

### 13.5.3 Cost Estimate of Projects

#### (1) Basis of Cost Estimate

The unit rates are derived from the countercheck on the precedents of construction works executed in Egyptian market in recent past years. The major components of direct cost are material, construction equipment and labor costs, which are estimated based currently prevailing cost thereof in this study. Normal type equipment will be obtainable at local market. But, such specific equipment or machinery as cargo handling equipment, navigation aids etc. may be procured through importation from manufacturing countries. The cost for procurement of equipment consists of purchasing cost on CIF basis, installation cost, mobilization cost and the overhead. In estimating indirect cost components of the work, the following rates deems to consider reasonable in view of precedent of on-going projects in Egypt and are applied in this study.

Site Temporary Work	3 to 6 % of Direct Cost
Overhead	12% of Direct Cost
Profit	10% of Direct Cost

In the cost estimate for projects formulated in this study, the necessary cost for engineering services is added at a rate of about 5% to 8 % against the total construction cost for construction of infrastructures or 2.5 to 3 % for the procurement of machinery and equipment. The contingencies for the project consist of physical and price contingencies. Considering recent climate of international and domestic market, physical and price contingency for the project is taken at a rate of 10 % of the construction cost and 3 % for the procurement of equipment.

The project cost is estimated based on currently prevailing unit costs as of 2002. The following foreign exchange rate is applied:

$$\text{US\$}=4.6 \text{ L.E.}=\text{JP¥}120.00$$

The construction costs of major cost components such as locally available construction materials, fuel and electricity and present level of salaries and wages for manpower costs will be classified into local cost portion and are expressed in terms of Egyptian Pound (L.E.). Specific equipment/machinery which may be procured through importation from the manufacturing countries or foreign skilled manpower to be deployed for the construction is estimated as foreign cost portion and are expressed in terms of Egyptian Pound (L.E.).

## (2) Cost Estimate of Each Project Component

### 1) Major Facilities of the Project

Major works and the work quantity of each project component for the short-term development plan are summarized as follows.

#### Major Facilities of the Project

Project Components	Major Work Item		
	Item	Unit	Quantity
<b>A. Alexandria/Cairo IW Project</b>			
A1. Dredging and Bank Protection	(1) Dredging Nobaria Canal	cu.m	355,400
	(2) Bank Protection	l.m	21,000
A2. Navigation Aids	(1) Light Beacon	nr	540
	(2) Bridge Traffic Lights	set	35
A3. Alexandria Maritime Lock Extension	(1) Demolition of Existing Lock Structure	cu.m	2,410
	(2) New Lock Extension RC	cu.m	11,100
<b>B. Cairo Public River Port Project</b>			
B1. Container Terminal	(1) Reinforcement of Existing Quay	l.m	115
	(2) Rehabilitation of Existing Quay	l.m	230
	(3) Terminal Yard	sq.m	44,000
B2. General Cargo Terminal	(1) Reinforcement of Existing Quay	l.m	230
	(2) Rehabilitation of Existing Quay	l.m	230
	(3) Terminal Yard	sq. m	11,000
B3. Procurement of Cargo Handling Equipment	(1) Quayside Mobile Crane	nr	2
	(2) RTG Container Yard Crane	nr	5
	(3) Tractor Head	nr	6
	(4) Trailer	nr	6
	(5) Truck Crane for General Cargo	nr	4
	(6) Lift Truck	nr	8
	(7) Truck Scale	nr	1
<b>C. New Bolin Connection Canal Project</b>			
	(1) Deepening & Widening Canal	cu.m	229,000
	(2) Navigation Lock (L=116m, W=17m)	nr	1
	(3) Irrigation Barrage	nr	1
	(4) Cross Bridge	nr	1
	(5) Dredging Rosetta Branch & Disposal	cu.m	480,000

## **2) Overall Project Costs**

The capital cost for cost category of foreign and local currency component is estimated for each project component. In addition, annual fund requirement for construction and equipment procurement with sub-divided costs on foreign and local currency components is prepared for each project component based on study results of project implementation program.

**Capital Cost for the Projects**

Cost in 1,000L.E

Project Component	Cost Category	Total Cost	Foreign	Local
<b>A. Alexandria/Cairo IW Project</b>				
A1.Dredging & Bank Protection	1) Civil Work	25,981	2,979	23,002
	2) Engineering Services	2,779	1,315	1,463
	3) Contingencies	2,876	429	2,447
	Total Cost	31,636	4,724	26,912
A2.Procurement of Navigation Aids	1) Procurement	20,263	18,256	2,007
	2) Engineering Services	608	456	152
	3) Contingencies	626	561	65
	Total Cost	21,497	19,273	2,224
A3.Alexandria Lock Extension	1) Civil Work	54,993	27,059	27,934
	2) Engineering Services	3,224	1,972	1,252
	3) Contingencies	5,265	2,474	2,790
	Total Cost	63,481	31,505	31,976
<b>B. Cairo Public River Port Project</b>				
B1.River Port Construction	1) Civil Work	31,901	11,856	20,046
	2) Engineering Services	2,552	1,276	1,276
	3) Contingencies	3,445	1,313	2,132
	Total Cost	37,899	14,445	23,454
B2.Procurement of Equipment	1) Procurement	56,420	52,492	3,928
	2) Engineering Services	1,411	1,058	353
	3) Contingencies	1,735	1,606	128
	Total Cost	59,565	55,156	4,409
C. New Bolin Connection Canal Project	1) Civil Work	69,802	22,908	46,893
	2) Engineering Services	5,103	2,497	2,607
	3) Contingencies	6,313	1,646	4,667
	Total Cost	81,218	27,051	54,167
<b>Overall Project Cost (A+B+C)</b>				
(1) Civil Work Construction (A1+A3+B1+C)	1) Civil Work	182,677	64,802	117,875
	2) Engineering Services	13,658	7,060	6,598
	3) Contingencies	17,899	5,862	12,036
	Total Cost	214,234	77,725	136,509
(2) Procurement of Equipment (A2+B2)	1) Procurement	76,683	70,748	5,935
	2) Engineering Services	2,019	1,514	505
	3) Contingencies	2,361	2,167	193
	Total Cost	81,062	74,429	6,633
(3) Grand Total (Civil Work Construction + Equipment Procurement)		295,296	152,154	143,142

## Annual Cost Requirements

1,000L.E

Project Component		Total Cost	1st Year	2nd Year	3rd Year	4th Year	5th Year
<b>A Alexandria/Cairo IW Project</b>	Total	116,614	3,025	1,216	106,628	5,745	0
	F/C	55,502	1,655	655	50,456	2,735	0
	L/C	61,112	1,370	560	56,173	3,009	0
A1 Dredging & Bank Protection	Total	31,636	1,406	856	27,884	1,490	0
	F/C	4,724	665	405	3,460	193	0
	L/C	26,912	740	451	24,423	1,297	0
A2 Navigation Aids	Total	21,497	0	219	20,197	1,081	0
	F/C	19,273	0	164	18,141	968	0
	L/C	2,224	0	55	2,056	113	0
A3 Alexandria Maritime Lock Extention	Total	63,481	1,619	141	58,547	3,174	0
	F/C	31,505	989	86	28,855	1,574	0
	L/C	31,976	630	55	29,693	1,599	0
<b>B Public River Port Project</b>	Total	97,464	2,081	22,775	67,848	4,760	0
	F/C	69,601	1,167	21,030	43,988	3,416	0
	L/C	27,863	913	1,746	23,861	1,344	0
B1 River Port Terminal Construction	Total	37,899	1,572	140	34,375	1,811	0
	F/C	14,445	786	70	12,909	680	0
	L/C	23,454	786	70	21,467	1,131	0
B2 Procurement of Cargo Handling Equipme	Total	59,565	509	22,635	33,473	2,949	0
	F/C	55,156	381	20,959	31,080	2,736	0
	L/C	4,409	127	1,676	2,393	213	0
<b>C New Bolin Connection Canal Project</b>	Total	81,218	3,001	333	31,320	42,669	3,894
	F/C	27,051	1,462	162	10,252	13,903	1,271
	L/C	54,167	1,539	171	21,068	28,765	2,623
<b>Overall Project Cost</b>	Total	295,296	8,107	24,325	205,796	53,174	3,894
	F/C	152,154	4,284	21,848	104,696	20,055	1,271
	L/C	143,142	3,822	2,477	101,101	33,118	2,623

## **13.6 Improvement Plan of Managerial and Operational System of RTA**

### **13.6.1 General**

For the purpose of IWT promotion it is paramount that RTA strengthen its function, organization and financial basis as an IWT management body.

Major roles of a management body are planning, construction and maintenance, granting permission for navigational license, leasing of facilities, establishing conditions for providing service, data collection, marketing and so on.

RTA should be the driving force behind IWT prosperity. In addition, RTA needs to maintain IWT facilities systematically.

Study Team approaches this matter from the following aspects.

- Organizational Improvements
- Establishment of financial collecting system
- Management & Repair for IWT

### **13.6.2 Organizational Improvements**

#### **(1) Strengthening Branch functions by transferring Headquarter authority**

Study team would like to propose that the organizational capacity of RTA which is responsible for the management of IWTs be strengthened to operate the new IWT system efficiently and smoothly. As the IWT system becomes more complex it will be more and more inefficient to manage all matters only through headquarters.

What is needed initially will be the allocation of required staff for 24-hour operation to regional offices and lock offices of RTA, and the installation of telecommunication equipment at these offices.

For 24-hour operation in future, it is desirable for RTA to carry out operations without increasing the number of staffs.

#### **(2) Effective data collection by using computers**

##### **a) Introduction of Management Information System (MIS)**

Management Information System is a comprehensive system using computers which allows information to be accumulated and circulated to relevant personnel in a timely manner. Since there is a limit to the amount of information that can be managed by human power, information is generally distributed to a certain section and then filtered down to other sections. In other words, information is not immediately distributed. With MIS, however, information is dispersed from a central organization to all sections simultaneously.

Since information in IWT management and operation such as arrival and departure of

vessels, use of port facilities, charge and due collection and port statistics is mutually related, the introduction of MIS will bring the following benefits.

- 1) Faster and more efficient operation
- 2) Efficient management of public facilities
- 3) More efficient handling of charges
- 4) Utilization of advanced data

**b) Improvement of Statistics**

The basic policy to improve the statistics system is as follows;

- a) Statistics should be kept in a uniform format by computers so that they can be easily accessed and understood.
- b) Statistics should at least clarify the trend of cargo volume of each kind of commodity, its origin/destination and cargo type, the number of vessels, number of passengers, and water depth and land and facilities register.
- c) If possible, statistics on inland waterways should be integrated with statistic system of land transportation, which is closely related to inland activities, and be compatible with international statistics systems.
- d) In addition, data collection should be put to practical use on the accounting and the register list of their assets and activities for daily operations.

**(3) Training of RTA's staff**

General recommendations can be made in order to increase the quality and motivation of those vocational training centers, which provide in-house training:

- a) Provision of better training materials including modern teaching aids (hardware and software),
- b) Providing trainers with training in teaching, opportunity for periodic updating of technical skills and establishing a career structure,
- c) Improving procedures for monitoring and modifying course contents to meet the changing requirements within several modes of transport,
- d) Improving procedures for evaluating training output and linkage with on-the-job training,
- e) Increasing the budget allocated to training,

The Regional Institute for River Transport is part of RTA. But this institute does not provide the most up-to-date training in inland waterway transport. To provide the needed training, it is necessary to retrain teachers, reform curricula, upgrade textbooks, upgrade reference materials and improve availability of modern teaching aids.

In addition, the Study Team would like to emphasize the importance of ethical training. It is said that any nation without an ethical code will fade from history. In all organizations managerial resources cannot be efficiently used if there is no code of ethics on their job to connect each element.

### **13.6.3 Establishment of Tariff System**

It is desirable that RTA secure enough revenue to cover at least ordinary expenses. The only solution is to increase revenue and minimize expenses, and to that end RTA should take any necessary measures immediately.

The study team would like to recommend the creation of a new section in RTA responsible for introducing and managing the tariff system. The tariff will be imposed on users in the form of land leasing fee, charge for using canal and navigation aids and so on. In order to manage the things to prepare the detailed inventory covering all of RTA's assets and accurately grasp the state of their utilization. And at the same time it will be necessary aspect of RTA taking into consideration these new sources of revenue.

#### **(1) Land lease tariff**

What RTA should do firstly is to clarify the situation of proprietary rights and make lists in order to utilize idle public lots. And then they should negotiate with the occupants of land RTA owned to levy proper land lease fees. After going through this process RTA will be able to secure stable revenue from their land.

At the same time it is recommended that the present lease fee system be reconsidered.

Therefore RTA should be stipulated the public land fee in the official tariff. It results in appropriate administration of public lands.

By collecting proper lease fee from land users, especially those who engage in profit making business, it would be possible for RTA to secure a part of the financial resources necessary for port construction, maintenance, dredging, etc.

It should be noted, however, that a sudden, dramatic increase in the lease fee would not be well received by land users. Therefore, a gradual, step by step increase in lease fees should be adopted.

#### **(2) Canal entrance dues**

At present RTA does not levy fees on barges going through canals and locks of inland waterways. In future RTA should consider the introduction of canal entrance dues or lock passing charge including night navigation. However, RTA must ensure that such a tariff would not hurt the competitiveness of IWT.

Introduction of canal entrance dues or lock passing charge taking the competitiveness of IWT with other modes into consideration.





## **14. Economic Analysis and Financial Analysis**

### **14.1 Economic Analysis**

#### **14.1.1 Purpose of Economic Analysis**

The purpose of the economic analysis is to appraise economic feasibility from the viewpoint of national economy in the target year for the Short Term Development Plan (2010).

The analysis studies economic benefits as well as economic costs arising from this project, and evaluates whether the project benefits exceed those that could be obtained from other investment opportunities in Egypt.

#### **14.1.2 Methodology**

Feasibility of each project is appraised based on a cost-benefit analysis by the economic internal rate of return (EIRR) and the benefit/cost ratio (B/C ratio).

EIRR is a discount rate, which makes the value between the total costs, and the total benefits of a project during the project life equal; that is, IRR shows the maximum interest rate of borrowing for the project.

The benefit/cost ratio (B/C ratio) is obtained by dividing benefit by cost. In this method, it is necessary to set a suitable discount ratio based on the prevalent socio-economic conditions.

#### **14.1.3 Economic Prices**

##### **(1) Conversion Factor**

##### **1) Standard Conversion Factor (SCF)**

The difference between the domestic market prices and the border prices is mainly attributed to customs duties. SCF is used to determine the economic prices of non-tradable goods that have only the market prices and makes up for this price difference.

##### **2) Conversion Factor for Consumption (CFC)**

The conversion factor for consumption is used to convert the market prices of consumer goods into the economic prices.

##### **3) Conversion Factor for Skilled Labor (CFSL)**

The cost of skilled labor is calculated based on the actual market wages on the assumption that the mechanism of skilled labor market is functioning properly. The data should be converted to economic prices because they are expressed by domestic prices or market prices.

##### **4) Conversion Factor for Unskilled Labor (CFUL)**

A common practice is to set the economic cost of unskilled labor equal to the per capita income of the agriculture sector, which is normally the lowest in all the sectors.

#### **14.1.4 General Prerequisites of Economic Analysis (1) Base Year**

“Base Year” means the year in the estimation of costs and benefits. The year already mentioned in the Master Plan study, viz., the year 2002, is adopted as the “Base Year”.

##### **(2) Project life**

The project life in the economic analysis is assumed based on depreciation period of the main facility in the project. In this study, the project life of each project in the Short Term Development Plan is mentioned in (4).

##### **(3) Foreign Exchange Rate**

The foreign exchange rate adopted for this analysis is the same as in the Master plan of this study, namely US\$1.00 = LE4.6.

##### **(4) “With Case” and “Without Case”**

###### **a) “With case”**

###### **- Alexandria-Cairo IWT Project**

- \* Maritime lock will be renovated.
- \* Navigation aids to enable night navigation will be installed.
- \* Dredging and bank protection will be executed for the proposed barge types.
- \* Ather El Nabi Port will be developed to provide public port services  
50 years is adopted as the project life of this project.

###### **- New Bolin Canal Project**

- \* New Bolin Canal will be created to connect Boulou and Rasheed Branch  
50 years is adopted as the project life of this project.

###### **b) “Without case”**

In “without case”, no investment will be made for IWT.

###### **- Alexandria-Cairo IWT Project**

- \* Maritime lock will not be renovated
- \* Navigation aids to enable night navigation will not be prepared
- \* Dredging and bank protection will not be executed.
- \* Ather El Nabi Port will remain as it is without any development.

###### **- New Bolin Canal Project**

- \* Rasheed Branch will be left disconnected with Bolin in IWT.

#### **14.1.5 Benefits of the projects**

In this study, economic analysis is executed for three items, viz, Alexandria-Cairo IWT Project, New Boulou Canal Project and the new public river port development at Ather El Nabi.

##### **(1) Alexandria-Cairo IWT Project**

Major benefits expected from this project are described below.

- 1. Cost reduction by mass transportation and energy saving**
- 2. Reduction of NO<sub>2</sub> exhaust by waterway transportation**
- 3. Waterway transportation including those at night will prevent cargo theft, etc.**
- 4. Less vibration during transport will prevent cargo damage, etc.**

Among those benefits, there are not sufficient data for those described under 2 through 4 and

therefore they are quantified (although not impossible). Therefore, differences in the costs of other land transportation (the main mode usually used for cargo transportation for this route) and the waterway transportation were sought and the result was deemed as benefits.

## (2) New Bolin Canal Project

Benefits of this project are similar to those of the Alexandria-Cairo IWT Project. This study sought the difference in transportation costs compared to other land transport modes, and regarded this as the benefit.

## (3) Ather El Nabi Public Port

Differences in transportation costs between the waterway transport and other modes will be deemed as benefits to be expected from this project, since the port will enable inland waterway transportation of container and break bulk cargoes as in the case of the two projects discussed above.

### 14.1.6 Cost of Projects

#### (1) Construction cost

The construction cost also includes the required purchase price of transportation equipment such as new type barges in the "With case" and required additional trucks or trains in the "Without case".

#### (2) Re-investment

Facilities and machineries of which depreciation periods end within the project life of each project will be renewed.

#### (3) Maintenance cost

The annual maintenance costs for facilities and machinery are calculated based on the estimated fixed rate for the annual maintenance costs vs. their initial investments. In this study, the fixed rates are set as follows: 2% for structures made mainly of concrete and stones, 4% for those made of steel stocks and machines and 5% for transportation machinery such as automobile, vessels.

#### (4) Personnel and administration costs

The annual personnel and administration cost are calculated based on the number of employees necessary for management of each project.

#### (5) Total cost

The total cost of each project in the Short Term Development Plan is shown in the following table.

Table 14.1.1 Cost of each project in the Short Term Development Plan

Item	Total Cost	F/C Portion Cost	L/C Portion Cost	Foreign Skilled Cost	Local Skilled Cost	Local Unskilled Cost	F/C Portion Cost	L/C Portion Cost
<b>Market Price</b>								
1 Alexandria-Cairo IWT Project	214,080	125,106	88,974	12,964	21,333	8,846	112,142	58,794
Ather El Nabi Public Port	97,464	69,601	27,863	5,147	5,824	2,331	64,455	19,707
2 New Bolin Canal Project	81,218	27,051	54,167	6,482	11,412	4,708	20,568	38,047
<b>Conversion factor</b>								
				1.000	0.855	0.685	1.000	0.821
<b>Economic Price</b>								
1 Alexandria-Cairo IWT Project	197,665	125,106	72,559	12,964	18,242	6,060	112,142	48,257
Ather El Nabi Public Port	92,354	69,601	22,753	5,147	4,981	1,597	64,455	16,175
2 New Bolin Canal Project	71,262	27,051	44,212	6,482	9,758	3,225	20,568	31,228

### 14.1.7 Evaluation of Project

#### (1) EIRR, B/C ratio and NPV

Result of the calculation for EIRR, B/C ratio and NPV for each project are shown Table 14.1.2.

**Table 14.1.2 EIRR, B/C Ratio and NPV**

Project	EIRR	B/C Ratio	NPV
(1) Alexandria-Cairo IWT Project	19.0	2.25	24,114
(2) New Bolin Canal Project	17.7	1.23	2,010
(3) Ather El Nabi Public Port	10.5	1.09	1,570

#### (2) Sensitivity Analysis

The sensitivity analysis is performed in order to assess effects of unexpected changes in cargo volume, construction costs, benefits, etc. for each project.

Case 1: Where the costs increase by 10%

Case 2: Where the benefits decrease by 10%

Case 3: Where the costs increase by 10% and the benefits decrease by 10%

#### (3) Evaluation

A project of which EIRR is more than 10% is generally considered economically feasible by considering the capital opportunity cost. In this study, the results of calculation for three projects all exceed 10% for EIRR and B/C ratio is larger than 1. Therefore, the proposed projects in the Short Term Development Plan in this study are considered feasible from the viewpoint of national economy.

**Table 14.1.3 Result of Sensitivity Analysis**

	Project	EIRR	B/C Ratio	NPV
Case1	(1) Alexandria-Cairo IWT Project	14.3	5.15	15,260
	(2) New Bolin Canal Project	16.4	1.12	1,145
	(3) Ather El Nabi Public Port	10.1	1.05	241
Case2	(1) Alexandria-Cairo IWT Project	14.2	1.52	13,473
	(2) New Bolin Canal Project	16.3	1.11	944
	(3) Ather El Nabi Public Port	10.1	1.03	398
Case3	(1) Alexandria-Cairo IWT Project	13.2	1.38	10,857
	(2) New Bolin Canal Project	15.1	1.01	780
	(3) Ather El Nabi Public Port	10.0	1.01	221

## **14.2 Financial Analysis**

### **14.2.1 Purpose of the Analysis**

In general, the purpose of the financial analysis is to appraise the financial feasibility of the short-term development plan. This analysis focuses on the project viability and financial soundness of the management body of the project, namely RTA, during the project life.

### **14.2.2 Methodology**

#### **(1) Project viability**

The project viability is analyzed using the discount cash flow method and appraised by Financial Internal Rate of Return (FIRR). FIRR is a discount rate that makes the total costs and the total revenues during the project life equal.

In general, the project is regarded as financially feasible if FIRR exceeds the weighted average interest rate of the total funds for the investment of the project.

#### **(2) Financial Soundness of RTA**

Financial soundness of RTA is appraised based on the financial statements of RTA, namely Profit and Loss Statement, Cash Flow Statement and Balance Sheet. Appraisal is made from the viewpoint of profitability and operational efficiency. If the components of financial resources of the Short Term Plan include a loan, the loan repayment capacity must be included in the appraisal items.

### **14.2.3 General Prerequisites of Financial Analysis**

#### **(1) Scope of Analysis**

Financial analysis is implemented for the project in the short-term development plan from the viewpoint of the project management body, namely RTA.

The Short Term Development Plan proposes three projects of Alexandria/Cairo IW Project, New Bolin Connection Canal Project and Public River Port Project. Except for the Public River Port Project, their profitability is nil. We therefore propose to conduct the financial analysis only in respect of the Public River Port Project.

In this study, the management of the public river port at Ather El Nabi is assumed to be implemented by the management office for this terminal under the RTA. As for the financial analysis in this study, the project viability and financial soundness of the management body is appraised for this office which is assumed to be financial in depended in this study because RTA is not financial in dependent office with a lot of genuine public works.

(Hereafter, the management office is referred to as RTA.)

#### **(2) “With Case” and “Without Case”**

Project viability is assessed by FIRR. FIRR analysis is based on the differences of revenue and expenditure between “With Case” and “Without Case”. In this study, the case where the short

term development plan including the public river port project is implemented shall be deemed as "With Case", and the case where the current status prevails without the short term plan shall be deemed as "Without Case".

**(3) Base Year**

"Base Year" means the year for estimation of the costs and revenue. The year 2002 is adopted as "the Base Year" in this study.

**(4) Project life**

The project life for financial analysis is based on depreciation of main facilities in the project and the period of the long-term loan in general.

The project life in this study adopts 50 years including after completion of the construction. Inflation and nominal wage raises during the project life are disregarded.

**(5) Fund Raising**

The financing conditions are as follows.

1) Foreign funds

Term of repayment: 30 years (including the grace period of 10 years for capital repayment)

Interest rate: 2.2% per annum

Method for repayment: Level payments of principal and interests

2) Domestic funds

Term of repayment: 10 years

Interest rate: 13.0% per annum

Method of repayment: Level payments of principal and interests

3) Weighted average interest rate on the funds raised

4.90% per annum

**(6) Cargo Handling Volume and**

According to the demand forecast, cargo handling volume at the public river port is as follows:

Table 14.2.1 Cargo handling volume at public river port

Year	2010	2020
Container cargo (Unit:1000TEU)	138	281
Break bulk cargo (Unit:1000MT)	263	409

**(7) Revenues and Expenses**

RTA's revenues in this project accrue from the concession fee. (Refer to Appendix 14.1)

Main items of expenses of the projects in the Short-term Development Plan are the investment in capital assets and the management costs including maintenance costs.

#### 14.2.4 Evaluation and Conclusion

##### (1) Result of FIRR calculation

The result of FIRR calculation is 6.1%. FIRR as calculated exceeds the weighted average interest rate on funding.

##### (2) Sensitivity Analysis

Sensitivity analysis is conducted to investigate influence of future changes that are difficult to foresee such as those of the cargo volume, construction costs, inflation, and exchange rate. In this study, the following cases are envisaged by considering the gap between the high and the low cases and inflations of the past decade.

Case 1: when the investment cost increases by 10%

Case 2: when the revenue decreases by 10%

Case 3: when the investment cost increases by 10% and the revenue decreases by 10%

The result of sensitivity analysis is shown in the table 14.2.2. In all the cases, FIRR exceeds the weighted average interest rate of the funds.

**Table 14. 2. 2 Result of the Sensitivity Analysis**

Original	Case-1	Case-2	Case-3
6.1%	5.5%	5.4%	5.0%

##### (3) Appraisal

Based on (1) and (2), the proposed project in this study is financially feasible.

#### 14.2.5 Conclusion

In the basic case and all the cases used for sensitivity analysis, FIRR falls within the allowable scope, if not very high. The result of analysis of financial soundness also falls within the adequate scope. Therefore, it is determined that this project is financially feasible and will not adversely affect the finance of RTA, the project management body.

#### 14.2.6 Financial analysis from a point of view of a private concessionaire

In this study, we calculated FIRR of a private concessionaire for the basic case under the same premises as of 14.2.3, and studied the financial feasibility of a private concessionaire.

Condition of funds (for terminal operator)

Term of repayment: 10 years

Interest rate: 13.0% per annum

Method of repayment: Level payments of principal and interests

Result of calculation, FIRR is 12.6%.



As a result, FIRR exceeded the interest rate of procured fund, viz, this project is financially feasible from a point of view of a private concessionaire.

## **Chapter 15 Environmental Impact Assessment (EIA)**

### **15.1 Projects of EIA Study**

There are three major projects envisaged in the short-term development plan. Of these 3 projects only 2 projects, namely, Alexandria Project and Bolin Project are targeted for the EIA Study as new projects. The public river port project at Ather El Nabi is considered as an on-going project since it is only an improvement to the already planned container terminal at the same location for which RTA has already carried out the EIA study very recently in 2000, and hence not targeted for the conduct of EIA.

Two separate EIA studies for each project components were conducted in consideration to their distinct geographic locations of Alexandria (Mediterranean coastal area) and Bolin (Nile Delta area), conforming the EIA Guidelines of EEAA.

### **15.2 Findings of EIA Studies**

The most significant long-term environmental benefit of inland waterway transport (IWT) is the reduction in the emission of GHG (greenhouse gas) and other air pollutants in comparison to that of road-based trucks due to the high-energy efficiency of waterway transport. Still, the potential long-term adverse effects are navigational safety concern and proper management of wastes arising from barge operation. Important navigational safety enhancement measures are restriction on the transport of dangerous cargo and regular conduct of bathymetric survey, while proper handling of oily (bilge) wastes and solid wastes of barge operation is the most significant requirement of waste management. The other most significant findings of both EIA studies are summarized below.

#### **(1) Alexandria Project**

The most significant construction related environmental issue is the management of potentially contaminated dredged material derived in the port waters of Maritime Lock. This seabed material is evaluated as contaminated with some heavy metals. The total quantity of dredged material is about 10,000 m<sup>3</sup>, of which only the top seabed surface layer of about 5000 m<sup>3</sup> should be classified as contaminated and hence subjected to controlled management measures. It is proposed to store this contaminated dredged material permanently in a controlled manner in a designated nearby desert area.

Moreover, any potential encounter with archeological treasures in the process of dredging work is considered as highly improbable in consideration to no historical records on such past encounter and the limited extent of area targeted for dredging.

## **(2) Bolin Project**

### **1) Pre-construction and construction stages**

The most significant pre-construction related environmental issue is the social concerns of agricultural land acquisition. In this respect the required minimum lands for the widening of the Bolin Canal is determined as 25,000m<sup>2</sup>. It is recommended that farmers permanently disposed of their land be provided with alternative farmland in newly developed agricultural land in addition to reasonable monetary compensation, while those temporarily disposed of their land during the construction period be given adequate compensation for lost production determined based on the annual agricultural production value and land sale value as customary in Egypt.

Moreover, beneficial use for the dredged material and surplus soil is recommended. Also, in consideration to past non-encounter with any archeological treasures and also to the long history of anthropogenic agricultural interference of this Nile Delta area, it is highly improbable to encounter with any archeological treasures consequent to the dredging and excavation works.

### **2) Operation (post construction) stage**

The current average discharge through the Bolin Canal is estimated at about 30 m<sup>3</sup>/sec. With the conversion of this canal as navigation canal consequent to this project, discharge through the canal would occur both via the navigation lock (New Bolin Lock), only when the lock is open to facilitate passage of a barge but the discharge could not be regulated (unregulated discharge), and via the new barrage adjacent to the navigation lock, the discharge of which could be regulated (regulated discharge).

It is considered that consequent to the navigation of barges through this New Bolin Lock as long as the average discharge through the canal could be maintained as of the current discharge, then the project has no long-term operational interference with irrigation water use. In fact the maximum total unregulated discharge with the maximum possible barge passage through the new lock is determined to account for only 12% of the current average discharge. Accordingly, total canal discharge could be regulated so as not to exceed the current discharge using the new barrage even under the condition of maximum operational capacity of the New Bolin Lock.

## **15.3 Conclusion and Recommendation**

### **15.3.1 Conclusion**

The implementation of both of the projects would result in long-term environmental benefit of reduced emission of GHG (greenhouse gas) and other air pollutants. This long-term environmental benefit amply justifies the implementation of the projects.

Important navigational safety measures include regular conduct of bathymetric survey and restriction on the transport of dangerous cargo. While, concerning waste management, proper management of waste oil (bilge waste) and solid waste shall be ensured. These precautionary measures are required so as not to impair the lifeline beneficial uses of Nile River consequent to increased barge operational frequency.

### **15.3.2 Recommendations**

#### **(1) Dredged and excavated material**

The potentially contaminated dredged material of about 5000m<sup>3</sup> derived from the surface seabed layer of the maritime lock area (Alexandria Project) is recommended to be stored permanently in a designated nearby desert area. Beneficial use is recommended for the remainder of dredged and surplus excavated material. In particular, the surplus material derived in the Bolin area (Bolin Project) is amenable for brick making and new agricultural land development.

#### **(2) Further modal shift with railway transport**

From the viewpoint of increased energy efficiency related environmental benefit realization, both waterway and railway are preferred complementary cargo transport modes in comparison to road trucks. Accordingly, further modal shift with development of freight railway is recommended.

#### **(3) Independent environmental improvement measures**

The water environment of the Nobaria Canal reaches of Alexandria Port area is severely deteriorated. The principal cause of this environmental degradation is the disposal of improperly treated (and untreated) wastes of Alexandria City origin into the Lake Maryut. It is imperative to undertake the necessary corrective measures to control runoff of these land based pollution sources as the first priority to improve the water environment of Lake Maryut as well as the Nobaria canal reaches of Alexandria.

Moreover, in the inner Nile Delta river reaches, including the Bolin Project Area, the water environmental quality is assessed as only marginally meets the requirements for water having multiple lifeline beneficial uses. Accordingly, action programs to control any further increase in pollution load runoff into the Nile waters due to land based anthropogenic activities need to be initiated so as to mitigate progressing water quality degradation.

The required improvement measures to ameliorate these issues of water environmental degradation need to be undertaken independently irrespective of the implementation of the projects envisaged by this Inland Waterway Transport Development Master Plan.



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