

Subject	Issues Raised
	engineering solutions to avert such problems.
Resettlement and Land Acquisition	<ul style="list-style-type: none"> <li>• 84 feddans that are going to be expropriated for the establishment of the workshops or Depot Station of Metro Line 3 in Warak west of the ring road. A concern for loss of agricultural land of high value and whether or not the owners will be compensated.</li> </ul>
Archaeological Aspects	<ul style="list-style-type: none"> <li>• Possible impact of the metro project on the Pyramids and the Sphinx.</li> <li>• Inquiry about NAT's procedure for ensuring that no archaeological monuments will be encountered during tunnel boring as not to reach a situation like that encountered in Metro Line 3 and the latest incident of land collapse.</li> <li>• Possible impact on archaeological sites such as the Citadel and Sultan Hassan Mosque and the buried ones that could stop the work of NAT and a recommendation for the use of radar or electromagnetic investigations.</li> </ul>
Management Plan	<ul style="list-style-type: none"> <li>• Encouraging the design of proper emergency response plan as this Metro will be a single line.</li> <li>• Emergency response plan in case of electricity/power failure.</li> <li>• Rodent fighting plans within tunnels as some were observed in some stations.</li> <li>• Coordination with the other entities that could make use of the proposed line.</li> </ul>

Source: JICA Study Team, referring EIA report by Enviro-nics

**Sample of Photos of the 2nd Stakeholder Meeting on 28th December 2009**



## **Annex 9-4**

### **Proposed Outline of Implementation System for Environmental and Social Considerations of the Project [Phase 1]**

## Proposed Outline of Implementation System for Environmental and Social Considerations of the Project [Phase 1]<sup>1</sup>

The outline proposed hereinafter is developed for the purpose of realizing the due environmental and social considerations including mitigation measures and monitoring for the Phase 1 Project, based on the findings and outcomes obtained through a series of the studies such as EIA and RAP Framework in the F/S stage. The outline shows the directions and the overall frameworks proposed for implementing the environmental and social considerations according to the Project implementation stage, namely pre-construction, construction and O&M stages.

It is noted that the implementing system for environmental and social considerations could be cultivated and matured along with the Project stage of the Phase 1 with reference to the outline proposed in this document. Similar outline for the Phase 2 is recommended to be developed at the time of completion of the EIA study for Phase 2.

### 1. Items of Mitigation Measures and Monitoring

Based on the EIA and RAP Framework studies, the items shown in Table 1.1 are to be covered in the outline proposed. The details on each item as well as the reports of EIA and RAP Framework are discussed and compiled in Chapters 9 and 10.

**Table 1.1 Items to be Covered in the Proposed Outline**

Type of Impact Conceivable	Mitigation			Monitoring		
	Pre-C	C	OM	Pre-C	C	OM
Resettlement and land acquisition	O	O (*2)	O (*2)	O	O (*2)	O (*2)
Impact on utility	O	O (*2)	-	O	O (*2)	-
Impact on cultural heritage	O	O (*2)	-	O	O (*2)	-
Air pollution	-	O	O (*3)	-	O	O (*3)
Noise and vibrations	-	O	O (*3)	-	-	O (*3)
Water & groundwater quality	-	O	-	-	O	-
Traffic condition	-	O	O (*3)	-	O	O (*3)
Sanitation and health hazard risk	-	O	O	-	O	O
Land use change	-	-	O (*3)	-	-	O (*3)
Other impacts conceivable due to construction works (*1)	-	O	O (*2)	-	O	O (*2)

Remarks: Pre-C (Pre-construction stage), C (Construction stage), OM (O&M stage)

\*1: Miscellaneous impacts are conceivable due to construction works, such as soil contamination, construction waste generation, change of groundwater level, physical division of local areas, and change of landscape, although these impacts will be limited during construction stage.

\*2: In case that residual impact would be still beyond acceptable level from the environmental and/ or social viewpoints, then further actions would be designed and provided.

\*3: In case that the secondary impacts would be recognized, then the necessary actions would be designed and provided.

Source: JICA Study Team

<sup>1</sup> This annex is quoted from the F/S report 3/4 prepared by JICA.

## 2. Proposed Outline in Pre-construction and Construction Stages

### 2.1 Organizational Arrangement of Key Entities

NAT, being the Project executing agency under the superior administration by MOT, is the primary entity responsible for the Project in the pre-construction and construction stages. Therefore, NAT has principal role to supervise and implement all necessary actions for environmental and social considerations such as mitigation measures and monitoring in pre-construction and construction stages.

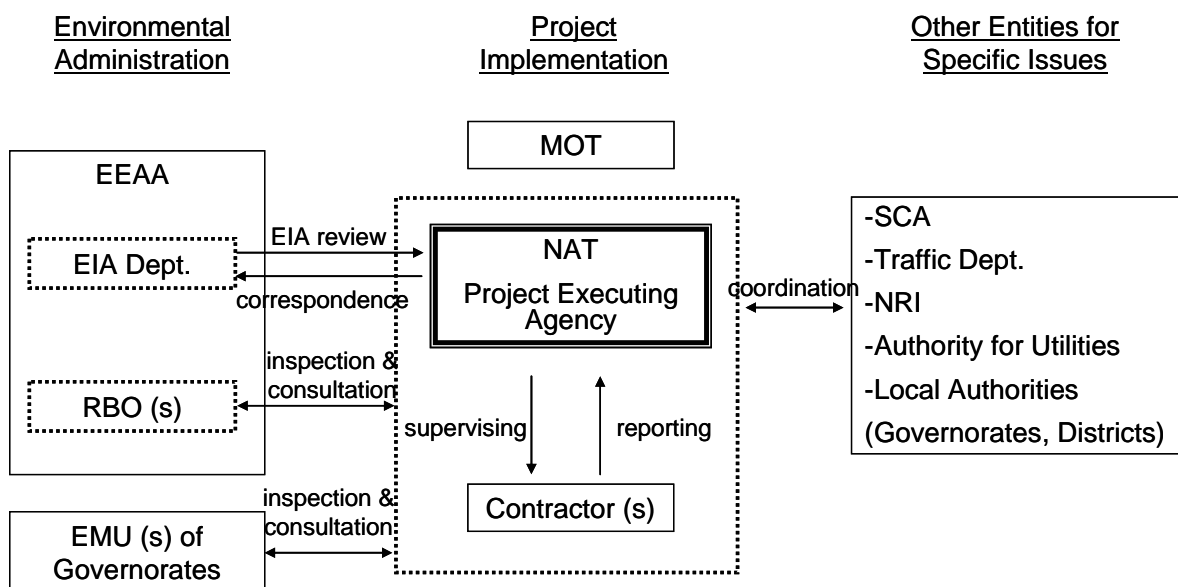
Coordination and cooperation with related entities are also NAT's responsibility, since these various aspects should be covered in the course of supervising and implementing the necessary actions of NAT. According to the items clarified in Table 1.1, Table 2.1 shows the key entities to be coordinated/cooperated with functional requirements and major tasks expected. The overall organizational chart of key entities concerned is also depicted in Figure 2.1.

**Table 2.1 Key Entities and Functional Requirements/ Major Tasks Expected  
(Pre-construction and Construction Stages)**

Key entities concerned	Functional requirements/ major tasks expected
NAT	<ul style="list-style-type: none"> <li>- Project executing agency.</li> <li>- Primarily responsible for supervising and implementing the necessary actions for mitigation measures and monitoring.</li> <li>- Primarily responsible for coordinating and consulting with other key entities regarding mitigation measures and monitoring.</li> <li>- Involvement of consultants and/or NGOs on in-house base or outsource base for implementing the mitigation measures and monitoring activities, if necessary.</li> </ul>
MOT	<ul style="list-style-type: none"> <li>- Overall administration of the Project implementation.</li> <li>- Supervision to and communication with NAT necessary for the Project implementation.</li> <li>- Coordination with other line ministries and/ or other national authorities together with NAT whenever necessary.</li> </ul>
EEAA and its RBO(s)	<ul style="list-style-type: none"> <li>- Responsible for environmental administration related to the Project.</li> <li>- Review of EIA of the Project including approval judgement.</li> <li>- Consultation with NAT whenever necessary for EIA preparation, procedure, and follow up.</li> <li>- Environmental inspection to the Project if necessary (by RBO(s))</li> </ul>
Local authorities (governorates, districts)	<ul style="list-style-type: none"> <li>- Consultation with NAT whenever necessary for follow up of EIA (by EMU).</li> <li>- Environmental inspection to the Project if necessary (by EMU).</li> <li>- Consultation with NAT and management of solid waste (by districts).</li> <li>- Implementation of necessary activities for resettlement, land acquisition and compensation in close coordination with NAT.</li> </ul>

Key entities concerned	Functional requirements/ major tasks expected
SCA	- Coordination and consultation with NAT to manage the issues on cultural/archaeological assets related to the Project whenever necessary.
Traffic department, Ministry of Interior	- Coordination and consultation with NAT on traffic management related to construction activities of the Project.
Nile Research Institute	- Coordination and consultation with NAT on engineering issues of the Project especially related to Nile river and groundwater.
Authorities responsible for utilities	- Coordination and consultation with NAT on engineering issues of the Project especially related to utilities protection and/ or relocation.
Contractor(s)	- Implementation of mitigation measures and monitoring according to the contract and specifications under supervision of NAT. - Reporting the above to NAT.

Source: JICA Study Team



Source: JICA Study Team

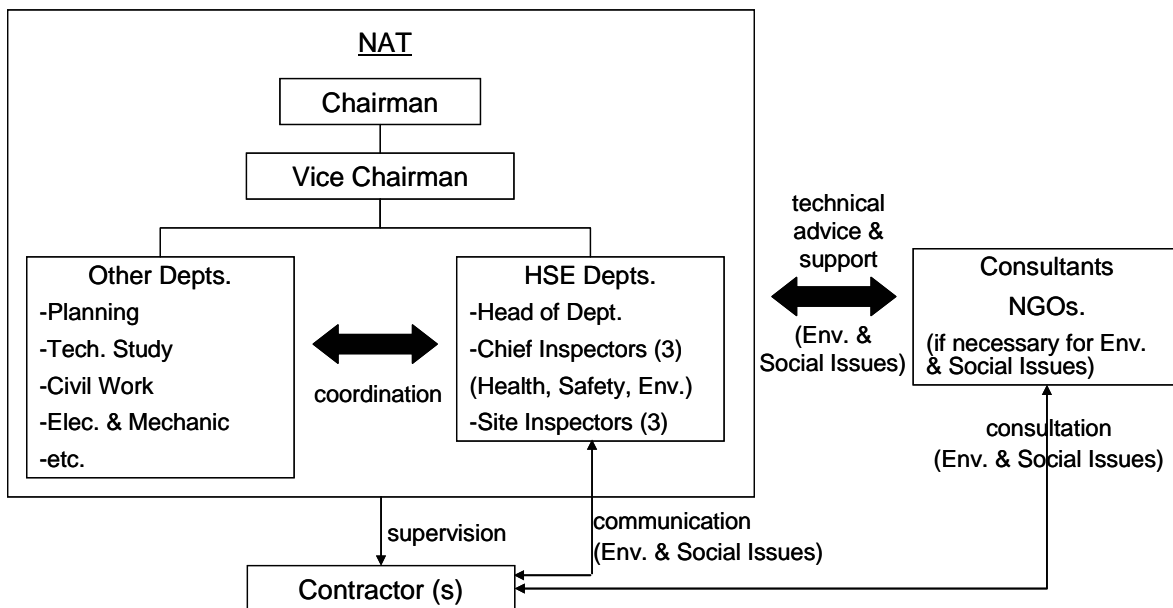
**Figure 2.1 Overall Organizational Chart of Key Entities Concerned (Pre-construction and Construction Stages)**

## 2.2 Implementation Arrangement Proposed

In order to implement the necessary actions for environmental and social considerations in the pre-construction and construction stages of the Phase 1 project, it is proposed for NAT to develop a system within its entity as a part of the project implementation unit. It is also proposed for NAT to consider involvement of external bodies, such as national consulting firms, for the smooth implementation of necessary actions.

As of February 2010, there is no specific department in NAT that is responsible for the environmental and social considerations. Therefore it is proposed for NAT to arrange a new department to assure the implementation of mitigation measures and monitoring. Figure 2.2 shows the proposed arrangement of the

department (Health, Safety, and Environment Department - HSE Dept.) as well as the relations with external bodies to be cooperated with NAT, whereas Table 2.2 shows the functional requirements and major mandates expected.



Source: JICA Study Team

**Figure 2.2 Proposed Arrangement (Pre-construction and Construction Stages)**

**Table 2.2 Functional Requirements and Major Mandates Expected (Pre-construction and Construction Stages)**

Name	Functional requirements/ major mandates
HSE Dept.	<ul style="list-style-type: none"> <li>- Key arm in NAT for performing the necessary actions of mitigation measures and monitoring.</li> <li>- Supervision and implementation of actual activities of mitigation measures and monitoring.</li> <li>- Coordination and cooperation with other departments in NAT whenever necessary for performing the actions.</li> <li>- Actual facilitation and coordination with other external bodies whenever necessary for performing the actions.</li> </ul>
Health unit	- Responsible especially for performing the actions of health issues related to the Project based on the plans/designs of mitigation measures and monitoring.
Safety unit	- Responsible especially for performing the actions of safety issues related to the Project based on the plans/ designs of mitigation measures and monitoring.
Environment unit	- Responsible especially for performing the actions of environmental issues including the requirement of RAP Framework related to the Project based on the plans/designs of mitigation measures and monitoring.
Other Depts. of NAT	- Coordination and cooperation with HSE Dept. whenever necessary for



Name		Functional requirements/ major mandates
(CWD, EMD, TD, etc)		performing the actions of mitigation measures and monitoring.
External bodies (*1)		
	Consultant/ NGO	<ul style="list-style-type: none"> <li>- Providing technical support and advice to HSE Depts. and/ or other depts. of NAT on environmental and social issues related to the Project.</li> <li>- Consultation with contractor(s) whenever necessary on environmental and social issues.</li> <li>- Working together with HSE Dept. on in-house base and/ or outsource base to perform the monitoring activities whenever necessary.</li> </ul>
	Contractor(s)	<ul style="list-style-type: none"> <li>- Implementation of mitigation measures and monitoring according to the contract and specifications under supervision of NAT.</li> <li>- Reporting the above.</li> </ul>

\*1: Cost necessary for involving the external bodies are estimated tentatively in EIA report Chapter 7.

Source: JICA Study Team

### 2.3 Proposed Outline of Human Resource Requirements

In the context of the implementation arrangement for mitigation measures and monitoring in pre-construction and construction stages, human resources are also proposed to be arranged to fulfill the functional requirements mentioned above. Table 2.3 shows the proposed outline of human resource requirements, including qualification standard, major job description expected, provisional input necessary for human resource arrangement, etc.

**Table 2.3 Proposed Outline of Human Resource Requirements  
(Pre-construction and Construction Stages)**

Name	Human resources (nos.)	Qualification and job description	Provisional input for arrangement (*1)
HSE dept.	1. Manager (1) 2. Chief inspector for 3 unit each (3) 3. Site inspector for 3 unit each (3)	1. Manager - Bachelor of Science, Experiences more than 10 years in HSE field, preferably. - Managerial and technical supervision of dept's activities. 2. Chief inspectors: - Bachelor of Science, Experiences more than 5 years in specific field, preferably. - Technical supervision and performing the actions. 3. Site inspectors: - Middle technical education. - Technical application and performing the actions.	1. Manager: LE 60,000/y 2. Chief inspectors: LE 42,000/y*3 nos. 3. Site inspectors: LE 24,000/y*3 nos. Note: Initial input would be necessary provisionally equivalent to USD 200,000 for establishment of dept., training staff, awareness, etc. The initial input would unnecessary to be allocated from the 2nd year.
Other depts.	(no incremental human resources.)		

\*1: Direct cost necessary for implementing mitigation measures and monitoring are estimated tentatively in EIA report Chapter 7.

Source: JICA Study Team

### 3. Proposed Outline in O&M Stage

#### 3.1 Organizational Arrangement of Key Entities

In the O&M stage, ECM will be the responsible entity for the Project under the superior administration by ENR and MOT<sup>2</sup>. NAT will be coordinated in such cases as improvement or renewal of facilities/ equipment within a certain scale. Therefore, the proposed role of ECM is to supervise and implement the necessary actions for environmental and social considerations such as mitigation measures and monitoring in O&M stage, in collaboration with NAT.

Coordination and cooperation, not only with NAT but also with other related entities, are also necessary for ECM to accomplish the roles, since the various aspects should be covered in the course of supervising and implementing the necessary actions. According to the items clarified in Table 1.1, Table 3.1 shows the key entities to be coordinated/cooperated with functional requirements and major tasks expected. The overall organizational chart of key entities concerned is also depicted in Figure 3.1.

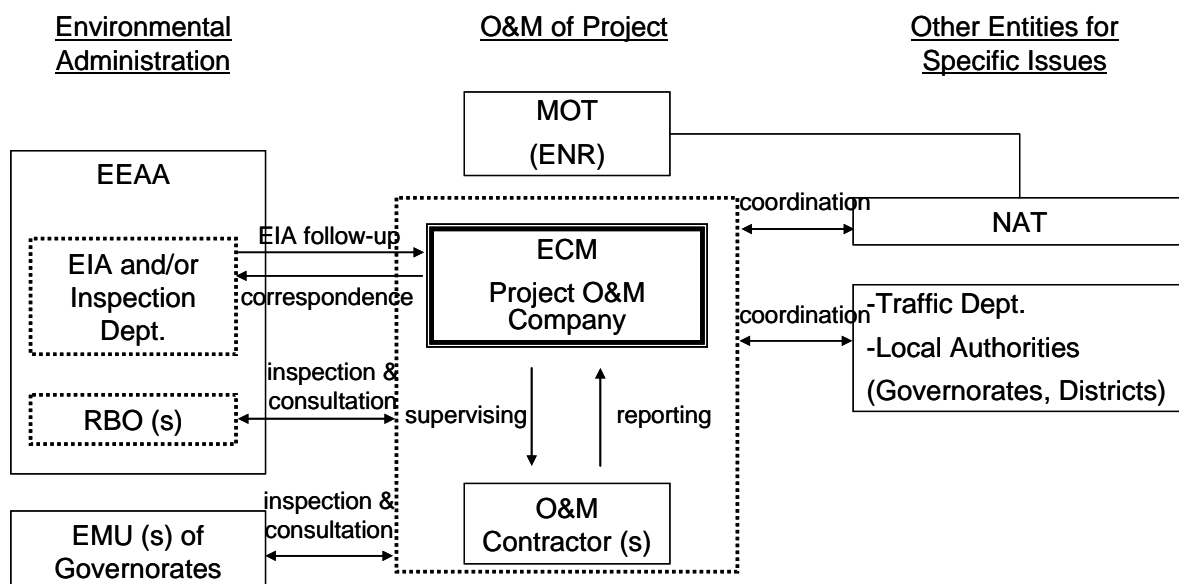
**Table 3.1 Key Entities and Functional Requirements/ Major Tasks Expected (O&M Stage)**

Key entities concerned	Functional requirements/ major tasks expected
ECM	<ul style="list-style-type: none"> <li>- Project O&amp;M company.</li> <li>- Primarily responsible for supervising and implementing the necessary actions for mitigation measures and monitoring.</li> <li>- Primarily responsible for coordinating and consulting with other key entities regarding mitigation measures and monitoring.</li> <li>- Involvement of consultants and/ or NGOs on in-house base or outsource base for implementing the mitigation measures and monitoring activities, if necessary.</li> </ul>
NAT	<ul style="list-style-type: none"> <li>- Coordination and cooperation with ECM whenever necessary for implementing the mitigation measures and monitoring.</li> </ul>
ENR & MOT	<ul style="list-style-type: none"> <li>- Overall administration for O&amp;M of the Project.</li> <li>- Supervision to and communication with ECM necessary for O&amp;M of the Project.</li> <li>- Coordination with other line ministries and/ or other national authorities together with ECM whenever necessary.</li> </ul>
EEAA and its RBO(s)	<ul style="list-style-type: none"> <li>- Responsible for environmental administration related to the Project.</li> <li>- Follow up of EIA of the Project including consultation with ECM whenever necessary.</li> <li>- Environmental inspection to the Project if necessary (by RBOs)</li> </ul>
Local authorities (governorates, districts)	<ul style="list-style-type: none"> <li>- Consultation with ECM whenever necessary for follow up of EIA</li> </ul>

<sup>2</sup> ECM is currently an arm of ENR. However, restructure of ECM is under planning, which would include separation of ECM from ENR and re-organization directly under MOT.

Key entities concerned	Functional requirements/ major tasks expected
	(by EMU). - Environmental inspection to the Project if necessary (by EMU). - Consultation with ECM and management of solid waste (by districts). - Follow up activities for resettlement, land acquisition and compensation in close coordination with ECM and NAT whenever necessary.
Traffic department, Ministry of Interior	- Coordination and consultation with ECM on traffic management, if necessary, for managing the secondary impacts by the Project.
O&M Contractor(s)	- Implementation of mitigation measures and monitoring according to the contract and specifications under supervision of ECM. - Reporting the above to ECM.

Source: JICA Study Team



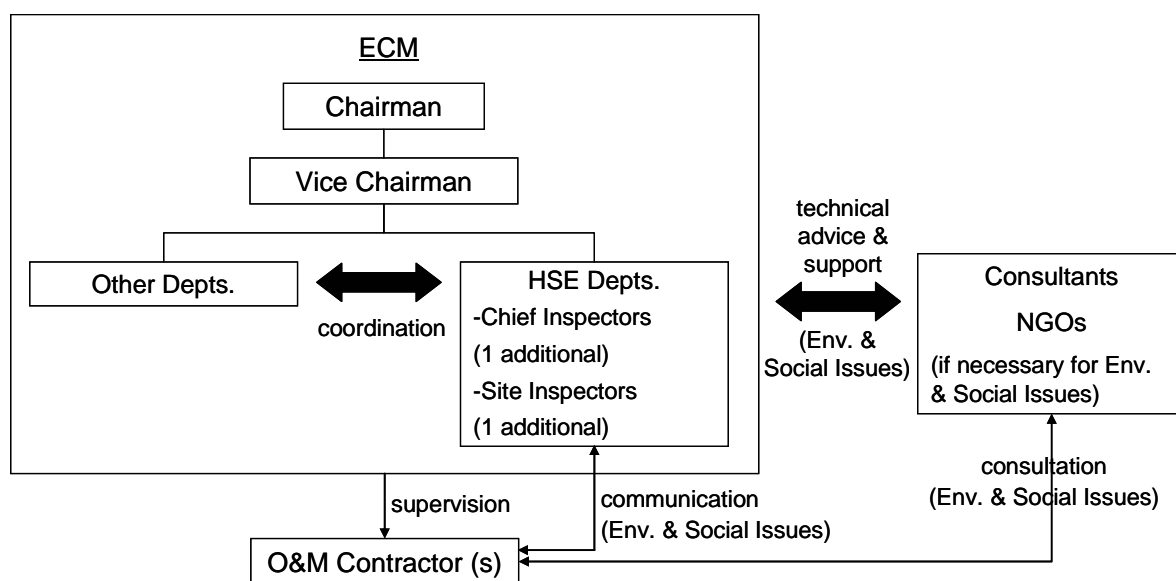
Source: JICA Study Team

Figure 3.1 Overall Organizational Chart of Key Entities Concerned (O&M Stage)

### 3.2 Implementation Arrangement Proposed

It is proposed for ECM to establish a system within its entity as a part of Project O&M unit which will implement the necessary actions for environmental and social considerations of the Phase 1 Project in the O&M stage. ECM has already established the Health, Safety, and Environment Department (HSE Dept.), although its present mandate is the management of issues related to passengers of metro and its labor force on health and safety viewpoints. Therefore, it is proposed for ECM to expand the mandates of HSE Dept. to assure the implementation of mitigation measures and monitoring. It is also proposed for ECM to involve external bodies such as national consulting firms to assure smooth implementation of necessary actions.

Figure 3.2 shows the proposed arrangement of the HSE Dept. as well as the relations with external bodies to be cooperated with ECM, whereas Table 3.2 shows the functional requirements and major mandates expected.



Source: JICA Study Team

**Figure 3.2 Proposed Arrangement (O&M Stage)**

**Table 3.2 Functional Requirements and Major Mandates Expected (O&M Stage)**

Name	Functional requirements/ major mandates
HSE Dept.	<ul style="list-style-type: none"> <li>- Key arm in ECM for performing the necessary actions of mitigation measures and monitoring.</li> <li>- Supervision and implementation of actual activities of mitigation measures and monitoring.</li> <li>- Coordination and cooperation with other departments in ECM whenever necessary for performing the actions.</li> <li>- Actual facilitation and coordination with other external bodies including NAT whenever necessary for performing the actions.</li> </ul>
Other Depts. of ECM	- Coordination and cooperation with HSE dept. whenever necessary for performing the actions of mitigation measures and monitoring.
External bodies (*1)	

Name	Functional requirements/ major mandates
Consultant/ NGO	<ul style="list-style-type: none"> <li>- Providing technical support and advice to HSE Depts. and/or other depts. of ECM on environmental and social issues related to the Project.</li> <li>- Consultation with O&amp;M contractor(s) whenever necessary on environmental and social issues.</li> <li>- Working together with HSE Dept. on in-house base and/or outsource base to perform the monitoring activities whenever necessary.</li> </ul>
O&M Contractor(s)	<ul style="list-style-type: none"> <li>- Implementation of mitigation measures and monitoring according to the contract and specifications under supervision.</li> <li>- Reporting the above.</li> </ul>

\*1: Necessary cost to be estimated specifically are summarised in EIA report Chapter 7.

Source: JICA Study Team

### 3.3 Proposed Outline of Human Resource Requirements

In the context of the implementation arrangement for mitigation measures and monitoring in O&M stage, human resources are also proposed to be arranged to fulfil the functional requirements mentioned above. Table 3.3 shows the proposed outline of human resource requirements, including qualification standards, major job description expected, provisional input necessary for human resource arrangement, etc.

**Table 3.3 Proposed Outline of Human Resource Requirements (O&M Stage)**

Name	Human resources (nos.)	Qualification and job description	Provisional input for arrangement (*1)
HSE dept.	<ol style="list-style-type: none"> <li>1. Manager (already assigned)</li> <li>2. Chief inspector specifically for env. unit (1 additionally assigned)</li> <li>3. Site inspector specifically for env. unit (1 additionally assigned)</li> </ol>	<ol style="list-style-type: none"> <li>1. Manager: (Assigned already in current HSE Dept.)</li> <li>2. Chief inspector: (additional 1 assignment for env. unit) <ul style="list-style-type: none"> <li>- Bachelor of Science, Experiences more than 5 years in specific field, preferably.</li> </ul> </li> <li>- Technical supervision and performing the actions.</li> <li>3. Site inspectors: (additional 1 assignment for env. unit) <ul style="list-style-type: none"> <li>- Middle technical education.</li> <li>- Technical application and performing the actions.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Manager: (no incremental cost)</li> <li>2. Chief inspectors: LE 42,000/y*1 nos.</li> <li>3. Site inspectors: LE 24,000/y*1 nos.</li> </ol> <p>Note: Initial input for training staff, awareness, etc. would be covered by initial cost in Table 2.3.</p>
Other depts.	(no incremental human resources.)		

\*1: Direct cost necessary for implementing mitigation measures and monitoring are estimated tentatively in EIA report Chapter 7.

Source: JICA Study Team

## **Annex 10-1**

### **Questionnaire Form for Household Interview Survey**

FOR SURVEYOR USE ONLY

Serial

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Name of person in charge of this survey sheet

Interviewer	
Supervisor	

Survey Date

Date / Month	
--------------	--

Phase                    1                    2

Name of Interviewee

---

Address

---

District-----

Governorate -----

**Part One: Perceptions Survey**

101. Age of interviewee
102. Sex of interviewee A. Male B. Female
103. Which transportation do you or any of your family members use more often?  
A. Public bus B. Metro C. Taxi D. Own car  
E. Others (specify) \_\_\_\_\_
104. Which transportation is the most convenient method for you or your family members to use?  
A. Public bus B. Metro C. Taxi D. Own car  
E. Others (specify) \_\_\_\_\_
105. What is the reason(s)?  
-----  
-----
106. How often do you or any of your family members use the Metro?  
A. Everyday B. 3-4 times a week C. 1-2 times a week  
D. less than 5 times a month
107. Have you ever heard about the Metro Line No. 4 project?  
A. Yes B. No (Go to q 9.1)
108. If yes, how did you receive the information about the Metro Line No. 4 project?  
A. Official gazette B. Media C. Friends and relatives  
D. Colleagues E. Internet F. Others (specify)
109. How much do you agree/disagree about the Metro Line No.4 project?  
A. Strongly agree B. Agree C. Uncertain D. Disagree E. Strongly disagree
1010. If uncertain, what are your conditions to agree about the Metro Line No. 4 project?  
A. Secure information disclosure about the project  
B. Reflect perceptions and opinions of local residents in project area  
C. Other (specify) \_\_\_\_\_
1011. What are your main reasons to disagree?  
A. Lack of information about the Metro Line No. 4 project  
B. Deterioration of physical environment and traffic during construction phase  
C. Disruption of existing regional economic activities during construction phase  
D. Loss/disturbance of habitat in case of relocation  
E. Loss/interruption of livelihood in case of relocation  
F. Other (specify) \_\_\_\_\_
1012. What is the average actual value of a m<sup>2</sup> in this area (in LE)?  
A. Residential \_\_\_\_\_ B. Commercial \_\_\_\_\_
1013. What kind of general economic benefits do you expect by the Metro Line No. 4 project?  
A. Boom in the economy



- B. More employment opportunities
- C. Improvements in people's quality of life
- D. No significant changes
- E. Don't know
- F. Others (specify) \_\_\_\_\_

1014. What kind of general benefits on infrastructure and public services do you expect?

- A. Improvement of transportation services
- B. Provision of safer means of transportation
- C. Minimization of traveling time
- D. No significant changes
- E. Don't know
- F. Others (specify) \_\_\_\_\_

**Part Two: General Socio-Economic Survey**

<b>A. Properties of the Households</b>	
201. Type of house based on material used (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) cement b) mud brick c) cottage, wood, metal d) others (specify) -----
202. Appearance of house (visual confirmation by interviewers)	a) good condition b) slightly good condition c) fair d) bad condition e) almost collapse
203. Type of residence	a) house b) apartment in a house c) shared apartment d) one room residence
204. If apartment, how many apartments are there in the house	----- apartment(s)
205. Number of rooms of your apartment	----- room(s)
206. Approximate area of your apartment/house (m <sup>2</sup> )	-----m <sup>2</sup>
207. Approximate area of your garden (m <sup>2</sup> ) if you have	-----m <sup>2</sup>
208. Property status (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) owned b) old rent c) new rent d) illegal occupancy e) others (specify)-----
209. In case of owned property, do you have legal documents?	a) primary contract b) legal registrar c) neither d) others (specify)-----

2010. In case of rented units, how much do you pay monthly?	_____ (LE/month)
2011. In case of not rented properties, what is the land tenure status (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) privately-owned land b) public land c) endowment d) illegal occupancy e) others (specify)-----
2012. In case of not rented properties, how did you get your unit?  (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) inherited from parents b) bought c) illegally occupied d) others (specify)-----
2013. In case of not rented properties, how much would this unit value if you want to sell it today?	----- (LE)
2014. How long has your house/apartment been here?	
2015. How many years have you lived here?	-----years
2016. Any movable properties in the land?	Household items a) TV b) radio c) electric fan d) air conditioner e) fridge f) washing machine g) microwave  Other properties a) car b) motor cycle c) bicycle d) others (specify)-----
<b><u>B. Socio-Economic Characteristic of the Household</u></b>	
2017. Number of household members (person)	----- person(s)

2018. Educational level of Household Head	a) Illiterate b) Read and write c) Primary school d) Preparatory school e) Secondary school f) Above secondary g) University degree and above
2019. Main occupation of household's head (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) top managerial level b) top technical level c) technical assistance d) administrative work e) services, retail & trade f) agriculture and fishing g) handicrafts h) industrial labor i) others, (specify)-----
2020. Average monthly household's income	----- LE
2021. Average monthly expenditure	a) food b) education c) others (specify)-----
2022. Are you provided any public social welfare service?	a) Yes (describe type of welfare service) b) No
2023. Average monthly financial living support	----- LE
<b><u>C. Access Limitation</u></b>	
2024. Where is your work place?	a) inside the district b) inside the governorate c) outside the governorate
2025. How long does it take from your house to work place?	
2026. How do you go to the work place?	a) owned car b) public transportation c) mini bus d) shared taxi e) others (specify)-----
<b><u>D. Infrastructure Coverage</u></b>	
2027. Infrastructure served (check appropriate <input type="checkbox"/> as <input checked="" type="checkbox"/> )	a) electricity b) piped water supply c) other water source d) public sanitary network e) other sanitary system f) water borne toilet (WC) g) pit latrine
<b><u>E. Special concerns about involuntary resettlement</u></b>	
2028. Do you know regulations of land acquisition and resettlement?	a) Yes b) No

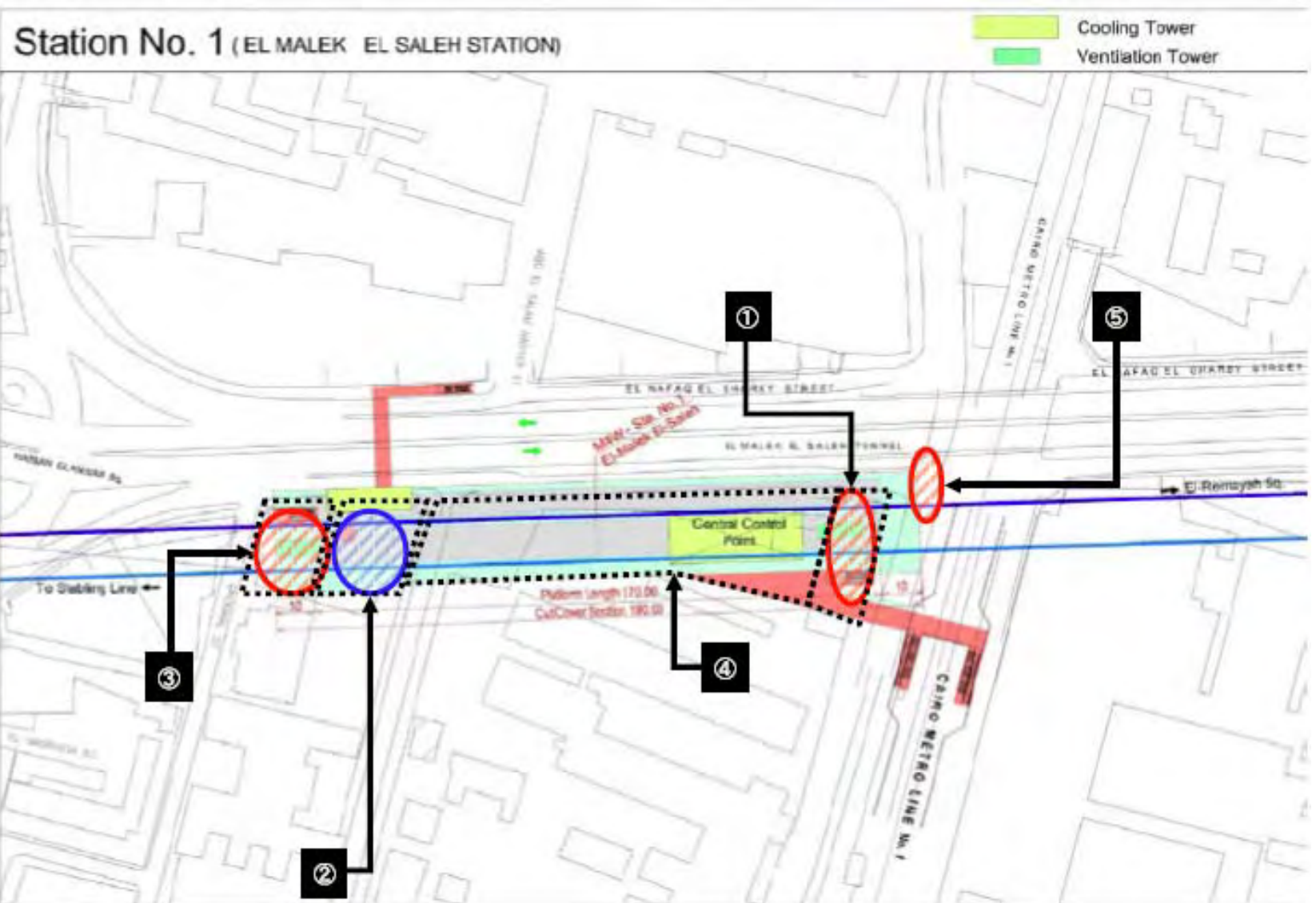
2029. Do you think the project will provide benefits in the area?	a) Yes (please describe) b) No
2030. Do you think there is any negative impact due to the project?	a) Yes (please describe) b) No
2031. In case of involuntary resettlement, how much do you accept if you are requested to? (choose only one response)	a) strongly accept b) accept c) uncertain d) do not accept e) strongly do not accept
2032. Where do you prefer to move? (choose only one response)	a) within same district b) within same governorate c) any other place
2033. Which compensation method do you prefer?	a) cash payment b) provide alternative by Government/governorate c) any method d) uncertain
2034. Special concerns about residence relocation	a) inappropriate compensation b) alternative will be much more expensive c) longer journey to workplace d) disruption of social networks e) disruption of access to social services f) others (specify)-----
2035. Do you need any support to stabilize your life after resettlement?	a) Yes b) No
2036. Which support do you need?	a) financial support b) job training c) others (specify)-----
2037. How long do you need such support?	a) 1 month b) 6 month c) 1 year d) more than 1 year e) others (specify)-----
2038. What is a concern if you are requested to resettle?	a) job b) access limitation to public facility c) relationship with new neighbor d) others (specify)-----
2039. In your opinion, how can these issues be mitigated?	..... .....
2040. Do you have any comment to add in this regard?	..... .....



## **Annex 10-2**



### **Examination of Potential Impact on Land Acquisition and Property**

#### **Demolition**



### Annex 3: Examination of Potential Impact on Land Acquisition and Property Demolition

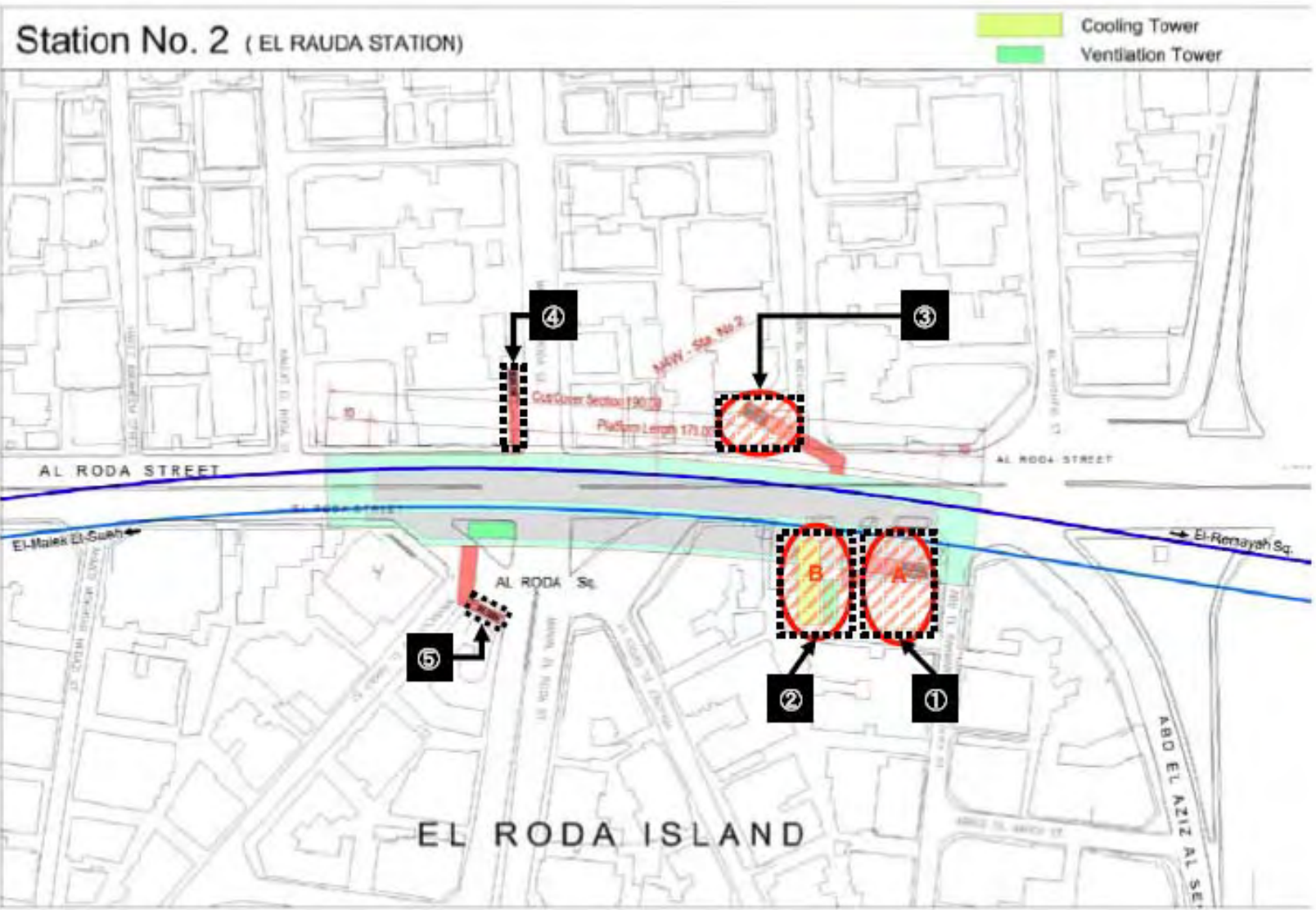




Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)		
	Condition of Building or Structure	
	No.	1-1
	Type of Acquisition	To be Demolished
	Acquired Area (m2)	674 (total area of 1-1 & 1-2)
	Acquired Type	Permanent
	Land Use	Commercial
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
Number of Shop	5	
Shop	5	
Apartment	0	
Remarks	2 out of 5 shops were closed at the time of site investigation.	
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		
Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)		
	Condition of Building or Structure	
	No	1-2
	Type of Acquisition	To be Demolished
	Acquired Area (m2)	674 (total area of 1-1 & 1-2)
	Acquired Type	Permanent
	Land Use	Commercial(wooden)
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
Number of Shop	1	
Shop	1	
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		


Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)			
	Condition of Building or Structure		
	No	2	
	Type of Acquisition	To be Demolished Partially	
	Acquired Area (m2)	720	
	Acquired Type	Permanent	
	Land Use	Girl Orphanage	
	Land Category	Private	
	Number of Stories	G+3	
	Number of Apartment	0	
		family	0
		Shop	0
		Vacant	0
	Number of Shop	0	
		Shop	0
	Apartment	0	
Remarks	Renewal of the property in the area is proposed.		
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			
Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)			
	Condition of Building or Structure		
	No	3	
	Type of Acquisition	To be Demolished	
	Acquired Area (m2)	675	
	Acquired Type	Permanent	
	Land Use	Residential	
	Land Category	Private	
	Number of Stories	G+4	
	Number of Apartment	12	
		family	11
		Shop	1
		Vacant	0
	Number of Shop	3	
		Shop	2
	Apartment	1	
Remarks	Total building area will be 2,700 m2 since the building has 4 floors. Ground floor area is excluded from the acquired area as residential, but it is included in the shop area at the main report.		
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			

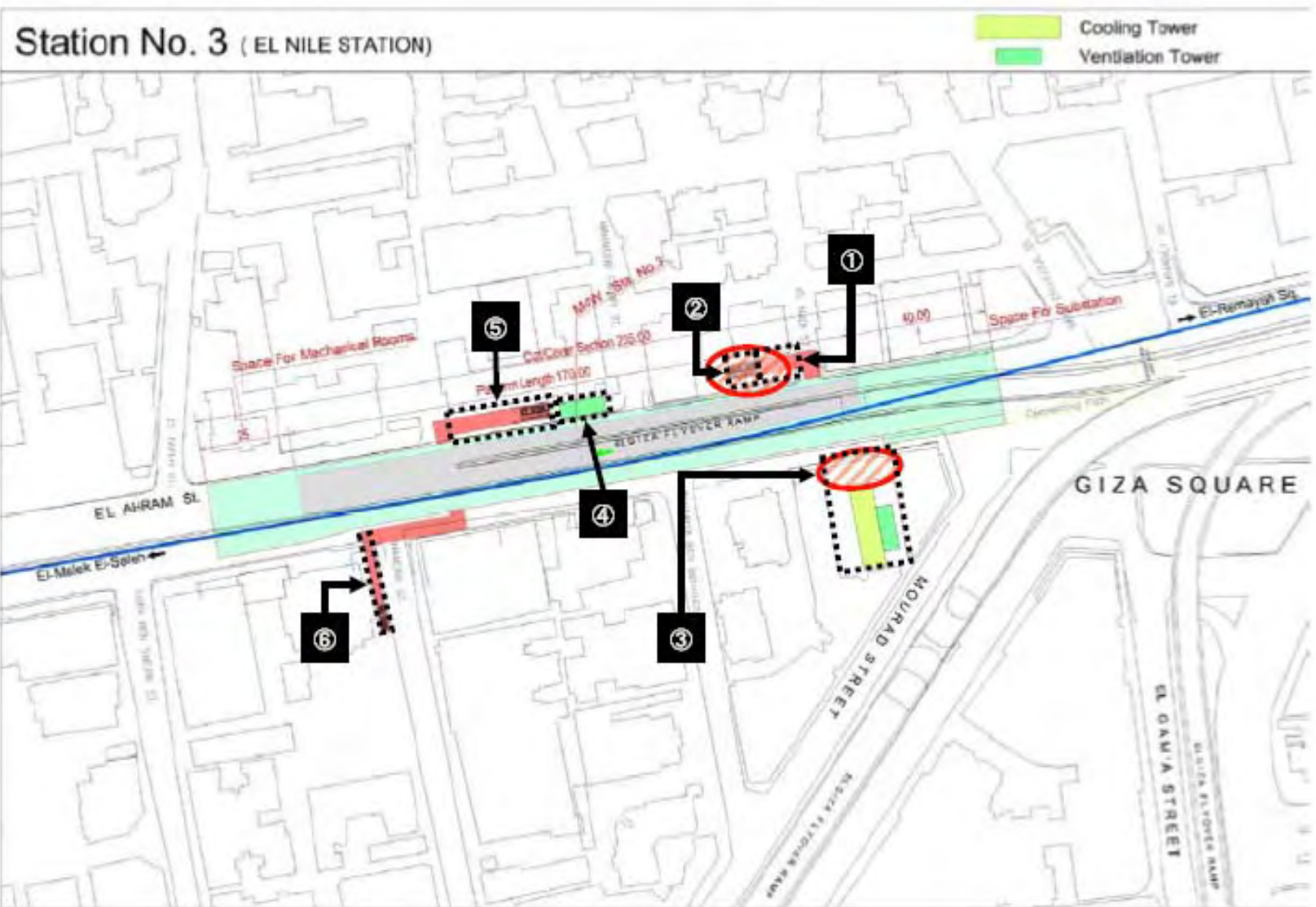


Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)		
	Condition of Building or Structure	
	No	4
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	2614
	Acquired Type	Permanent
	Land Use	Misrel Quadima Hospital
	Land Category	Private
	Number of Stories	G+2
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	0
	Shop	0
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		
Phase 1 Station 1 El-Malek El-Salek (Survey Sheet)		
	Condition of Building or Structure	
	No	5
	Type of Acquisition	To be Demolished
	Acquired Type	Permanent
	Land Use	Street Stall
	Number of Stories	-
	Number of Apartment	0
	family	-
	Shop	-
	Vacant	-
	Number of Shop	9
	Shop	9
	Apartment	-
	Remarks	It will be possible not to be demolished but relocation only.
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		






Phase 1 Station 2 El-Rouda (Survey Sheet)			
	No		1
	Type of Acquisition		To be Demolished
	Acquired Area (m2)		400
	Acquired Type		Permanent
	Land Use		Commercial
	Land Category		Private
	Number of Stories		G
	Number of Apartment		0
	family		0
	Shop		0
	Vacant		0
Number of Shop		3	
Shop		3	
Apartment		0	
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner		to be confirmed	
Building or Structure Age		to be confirmed	
Any Other Significant Aspect of Building or Structure		to be confirmed	
Note			
Phase 1 Station 2 El-Rouda (Survey Sheet)			
	Condition of Building or Structure		
	No		2
	Type of Acquisition		To be Demolished
	Acquired Area (m2)		800
	Acquired Type		Permanent
	Land Use		Commercial
	Land Category		Private
	Number of Stories		G+1
	Number of Apartment		0
	family		0
	Shop		0
Vacant		0	
Number of Shop		2	
Shop		2	
Apartment		0	
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner		to be confirmed	
Building or Structure Age		to be confirmed	
Any Other Significant Aspect of Building or Structure		to be confirmed	
Note			

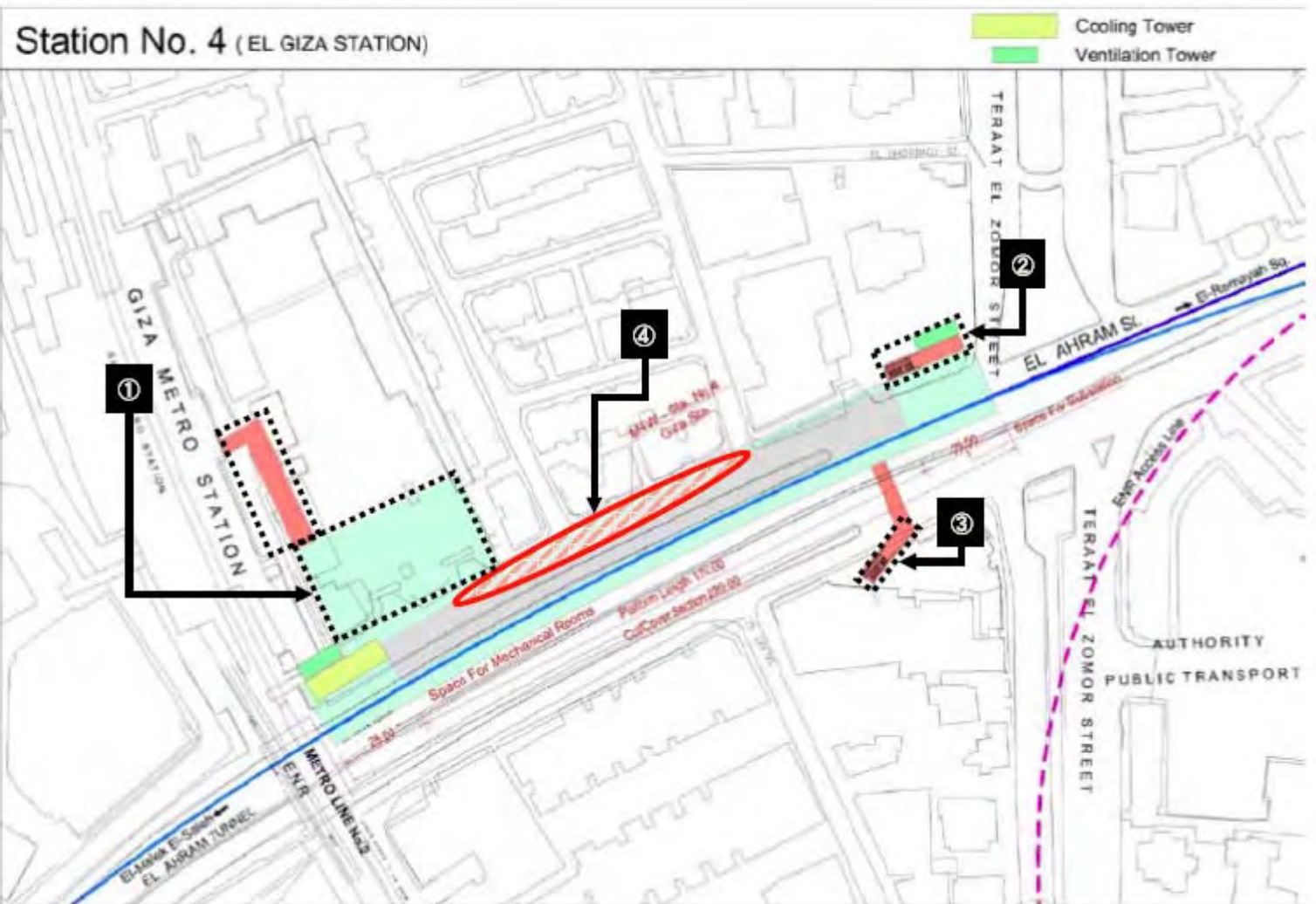
Phase 1 Station 2 El-Rouda (Survey Sheet)			
	Condition of Building or Structure		
	No	3	
	Type of Acquisition	To be Demolished	
	Acquired Area (m2)	700	
	Acquired Type	Permanent	
	Land Use	Commercial	
	Land Category	Private	
	Number of Stories	G	
	Number of Apartment	0	
	family	0	
	Shop	0	
	Vacant	0	
	Number of Shop	1	
	Shop	1	
Apartment	0		
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			
Phase 1 Station 2 El-Rouda (Survey Sheet)			
No.	4	Land Use	Sidewalk
Acquired Area (m2)	125	Land Category	Public
Acquired Type	Permanent	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 2 El-Rouda (Survey Sheet)			
No.	5	Land Use	Sidewalk
Acquired Area (m2)	30	Land Category	Public
Acquired Type	Permanent	Responsible Agency of the Land	To be Confirmed
Note			





JICA PREPARATORY SURVEY ON  
GREATER CAIRO METRO LINE NO. 4


Phase 1 Station 3 El-Nile (Survey Sheet)		
	No	1
	Type of Acquisition	To be Acquired
	Acquired Area (m2)	105
	Acquired Type	Permanent
	Land use	Garden in Residence
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	0
	Shop	0
	Apartment	0
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		
Phase 1 Station 3 El-Nile (Survey Sheet)		
	No	2
	Type of Acquisition	To be Demolished
	Acquired Area (m2)	96
	Acquired Type	Permanent
	Land use	Commercial
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	3
	Shop	3
	Apartment	0
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		

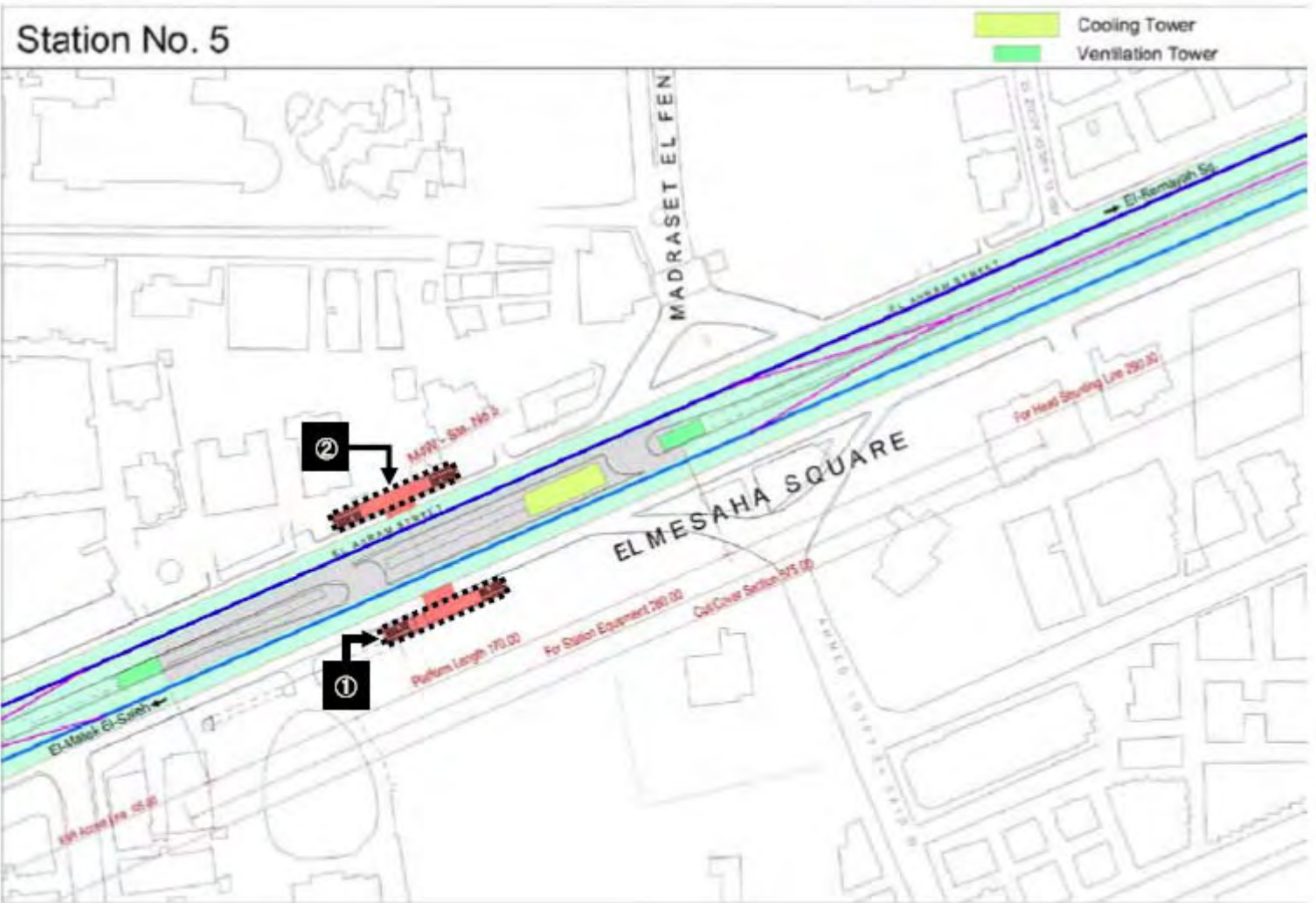
Phase 1 Station 3 El-Nile (Survey Sheet)		
	No	3
	Type of Acquisition	To be Demolished
	Acquired Area (m2)	748
	Acquired Type	Permanent
	Land Use	Commercial
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	5
	Shop	5
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner		to be confirmed
Building or Structure Age		to be confirmed
Any Other Significant Aspect of Building or Structure		to be confirmed
Responsible Agency of the Land		To be Confirmed
Note		
Phase 1 Station 2 El-Rouda (Survey Sheet)		
No.	4	Land Use Sidewalk
Acquired Area (m2)	78	Land Category Public
Acquired Type	Permanent	Responsible Agency of the Land To be Confirmed
Note		
Phase 1 Station 2 El-Rouda (Survey Sheet)		
No.	5	Land Use Sidewalk
Acquired Area (m2)	150	Land Category Public
Acquired Type	Permanent	Responsible Agency of the Land To be Confirmed
Note		
Phase 1 Station 2 El-Rouda (Survey Sheet)		
No.	6	Land Use Sidewalk
Acquired Area (m2)	65	Land Category Public
Acquired Type	Permanent	Responsible Agency of the Land To be Confirmed
Note		



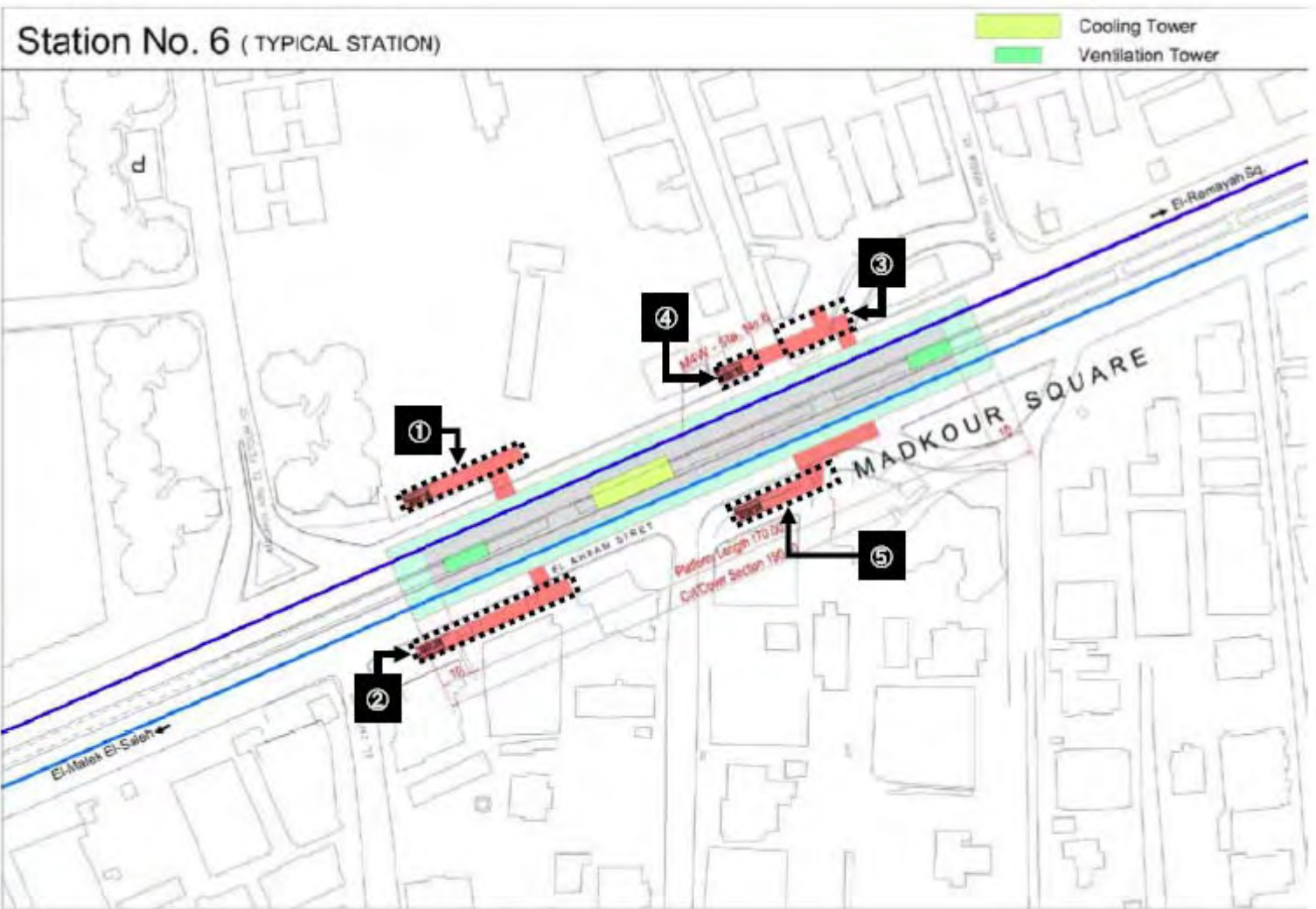


Phase 1 Station 4 El-Giza (Survey Sheet)		
	No	1
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	2115
	Acquired Type	Permanent
	Land Use	Bus terminal
	Land Category	Private
	Number of Stories	Some Offices
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
Number of Shop	0	
Shop	0	
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		
Phase 1 Station 4 El-Giza (Survey Sheet)		
	No	2
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	315
	Acquired Type	Permanent
	Land Use	Garden in Residence
	Land Category	Private
	Number of Stories	None
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
Number of Shop	0	
Shop	0	
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		

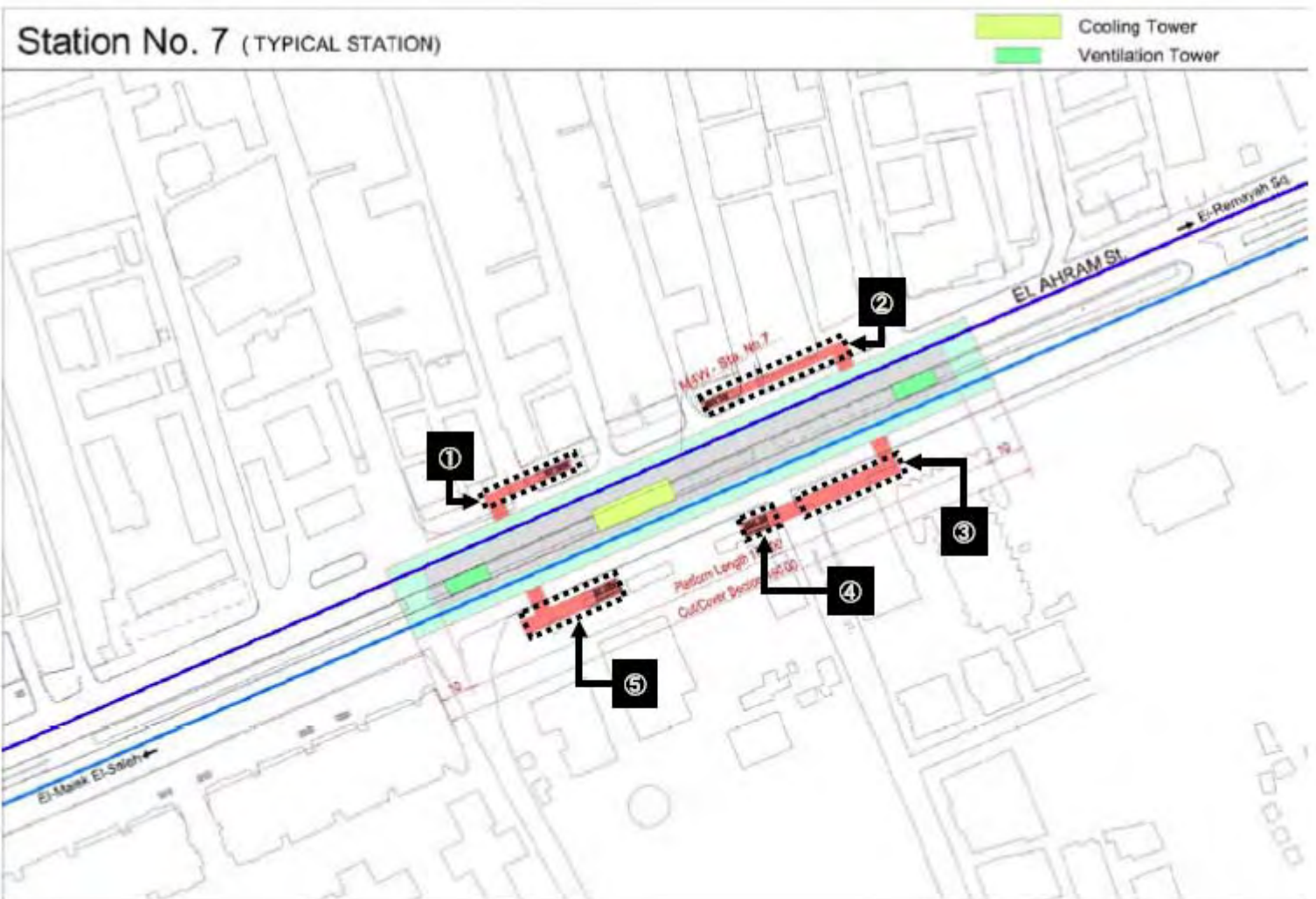
Phase 1 Station 4 El-Giza (Survey Sheet)		
No.	3	Land Use Sidewalk
Acquired Area (m2)	100	Land Category Public
Acquired Type	Permanen	Responsible Agency of the Land To be Confirmed
Note		
Phase 1 Station 4 El-Giza (Survey Sheet)		
	No	4
	Type of Acquisition	To be Demolished
	Acquired Type	Permanent
	Land Use	Street Stalls
	Number of Stories	G
	Number of Apartment	0
		family 0
		Shop 0
		Vacant 0
	Number of Shop	27
	Shop 27	
	Apartment 0	
Remarks	It will be possible not to be demolished but relocation only.	
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		




Phase 1 Station 5 (Survey Sheet)			
No.	1	Land Use	Sidewalk
Acquired Area (m2)	200	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 5 (Survey Sheet)			
No.	2	Land Use	Sidewalk
Acquired Area (m2)	200	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			

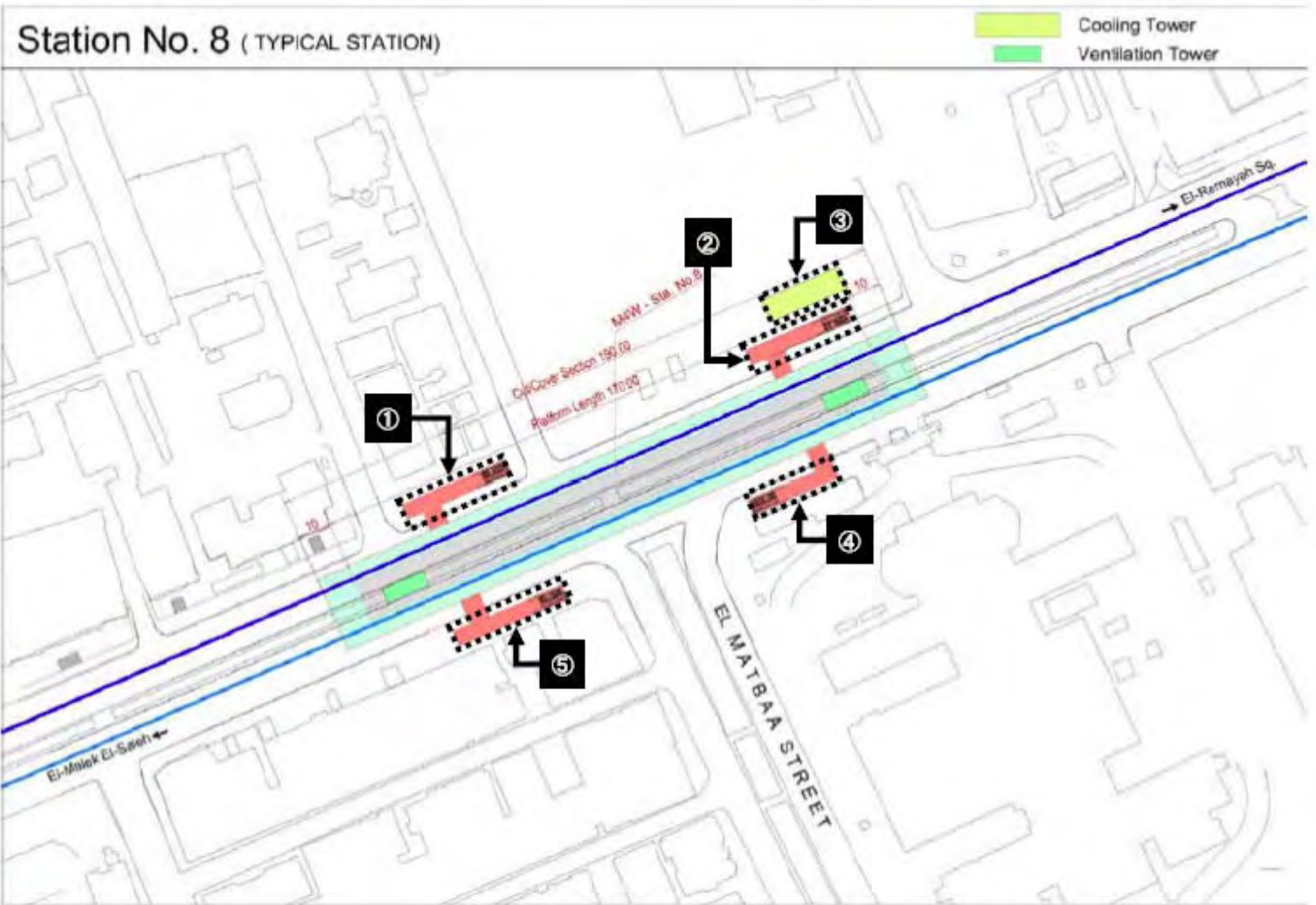



Phase 1 Station 6 (Survey Sheet)			
No.	1	Land Use	Open Space in School
Acquired Area (m2)	190	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 6 (Survey Sheet)			
No.	2	Land Use	Sidewalk
Acquired Area (m2)	70	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 6 (Survey Sheet)			
No.	3	Land Use	Sidewalk
Acquired Area (m2)	110	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 6 (Survey Sheet)			
No.	4	Land Use	Open Space in School
Acquired Area (m2)	70	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 6 (Survey Sheet)			
No.	5	Land Use	Sidewalk
Acquired Area (m2)	230	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			



Phase 1 Station 7 (Survey Sheet)			
No.	1	Land Use	Sidewalk
Acquired Area (m2)	109	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 7 (Survey Sheet)			
No.	2	Land Use	Sidewalk
Acquired Area (m2)	94	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 7 (Survey Sheet)			
No.	3	Land Use	Sidewalk
Acquired Area (m2)	155	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 7 (Survey Sheet)			
	No	4	
	Type of Acquisition	Land Acquisition	
	Acquired Area (m2)	60	
	Acquired Type	Permanent	
	Land Use	Open Space	
	Land Category	Private	
	Number of Stories	G	
	Number of Apartment	0	
		family	0
		Shop	0
		Vacant	0
	Number of Shop	0	
	Shop	0	
	Apartment	0	
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			
Phase 1 Station 7 (Survey Sheet)			
No.	5	Land Use	Sidewalk
Acquired Area (m2)	175	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			

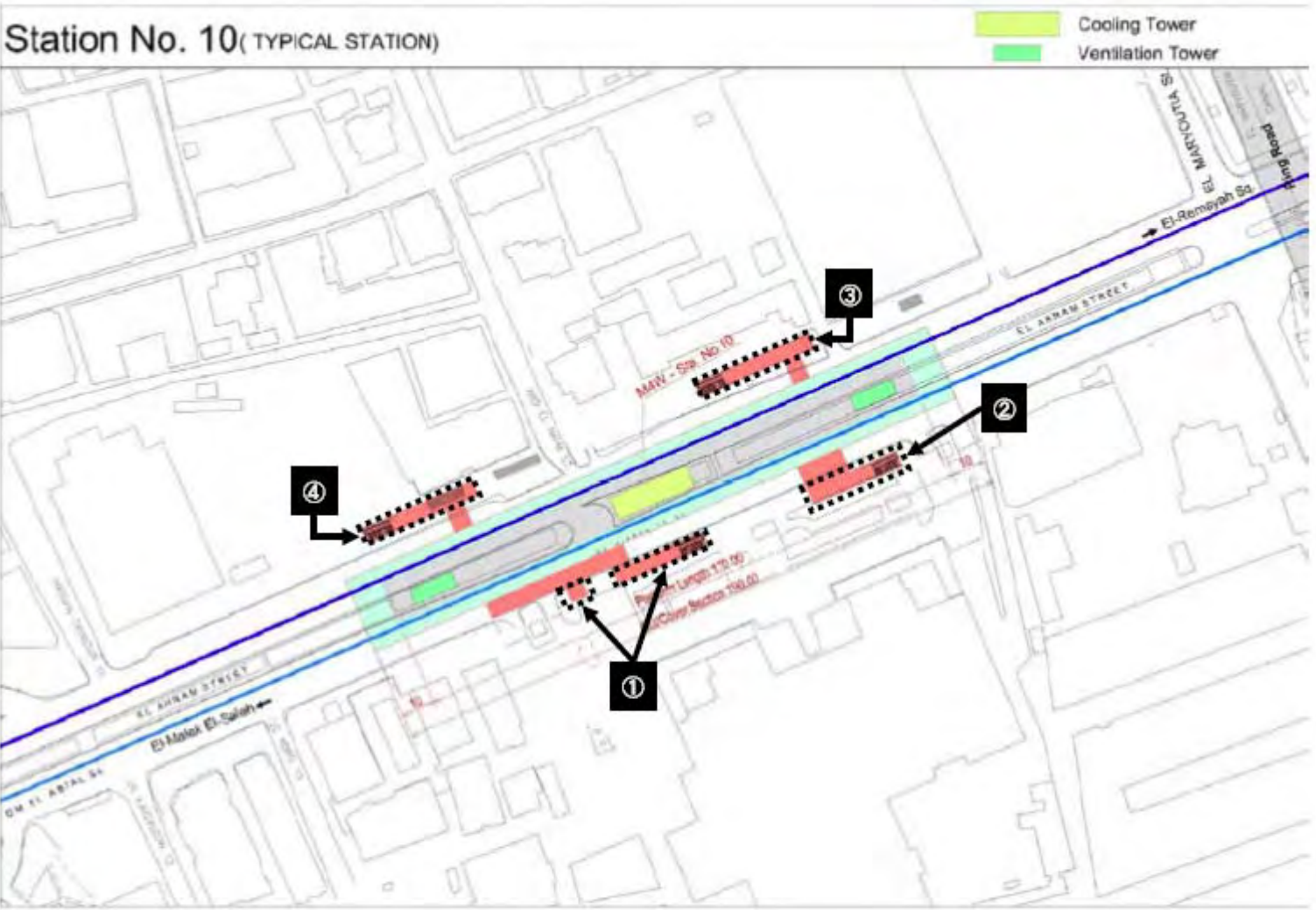





Phase 1 Station 8 (Survey Sheet)				
No.	1	Land Use	Sidewalk	
Acquired Area (m2)	188	Land Category	Public	
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed	
Note				
Phase 1 Station 8 (Survey Sheet)				
	No	2 & 3		
	Type of Acquisition	Land Acquisition		
	Acquired Area (m2)	358		
	Acquired Type	Permanent		
	Land Use	Open Space		
	Land Category	Private		
	Number of Stories	G		
	Number of Apartment	0		
		family	0	
		Shop	0	
		Vacant	0	
	Number of Shop	0		
		Shop	0	
		Apartment	0	
Remarks				
Basic Information of Building, Structure	Name	to be confirmed		
	Address	to be confirmed		
	Distance from Station	to be confirmed		
	Minimum Distance (M)	to be confirmed		
	Distance depended on What	to be confirmed		
Owner	to be confirmed			
Building or Structure Age	to be confirmed			
Any Other Significant Aspect of Building or Structure	to be confirmed			
Note				
Phase 1 Station 8 (Survey Sheet)				
No.	4	Land Use	Sidewalk	
Acquired Area (m2)	152	Land Category	Public	
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed	
Note				
Phase 1 Station 8 (Survey Sheet)				
No.	5	Land Use	Sidewalk	
Acquired Area (m2)	198	Land Category	Public	
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed	
Note				

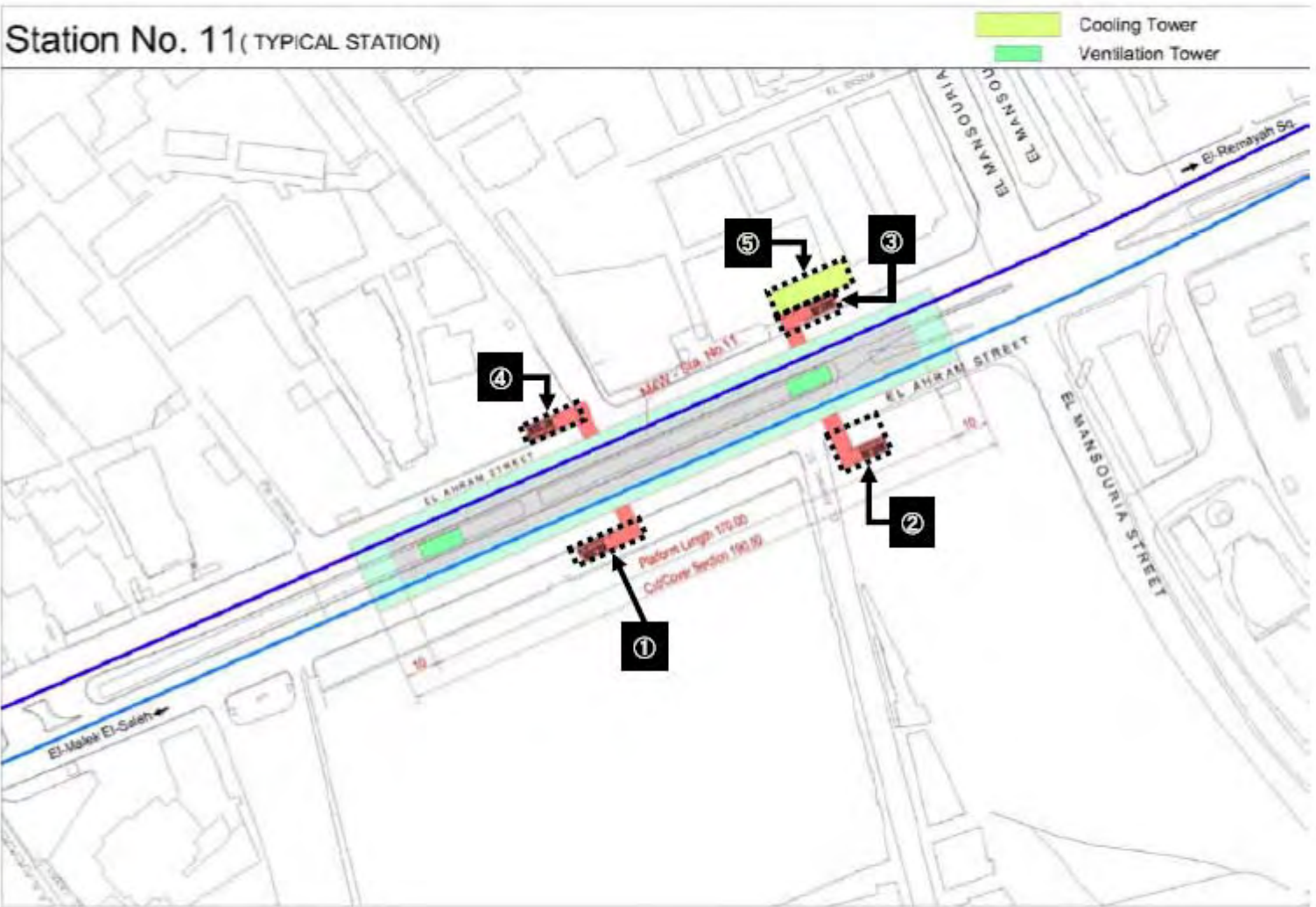


Phase 1 Station 9 (Survey Sheet)			
No.	1	Land Use	Sidewalk
Acquired Area (m2)	175	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 9 (Survey Sheet)			
No.	2	Land Use	Sidewalk
Acquired Area (m2)	195	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			




Phase 1 Station 10 (Survey Sheet)			
No.	1	Land Use	Open Space in Hospital
Acquired Area (m2)	145	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 10 (Survey Sheet)			
No.	2	Land Use	Open Space in Hospital
Acquired Area (m2)	110	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			

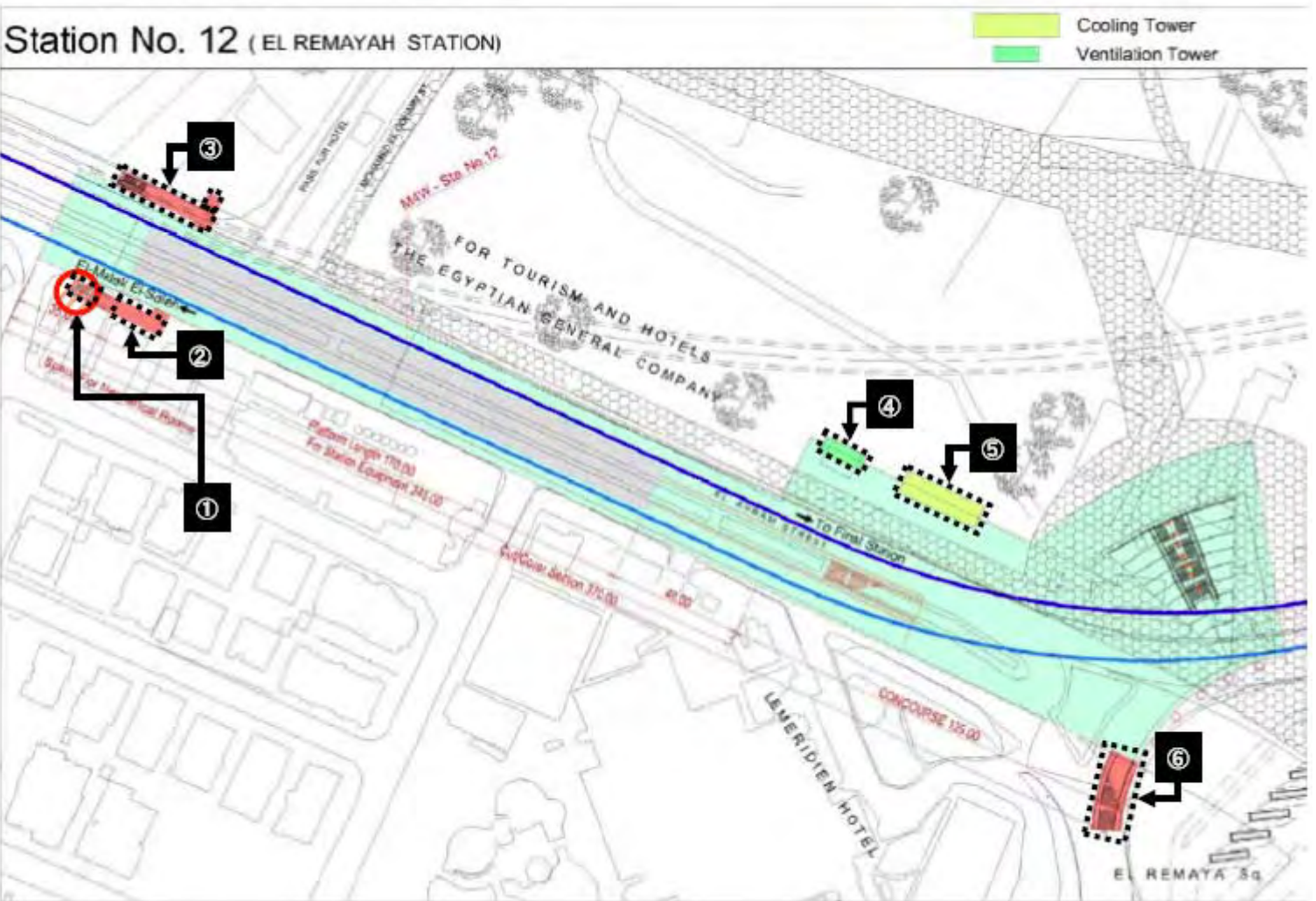
Phase 1 Station 10 (Survey Sheet)		
	No	3
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	205
	Acquired Type	Permanent
	Land Use	Open Space
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	0
	Shop	0
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner		to be confirmed
Building or Structure Age		to be confirmed
Any Other Significant Aspect of Building or Structure		to be confirmed
Note		
Phase 1 Station 10 (Survey Sheet)		
	No	4
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	204
	Acquired Type	Permanent
	Land Use	Open Space
	Land Category	Private
	Number of Stories	G
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	0
	Shop	0
Apartment	0	
Remarks		
Basic Information of Building, Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner		to be confirmed
Building or Structure Age		to be confirmed
Any Other Significant Aspect of Building or Structure		to be confirmed
Note		






Phase 1 Station 11 (Survey Sheet)		
No.	1	Land Use Sidewalk
Acquired Area (m2)	100	Land Category Public
Acquired Type	Permanen	Responsible Agency of the Land To be Confirmed
Note		
Phase 1 Station 11 (Survey Sheet)		
	No	2
	Type of Acquisition	Land Acquisition
	Acquired Area (m2)	165
	Acquired Type	Permanent
	Land Use	Open Space
	Land Category	Private
	Number of Stories	None
	Number of Apartment	0
	family	0
	Shop	0
	Vacant	0
	Number of Shop	0
	Shop	0
	Apartment	0
Remarks		
Basic Information of Building Structure	Name	to be confirmed
	Address	to be confirmed
	Distance from Station	to be confirmed
	Minimum Distance (M)	to be confirmed
	Distance depended on What	to be confirmed
Owner	to be confirmed	
Building or Structure Age	to be confirmed	
Any Other Significant Aspect of Building or Structure	to be confirmed	
Note		

Phase 1 Station 11 (Survey Sheet)			
	No		3&5
	Type of Acquisition		Land Acquisition
	Acquired Area (m2)		265
	Acquired Type		Permanent
	Land Use		Bus Terminal
	Land Category		Private
	Number of Stories		None
	Number of Apartment		0
	family		0
	Shop		0
	Vacant		0
	Number of Shop		0
	Shop		0
	Apartment		0
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			
Phase 1 Station 11 (Survey Sheet)			
	No		4
	Type of Acquisition		Land Acquisition
	Acquired Area (m2)		85
	Acquired Type		Permanent
	Land use		Open Area
	Land Category		Private
	Number of Stories		None
	Number of Apartment		0
	family		0
	Shop		0
	Vacant		0
	Number of Shop		0
	Shop		0
	Apartment		0
Remarks			
Basic Information of Building, Structure	Name	to be confirmed	
	Address	to be confirmed	
	Distance from Station	to be confirmed	
	Minimum Distance (M)	to be confirmed	
	Distance depended on What	to be confirmed	
Owner	to be confirmed		
Building or Structure Age	to be confirmed		
Any Other Significant Aspect of Building or Structure	to be confirmed		
Note			



Phase 1 Station 12 (Survey Sheet)				
No.	1	Land Use	Sidewalk	
Acquired Area (m2)	120	Land Category	Public	
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed	
Note				
Phase 1 Station12				
	No	2		
	Type of Acquisition	To be Demolished		
	Acquired Area (m2)	30		
	Land Use	Parking		
	Land Category	Private		
	Number of Stories	G		
	Number of Apartment	0		
		family	0	
		Shop	0	
		Vacant	0	
	Number of Shop	0		
		Shop	0	
	Apartment	0		
Remarks	There is a parking faciliy such as roof.			
Basic Information of Building Structure	Name	to be confirmed		
	Address	to be confirmed		
	Distance from Station	to be confirmed		
	Minimum Distance (M)	to be confirmed		
	Distance depended on What	to be confirmed		
Owner	to be confirmed			
Building or Structure Age	to be confirmed			
Any Other Significant Aspect of Building or Structure	to be confirmed			
Note				

Phase 1 Station 12 (Survey Sheet)			
No.	3	Land Use	Sidewalk
Acquired Area (m2)	180	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 12 (Survey Sheet)			
No.	4	Land Use	Governmental Land
Acquired Area (m2)	70	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 12 (Survey Sheet)			
No.	5	Land Use	Governmental Land
Acquired Area (m2)	175	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			
Phase 1 Station 12 (Survey Sheet)			
No.	6	Land Use	Sidewalk
Acquired Area (m2)	50	Land Category	Public
Acquired Type	Permanen	Responsible Agency of the Land	To be Confirmed
Note			

## **Annex 10-3**

### **Sample Form for Population Census**

**【Sample】 Survey Sheet on Population Census for Metro Line No. 4 Phase 1**

Surveyed by

1. Notification Number:
2. Identification Number of the Target Property:
3. Date for Filling the Questionnaire:
4. Name of Household Leader in the Target Property:
5. ID Number of Household Leader:
6. Age of Household Leader:
7. Number and Structure of Family Member:

Member	Number	Age	Member	Number	Age
Wife			Husband		
Son			Daughter		
Father			Mother		
Other (specify)					

8. Address of the Target Property:

9. Legal Status of the Property:

Owned House		Rental House	
Owned Flat		Rental Flat	
Illegal Occupant		Others (specify)	

10. Occupancy Period in the Property:

11. Other Information

Photo of Household Leader/Interviewees

Photo of Property

I have confirmed the contents of this survey sheet.

Name:

Signature:

Date: