Republic of Iraq
General Company for Ports of Iraq (GCPI)
Ministry of Transport (MOT)

DATA COLLECTION SURVEY ON PORT SECTOR DEVELOPMENT PLAN IN IRAQ

FINAL REPORT

MAIN REPORT

June 2012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Nippon Koei Co., Ltd. (NK)
Oriental Consultants Co., Ltd. (OC)

Republic of Iraq
General Company for Ports of Iraq (GCPI)
Ministry of Transport (MOT)

DATA COLLECTION SURVEY
ON
PORT SECTOR DEVELOPMENT PLAN
IN
IRAQ

FINAL REPORT

MAIN REPORT

June 2012

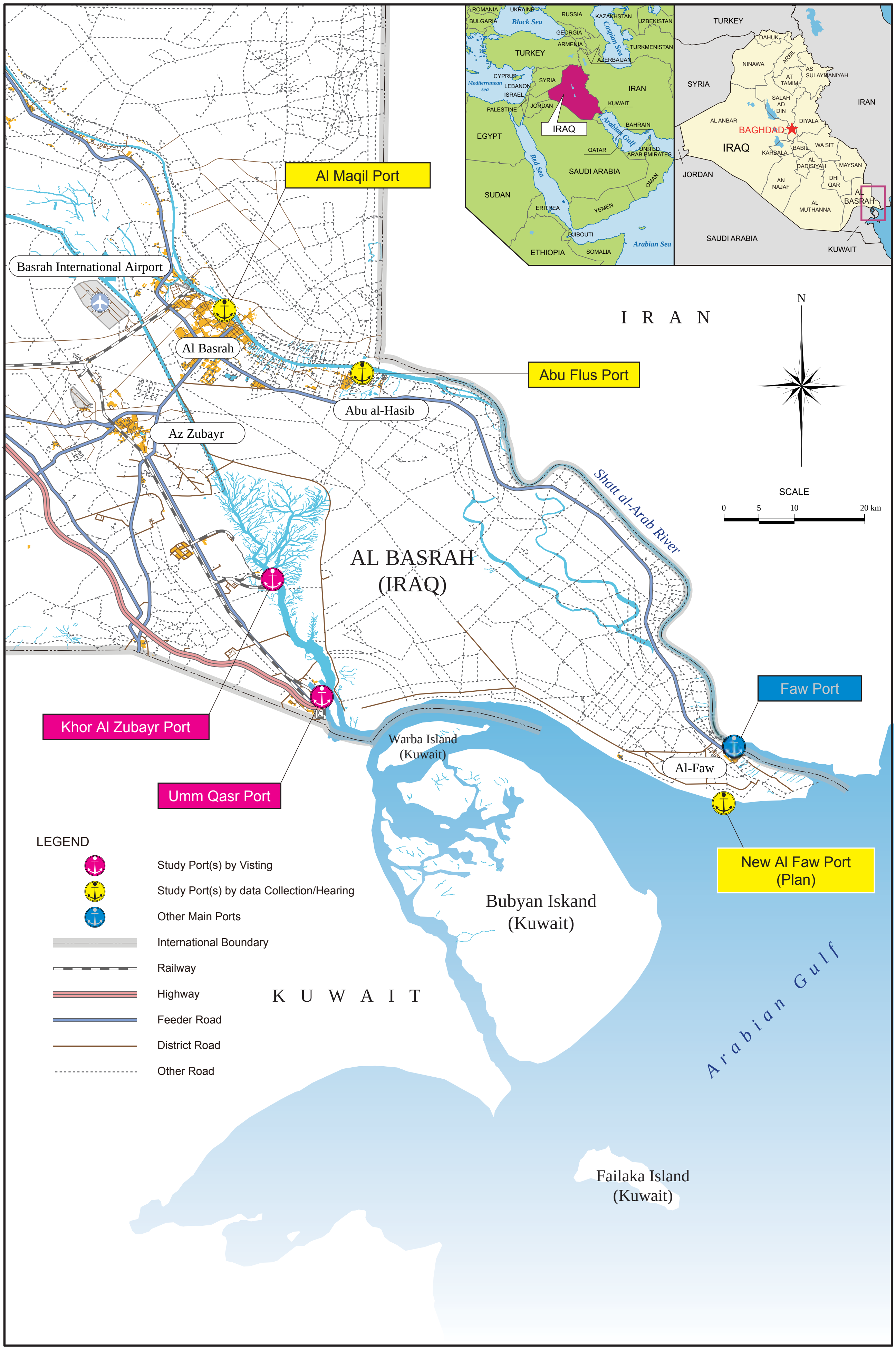
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Nippon Koei Co., Ltd. (NK)
Oriental Consultants Co., Ltd. (OC)

Exchange Rates

Date: February 2012

US$ 1.00 = ID 1,166
US$ 1.00 = JPY 78.5



LOCATION MAP OF STUDY AREA

Data Collection Survey
on Port Sector Development Plan in Iraq

Final Report

Location Map of Study Area

Table of Contents

Part 2: Cargo Traffic Forecast and Conceptual Plan of Ports Development

Part 3: Port Management and Operation

List of Tables

List of Figures

List of Photos

List of Abbreviations

A

ACD	Admiralty Chart Datum
AIS	Automated Identification System

B

BL	Bill of Lading
BOD	Biochemical Oxygen Demand

C

CLW	Chart Low Water
CONS	Project Consultants
CONT	Contractor
CSD	Cutter Suction Dredger

D

DDT	Dichloro-diphenyl-trichloroethane
DG	Director General
DMP	Dredging Management Plan
DWT	Dead Weight Tonnage

E

ECOP	Environmental Codes of Practice
EDI	Electronic Data Interchange System
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ESSAF	Environmental and Social Screening and Assessment Framework
EU	European Union

F

FAO	Food and Agriculture Organization of the United Nations
FIRR	Financial Internal Rate of Return
FSA	Financial Services Agency
FTZ	Free Trade Zone

G

GCPI	General Company for Ports of Iraq
GDP	Gross Domestic Product
GNP	Gross National Product
GPS	Global Positioning System
GRT	Gross Registered Tonnage

I	
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBA	Important Bird Area
IEE	Initial Environmental Evaluation
IMF	International Monetary Fund
IMO	International Maritime Organization
IPA-EU	Environmental Unit IPA
IRR	The Iraqi Railway Company
ISCST	The Iraq State Company for Sea Transport
ISPS	International Ship Security Management System
IT	Information Technology
J	
JBIC	Japan Bank for International Cooperation
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
K	
KA	Khawr Abdallah
KZ	Khawr Zubayr (=KZC)
KZC	Khawr Zubayr Channel
KZP	Khor Al Zubayr Port
L	
LAZ	Immediate Action Plan
LC	Letter of Credit
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LWL	Low Water Level
M	
MHHW	Mean Higher High Water
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MOE	The Ministry of Environment
MOO	Ministry of Oil
MOT	Ministry of Transport
MTI	Ministry of Trade and Industry
N	
NDP	National Development Plan
NDS	National Development Strategy
NPV	Net Present Value

O

ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development

P

PAH	Polycyclic Aromatic Hydrocarbon
PCB	Poly Chlorinated Biphenyl
PCC	Pyridinium Chlorochromate
PIANC	Permanent International Association of Navigation Congress
PMT	Project Management Team
POC	Project Oversight Committee
PPP	Public–private partnership
PVC	Polyvinyl Chloride

R

Ro/Ro	Roll-on and Roll-off
ROPME	Regional Organization for the Protection of the Marine Environment
RTG	Rubber Tyred Gantry Crane

S

SAPROF	Special Assistance for Project Formation
SCF	Social Cost Factor
SOLAS	(International Convention for the) Safety of Life at Sea

T

TBI	Trade Bank of Iraq
TEU	Twenty-Foot Equivalent Unit
TOT	Training of Trainer
TPH	Total Petroleum Hydrocarbon
TSHD	Trailing Suction Hopper. Dredger

U

UAE	United Arab Emirates
UN	United Nation
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNJLC	UN Joint Logistics Centre
UQP	Umm Qasr Port
USAID	United States Agency for International Development

V

VTS	Vessel Traffic Services

EXECTIVE SUMMARY

1. BACKGROUND AND PRESENT SITUATION OF PORTS IN IRAQ

(1) Objective of the Study

The main objectives of the Study are to collect information for the enhancement of port operations and management capability, and arrange them in order to support the port development plan prepared by the Government of Iraq. The following points are focused on:

- To collect information on the present situation of the port sector in Iraq and review them.
- To have a understanding of the operation and management system of the GCPI, and examine the issues on the system.
- To recommend an improvement plan for the enhancement of port operations and management capability.
- To review the KZP restoration plan proposed in the Study for Development of Southern Ports in Iraq Post Phase I Development Plan, and conduct supplementary survey for the formation of the next restoration step.

The study area covers the ports in Iraq, mainly UQP, KZP, Al Maqil Port, and the new Al-Faw Port, which is under planning.

(2) Transport Policy and Plan

Ministry of Transportation (MOT) planned to implement the following policies on transportation with a development program for the privatization of some activities in the sector.

Port Sector

- Continue ongoing restoration and rehabilitation projects in and around UQP and KZP,
- Remove wreckages in the Shatt Al Arab channel and UQP with the most environmentally sound way possible, and
- Develop a master plan to increase efficiency and optimize the institutional arrangement of ports and inland waterways.

Land Transportation

- Explore the potentials of developing a bus rapid transit system and dedicated bus lanes.

Railway Sector

- Rehabilitate key railway stations, refurbish rolling stocks, and maintain equipment,
- Modernize the railway training center in order to develop the skills of railway staff, and
- Prepare a railway strategy to assess the merits for restructuring the present system to permit for greater private sector participation into the delivery of services.

(3) Ports in Iraq

The waterfront in Iraq is limited between the national boundary of Iran and Kuwait, while Iraq's coastline is short at about 48 km. There are five major cargo ports in Iraq such as UQP, KZP, Al Maqil Port, Abu Flus Port, and Al Faw Port, which are located along Khor Al Zubayr channel or the Shatt Al Arab channel in the southern part of Basra Province. Apart from these cargo ports, two oil terminals for exporting crude oil such as Al Bakr and Al Amaya are located in the Arab Bay of the Gulf.

a. UQP

- UQP is the biggest Iraqi foreign trade cargo port in Iraq and the only port facing the Arab Bay of the Arabian Gulf. UQP is the most multifunctional primary port in Iraq. The port is located close to the border of Kuwait near the entrance of the Arabian Gulf on the west bank of the Khor Al Zubayr River, approximately 90 km upstream from the northwest edge of the Arabian Gulf.
- UQP is now divided into two ports, namely, the South Port and the North Port. The South Port includes ten berths for ordinary goods with container terminal. The GCPI would like to make the South Port as a dedicated port for containers.
- The North Port has 13 multipurpose berths for commercial use including equipment, transportation links, offices, and warehouses. The berths will include regular cargo berths, container berths and ro-ro berths. The total berth length is 4 km and the length of each berth is 200-250 m. The concession contract of berth nos. 11a and 11b was made with Gulftainer, and the container terminal is under construction.

b. KZP

- The KZP is located 60 km from the center of Basra City, 105 km from the northern end of the Arabian Gulf, and 12 nautical miles from UQP. Constructed from 1975 to 1980, KZP operated as a free trade zone and industrial port supporting industrial developments in Basrah and its vicinity.
- KZP was designed to handle general cargo and bulk cargoes such as wheat, fertilizer, phosphate and petrochemicals imports/exports, as well as sponge iron and iron ore imports. The port's facilities extend beyond the Q/Cs and warehouses.
- Although the planned water depth at the berth front is -12 m, the current water depth is between 6 m and 8 m due to the lack of proper maintenance dredging activities.

c. Trends of Cargo Transportation

- The percentages of ship calls by cargo type in 2009 were 9.5% for tankers, 52.6% for general cargo ships, and 37.9% for, dhows. While in 2010, the percentages were 10.4%, 46.1%, and 43.5%, respectively. The trend on the number of dhows has been increasing, but for general cargo ships it has been decreasing.
- There has been a decrease in the sizes of tankers with a maximum size of 50,000 DWT.
- At 60% in 2009 (and 50% in 2010), majority of the general cargo ships range between 0 and 3,000 DWT with a maximum size of over 30,000 DWT for cement and iron.
- The maximum vessel sizes are 30,251 DWT for container ships, 27,000 DWT for pure car carriers (PCCs), 41,450 DWT for tankers, and 74,577 DWT for bulk carriers.

2. DEMAND FORECAST AND CONCEPTIONAL PLAN OF PORTS DEVELOPMENT

(1) Demand Forecast

a. LATEST CARGO STATISTICS OF PORTS IN IRAQ

The total cargo volumes in Iraqi ports reached 10.12 million tons in 2001.
After that, the total cargo decreased in volume until 2003 with a handling volume of 1.81 million tons. The total cargo volume then increased after making the lowest volume in 2003 and recorded the highest volume of 11.94 million tons in 2006. The latest cargo handling volume was 10.31 million tons in 2010.

b. Cargo Statistics of Umm Qasr Port (UQP) and Khor Al Zubayr Port (KZP)

- The cargo handling volumes between 2006 and 2010 in UQP reached 7.65 million tons in 2006 and the range continued from 6.31 to 7.66 million tons in 2007 until 2010.
- The handling volume of container cargoes has been more than three times. Cargoes in UQP are almost imported and the export cargoes have not been recorded for the last five years.
- The cargo handling volumes between 2006 and 2010 in UQP. The total cargo volumes in UQP reached 7.65 million tons in 2006 and the range continued from 6.31 to 7.66 million tons in 2007 until 2010.

c. Cargo Demand Forecast

Based on cargo data up to the year 2012, of 2010, it is estimated the demand forecast in 2015, 2025 and 2035 by not only micro analysis but also macro analysis as summarized in below table.

Comparison of Forecast by Macro and Micro Analyses

Year	Macro Analysis (x1,000 ton)		Micro Analysis (x1,000 ton)
2015	(Low) (Medium) (High)	14,131 16,393 17,588	19,502
2025	(Low) (Medium) (High)	30,396 43,163 50,910	48,683
2035	(Low) (Medium) (High)	58,180 98,337 126,250	101,668

Source: JICA Study Team

The forecast volume excluding liquid bulk cargoes by micro analysis in 2015 exceeds the volume in the high case of macro analysis by nearly 10%, while the forecast volume by micro analysis in 2025 and 2035 ranges between the medium case and the high case of macro analysis. Therefore, the micro analysis results will be used for planning the port development and project analysis.

(2) CONCEPTUAL PLAN OF PORTS DEVELOPMENT

a. General

In considering the future development plan of the ports of Iraq, the following two points listed below will be its main key factors;

1) Future cargo demand;
2) Implementation schedule of the new Al-Faw Port development and design capacity.

The realization of the new Al-Faw Port should decide the development plans of other existing ports. This would establish a viewpoint as to whether further investments (for expansion) to other existing ports should or should not be made. It will also depend on the time of completion and the consideration of future utilization of the existing ports after the new Al-Faw Port is completed.

b. BASIC CONCEPT FOR THE PORTS DEVELOPMENT

Considering the above mentioned situation and conditions, it is suggested that the following points should be regarded as a sort of pre-requisition in formulating future development plans for ports in Iraq;

1) The roles and functions of the existing ports after the new Al-Faw Port realization should be fully studied and established including the new port realistic implementation schedule.
2) Until the completion of the first stage of the new port, respective port development/improvement plans should be carefully studied to cope with the forecast cargo demand in a manner, for it to be cost effective and realistic, taking into account its future role and utilization.

Although there is no concrete policy on the future role and function of the existing ports, the New Al-Faw Port Master Plan (as conditions and consequence in the feasibility study) describes briefly the roles of the existing ports as follows;

- Umm Qasr Port: dedicated to international commercial traffic with its handling capacity of 10 to 11 MT/yr.
- Khor Al Zubayr Port: dedicated to local industrial traffic.
- Abu Flus Port and Maqil Port: dedicated to local commercial traffic, fed by cargo barges.

3. PORT MANAGEMENT AND OPERATION

(1) Issues on Port Management and Operation

According to the findings of the Study, the following points are the main issues on the port operation, in addition to the known physical issues such as damages of port facilities and obstructions in the access channels (shipwrecks and sedimentation);

Inefficiency of cargo handling and other port service related operations caused from shortage of cargo handling equipment and marine equipment.
Lack of timely repairs and maintenance of Port equipment due to shortage of spare parts.
Prolonged stay of vessels at berths, due to time consuming process in the custom clearance.
Inappropriate arrangement of port facilities and yards including the maintenance and repairs.
Delays in introduction of effective operation systems, especially in computerization, yard management & operation system, etc.
Shortage of experienced persons for the works in the port management and operation aspects.

(2) Proposed Capacity Building Implementation Plan

From the abovementioned discussions, the following themes and implementation methods for the capacity building are recommended.

Table 10.3.1 Proposed Subjects of Capacity Building Plan and Implementation Methods

Target Recipient	Subject/ Theme	Implementation Method
A. Responsible Persons ofGCPI, related Ministries	**(Institutional and Organizational Improvement)** 1. Port Management & Operation and Budget & Financial aspects 2. Policies on International organizations & Regulations 3. Privatization/PPP System/Policy	- Study and survey on other countries' system, modern ports. - JICA's workshop/Experts dispatch program - Workshop program by other donor countries or dedicated international organizations.
B. Management and Key Person of Responsible dept./section	**(Port M&O system/method Improvement)** 1. Project and Equipment procurement implementation & control ability 2. Demand forecast, Development planning 3. Port Facilities maintenance & control 4. Equipment maintenance & control 5. Environment protection, Safety 6. Budget & Financial aspects control 7. Capacity Building of Staff	(Training of responsible/key persons, trainers is effective) - Upgrading/improvement of skills/knowledge through JICA training course. - Technology transfer through implementation of projects, studies under JICA. - Training by sub-contracted specialist firms. - By providing facilities for survey/monitoring/inspection (Environment Unit) - Enhancement of GCPI Training Center.
C. Persons in Charge, Operation Staff	**(Upgrading of Individual skills and ability** 1. Facilities/Equipment operation skills 2. Facilities/Equipment maintenance skills 3. Systems running/operating skills 4. Environment protection/ operation safety skills	- System suppliers training by contract. - Equipment suppliers training program by contract. - Third Country Training - Training at GCPI Training Center.

The abovementioned Subjects/ Themes are to be further divided into more specific items in finalizing the Implementation Plan. It will however be necessary to further study and re-confirm the above needs before the preparation of the Implementation plan, since some themes/items may be under on-going status being arranged by GCPI or on a list for the planned program by JICA or other international organizations.

4. REVIEW OF KZP PORT DEVELOPMENT PLAN

(1) Long Term Development Plan

The proposed project components of the long-term development plan for KZP are summarized in Table below;

Long-term Project Components for KZP

<table>
<tr><th colspan="2">Project</th><th>Contents</th></tr>
<tr><td colspan="2">Navigational Condition Improvement
(capacity and safety)</td><td>- Widening of the main channel from UQP to KZP and development of a new turning basin around the LPG terminal area
- Widening of the channel and port basin at KZP area
- Removal of 12 wrecks in the channel and port basin at KZP urgently, and all wrecks in the access channel and basin in the short- to long-term</td></tr>
<tr><td colspan="3">Container Terminal Development
- one berth with terminal area in the short-term
- two berths with terminal area in the long-term as extension of the first berth</td></tr>
<tr><td colspan="3">Multi-purpose Terminal Development
- 9 additional berths with yard in the short-term
- 22 additional berths with yard in the long-term</td></tr>
<tr><td colspan="3">New Small Ship Operation Terminal
- four berths with yard in the short-term
- eight additional berths with yard as extension of the first four berths in the long-term</td></tr>
<tr><td colspan="3">Re-organization of Land Use in the Existing Port</td></tr>
<tr><td></td><td>Providing suitable and sufficient spaces for better port management</td><td>- Inland yard development
- Development of a new land by reclamation
- Development of the back-up area along new berths toward the southern direction from Berth No.1</td></tr>
<tr><td colspan="2">New Port Area Development</td><td>- Development of the small boat basin for government services
- Development of the access road</td></tr>
<tr><td colspan="2">Environmental Improvement</td><td>- Ecological waterfront development with mangrove planting</td></tr>
<tr><td colspan="2">Port Access Road/Railway Development</td><td>- Inner port road improvement
- Truck control yard development
- Improvement of the utilization of the railway transport</td></tr>
</table>

Source: JICA Study Team

(2) Urgent Development Plan

The project component of the Port Sector Rehabilitation Project Phase II is summarized in table below;

Project Components of Port Sector Rehabilitation Project Phase II

Project Component	Outline of Scope of Works	Remarks
(Construction Works)		
1. Dredging Works at KZP	Dredging of Port Basin, front of berthing areas, a limited area of Access Channel, Dredging volume: 5,400,000 cu.m, Depth: -12.5m, Width: Access Channel & Berthing areas 300m, and Turning basin 450m wide.	From UQP to KZP (including KZP port area), no maintenance dredging has been done for a long time. Especially the port basin and berth front areas are serious. The Channel (UQP-KZP) is also shallow and narrow in places, and widening and deepening are required, which can be done after the dredging works in the port area by GCPI own dredgers together with the planned rehabilitation and improvement of the LNG plant berth area.
2. Shipwrecks Removal Works	Total 12 wrecks removal located in the Main Channel and KZP basin.	6 wrecks located at KZP port basin area and KZP channel, the other 6 are along the Channel to UQP. Therefore, 6 wrecks located in KZP basin and access channel are the most critical.
3. Rehabilitation of Port Facilities	Damaged Fender Replacement: 60 pcs. (KZP) Repair of Tug berth structure (KZP), Yard pavement rehabilitation (KZP), Corrosion Protection (UQP)	According to the investigation results, total 97 pcs of Fenders were lost or damaged and need replacement. Some fenders are replacing by KZP. Thus 68 pcs of appropriate and suitable fenders will be replaced. Tug berth maintenance and corrosion protection. Yard pavement repair and maintenance including drainage. All North port berths (No.12-No.21), Total Cathode 1,845 pcs.
4. Expansion of Berth at KZP	300m Extension of the existing berth No.2 to South, and utilize as Multi-purpose Berth (KZP), Also connected to Berth No.1, Design depth -12.5m	In order to handle overflowed cargoes from UQP, it is necessary to extend the existing general cargo berth at least 300m. Design ship: 20,000-30,000 DWT max.
5. Navigation Aids Works	Procure and Install 20 Light Buoys along the Channel between UQP and KZP, 2 Leading lights installation at KZP Access Channel, AIS/VTS system installation	At present only 10 light buoys are installed along the channel between UQP and KZP, whilst 25 required as minimum. It is therefore recommended to provide 20 light buoys. At present no leading light is provided for the access to KZP, thus essential for safe navigation to KZP. Necessary to install the system according to the Strategy approved and required for ISPS compliant ports.
6. Utility Works	Rehabilitation/repair works at KZP, (Water supply, electricity cables, etc.)	Water supply system, electrical cables and pits rehabilitation A part of such works cam be done by the Port (GCPI). 40 quay cranes exist at UQP North, of which 24 cranes are not working. The work target is to remove total 14 nrs at Berth No.17,18 & 19 urgently for container cargo handling.
7. Removal of Unused Facilities & Equipment	Unused rail mounted quayside cranes at UQP	
(Procurement of Equipment)		
8. Cargo Handling Equipment	KZP: Container cargo handling equipment (21nrs.) , KZP: Maintenance works equipment (4nrs.) , UQP: RTG (4nrs)	
9. Marine Equipment (UQP/KZP)	Dredger (3), Tug (3), Survey boat(1), Mooring boat (2), Anti-pollution/monitoring vessels(3), Others (7)	

Source: JICA Study Team

(3) Project Cost and Implementation Schedule

a. Project Cost

The project cost based on proposed components is estimated as 80 Billion JPY in total. Summary of project cost is shown in table below;

Summary of Estimated Project Costs

	Acutual Proportion		Total (Equivalent to JPY)			Total (Original)		
	FC	LC	FC 1,000JPY	LC 1,000JPY	Total 1,000JPY	FC 1,000JPY	LC 1,000USD	Total 1,000JPY
A. ELIGIBLE PORTION								
I) Construction and Procurement			**64,993,870**	**8,464,082**	**73,457,952**	**64,993,870**	**107,822.70**	**73,457,952**
I.1 Dredging Works at KZP	83.3%	16.7%	5,318,117	1,067,670	6,385,788	5,318,117	13,600.90	6,385,788
I.2 Shipwrecks Removal Works	79.6%	20.4%	4,434,617	1,135,329	5,569,946	4,434,617	14,462.79	5,569,946
I.3 Rehabilitation of Port Facilities	59.0%	41.0%	1,291,849	898,383	2,190,232	1,291,849	11,444.37	2,190,232
I.4 Extension of Berth at KZP	70.5%	29.5%	5,311,607	2,221,822	7,533,429	5,311,607	28,303.46	7,533,429
I.5 Navigation Aids Works	97.3%	2.7%	2,247,750	62,100	2,309,850	2,247,750	791.08	2,309,850
I.6 Utility Works	0.0%	100.0%	0	362,954	362,954	0	4,623.62	362,954
I.7 Removal of Unused Facilities and Equipment	83.7%	16.3%	332,517	64,780	397,296	332,517	825.22	397,296
I.8 Procurement of Cargo Handling Equipment	99.1%	0.9%	1,952,730	16,980	1,969,710	1,952,730	216.31	1,969,710
I.9 Procurement of Marine Equipment	99.1%	0.9%	30,728,625	285,848	31,014,472	30,728,625	3,641.37	31,014,472
Base Project Cost for (I.1 to I.9)			51,617,811	6,115,865	57,733,677	51,617,811	77,909.11	57,733,677
Price Escalation			3,052,496	1,125,044	4,177,540	3,052,496	14,331.77	4,177,540
Physical Contingency			10,323,562	1,223,173	11,546,735	10,323,562	15,581.82	11,546,735
II) Consulting Services			**1,520,074**	**1,442,043**	**2,962,116**	**1,520,074**	**18,369.97**	**2,962,116**
Base Project Cost for (E/S)			1,391,513	1,210,543	2,602,056	1,391,513	15,420.93	2,602,056
Price Escalation			58,985	170,972	229,958	58,985	2,177.99	229,958
Physical Contingency			69,576	60,527	130,103	69,576	771.05	130,103
Total of A. (I + II) : BASE PROJECT COSTS			**66,513,943**	**9,906,125**	**76,420,068**	**66,513,943**	**126,192.67**	**76,420,068**
B. NON ELIGIBLE PORTION								
a. Land Acquisition and Compensation Cost		**0.00%**	0	0	0	0	0.00	0
b. Administration Cost		**5.00%**	0	3,821,003	3,821,003	0	48,675.20	3,821,003
c. VAT		**0.00%**	0	0	0	0	0.00	0
d. TAX and Duties		**0.00%**	0	0	0	0	0.00	0
Total of B. (a. + b. + c. + d.)			**0**	**3,821,003**	**3,821,003**	**0**	**48,675.20**	**3,821,003**
TOTAL (A. + B.)			**66,513,943**	**13,727,128**	**80,241,071**	**66,513,943**	**174,867.87**	**80,241,071**

Source: JICA Study Team

b. Implementation Schedule

The total project implementation period is estimated about 66 months, which including 12 months of defect period.

c. Case Study of Project Cost

The project scope options have been examined considering the proposed priorities of respective components. The project cost of options is summarized below;

Project Costs Options

（Unit: JPY million）

Options	Scope	FC	LC	Total
Option-1	Original (full scope)	66,514	13,727	80,241
Option-2A	Delete six shipwrecks, 8 kinds & 10 no. of ships (GHD, TSHD), and ten sets of Jib crane removal from the original	39,785	11,056	50,841
Option-2B	Delete six shipwrecks, 8 kinds & 10 no. of ships (CSD, TSHD), and ten sets of Jib crane removal from the original	35,891	10,819	46,710
Option-3	Delete six shipwrecks, nine kinds & 11 no. of ships (CSD, GHD, TSHD), and ten sets of Jib crane removal from the original	30,798	10,508	41,307
Option-4	Delete six shipwrecks, eleven & 15 no. kinds of ships (CSD, GHD, TSHD), ten sets of Jib crane removal from the original	27,580	10,312	37,892

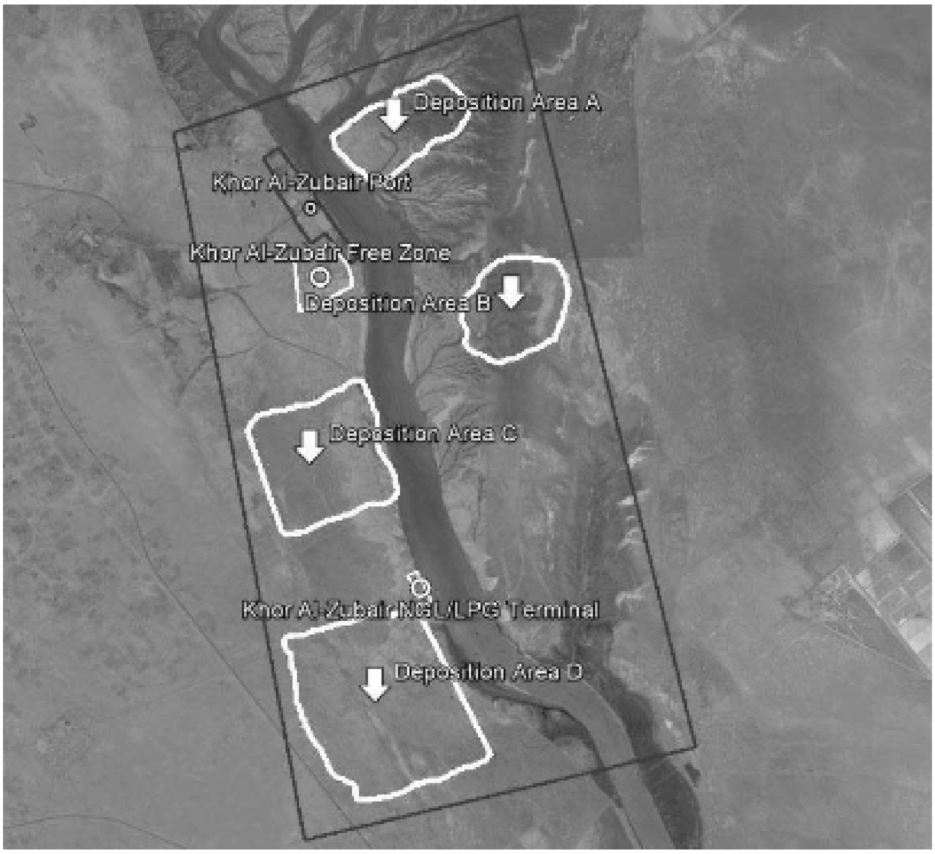
Source: JICA Study Team, Note: Exclude Interest during Construction

(4) Environmental Consideration

Environmental consideration for the Iraq Port Sector Rehabilitation Project Phase II was carried out. The major point in the Study are as follows;

Supplemental study to update the IEE prepared in the SAPROF study was carried out. The major points in this study are as follows:

- Desk-based study was carried out to supplement the baseline data.
- Legal framework was studied to update the information for environmental and social considerations.
- A series of study for EIA procedure based on Iraqi's law, JICA Guideline and World Bank Guideline concluded that this project would be categorized as Category B, which requires the preparation of an IEE.
- According to Iraqi environmental law, the ECC shall be obtained to start the project. IEE in this case is necessary to obtain the certificate.
- Water quality survey along the sea route did not show any major pollution including nutrient and oil.
- The results of the survey and the analysis of information gathered during the desk-based study suggested a dynamic and active environment with substantial mixing and movement of water and sediments over across seasons and over longer periods of time.
- Comparing with previous study results conducted in 2009, the water environment seems to have recovered as less pollution and less eutrophication.
- Sediment quality however, indicated some contaminations such as dioxins, furans, arsenic, total nitrogen, total sulphur, copper, and nickel.
- The rehabilitation project clearly has the potential to increase sediment load in the water column during the construction (and especially) dredging phases. Given the dynamic environment, however, and the fact that a large part of the study area is subject to regular high suspended sediment loads from natural processes, the impact of sediment mobilized by the construction activity is likely to be short-lived and of limited significance.
- With regards to the overall ecological sensitivity of the four areas, Areas C and D are the least sensitive, and therefore considered to be the most suitable for the deposition of the dredged material. The habitat maps produced during the desk-based study have proven to be very accurate and have been slightly updated following the field surveys.
- The highest mean concentrations of contaminants were consistently recorded in Areas A and B (copper, nickel, lead, zinc, iron, manganese, TPH, and dioxins). For this reason, it may also be preferable to deposit dredging in Areas C and D to reduce the contaminant loading on Areas A and B.
- Soil quality in candidate dumping site showed minor contamination in dioxins, furans, and arsenic, although these concentrations satisfy the guideline values.
- Therefore, measures to discharge water from dumping site and establishment of monitoring plan are recommended.
- As intertidal zone is ecologically important, change of the zone shall be avoided as much as possible. In case change is necessary, effort for recovery of the zone is recommended.
- The ecology of the intertidal zones in areas C and D (if used) should be monitored again after the deposition works have been completed to determine if significant impacts have been successfully avoided.



Location of Dumping Area in KZP

5. RECOMMENDATION ON STEP FORWARD

(1) Iraq Port Sector Rehabilitation Project Phase II

- It is recommended that the proposed Urgent Development Project needs to be implemented at an earliest possible time.
- In selecting loan type, the following categorization together with the packaging of the work component is suggested.

Project Package and Loan Type

Package	Project Component	ODA Loan Type
PACKAGE-1	DREDGING & WRECK REMOVAL	Un-tied loan
1.1	Dredging Work	
1.2	Shipwrecks Removal	
PACKAGE-2	MARINE/CIVIL WORKS	Tied (STEP)
2.1	Rehabilitation of Port Facilities	
2.2	Berth Extension	
2.3	Navigation Aids	
PACKAGE-3	EQUIPMENT	Tied (STEP)
3-1	Cargo Handling Equipment	
3-2	Marine Equipment	
PACKAGE-4	UTILITY & REMOVAL	Un-tied loan (by local competitive bidding)
4.1	Removal of Un-used Facilities and Equipment	
4.2	Utility Works	

Source: JICA Study Team

(2) Port Master Plan Study

The Port Sector Development Study contains various study aspects, it is recommended to implement as following items.

- To formulate Port Development Master Plan in Iraq
- To formulate improvement plan on Port Management and Operation Plan
- Capacity Building Plan

Part 1

BACKGROUND AND PRESENT SITUATION OF PORTS IN IRAQ

1. BACKGROUND AND OBJECTIVES OF THE STUDY

1.1. BACKGROUND OF THE STUDY

Iraq has a short coastline of about 48 km lying between the national boundaries of Iran and Kuwait, with all its ports situated within Al Basra Province. As a physical distribution base, ports are key infrastructure necessary for the recovery of Iraq's national economy. The port facilities in Iraq have plummeted in efficiency because of the long-term war, and suspension of new investment/maintenance due to economic sanctions. As a result, more than 70% of imported commodities rely heavily on inland transportation through neighboring countries. The National Development Plan (2010~2014) issued in 2010 aims at the restoration of port facilities from their severe condition, and to increase the port's competitiveness through rehabilitation of existing channels and port facilities.

The Umm Qasr Port (UQP) is the biggest foreign trade port in Iraq, and its development is in progress through the Iraq Port Sector Rehabilitation Project Phase I under the Japanese Official Development Assistance (ODA) loan, which aims to recover port operation functions and increase the port's efficiency. As a result of this project, the handling capacities of cargos will be improved. Also, counterpart trainings for persons concerned in the General Company for Ports of Iraq (GCPI) will be simultaneously conducted in order to improve port operations and their management capability.

On the other hand, it is expected that the volume of cargoes in Iraq will increase greatly, and the enhancement of cargo handling capacity at ports would be urgently solved. The Khor Al Zubayr Port (KZP), which is the second largest international trading port in Iraq, has not been functioning well and its handling capacity does not meet the cargo demand. In addition, there are several issues on its port operations and management system such as ship dispatch control, customs clearance, and efficiency of terminal operation system.

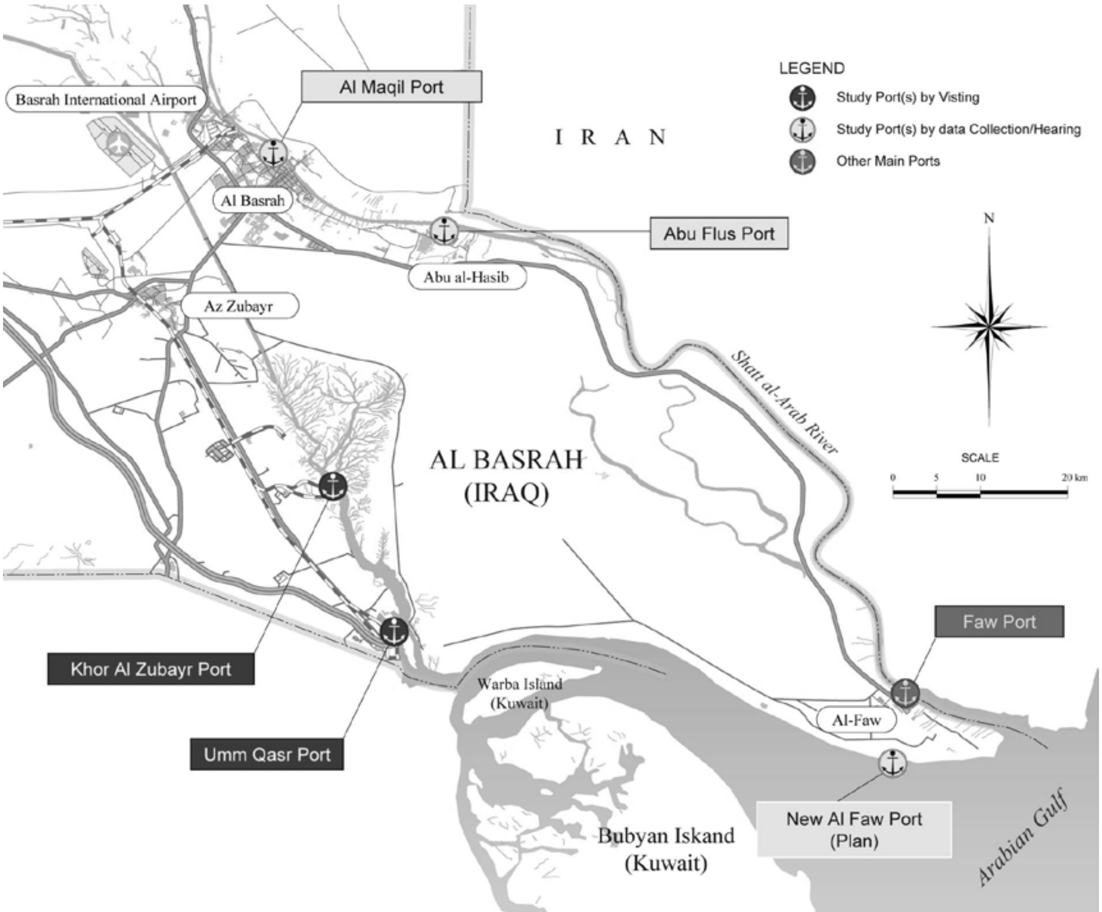
Based on the above background, this Data Collection Survey (herewith referred as the Study) is carried out to collect information that are important for the enhancement of port operations and management capability. The collected information are then organized and utilized for the port development plan prepared by the Government of Iraq. The Study for Development of Southern Ports in Iraq Post Phase I Development Plan prepared under the Iraq Port Sector Rehabilitation Project Phase I is referred in the Study.

1.2. OBJECTIVES OF THE STUDY

The main objectives of the Study are to collect information for the enhancement of port operations and management capability, and arrange them in order to support the port development plan prepared by the Government of Iraq. The following points are focused on:

- To collect information on the present situation of the port sector in Iraq and review them.
- To have a understanding of the operation and management system of the GCPI, and examine the issues on the system.
- To recommend an improvement plan for the enhancement of port operations and management capability.
- To review the KZP restoration plan proposed in the Study for Development of Southern Ports in Iraq Post Phase I Development Plan, and conduct supplementary survey for the formation of the next restoration step.

As shown in Figure 1.2.1, the Study covers the ports in Iraq, mainly UQP, KZP, Al Maqil Port, and the new Al-Faw Port, which is under planning. The Faw Port was excluded from the main ports because it will be replaced by the new Al-Faw Port.



Source: JICA Study Team

Figure 1.2.1 Survey Area

The Study has been carried out in three phases as discussed below.

Phase-1: Data Collection and Preliminary Examination on:

- Port development plans;
- Physical distribution, maritime transportation and demand forecast;
- Port operations and management plan;
- Preliminary design of port facilities;
- Procurement and cost estimates; and
- Environmental considerations.

Phase-2: Review on Present Port Operations/Management System and Restoration Plan for KZP

- Issues on present port operations and management system;
- Issues on port services, customs clearance and logistics; and
- Review of the restoration plan for KZP, demand forecast, design of port facilities, project cost, and environmental considerations.

Phase-3: Proposal on Port Operations/Management System and Restoration Plan for KZP

- Recommendations on issues on the present port operations and management system;
- Examination on issues on port services, customs clearance, and logistics; and
- Preparation of the restoration plan for KZP including rough estimate of the project cost, procurement methods, and environmental issues.

The report in the Study consists of;

Part 1: Background and Present Situation of Ports In Iraq
1. Background and Objectives of The Study
2. Current Conditions of Iraq
3. Present Situation of Ports In Iraq
4. Trends of Marine Transport and Cargoes

Part 2: Cargo Traffic Forecast and Conceptual Plan of Ports Development
5. Prospects of Cargo Traffic Demand
6. Current Port Development Plans
7. Conceptual Plan of Ports Development

Part 3: Port Management and Operation
8. Present Situation on Port Management & Operation
9. Improvement Plan on Port Management & Operation
10. Capacity Building Plan

Part 4: Review of KZP Development Plan
11. Review of Long Term Development Plan for KZP
12. Urgent Development Plan
13. Project Cost and Implementation Schedule
14. Environmental Consideration on Urgent Development Plan

Part 5: Recommendation on Step Forward
15. Recommendation on Step Forward

2. CURRENT CONDITIONS OF IRAQ

2.1. NATIONAL GEOGRAPHY, POPULATION, AND CLIMATE

(1) Population

The average annual growth rate of population between 1995 and 2000 was 3.30% per year, while the growth rate for ten years between 2000 and 2010 was 2.87% per year. The population in 2010 was estimated at 31.7 million. The number of population per region in 2009 is shown in Table 2.1.1.

Table 2.1.1 Distribution of Population in Iraq in 2009

Region of Iraq	States and Provinces	Number of Population in 2009 (x 1000)	Percentage of the Total Population (%)
North	Three states	5,678	17.7
Middle	Baghdad City	7,181	22.4
	Wasit	1,158	3.6
	Dijala	1,371	4.3
	Al Anbar	1,452	4.5
	Others	4,101	12.8
South	Basra state and other states	11,164	34.7
Total		32,105	100.0

Source: Central Organization for Statistics and Information Technology (web)

(2) Climate and Topography

a. Climate

Iraq has a hot and dry climate characterized by long, hot, and dry summers ,and short and cool winters. The climate is influenced by Iraq's location between the subtropical aridity of the Arabian Deserts and subtropical humidity of the Arabian Gulf. January is the coldest month, with temperatures ranging from 5 °C to 10 °C, while August is the hottest month, with an average temperature rising up more than 30 °C.

In most areas, the summers are warm to hot with the sun showing most of the time, but the humidity is high in the southern coastal areas of the Arabian Gulf. Daily temperatures can be very hot; on some days temperature can easily reach 45 °C or more, especially in the Iraqi desert areas wherein there is a risk of heat exhaustion. The hot and dry desert winds can be very strong sometimes, and can cause violent sandstorms.

About 70% of the average rainfall in the country falls between November and March, while it is often rainless from June through August. Rainfall varies in each season and in each year. Precipitation is sometimes concentrated in local, but violent storms cause erosion and local flooding especially in the winter season.

b. Topographic Conditions

The land area of Iraq is about 440,000 km^2, which is about 1.5 times larger than the land area of Japan. There are two large rivers in Iraq, namely the Tigris River (190 km long), and the Euphrates River (280 km long, with a river basin area of 765,000 km^2).

Land along these rivers is rich for agricultural cultivation. The agricultural land area is 100,190 km^2, which is 22.9% of the national land area (438,000 km^2). Land outside the river basin is mostly desert and mountainous areas. The coastal area facing the Arabian Gulf is only 48 km in distance.

2.2. SOCIOECONOMIC CONDITIONS

2.2.1 GROSS DOMESTIC PRODUCT (GDP)

According to the JICA study report entitled the Basic Study on the Program Formulation for Reconstruction and Rehabilitation of Infrastructures in Iraq (Project Study Phase I), the International Monetary Fund (IMF) data and statistics, and the World Bank, the GDP and social economic index in Iraq from 1995 to 2010 are as shown in Table2.2.1 below.
Iraq's GDP increased at a rate of about 34.5% from 1995 to 2000, but then fluctuated from 2000 to 2010 at an annual growth rate of -0.9%.

Table 2.2.1 Trend of Economic Index in Iraq from 1995 to 2010

Item	1995	2000	2005	2010
Population (million)	20.54	23.86	27.36	31.67
Annual growth rate (%/year)	NA	3.04	2.78	2.97
GDP per capita (USD)	1,063	1,389	1,124	2,531
Rate of increase (%)	NA	30.7	-19.1	225
GDP (USD million)	48,657	25,857	19,014	23,583
Annual growth rate (%)	NA	-11.88	-5.96	4.40

Source: Basic Study on the Program Formulation for Reconstruction and Rehabilitation of Infrastructures in Iraq, JICA (Project Study Phase 1), IMF Data and Statistics, and the World Bank.

2.2.2 DOMESTIC AGRICULTURAL PRODUCTS AND IMPORT VOLUMES BY THE FOOD AND AGRICULTURE

(1) Domestic Products and Import Volumes from 2006 to 2009

According to FAO records, the domestic products and import volumes of major agricultural products from 2006 to 2009 are shown in Table 2.2.2.

Table 2.2.2 Agricultural Products and Import Volumes from 2006 to 2009 (million tons)

Item		2006	2007	2008	2009
Domestic Product	Wheat	2,086	2,203	1,255	1,700
	Tomatoes	1,042	955	802	913
	Rice	363	393	248	173
	Cucumbers	411	422	381	421
Import Volume	Wheat	4,134	3,147	3,624	4,159
	Rice	1,147	736	694	756
	Sugar	629	372	726	750
	Non-Alcoholic Beverages	526	322	118	85
	Tomatoes	252	655	112	148
	Food Oil	558	371	658	594

Source: FAO

FAOSTAT publicly reported in 2009 that the unfavorable weather during the 2007-2008 growing season led to reduce drastically the 2008 winter grain production. The aggregate output of wheat and barley crops was estimated at 1.9 million tons, which is about 85% lower than the average level in 2005.

According to the table above, the domestic product of grains (wheat) has fluctuated following a trend of decreasing volume, while the import volume of grains (wheat) has also fluctuated following a trend of increasing volume.

(2) Estimate of Food Supply Volume per Person

According to records in 2005, the population was at 27 million and the supply volumes were 1,028,000 tons for rice, 4,764,000 tons for wheat, and 754,000 tons for barley. Supply volume is a combination of domestic product and imported volume. Based on such records, the required supply volume per head was estimated as shown in Table 2.2.3

Table 2.2.3 Consumed Volume of Grain per Head in 2000, 2005 and 2009

(Unit: kg/head)

Year	Rice	Wheat	Barley
2000	52.5	143.4	18.7
2005	36.7	170.4	26.97
2009	30.2	190.2	NA

Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI

It is considered that the living standards and food variety of Iraqi people have been improving gradually following stability and security in the social and economic situations.

2.2.3 OUTLINE OF INDUSTRIES IN THE STUDY AREA

(1) Oil Sector

The main industry in the study area involves oil products and exporting oil. According to the Energy Statistics of OECD countries/Non-OECD countries 2007, the volume of oil deposits is 18,285 million kℓ, which is the fourth largest in the world after the United Arab Emirates. The oil production and export volumes of Iraq in 2004 and 2005 are as shown in Table 2.2.4

Table 2.2.4 Oil Production and Export Volumes in 2004 and 2005

(Unit: 10,000 t)

Year	Production Volume	Exporting Volume	Domestic Consumption
2004	9,813	7,477	2,336
2005	9,086	6,778	2,308

Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI

The oil sector dominates Iraq’s economy with 74% of GDP. Also, Iraq depends solely on oil exports for funding investments and consumption expenditures, revenues of which oil export proceeds exceed 93%, and 98% for foreign currency earning.

Major rehabilitation works of oil infrastructure have led to an increase in production capacity to 2.8 million barrel per day (bpd), of which 2.1 million bpd can be exported under normal conditions. However at present, Iraq is exporting in the range of 1.7 million bpd. The oil sector is to be restructured by combining the three national oil companies into one national oil company.

Annual proceeds of crude oil exports and oil products range between USD 17.1 billion and USD 26.6 billion for the period of 2005-2007. These are 92.3% of the total revenue of the budget (excluding external donations). These estimates were based on a production rate of 2.35 million bpd and an export rate of 1.8 million bpd at an average price of USD 26 per barrel. This is the average price designated by the Organization of the Petroleum Exporting Countries (OPEC). In 2006, Iraq increased its oil production to 2.7 million bpd, of which 2.15 million bpd was exported. While in 2007, the rate of production has been expected to increase to 3.5 million bpd, of which the exported was increased to 2.8 million bpd.

Liquefied natural gas (LNG) is also one of the important export commodities which contribute to the improvement of GDP. It was desired to rehabilitate the existing terminal facilities located along the access channel between UQP and KZP.

(2) Fertilizer and Cement

The production volume of fertilizers in 2003 were as follows:

i) Nitrogenous fertilizer: 520,000 tons
ii) Phosphates fertilizer: 120,000 tons

These products were consumed for domestic agriculture production.

The production volume of cement in 2006 was about 3.5 million tons, which was consumed for domestic demand of construction works. The domestic demand is very strong. Cement of around 216,399 tons were imported in 2005 through both ports (UQP at 77,168 tons, and KZP at 139,231 tons). Meanwhile, the import volume in 2008 was 1,034,712 tons (UQP at 448,850 tons, and KZP at 585,862 tons), which is nearly five times the import volume in 2005.

There are fertilizer and cement factories in the port area.

(3) Agriculture

The agriculture sector currently provided share of GDP with less than half of its 20% share of employment. It supports a population of more than seven million people. Over the last 15 years, agricultural production has dropped at an average of 1.1% per year.

Per capita agricultural production declined about 3.9% annually from 2000 to 2006. Productivity of the main cereal crops such as wheat, barley, and rice has fallen drastically. The production in 2006 were at 1.7 million tons of wheat, 220,000 tons of rice, and 50,000 tons of barley.

Such drastic decrease of domestic products was due to previous policies, which were issued by the government to maintain food prices low through the control of prices, production volumes, and marketing system.

2.3. TRANSPORT SECTOR

2.3.1 TRANSPORT POLICY AND PLAN

The main transportation axes in Iraq run from northwest to southeast, from Mosul via Kirkuk to Baghdad, and then south to Basra and the Arabian Gulf. According to the National Development Strategy for 2005-2007 prepared by the Ministry of Planning and Development Cooperation of Iraq, the social and economic reforms for the reconstruction and economic development, the development policies of the transportation sector were proposed as stated below.

The transport sectors in Iraq are composed of roads with a total length of 40,690 km, two international and three major domestic airports, six seaports, two oil terminals, and railways with a total length of 2,456 km. Though the road network accommodates about 70% of all traffic in Iraq, its existing facilities are under undeveloped conditions. The transportation and communication networks in Iraq should be modernized and expanded with domestic and international connections. The Ministry of Transportation (MOT) planned to implement the following policies on transportation with a development program for the privatization of some activities in the sector, particularly in the field of communications, and the different modes of transportation include land, sea, and air.

Port Sector

- Continue ongoing restoration and rehabilitation projects in and around UQP and KZP,
- Remove wreckages in the Shatt Al Arab channel and UQP with the most environmentally sound way possible, and
- Develop a master plan to increase efficiency and optimize the institutional arrangement of ports and inland waterways.

Land Transportation

- Explore the potentials of developing a bus rapid transit system and dedicated bus lanes.

Railway Sector

- Rehabilitate key railway stations, refurbish rolling stocks, and maintain equipment,
- Modernize the railway training center in order to develop the skills of railway staff, and
- Prepare a railway strategy to assess the merits for restructuring the present system to permit for greater private sector participation into the delivery of services.

Airport Sector

- Develop airport and civil aviation strategies coupled with a master plan which should include a rehabilitation plan of facilities and future institutional arrangement with the possibility of outsourcing airport management to private operators, and
- Retrain supervisory and operational staff, particularly in the area of suspended activities, previously such as aviation and maritime fields.

2.3.2 PRESENT SITUATION OF LAND TRANSPORT

(1) Road Transport

A six-lane international expressway was developed in 1987 to link the Arabian Gulf States with the Mediterranean Sea. In Iraq, the road would stretch from the Jordanian border through Ar Rutbah to Tulayah near An Najaf, then to Ash Shaykh and Ash Shuyukh in the south of Iraq, and finally to Safwan at the Kuwaiti border.

The expressway was developed to link Baghdad with the Turkish border via Kirkuk and Mosul. Presently, there are 40,690 km roads and 1,156 road bridges, composed of 148 main bridges (>180 m in length) and 1,008 secondary bridges in Iraq.

a. Road Capacity in Iraq and Neighboring Countries

Approximately 85% of the road network is paved, however its conditions are extremely poor. The road capacity on the tolerated maximum truck-load along various corridors gives a bad effect to the economy. The tolerated loads in terms of the max wheel loads of a truck which are allowed to run in neighboring countries and in Iraq are shown in Table 2.3.1.

Table 2.3.1 Tolerated Loads

(Unit: MT)

Country	Tolerated Load
Iraq	44
Syria	44
Turkey	25
Jordan	27
Iran	22

Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI

The 40 ft containers have a gross weight of 30.5 tons in terms of a full load. Therefore, trucks with 40 ft containers going to Turkey are not allowed to carry full load containers. The Bandar Imman Khomeini Port in Iran was not considered as a viable alternative candidate to Iraqi ports because the roads from Iran to Iraq allow only 22 tons of maximum load, which means that a cargo with 18 tons of weight is loaded on the 40 ft container truck, an approximately 60% rate of the full load.

b. Road System in Iraq

The road system in Iraq is classified into five categories as shown in Table 2.3.2

Table 2.3.2 Classification of the Road System in Iraq

Classification	Length (km)	Assessed Condition (%) in 2003		
		Good	Fair	Poor
Expressway (road design 16.3 tons/axis)	1,061	60	30	10
Primary Roads (road design 13.2 tons/axis)	10,911	30	66	4
Secondary Roads	14,193	20	70	10
Village Roads	3,704	10	30	60
Military /Border Roads	10,815	NA	NA	NA
Total	40,690			

Source: UNDP-Iraq; Recovery & Conflict Prevention Branch, Nov 2008

c. Road Development Projects Planned by MOT

The macro projects for 2015-2020 as listed below were planned by MOT. The major routes of roads and railways are shown in Figure 2.3.1.

- Rehabilitation and periodic maintenance of the actual road network extension in 18 states, which is about 30,615 km in length from 2005 to 2009,
- Construction of the high capacity road sub-networks with expressway standard,
- Construction of ring roads and diversion roads, and local road improvement. The construction of new connecting roads is planned for development in 2009-2025,

Construction of New Connecting Roads	Length (km)
Mosul-Rabeerak	110
Kirkuk-Tikret	110
Diwania-Samawa	100
Baquba-Kanakin	120
Baquba-Baghdad	50
Ramadi-Kadeefha	130
D’hok-Khalis	90
Samawa-Expressway N 1	30

- Improvement of the road cadastre, and
- Development of national safety and road traffic signs.

d. Government Agencies Involved in Road Transport

Though MOT is responsible for surface transport, the Ministry of Housing and Construction (MOHC) is the key agency on restoration, rehabilitation, and development of road infrastructure along with the State Corporation for Roads and Bridges, which was established under the Bylaw No.3 of 1988 concerning MOHC.
There are 11 key state-owned enterprises under MOT which provide public transportation. However it was estimated that there are about 400 private trucking firms and about 60,000 private vehicle offering services (taxi, vans, small buses) in addition to the government service providers.

(2) Railway Transport

a. Facilities and Traffic on Railway

From an economic point of view, railway transport proves to be more efficient than trucking when covering distances longer than 500 km. Iraq possesses an extensive railway network. During its years under sanctions, half the goods imported to UQP were carried to inland destinations via railway network. Once railway facilities are fully rehabilitated, the railway system would play an important role in long distance transportation within Iraq.

Iraq has a significant railway network which is the most extensive one in the region; however was considerably damaged during the conflicts. It was estimated that there are tracks totaling to 2,456 km including branch lines of 551 km. About 45% of the tracks were assessed as under poor condition.
In 1985, 2,029 km of railway tracks existed. Standard gauge was used for the 1,496 km section, while meter gauge was used for the rest. Four hundred and forty units of the standard gauge locomotive carried more than one million passengers and a freight of more than three million tons annually.

Iraq possessed two separate railways, i.e, standard gauge and meter gauge. The standard gauge line runs to the north, from Bagdad through Mosul to the Syrian border and then to a connection with the Turkish railway system, and the meter gauge line runs to the south, from Baghdad to Basra. Until the 1960s cargoes were transported to Baghdad for distribution all over the country since the two systems were incompatible. The Soviet Union assisted in extending the standard gauge system to Basra.

The main railway lines are shown in Table 2.3.3, and the main roadway route is shown in Figure 2.3.1.

Table 2.3.3 Existing Main Railway Lines in Iraq

Line	Length (km)	Single line (SL) Double Line (DL) Construction	Signaling and Telecommunication Condition (2003)	No. of Stations
Baghdad-Basra-Umm Qasr	609	SL 1960	Semi-Automatic	43
Baghdad-Mosul-Syrian Border	524	SL 1910-1940	Manual (Damaged)	20
Baghdad-Ramadi-Al Qaim	376	SL (DL to Ramadi) 1987	Semi-Automatic (Damaged)	24
Al Qail-Akashar	144	SL 1987	(Damaged)	6
Kirkuk-Baiji-Haditha	252	SL 1987	CTC (GEC) (Damaged)	14
Total	1,905			107
Branch Line	551			

Source: UNDP-Iraq; Recovery & Conflict Prevention Branch Nov. 2008

There are 107 stations, 11 regional offices, seven maintenance facilities and workshops, and a plant for producing concrete sleepers. Most equipment, machinery, and training institutes were lost during the wars and subsequently. It was planned to construct 16 new lines with 3,091 km of tracks and 161 stations.

b. Present Conditions of the Existing Railway Lines

The present conditions of the existing railway lines based on the survey results carried out in 2003-2004 were as follows:

- Geometric features allow a maximum operating speed of 100 km/h,
- Due to the present conditions the actual commercial speed is 40 (freight trains) to 50 (passenger trains) km/h,
- Substructures (embankment, bridges, and culverts etc.) are in poor condition,
- Superstructures (rails, sleepers, etc.) are outdated and in poor condition, and
- Signaling and telecommunication system (S&T) are unserviceable.

c. Restoration and Development Strategy

Under such circumstances, MOT planned to construct new lines and rehabilitate the existing five lines, and introduce and upgrade S&T at the following three different levels of interventions:

Level-1 Construction/rehabilitation and maintenance of the existing railway lines:
The existing lines of Baghdad-Basra-Umm Qasr and Baghdad-Mosul-Rabia should be upgraded from the present level to a new level corresponding a design speed of 100 km/h. All signaling and telecommunication facilities on a temporary safety system are provided as urgent measures for railway traffic. Meanwhile, the installation is integrated by a modern safety system based on electrical signal boxes at stations, an automatic block system in line, and centralized traffic control by a computerized system.

Level-2 For future planned railway:
It is aimed to expand the railway network with the construction of new lines. The first priority is to connect the new lines to the new Bagdad Railway Complex and Loop Line, and introduce the new S&T based on modern technologies and extend to the existing lines as well to the future lines.

Level-3 For all lines:
Completion of the new Baghdad Railway Complex and Loop Line
Doubling of signal track lines of Levels-1 and -2
Implementation of Phase III on the new S&T
Iraq has conducted intermittent negotiations with Turkey, Kuwait, and Saudi Arabia

concerning the development of rail links to complete a continuous Europe-Arabian Gulf railway route.

d. Introduction and Development of Metro System

In 1983, a metro system plan in Baghdad was drawn, and construction of related infrastructure had commenced with about 43 km of tunnel construction. A number of lines were also proposed, but it was suspended due to the wars.

The Iraqi Railway Company (IRR) was established in 1998 as an independent entity under MOT. The IRR's main responsibilities are planning, managing, and operating railway services in Iraq.

Table 2.3.4 Difference of Equipment and Transport Services in 1994 and in 2003

IRR	Rolling stocks	Equipment and facilities	Services
In 1994	385 locomotives in service, 50 additional locomotives in 2002	319 passenger carriages, and 12,442 freight wagons and flatbeds	Service: 30 trains per day, and transported 7,734,000 passengers in 1994, and 7,701,560 tons of freight in 1990.
In 2003	160 (less than 40%) locomotives were functional	150 carriages and 8,795 wagons were functional	Reduced to just ten trains per day. Resumed services of passenger and freight transport in 2003 to the Syrian border. Bulk cargo transport of sulfur, phosphate, and grains started from Umm Qasr to Baghdad.

Source: UNDP-Iraq; Recovery & Conflict Prevention Branch Nov. 2008

Railway used to account for about 30% of the traffic volume transported in Iraq. It will continue to play an important role of transporting heavy and bulk goods and to play as a key social function in providing passenger and freight transport.

e. Intermodal Transport

The intermodal transport facilities in Iraq are not well developed from the port to the countryside of the hinterland.

Long-term priorities include the following:

- Signaling from Baghdad to Basra and Umm Qasr lines, rehabilitation of all stations and restoration of workshops;
- Completion of the track replacement and parallel tracks, rehabilitation of the sleeper factory, and installation of optical fiber communications system; and
- Completion of the track replacement on Baghdad-Mosul-Al Yaribeyeh

The Italian consortium for the Iraq Transport Master Plan was established by the Italian railway agency in 2004. The development of an effective railway system in Iraq should focus on the necessity of long distance bulk cargo transport and affordable passenger transport, while the private sector will be expected to continue to play a key role.

2.3.3 MAJOR PROJECTS OF TRANSPORT SECTOR PLANNING FROM 2010 TO 2035

The Iraq Transport Master Plan listed in 2009 the following major projects by respective target years:

(1) Target Year 2010

- Railway Sector: Upgrading/rehabilitation of existing railway lines
  Rehabilitation of existing maintenance facilities
  Procurement of rolling stocks
- Road Sector: Rehabilitation of existing roads
  Development of Expressway No. 1 and FTP
  (Hilla, Daura-Yusifia)

		National safety and road traffic signs improvement
		Road cadastre projects
➢	Port Sector	Rehabilitation of the UQP and KZP
		Restoration/rehabilitation of the access channel by removal of wreckages
➢	Airport Sector	Rehabilitation of Baghdad, Basrah, and Mosul Airports
		Construction of Najaf Airport

(2) Target Year 2015

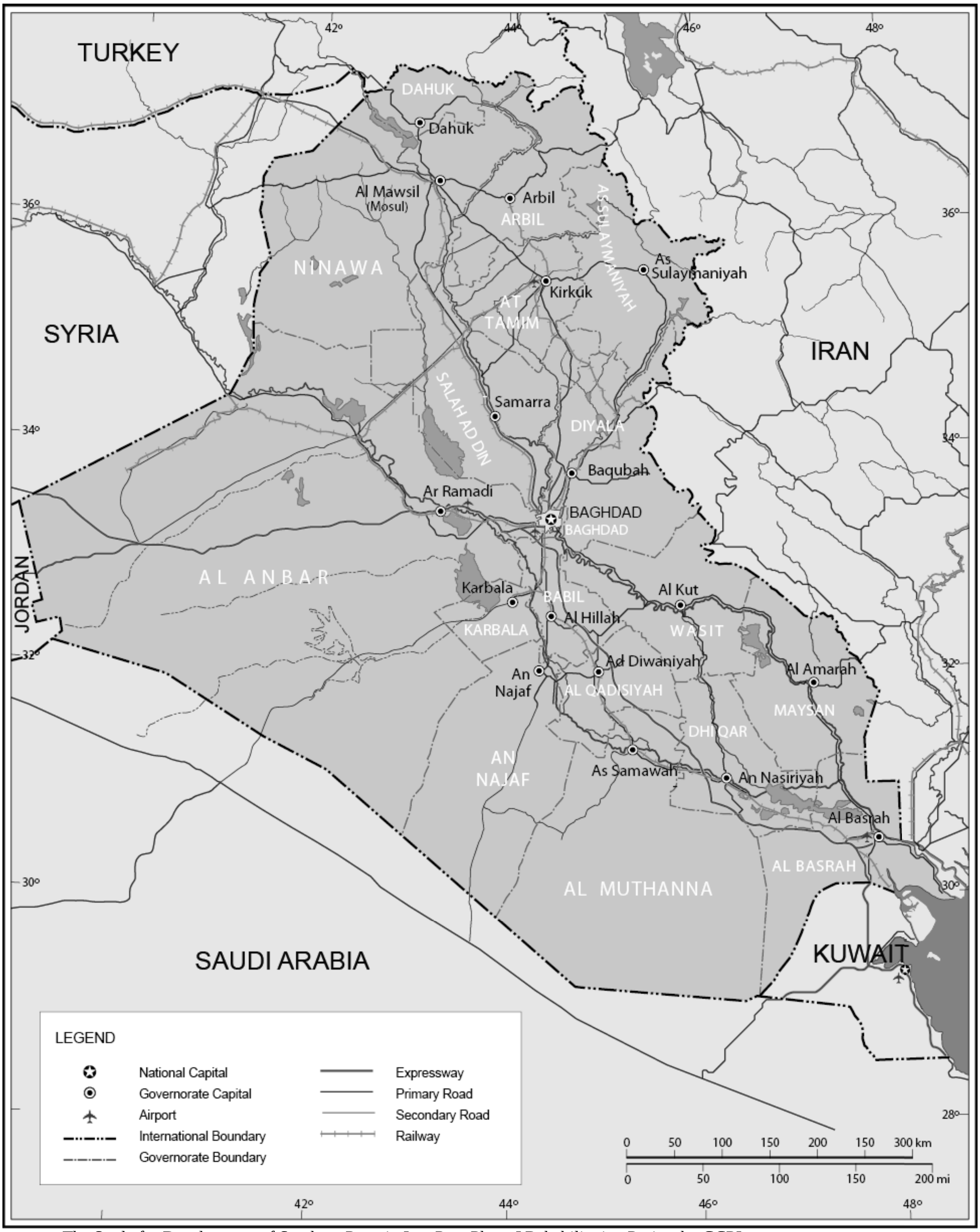
➢	Railway Sector	Construction of new railway lines
		Baghdad Railway Complex
		Baghdad Loop Line
		Baghdad-Kirukuk-Arbil-Mosul
		Baghdad-Kut-Nasiriyah-Basra-Umm Qasr
		Mussayeb-Kerbala-Samawa
		Acquisition of rolling stocks
➢	Road Sector	Construction of no. 2 ring road
		Construction of no. 4 city diversion
		Construction of no. 11 bridge
		Construction of national safety and road traffic signs
➢	Port Sector	Improvement of UQP
		Restoration/rehabilitation of KZP
➢	Airport Sector	Construction of Sulamanya Airport

(3) Target Year 2020

➢	Railway Sector	Construction of new railway lines
		Mosul-Duhok-Zakho
		Kirkuk-Sulaymaniyah
		Baghdad Railway Complex
		Baghdad Loop Line
		Basra-Iran borders
		Basra-Kuwait borders
		Acquisition of rolling stocks
➢	Road Sector	Construction of Baghdad freeway ring road
		Construction of Expressway No. 2
		Improvement of local secondary carriageway
➢	Port Sector	Development of new container terminals at UQP
		Development of the new terminals at KZP
		Grand Faw Port Development

(4) Target Year 2035

➢	Railway Sector	Construction of new railway lines
		Haqlaniyah-Traibal
➢	Road Sector	Construction of no. 6 ring road/city diversion
		Construction of new connecting road
➢	Airport Sector	Construction of no. 10 small airport



Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI

Figure 2.3.1 Existing Major Route Map of Roads and Railways in Iraq for the Rehabilitation and Development Plans of MOT

2.3.4 PRESENT SITUATION OF IMPORT CARGO ROUTES TO IRAQ

(1) Major Routes of Import Cargoes to Iraq

Iraq has been historically and geographically connected with its neighboring countries through transportation infrastructure. Goods have been traded and people have travelled among countries. Transportation infrastructure such as roads and railways have been developed and have formed network connections between Iraq and its neighboring countries.

The following three routes for transporting imported cargoes to Iraq were considered as the main routes to distribute them to the corners of the entire nation:

Route 1: Syria and Turkish Corridors

- For the central to the northern regions, imported cargoes were transported mainly from ports in Syria and Turkey. Majority of imported cargoes to the northern region were transported from ports in Turkey (Mersin Port) and in Syria (Tartous and Latakia Ports).

Route 2: Aqaba Port in Jordan

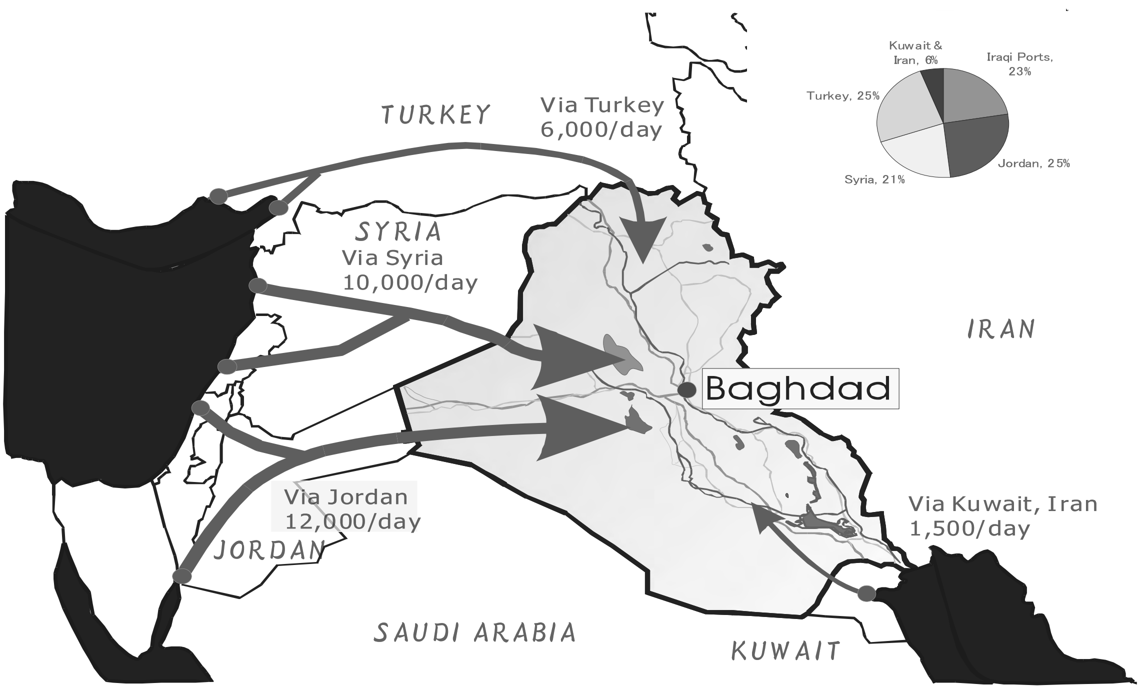
- For the northern part of Baghdad City and the central region, imported cargoes were transported by land transportation from Aqaba Port in Jordan as well as the ports in Syria and Turkey.

Route 3: Ports in Iraq, primarily UQP

- For the southern parts of the country and eight states in the southern region, imported cargo depended on the ports in Basra Province, which have not yet recovered to their full capacity. Some areas of this region relied upon imported cargoes from Aqaba Port in Jordan and from ports in Kuwait.

Figure 2.3.2 shows the amount of imported cargoes in 2002 through the three major routes based on a JICA study in 2002.

According to the interview survey in 2009, by the consultant in charge of the Port Sector Rehabilitation Project Phase I, with truck transport companies who are handling cargoes transported to Iraq from ports of neighboring countries, they estimated that approximately 60% of the total imported cargoes have been transported using Route 2 (Aqaba Port in Jordan) to Iraq, 30% were from ports of the northern and western corridors in Turkey and Syria, and only around 10% were through UQP and KZP in the southern region of Iraq.



Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI

Figure 2.3.2 Imported Cargo Transport Routes to Iraq

(2) Transported Volume by Route

Recent statistics of cargo traffic shows the following:

- Importation of food, general cargoes, and container goods have increased at Iraqi ports since the end of the recent war,
- A slight increase in trade volumes along the Turkish corridor in 2005,
- Imported cargoes transiting through Jordan have decreased, and
- Imported cargoes transported through Syria have also substantially declined.

At the beginning of 2004, it was estimated that 62,000 tons of goods arrived in Iraq on a daily basis, as shown in Table 2.3.5below. Food was the most important commodity. Other goods included were building materials and used cars. However in 2005, majority of food were imported to Iraq through UQP.

Table 2.3.5 Imported Goods through All the Corridors to Iraq During the Second Quarter of 2004

(Unit: MT)

Through	Total Import	Border Trade	From Distant Origin
Iraqi ports	14,000	-	14,000
Jordan	16,000	4,000	12,000
Syria	13,000	3,000	10,000
Turkey	15,500	9,500	6,000
Kuwait and Iran	3,500	2,000	1,500
Total	62,000	18,500	43,500

Source: UNDP, Iraq Port Study 2006

(3) The Latest Transport Survey on Trucks

Table 2.3.6 shows the number of containers from Jordan and Turkey to Iraq, and those handled at ports in Iraq. The number of containers from Aqaba Port in Jordan to Iraq from 2009 to 2011 was referred to the transport survey data on trucks by NAFITH. NAFITH developed and is presently operating the truck control system (TCS) in Aqaba Port which consists of a regulatory framework, physical infrastructure, and IT systems to manage the movement of commercial trucks entering the Aqaba Special Economic and IT systems to manage the movement of commercial trucks entering the Aqaba Special Economic Zone, and to provide a platform for coordinating such activities between freight agents, trucking companies, and truck drivers in a deregulated environment.

Table 2.3.6 Number of Containers from Jordan and Turkey to Iraq, and those Handled at Ports in Iraq

Year	2004	2009	2010	2011
Number of containers from Jordan (BOX) Share (%)	40,000 (35%)	51,525 (24%)	39,046 (16%)	54,567 (21%)
Number of containers from Turkey (BOX) Share (%)	57,000 (49%)	71,168 (33%)	74,399 (30%)	77,777 (30%)
Containers handled at ports in Iraq (BOX) Share (%)	18,000 (16%)	90,525 (43%)	133,508 (54%)	124,934 (49%)

Source: NAFITH and the Consultants' estimate based on GCPI data

The above table indicates that the proportion of container cargo volume handled at ports to the total imported container volume in Iraq has increased from 16% in 2004 to nearly 50% in 2011, while the proportion of container cargo volume from Jordan and Turkey has dropped sharply, from 35% in 2004 to 21% in 2011, and from 49% in 2004 to 30% in 2011, respectively. It is expected that once operations of the planned container terminals in UQP and the new Al Faw Port has commenced, the proportion of container volumes handled at the ports in Iraq would increase remarkably, say nearly 70% in 2015 and over 80% in 2025 and 2035.

Table 2.3.7 shows the average numbers of trucks per month by cargo type from Aqaba Port to Iraq between 2006 and 2011. It should be noted that the number of trucks shown in the table is only those registered in Iraq, and does not represent the total number of trucks transporting cargoes to Iraq.

Table 2.3.7 Average Number of Trucks per Month by Cargo Type from Aqaba Port to Iraq

(Unit: no. of trucks per month)

Year	2006	2007	2008	2009	2010	2011
Containers	679	468	369	386	649	884
General Cargoes	504	414	456	465	555	698
Others	340	506	615	820	1,269	1,492
Total	1,523	1,388	1,441	1,671	2,473	3,073

Source: NAFITH

According to Table 2.3.7, the total number of trucks from Aqaba Port to Iraq has increased sharply in 2011, and it was the highest at 3,073 trucks. The growth rate of containers and general cargoes are 5.4% and 6.7% per year, respectively. These rates are quite low compared to the growth rate of the total number of trucks which is 15.1% per year.

Considering the growth rate of container handling volume at ports in Iraq, which was more than 35% per year from 2006 to 2010, it is quite clear that the proportion of handling cargo volume to the total import/export volume at ports in Iraq has grown remarkably especially for container cargoes.

Imported cargoes from Kuwait are being transported by trucks through the Kuwaiti border. According to the records of NAFITH, the total number of trucks from Kuwait was 194,156 in 2010, and 128,400. in 2011. The average number of trucks per day was 532 in 2010 and 352 in 2011. The reason why the number in 2011 was less than that in 2010 was due to the Iraqi's government announcement on the sudden change of law in June 2011. After that, there were no trucks transporting to Iraq. The number of trucks has recovered up to 200 trucks per day in October 2011. The imported cargo volume from Kuwait to Iraq in 2010 was nearly 5.5 million tons with the assumption that one truck bears a load of about 28 tons.

3. PRESENT SITUATION OF PORTS IN IRAQ

3.1. BASIC POLICY OF MARITIME TRANSPORT IN IRAQ

The channel and basin to UQP from the entrance of the channel in Arab Bay was dredged and the wreckages of sunken ships were removed from the channel to make it navigable for 50,000 DWT vessels. It was intended by the Government of Iraq through Japan's ODA loan that the UQP would be restored to its original design capacity and to secure accommodations for ships of adequate size.

In consideration of the recovery of the Iraqi economy, there is a very strong demand to utilize the existing port facilities of KZP in a maximum effective way as well as the restoration of UQP.

After the United Nations Development Programme (UNDP) carried out dredging works and the removal of sunken ships at UQP, it is expected that the cargo handling volume at the port will increase due to the economic reconstruction in Iraq, and subsequently the present cargo handling capability of these ports will become sufficient. Therefore, KZP as well as UQP should be restored to function as the center of the import/export trade distribution system. The access channel to these ports should also be restored so that plenty of urgent goods necessary for Iraq's economic reconstruction can be transported by larger vessels through these ports.

The Iraqi government has expected that the new port facility will be started by channel dredging, removal of wreckages, procurement of necessary equipment and working vessels, and rehabilitation of port facilities. Such works should be done in order to recover the original function of port operations that would handle the urgent aid cargoes necessary for the economic reconstruction.

As a result, the restoration project will bring the efficiency of port operations back to pre-conflict levels in 2003, and establish a framework and mechanisms to enable ports to effectively accommodate future growth and expansion.

In October 2004 at the Tokyo Conference, the Iraqi government officially presented the National Development Strategy (NDS) and reconstruction strategy for the transportation sector, as follows:

- The restoration projects for UQP and KZP were proposed as the highest priorities among all urgent infrastructure development projects in Iraq.
- The restoration projects for KZP as well as for UQP should be prioritized because of their critical role in the recovery and reconstruction of the country.
- Both UQP and KZP are the most important ports in Iraq and have the potential to be major cargo handling facilities in the region. It means that a considerable number of job opportunities would be created in the region due to port activities.
- The 2003 needs assessment stated the necessity of an integrated master plan for port development in the southern region, and private sector participation in port operations.
- The Iraqi government (Ministry of Planning and MOT) had submitted the official requests for technical and financial assistance from the Japanese government since November 2003, and followed up the requests at the bilateral meeting held in Amman in September 2005 between both countries.
- The following projects were carried out by the United States Agency for International Development (USAID), UNDP and Japanese ODA:

- Immediate dredging works at the basin of the north port as part of the Umm Qasr Seaport Project by USAID in 2003;
- Dredging works at the Umm Qasr approach channel by UNDP, and emergency dredging works at UQP by Japanese ODA in order to provide a 12 m draft for 50,000 DWT vessels in 2004-2005; and
- The Iraq Port Sector Rehabilitation Project Phase I for UQP by Japanese ODA in 2009-2012 (ongoing).

In the National Development Plan for 2010-2014, the general objectives of the port development plan are stated as follows, and shows quantitative plans for target years 2014, 2018, and 2038 as short-, middle- and long-term plans, respectively:

- Increase the capacity of existing ports and shipping lanes.
- Utilize the available unused capacities of existing ports, which total about three million tons annually, and reduce reliance on ports of neighboring and nearby countries for Iraq’s trade by increasing the capacity of the current Iraqi ports.
- Transition to constructing major ports capable of receiving the largest ships; reduce transport costs to make Iraqi ports competitive with alternative ports; and equip one of them with the requirements necessary to act as a dry channel.
- Strengthen the private sector’s role in implementing port operations and providing port services.
- Increase the design capacity of Iraqi port docks to target levels of 2014.

The detail objective of port sector development in National Development Plan is described in Chapter 6.

3.2. PORTS OF IRAQ

The waterfront in Iraq is limited between the national boundary of Iran and Kuwait, while Iraq's coastline is short at about 48 km. There are five major cargo ports in Iraq such as UQP, KZP, Al Maqil Port, Abu Flus Port, and Al Faw Port, which are located along Khor Al Zubayr channel or the Shatt Al Arab channel in the southern part of Basra Province. Apart from these cargo ports, two oil terminals for exporting crude oil such as Al Bakr and Al Amaya are located in the Arab Bay of the Gulf.

Iraq has a small port capacity because of the country's traditional overland orientation towards Syria and Turkey rather than towards the Gulf. The Port of Basra was acknowledged as the Gulf port. The Iraqi government invested to expand the port capacity, resulting to the development of a new port at Umm Qasr in order to relieve pressure in the Port of Basra. In addition to UQP, another new port was built in the industrial center of Khor Al Zubayr.

Oil terminals were developed along Shatt al-Arab from the mouth of the river at the Gulf. The available infrastructure for crude oil transport seems to be sufficient to comply with future oil transport conditions.

Excluding crude oil, the container shipping business is the most strategic sector for future development of national trade in Iraq. The present infrastructure for container sea transport is underdeveloped far below international standards. The container terminals of ports in the Gulf region have a low capacity, particularly lacking a terminal operation/management system and connection system with the global networks.

Port activities were curtailed severely in the 1980s due to the Iraq-Iran war. Before shipping could resume operations, explosives, wreckages, and sedimentation at the bottom of the river of Shatt al-Arab had to be cleared, which will take many years to accomplish. The geographic location of the Iraqi ports supports the idea of Iraq functioning as a gateway or "land bridge" for container transport between countries in East Asia and Eastern Europe.

3.2.1 INLAND WATERWAY

Inland waterway transport has been completely neglected due to a lowered water level, siltation, and damaged bridges. Inland waterway may be worthy of consideration as an alternative to road and railway.

3.2.2 SHIPPING

The Iraq Maritime Transport Company was established in 1952 and was later known as the Iraq State Organization for Water Transport. It changed its name to the Iraq State Company for Sea Transport (ISCST). This organization practices marine business and accepts maritime agencies from shipping companies. It is also authorized to act exclusively as the maritime agent in Iraqi ports.

The maritime fleet in Iraq has been limited in the past, with 13 vessels having a total of 125,255 DWT and registered in 2003. The 13 vessels consist of six cargo vessels, one passenger/cargo vessel, five petroleum tankers, and one roll-on/off. Not included are dredgers and working vessels owned by GCPI.

Significant damage was done to shipping during the conflicts. The opportunity for Iraq to develop a maritime fleet and marine training has not been studied yet. The application of the Port State Control to the International Convention for the Safety of Life at Sea (SOLAS) and maritime licensing has just started through a contract with a Kuwaiti consultant to check the security system and prepare the application form of the International Ship and Port Facility Security (ISPS) Code.

3.3. CURRENT SITUATION OF THE PORTS

3.3.1 UQP

(1) Location and History

UQP is the biggest Iraqi foreign trade cargo port in Iraq and the only port facing the Arab Bay of the Arabian Gulf. UQP is the most multifunctional primary port in Iraq. The port is located close to the border of Kuwait near the entrance of the Arabian Gulf on the west bank of the Khor Al Zubayr River, approximately 90 km upstream from the northwest edge of the Arabian Gulf.

The port is located at a distance of 75 km from the southern entrance in the city of Basra. The growing movement of foreign trade and congestion in Maqil Port called for the need to consider the establishment of a new port. The new port was constructed in 1965 in order to receive larger sized ships.

Since the completion of the urgent dredging project by UNDP in 2003, 50,000 DWT size vessels have been able to enter UQP during high-tide levels and the function of the port was recovered to a limited extent. However, the required water depth was not achieved for the entire area of the channel and port basin, and consequently, the utilization of cargo handling operations was only 50% of the port sector's former capability.

Siltation in the 50 nautical mile approach channel, with an average depth of 11-11.5 m allowing ships up to 50,000 DWT, was a problem even though UNDP and Japan assisted in dredging and wreckage removal in 2009-2012. The Port of Dubai has also helped to reestablish procedures for passenger and cargo transport.

Photo 3.3.1 Aerial View of UQP

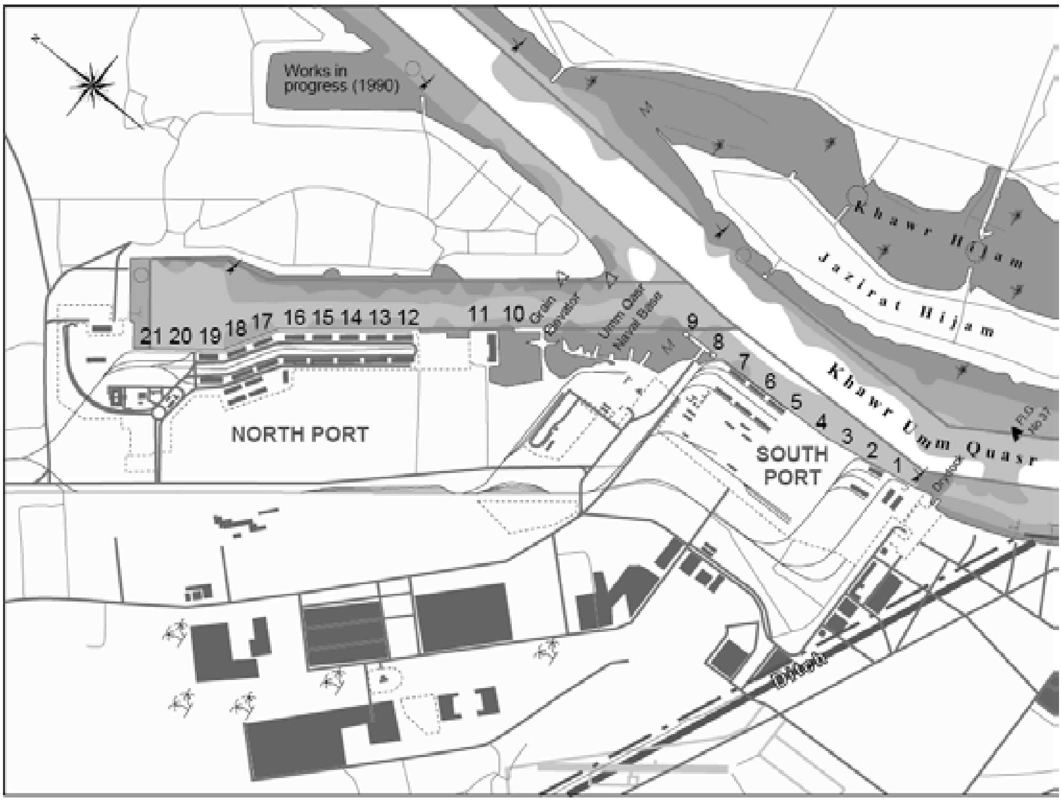


Figure 3.3.1 Layout of UQP

(2) South Port

UQP is now divided into two ports, namely, the South Port and the North Port. The South Port includes ten berths for ordinary goods with container terminal. The port manager would like to make the South Port as a dedicated port for containers.

Rehabilitation works at berth nos. 4 and 5 have been done. Fender rehabilitation has been completed at berth no. 2. Berth nos. 2 to 4 have been used for general cargo and GCPI has an idea to convert these berths into the container terminal. Concession contracts for berth nos. 4, 5 and 8 have been made.

Table 3.3.1 Berth Utilization of UQP's South Port

Berth No.	Berth Utilization	Remarks
1 A	Iraqi Navy	
1 B	Commercial (Bulk Wheat Offload)	
2-3	Break bulk cargo	
4	CMA-CGM , a French shipping company, use for container handling under a concession agreement	CMA/CGM has requested a lease on additional berths and the container yard and is positive to expand its concession.
5	Dubai Co. Global Com, a stevedore company, for handling container and general cargo handling under a concession agreement	GCPI owned and leased the quay crane (Q/C) and the concessionaire prepared the rest of port loading and unloading equipment such as R/S, forklift and trailer. Contract period was three years two years and a half ago and will be renewed for another five years. A new 50,000 m^2 container yard by the concessionaire is under construction.
6,7	-	-
8	Same but is leased under a concession agreement with Gulftainer	
9	Power generating barge mooring	125 MW Turkish power barge
10	Handling wheat by MTI	Detached dolphin structure type

Source: JICA Study Team

(3) North Port

The North Port has 13 multipurpose berths for commercial use including equipment, transportation links, offices, and warehouses. The berths will include regular cargo berths, container berths and ro-ro berths. The total berth length is 4 km and the length of each berth is 200-250 m. The concession contract of berth nos. 11a and 11b was made with Gulftainer, and the container terminal is under construction.

Table 3.3.2 Berth Utilization of UQP's North Port

Berth No.	Utilization in 2009	Present Utilization
11 a, b	Berth no. 11 is privately operated by AL-ABD Co. for GC and gasoline and diesel import.	Container handling berth will be operated by Gulftainer as its concessionaire. Q/Cs have been installed recently (2012/01). Container yard is now under construction.
12-18	For break bulk cargo and bulk cargo. Berth nos. 17 and 18 are also used for container handling.	Same as in 2009.
19	Two new Liebherr harbour mobile cranes are installed for container handling.	Same as in 2009.
20	Two ZPMC 40 ton gantry cranes were installed for handling containers.	Same as in 2009.
21	The berth is used for container handling.	Same as in 2009.
22	For ro-ro and passengers.	Same as in 2009.

Source: JICA Study Team

(4) Berth Front and Channel Water Depth

Water depth at the berth front and the channel of the North Port is maintained at a certain level with yearly maintenance dredging, but the berth front water depth at the South Port remains shallow due to the hard soil condition at the bottom which makes dredging operations unworkable. The planned water depth for the North Port is -12.5 m. Significant sedimentation occurs at the mouth of River 1. According to a Japanese shipping company, several navigational problems were reported recently due to the shallow water depth and lack of accurate information on the water depths at berth nos. 8, 11, and 13 of UQP.

Table 3.3.3 Dimensions of UQP's Berths

Berth No.	Designed Usage	Current Usage	Current Water Depth (m)	Length x Width (m)	Year of Construction
1	Grain Unloading	Used by the Iraqi Navy	-11	285 x 25	1974
2	General Cargo	General Cargo	-11	200 x 25	1979
3	General Cargo	General Cargo	-10	200 x 25	1979
4	General Cargo	Container	-10	200 x 25	1979
5	Containers	Container	-9	200 x 25	1977
6	General Cargo	General Cargo	-9	185 x 25	1967
7	General Cargo	General Cargo	-9	185 x 25	1967
8	General Cargo	General Cargo and Container	-8	185 x 25	1967
9	General Cargo	Moored Power Barge	-6	168 x 25	1974
10	Grain Silos	General Cargo	-6 ~ -7	280 x 30	1977
11	Sugar	Container	-6		1977
12	General Cargo	General Cargo	-9 ~ -10	185 x 25	
13	General Cargo	General Cargo	-9 ~ -10	200 x 25	
14	General Cargo	General Cargo	-9 ~ -10	200 x 25	
15	General Cargo	General Cargo	-9 ~ -10	200 x 25	
16	General Cargo	General Cargo	-9 ~ -10	240 x 25	
17	General Cargo	General Cargo and Container	-9 ~ -10	200 x 25	1974-1984
18	General Cargo	General Cargo and Container	--10	200 x 25	
19	General Cargo	General Cargo and Container	-11	210 x 25	
20	Container	Container	-11	180 x 25	
21	Container	Container	-11	200 x 25	
22	Ro-Ro	Passenger and Ro-Ro Ships	-11		

Source: SAPROF Study Team (October 2005), modified by the JICA Study Team

(5) Cargo Handling Operations

Cargo handling operations for the berth operated by GCPI is supposed to be for 24 hours a day, but currently the operational hours are from 8:00 a.m. to 4:00 p.m. and from 6:00 p.m. to 1:00 a.m. No data were officially obtained from the concessionaire.

Two gantry cranes (G/Cs) made by the Chinese were introduced in 1997 at berth no. 20 for container handling. Another two G/Cs made by Germans were introduced in 2004 at berth nos. 19 to 21 for container handling. Most of the quay cranes (Q/Cs) were installed in 1980 and many of them were no longer in working conditions. The container yard of berth no. 20 is now under rehabilitation as the Phase I Project by Japanese ODA.


Photo 3.3.2 Power Barge (at Berth No. 9)


Photo 3.3.3 Container Yard (at Berth No. 8)


Photo 3.3.4 Container Ship and Handling Operation (at Berth No. 8)

Photo 3.3.5 Fender (at Berth No. 8)

Photo 3.3.6 Non-operational Q/C (at Berth No. 7)

Photo 3.3.7 Q/C and Fender (at Berth No. 7)

Photo 3.3.8 Container Handling Operation (at Berth No. 4)

Photo 3.3.9 Container Handling Operation (at Berth No. 4)

Photo 3.3.10 Container Handling Operation (at Berth No. 4)

Photo 3.3.11 Container Handling Operation (at Berth No. 4)

Photo 3.3.12 Fender (at Berth No. 4)

Photo 3.3.13 Container Yard (at Berth No. 4)

Photo 3.3.14 Overview of Berth No. 21

Photo 3.3.15 Berth No. 22

Photo 3.3.16 Q/C (at Berth No. 20)

Photo 3.3.17 Fender (at Berth No. 12)

Photo 3.3.18 Berth Nos. 16 and 17

Photo 3.3.19 Cargo Handling Operation
(at Berth No. 12)

Photo 3.3.20 Cargo Handling Operation
(at Berth No. 12)

Photo 3.3.21 Container Cargo Yard
(at Berth No. 21)

3.3.2 KZP

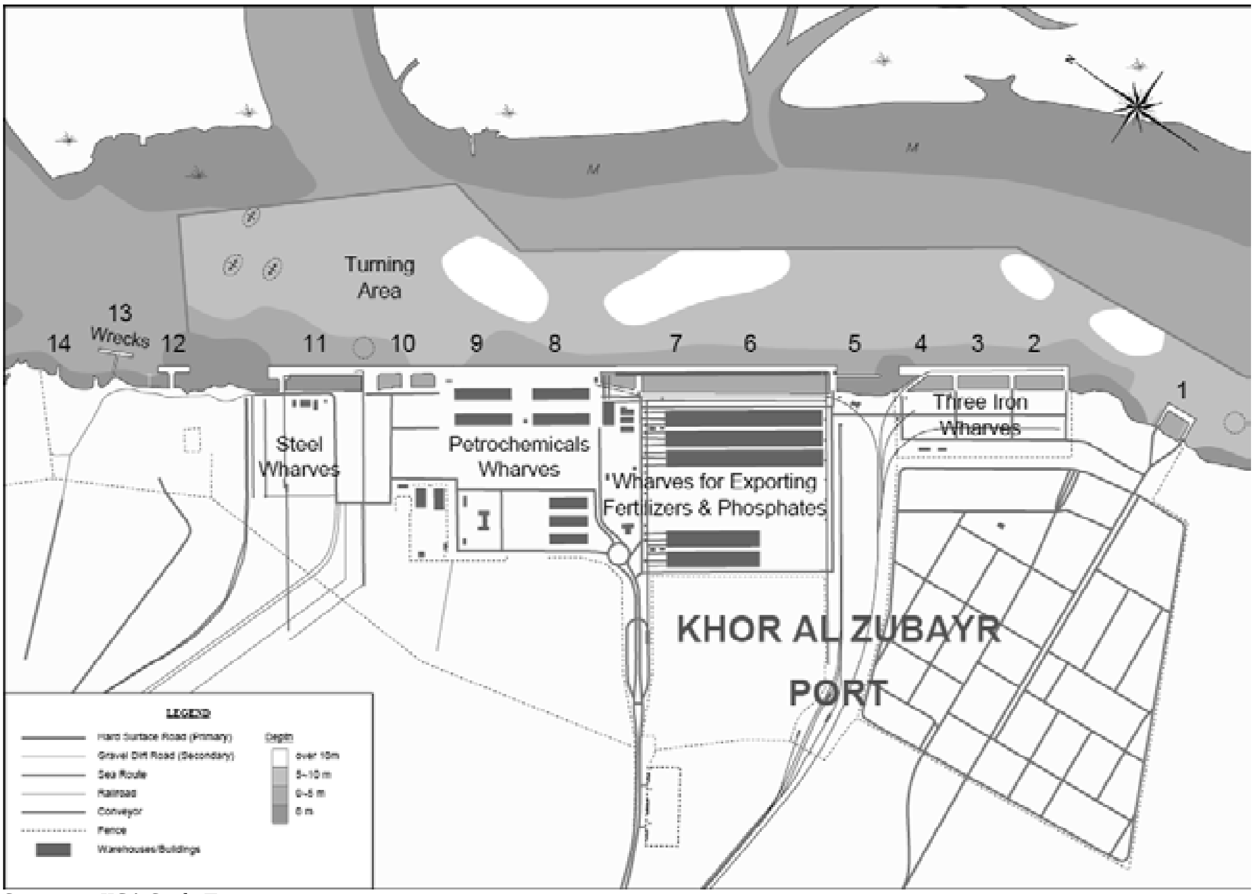
(1) Location and History

The KZP is located 60 km from the center of Basra City, 105 km from the northern end of the Arabian Gulf, and 12 nautical miles from UQP. Constructed from 1975 to 1980, KZP operated as a free trade zone and industrial port supporting industrial developments in Basrah and its vicinity. Soon after the end of the war in 2003, the general cargo berths were operated by Maersk Sealand Line for two years. Management of port operations was handover to GCPI on March 3, 2005. In 2010 a joint operating contract for berth no. 8 was made with the German company, Marlog.

(2) Berth Information

KZP was designed to handle general cargo and bulk cargoes such as wheat, fertilizer, phosphate and petrochemicals imports/exports, as well as sponge iron and iron ore imports. The port’s facilities extend beyond the Q/Cs and warehouses. Bulk handling facilities include conveyors and shiploaders for fertilizer exports and ship unloaders for iron ore imports. The iron ore handling facilities comprise open stockyards located within the port complex, equipped with belt conveyors, stackers, and bucket wheel stackers/reclaimers.

Although the planned water depth at the berth front is -12 m, the current water depth is between 6 m and 8 m due to the lack of proper maintenance dredging activities. The latest available bathymetric survey data was the one obtained in 2005, after which no such survey has been conducted. Berth nos. 2 and 3 had not been used till recently due to the existence of shipwrecks along the berths.



Source: JICA Study Team

Figure 3.3.2 Layout of KZP

Table 3.3.4 summarizes the originally designed usage and current berth utilization of KZP. All the berths in KZP have been owned by MOT(GCPI). As compared to UQP, almost none of the berths at KZP are currently used as intended in the original plans.

Berth no. 1 is temporarily used for anchoring empty cargo ships and placing sunken ships after lifting.

GCPI uses berth nos. 2 to 8 except for berth no. 5, which is being used by the Navigational Department. Berth nos. 6 and 7 were originally constructed as specialized berths for fertilizer. Since the termination of the fertilizer factory, these berths are now used by cargo ships and dhows for general cargo such as rice, bagged cement, and tires. Unloading operation is being done by mobile cranes or ship gears.

Berth nos. 8 and 9 were designed for exporting fuel oil and importing refined petroleum products. Berth nos. 10 and 11 were designed for importing iron ore and sponge iron. At present berth nos.9 to 11 are under MOO's operations and management, and GCPI has no authority over such activities. Berth no. 12 was designed for handling general cargo, however it is now used as a power barge berthing facility.

Table 3.3.4 Berth Utilization of KZP

Berth No.	Designed Usage	Berth Utilization	Remarks

1	General Cargo	Berth no. 1 is being used temporarily for anchoring empty cargo ships and placing sunken ships after lifting. Berth no. 1 will be tendered for concession soon.	Under GCPI's management
2, 3 and 4	General Cargo (break bulk and steel products handling)	Berth no. 2 & 3 have no records of being used by GCPI for cargo handling from 2006 to 2011 After removing the wreckages in front of these berths, cargo ships carrying general cargo such as cement, have been using these berths.	
6 and 7	Fertilizer and Phosphate	These berths were planned to be used for exporting fertilizer products by MTI, however dhows presently use Berth no. 6 for unloading general cargo mainly from India. Cargo ships carrying general cargo such as bagged sugar, rice, cement, and soya beans also use these berths.	
8	Petrochemicals	This berth was planned to be used by MOO for exporting fuel oil and importing petrochemical products. This berth is presently used by cargo ships for container and general cargo handling.	On concession by Marlog of Germany
9	Petrochemicals	This berth was planned to be used by MOO for exporting fuel oil and importing petrochemical products. Presently tankers use this berth for importing petrochemical products and exporting fuel oil.	Under MOO's management
10	Sponge Iron Import	This berth was planned to be used for importing sponge iron. Presently tankers use this berth for importing petrochemical products and exporting fuel oil under MOO's management.	
11	Raw Iron Imports	This berth was planned to be used for importing iron ore. Presently tankers use this berth for importing petrochemical products under MOO's management	
12	General Cargo	A 125 MW capacity Turkish power barge is berthed here.	Under GCPI management

Source: JICA Study Team

(3) Berth Structure

The berth structure was constructed as a detached type on the typical type of river port due to soft layer below existing surface) in order to obtain a river depth of -12 m and minimize maintenance dredging. The berth and land is connected with access bridges. These structures were supported by steel piles which were driven up to -32 m (N value more than 40).

Table 3.3.5 Dimensions of KZP's Berths

Berth No.	Current Usage	Current Water Depth (m)	Length x Width (m)	Construction Year
1	Not used	-6~-7	100 x 30	1976
2	Not used (Recently General Cargo handling have been resumed)	-6~-7	180 x 30	1980
3		-6~-7	180 x 30	1980
4	General Cargo Ships	-6~-7	180 x 30	1980
5	Not used (The berth is used for the mooring facility for GCPI working boats)	-5~-6	-	1978
6	General Cargo Ships, Dhow Ships	-5~-6	375 x 35	1978
7	General Cargo Ships	-5~-6	375 x 35	1978
8	Container Ships, General Cargo Ships	-8	250 x 35	1978
9	Tankers	-8	250 x 35	1978
10	Tankers	-8	240 x 24	1976
11	Tankers	-7~-8	320 x 26	1976
12	Power Parge	-7~-8	100 x 20	1975

Source: JICA Study Team

(4) Port Operation Concession

A joint operating contract for KZP's berth no. 8 had been made with the German company Marlog in August 2010. The contract stipulates that Marlog will administrate and operate berth no. 8, which was specified for transferring goods and containers, for seven years starting from the date of completing the rehabilitation and equipment operations of the wharf within nine months after receiving it. According to the terms of the contract, Marlog should prioritize to moor the arriving ships at this wharf at its own accountability and to prevent such ships from waiting. The contract also stipulates that Marlog should supply the wharf with the required equipment and machinery. According to a Japanese company, Marlog are also interested in a joint-operation contract as long as the surrounding activities coincide with their company’s activities.

(5) Cargo Handling Equipment

The efficiency of port operations and services is required to improve at least up to an internationally recognized minimum level, in order to cope with the increasing traffic of ships and cargo volume.

Under the present situation of worn-out and damaged cargo handling equipment, damaged berthing facilities, insufficient communication equipment, and insufficient and damaged water supply facilities, and electric power supply substations, the port would have difficulty in providing effective services and efficient operations.

The port management office of KZP is also short of working vessels like dredgers, tug boats, pilot boats, and suitable cargo handling equipment for bulk cargo and containers. In this regard, the port management office cannot provide efficient service to port users.

(6) Present Situation of Access Channel

The channel between UQP and KZP was developed by dredging to a depth of -12 m. Since then, maintenance dredging has not been carried out for the last ten years, except for partial maintenance dredging which was carried out in this channel by GCPI using their own dredgers from 1998 to 2002. According to the latest survey conducted in 2006 by the Japan External Trade Organization (JETRO), the channel between UQP and KZP, the upstream of the channel has shallow depths from around -8.2 to -8.5 m, and a ship size of 20,000 DWT can be navigated up to KZP. The port basin of KZP is as shallow at around -8.2 m. Six small and large sunken ships are scattered along the existing berthing and basin areas.

Photo 3.3.22 Aerial View of KZP

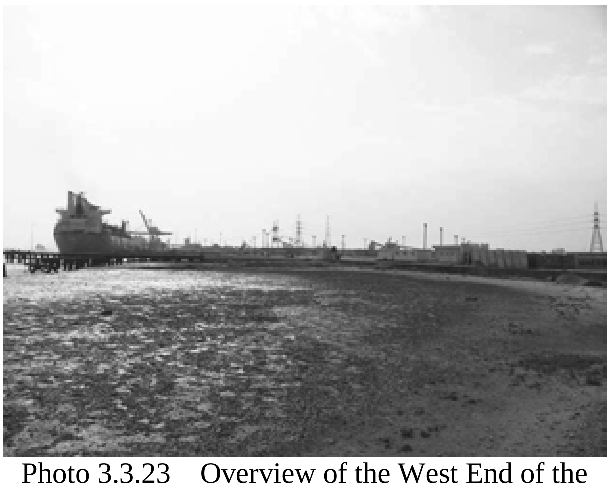


Photo 3.3.23 Overview of the West End of the Port

Photo 3.3.24 Moored Cutter Suction Dredger

Photo 3.3.25 Power Barge (at Berth No. 11)

Photo 3.3.26 Oil Tanker (at Berth Nos. 9 and 10)

Photo 3.3.27 Detached Pier Type Berth (at Berth Nos. 6 to 8)

Photo 3.3.28 Back Yard of Berth Nos. 6 to 8

Photo 3.3.29 Non-operational Q/C

Photo 3.3.30 Cargo Unloading Operation of Bagged Cement (at Berth Nos. 6 to 8)

Photo 3.3.31 Cargo Unloading Operation of Bagged Cement (at Berth Nos. 6 to 8)

Photo 3.3.32 Cargo Unloading Operation of Tires (at Berth Nos. 6 to 8)

Photo 3.3.33 Cargo Unloading Operation (Dhows) of Tires (at Berth Nos. 6 to 8)

Photo 3.3.34 Berth Nos. 6 to 8

Photo 3.3.35 Berth Nos. 6 to 8

Photo 3.3.36 Berth Nos. 2 to 4

Photo 3.3.37 Berth Nos. 2 to 4

Photo 3.3.38 Berth Nos. 2 to 4

Photo 3.3.39 Berth Nos. 2 to 4

Photo 3.3.40 Berth Nos. 2 to 4

Photo 3.3.41 Berth Nos. 2 to 4

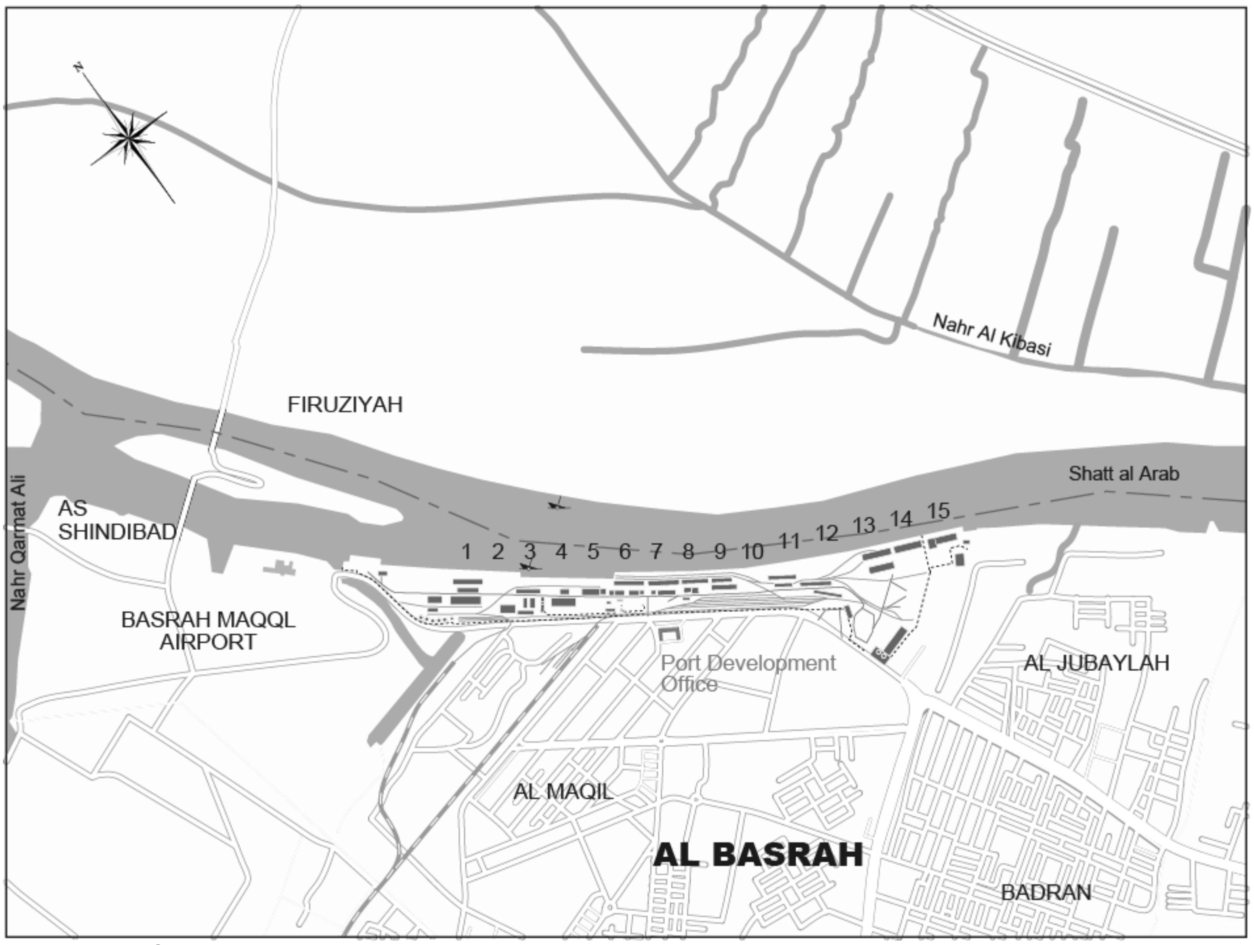

Photo 3.3.42 Fender (at Berth Nos. 2 to 4)


Photo 3.3.43 Overview of Berth Nos. 9 to 11


Photo 3.3.44 Overview of Berth Nos. 9 to 6


Photo 3.3.45 Overview of Berth Nos. 2 to 6

3.3.4 AL MAQIL PORT



Source: Annual report 2010

Figure 3.3.4 Layout of Al Maqil Port

The Al Maqil Port was founded in 1919 as the first port in Iraq. It is located on the banks of Shatt al-Arab, and is as 135 km away from the northern end of the Arabian Gulf.
There are eight sunken ships along the berth front, and 32 sunken ships along the channel of Shatt al-Arab. There is a floating bridge at the downstream of Shatt Al-Arab, and open/close operations of the gate has to be done when ships would pass.

The port has a total of 15 berths. There are 47 Q/Cs installed at seven berths, but only two Q/Cs are operational. Most of the Q/Cs were introduced from 1970 to 1980, and maintenance works have not been done since then due to the war and lack of materials/equipment for maintenance. Water depth at the berth front is around -9 m ACD.

Berth operations recently resumed at berth nos. 2 and 6 to 15 with the use of mobile cranes and ship gears. Total volume of cargo is small compared with other ports, and according to records in 2011, import through this port was about 500,000 tons/year and export was of a very small amount.

Photo 3.3.52 Overview of Al Maqil Port from the Administrative Building

Photo 3.3.53 Overview from Upstream

Photo 3.3.54 Non-operational Q/C

Photo 3.3.55 Cargo Unloading Operation Using Mobile Crane

3.3.5 AL FAW PORT

The Al Faw Port was importantly used in the 1970s but it was badly damaged in the Iran-Iraq war of the 1980s. Heavily blocked by wreckages and able to handle only small vessels, Al Faw Port is currently used as a dock by local fishermen.

The Government of Iraq has planned for a new Al Faw Port, which would replace the existing Al Faw Port, on the Faw Peninsula where the Shatt Al-Arab meets the Gulf. The intended location has the capacity to be developed into a major international port that would link the Gulf States and Northern Indian Ocean with Central Asia, as well as Europe by rail through Syria or Turkey. Al Faw Port is currently operated by GCPI, which is the operator of all the five commercial ports of Iraq.

3.3.6 NAVIGATIONAL CHANNELS

Khawr Abd Allah, Khawr Umm Qasr, and Khor Al Zubayr are the access channels for UQP and KZP. The said channels contained wreckages.

The poor condition of the navigational aids, the presence of wreckages, and siltation of all the channels, present major hazards to shipping and limit the operational capabilities of the ports due to the restricted sizes of vessels that are able to access the Iraqi ports. (The size of cargo ships at KZP is generally limited to less than 15,000 DWT.)

Khawr Abd Allah is approximately 80 km long from the entrance located at the northwest edge of the Gulf (where buoy no. 1 is placed). It was originally designed to have a minimum width of 200 m, and -12.5 m ACD throughout. Whereas, Khor Al Zubayr (channel to KZP from UQP) is approximately 18 km long and designed to have a width of 300 m, and section depth of -12.5 m. Khawr Umm Qasr is the channel connecting Khawr Abd Allah and UQP, and it is in front of the UQP's South Port area.

Extensive surveys of the access channels have been carried out in recent years and their results have revealed severe navigational and environmental problems posed by the wreckages in the waterways close to the South Port, berths and channel of Umm Qasr, the channel of Khor Al Zubayr, and KZP. Although capital and maintenance dredging works of the access channels had been carried out since the port development programs during the 1960s and 1970s, such programs were interrupted by various conflicts.

In 2005, a second UNDP project supported by the Government of Japan undertook dredging of the main channel from the channel entrance in the Gulf to Umm Qasr's channel opposite River 1. From this program, the access channel to UQP has been improved to the extent that 50,000 DWT class vessels are now able to call UQP using the high tide range as indicated in Table 3.3.6.

Table 3.3.6 Dimension of Access Channel

Channel	Length	Depth (below CD)	Width (m)
Khawr Abd Allah	Approximately 80 km	11.0 – 12.5 m	125 – 250
Khawr Umm Qasr (including front area of the South Port)	Approximately 10 km	10.3 – 11.3 m	Approximately 150 m for channel area
Khor Al Zubayr	Approximately 18 km	10.0 – 14.7 m	150 - 300

Source: UNDP (October 2005)

At several locations in Khawr Abd Allah, sections were shallower and narrower than as planned due to the existence of shipwrecks. The connecting area between the first UNDP dredging project and the second project has been left undredged, thus causing a smaller channel section than was originally designed. Dredging works have not yet been carried out for Khor Al Zubayr. In order to start dredging the blocking shipwrecks have to be salvaged. Throughout the access channels, navigation aids, which are necessary for safe navigation of ships, have not been properly provided.

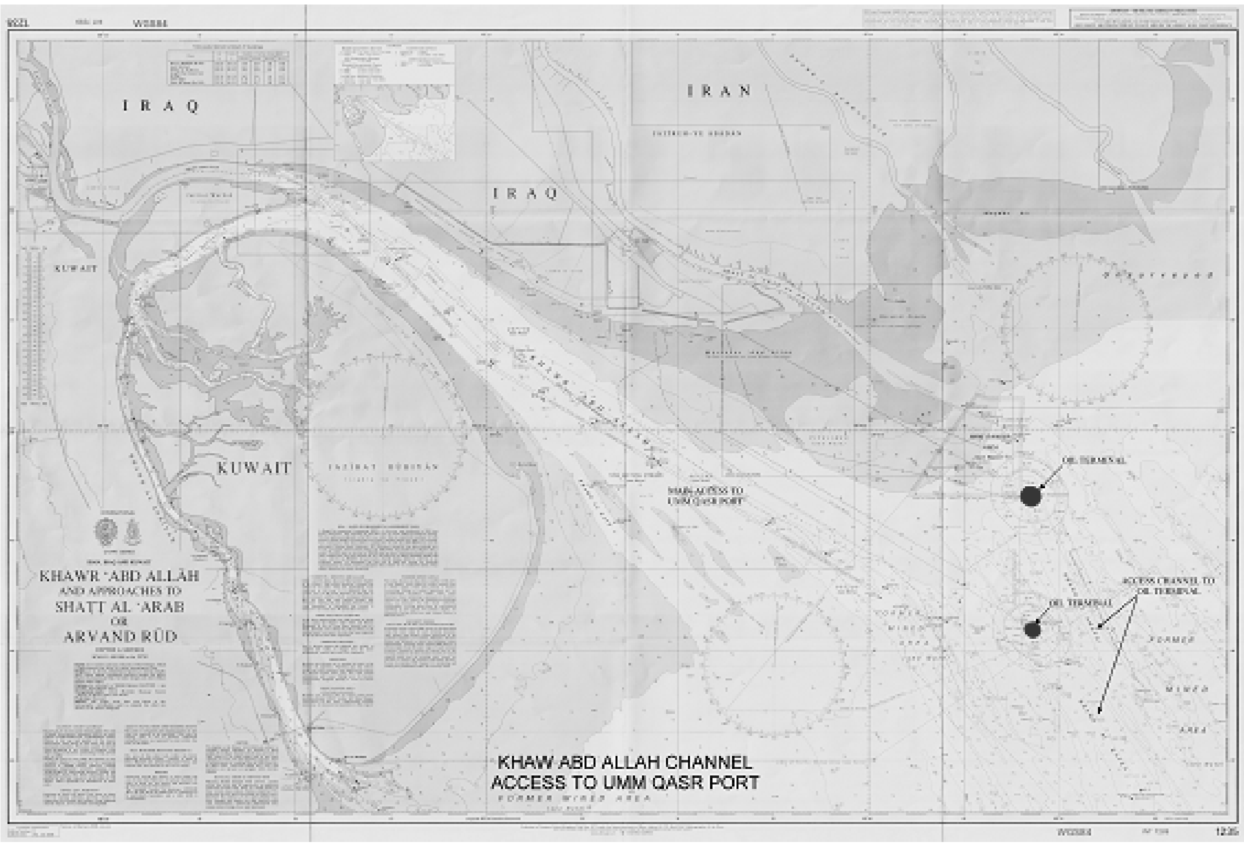


Figure 3.3.5 Khaw Abd Allah Access Channel to UQP

At present GCPI owns only one operational cutter suction dredger, thus maintenance dredging works have not been properly executed especially in the navigational channel of Shatt al-Arab. Serious sedimentation occurs at the mouth of the river and the confluence of the river from Iran. Navigation of relatively big ships into this channel is possible during high tide conditions. Procurement of new dredgers through the Port Sector Rehabilitation Project Phase I under Japanese ODA is now in progress.

The annual dredging for 2011 was planned at 8 million m^3, however only 6.8 million m^3 was actually dredged. Dredging for 2012 was also planned at 8 million m^3. Maintenance dredging plans include the area of River 1 (UQP), quay front at KZP, UQP's South Port, Khawr Abd Allah channel, Alkhafgah channel, and the new Al Faw Port.

3.4. PORT PROJECTS UNDER IMPLEMENTATION

3.4.1 PROJECTS AND PROCUREMENT FINANCED FROM MOT OWN BUDGET

Ongoing projects funded by own budget by MOT are summarized in Table 3.4.1.

Table 3.4.1 Investment Project Plans for 2011(funded in full by the Ministry of Transport)

No.	Project	Total Cost (IQD millions)	Adjusted Allocated Funds for 2011 (IQD million)	Aggregated completion at the end of Aug 2011 (%)
1	Procure cargo handling equipment	70,000	12,050	73
2	Supply and install four desalination unit of 1500 m^3/unit capacity	10,200	9,375,218	67
3	Study and execute anti-marine pollution plan	15,000	4,495	26
4	Procure marine vessels	112,000	86,876,534	25
5	Improve power supply to the ports	30,000	11,220	75
6	Manage and execute Japan's loan projects	40,000	9,202	26
7	Catholic protection for port quays	37,000	4,573	21
8	Manage and support consultation services and build service quays for Al Faw Port	53,000	2,733	3
9	Rehabilitate Abu Flus Port	32,000	6,712,525	68
10	Rehabilitate the ports quays	21,000	6,415	72
11	Rehabilitate and develop the marine dry dock	9,800	2,931	62
12	Rehabilitate and maintain the water projects at Al Maqal	1,400	428	55
13	Rehabilitate marine vessels	31,000	1,000	98
14	Support oil platform	24,243,611	24,243,611	80
15	Build two new berths at UQP (Berth no. 11a & 11b)	33,000	1,055	60
16	Procure fire engines and safety equipment	7,500	126	50

Source: GCPI

3.4.2 PORT SECTOR REHABILITATION PROJECT UNDER JAPAN'S ODA LOAN

The Iraq Port Sector Rehabilitation Project Phase I funded by Japan's ODA loan has been implemented since 2008. The project scope is shown in Table 3.4.2 and Table 3.4.3, which focuses mainly on the rehabilitation and improvement of the Umm Qasr Port (North Port). It is expected that the originally designed capacity of UQP and KZP in the southern region of Iraq will be recovered by the current ongoing restoration and rehabilitation projects. The current progress situation of the project is indicated in Table.3.4.2.

Table 3.4.2 Scope of Port Sector Rehabilitation Project (Ongoing Under Japanese ODA Loan)

Item	Content	Nos.
Dredging	Berth Front and Basin (5.4 million m^3)	1
Shipwreck Removal	Removal of Ship Wreckages	4
Equipment	**Marine:** - Hopper Suction Dredger (3,500 m^3) - Grab Dredger (5 m^3 grab, 500 m^3 hopper) - Floating Crane for Salvage (2,000 ton capacity) - Tug Boats (3,300 kW (~4,500 HP) capacity) - Diver Boat - Fuel Oil Tanker (1,000 tons) **Land:** - Mobile Crane (150 ton lifting capacity) - Forklift for Ro-ro (7 tons) - Forklift for Ro-ro (20 tons) - Workshop Vehicle - Mobile Hydraulic Platform	 1 1 1 3 1 1 2 2 2 2 1
Onshore Civil and Utilities Work for UQP	- Yard Pavement Power Supply, Water Supply, Firefighting Facilities, Communication System, and Water Treatment Facilities	L.S
Rehabilitation of Damaged Facilities	- Rubber Fender and Berth Repair	L.S

Source: GCPI

Table 3.4.3 Summary for the Port Sector Rehabilitation Project (JICA Loan No.IQ-P1)

Categories	Lots	Lot Names	Descriptions	Contract Price	Unit	Contract Period	Date of Commencement	Date of Completion
(A) Port Related Rehabilitation Works	Lot A	River-1 Dredging at Umm Qasr Port	Dredging to -12.5 m in Umm Qasr Port River 1 in width of 200 m basin in width of 300 m.	47,036,502	EURO	12 months	3 Mar 10	2 Mar 11
	Lot A2	Rehabilitation of TSHD Dredger Basra	Rehabilitation of TSHD dredger 1800 m^3 (to be used for maintaining the dredged -12.5 m water depth in Umm Qasr Port River 1)	5,918,750	USD	6 months	Expecting to start May 2012	Expecting to complete October, 2012
	Lot C	Shipwreck Removal	Removal of four wrecks at navigation channel	14,430,630	USD	12 months	1 May 11	30 Apr 11
	Lot D-1	Port Rehabilitation Works for Marine Civil Facilities	Installation of new fender system, concrete repair for cracks at slabs, etc.	4,103,270	USD	12 months	15 Apr 11	14 Apr 12
	Lot D-2	Port Rehabilitation Works for On shore Civil Facilities	Installation of container stacking blocks, overlay asphalt pavement at container yard, fences, and gate, etc.	1,398,431	USD	12 months	15 Feb 11	14 Feb 12
	Lot D-3	Port Rehabilitation Works for Utilities (water & electricity)	Rehabilitation of drainage system, electricity, and construction of new substation, etc.	8,627,450	USD	15 months	1 Jun 11	31 Aug 12
(B) Procurement of Equipment	Lot B1	Marine Equipment (1)	Procurement of TSHD 3,500 m^3 (1 no.), grab dredger 500 m^3 (1 no.)	86,685,980	EURO	24 months	21 Jan 11	20 Jan 13
	Lot B2a	Marine Equipment (2)	Floating crane 2000 ton	40,895,106	USD	18 months	23 Aug 11	22 Feb 13
	Lot B2b	Marine Equipment (2)	Tug boats 4500 HP (3 nos.), diving boat (1 no), fuel tanker 1,000 ton (1 no.)	59,925,832	USD	20 months	Expecting to start April 2012	Expecting to complete December 2013
	Lot B3	Land Equipment	Mobile crane 150 ton (2 nos.), forklift for ro-ro cargo 7 ton (2 nos.), workshop vehicle (2 nos.), mobile hydraulic platform (1 no.)	650,000,000	JPY	12 months	18 Aug 10	17 Aug 11

Table 3.4.4 Activity (Work) Schedule of the Port Sector Rehabilitation Project Phase I (JICA Loan No.IQ-P1)

Note:

: ORIGINAL SCHEDULE

OTHER COLOURS : REVISED SCHEDULE

Contract Signing: ◆ Actual

◇ Expected

3.4.3 OTHER GCPI INVOLVED PROJECTS

(1) Truck Movement Logistic Support Project

A contract agreement for a private sector investment project which aims to control truck movement before arriving at the port main gates is under finalization between GCPI and Nafith Company (Jordan).

The trucks' control points are to be located at Umm Qasr Port, Khor Al Zubayr Port, and border gate in Kuwait. Once the trucks movement control system has been established at the planned locations, a well controlled and accurate cargo movement from/into Iraqi ports will be achieved.

(2) Construction of Single Point Mooring (SPM) for Crude Oil Export

A few SPM construction projects are planned under the Ministry of Oil (one of the projects is under Japan's ODA loan) in order to provide sufficient capacity to export crude oil.
GCPI has been involved in supervising the dredging works of the SPM areas and the access channel including necessary installation of navigation aids and maintenance dredging.

The above mentioned rehabilitation/improvement and development works/projects are to be considered in the estimation of cargo handling capacities of respective ports.

4. TRENDS OF MARINE TRANSPORT AND CARGOES

4.1. SHIP SIZES OPERATING IN THE ARABIAN GULF AND SHIP CALLING AT PORTS IN IRAQ BY PREVIOUS STUDY

Reference is made to the Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project (Post-Phase 1 Development Plan) by GCPI.

(1) Container Ships

According to a shipping company operating in the Arabian Gulf stationed at Dubai, United Arab Emirates (UAE), the present ship sizes by commodity are as follows:

In the case of transporting import containers in the Arabian Gulf region, Jebel Ali Port in Dubai functions as a hub port of the region, having ship calls of the container mother ship of 50,000 to 60,000 DWT mainly for transshipment, and feeder ships (10,000 DWT) for distribution to major ports of countries in the Arabian Gulf.

Jebel Ali Port handled container volumes of 7.62 million TEU in 2005, and 8.92 million TEU in 2006, while container traffic volume in the Middle East region was about 22.56 million TEU in 2005. This port handles about 34% of the total volume going through this region.

At present, five or six companies operate regular container ship services for UQP in Iraq. Most of container goods are transshipped in UAE. Of all the cargo leaving UAE for Iraq, 70% are loaded in Dubai. The other 30% are loaded in the ports of Khor Al Fakkan and Sharjah.

There is a direct service from East Asia which originates at Port Kelang in Malaysia. This service uses vessels with a capacity of about 900 TEU which calls every five weeks.

Ship operators from UAE do not have a fixed weekly schedule. On average, ships make three roundtrip voyages per month instead of once a week. In addition, ships incur a “war risk” insurance premium of 0.2% of its value for each week spent in Iraqi waters. As a result, companies were inclined to use older, slower, and smaller ships which have a lower estimated value.

In the case of export containers, feeder ships collect export containers from each major port in the Gulf and transship them to the mother ship in Dubai for their final destination.

According to shipping companies in Dubai, considering the geographic locations of UQP and KZP as river ports, the size of feeder ships are shown in Table 4.1.1.

Table 4.1.1 Present Sizes of Container Ships Calling at UQP and KZP

Ship Size	LOA (m)	Width (m)	Draft (m)	DWT
500 TEU carriers	109	17.9	6.3	5,000
1,000 TEU carriers	143	22.5	8.2	12,500

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan

(2) Bulk Carrier

According to industry forecasts, UQP will serve as the primary point of entry to Iraq for wheat import at an estimated rate of about 3 million tons per annum. In the most economical approach, 50,000 DWT vessels will be used considering the channel depth.

In the case of bulk carriers multipurpose handy type ships (overall length = 190 m, width = 32 m, draft = 11.5 m, size = 48,000-52,000 DWT) are very popular in the Asian region and such call at Iraqi ports. At present, the size of bulk carriers is from 35,000 to 40,000 DWT which are a little smaller than the popular size in the Asian region because of the limited depth and width of the navigational channel. These bulk carriers carry imported rice and wheat to Iraqi ports.

(3) Ro-Ro Ships

In the case of ro-ro ships and ferries, there have been passenger services between Dubai and Umm Qasr for many years. Ferries are currently carrying more goods than passengers. Also, ferry operators have acquired ro-ro vessels, which are not used for transporting passengers. Ro-ro ships can operate on a similar schedule as ferry ships since ro-ro ships have berthing priority over container ships. Malaysian container ships occupy a berth for four to five days at each call.

The proportion of transport cargo volume of ferries is fairly high considering the following reasons:

- Traders or agents can ride onboard passenger ferries to bring their goods directly from the ship to a warehouse in the port.
- From warehouses, goods can be transported further north of the country along routes.

Ro-ro ships operate between UQP and Dubai port by regular shuttle services to transport general cargo, vehicles, trailers, and containers. The present standard ship has an overall length of 130 m, width of 22.25 m, draft of 5.8-6.4 m, and size of 7,300-10,165 GRT.

(4) Summary

According to ship size data called at UQP and KZP, the average and maximum size of ships by commodity are shown in Table 4.1.2. The ship sizes in terms of DWT and GRT have increased from 2005 to 2008, while the draft and length of ships have been limited due to the depth and width of navigational channels.

Table 4.1.2 Average and Maximum Size of Ships by Commodity in 2005 and 2008

Type of Ship	Average Ship Size in 2005			Maximum Ship Size in 2005		
	Draft (m)	Length (m)	Size	Draft (m)	Length (m)	Size
Ro-ro ship	5.88	126.01	6,730 GRT	6.4	130	10,165 GRT
Container ship	5.19	100.93	3,100 DWT	10.1	170	17,784 DWT
Bulk carrier	8.41	161.25	16,168 DWT	11.5	190	52,000 DWT
Type of Ship	**Average Ship Size in 2008**			**Maximum Ship Size in 2008**		
	Draft (m)	Length (m)	Size	Draft (m)	Length (m)	Size
Ro-ro ship	5.88	134	7,400 GRT	6.4	130	16,950 GRT
Container ship	5.19	100	5,700 DWT	10.1	170	18,537 DWT
Bulk carrier	8.41	161	47,630 DWT	12.0	211	55,000 DWT
Bagged cargo	9.6	161	17,168 DWT	10.9	180	35,000 DWT
Tanker	8.9	144	14,617 DWT	10.9	210	48,000 DWT

Source: Dubai Port Authority/GCPI

4.2. UPDATED STUDY

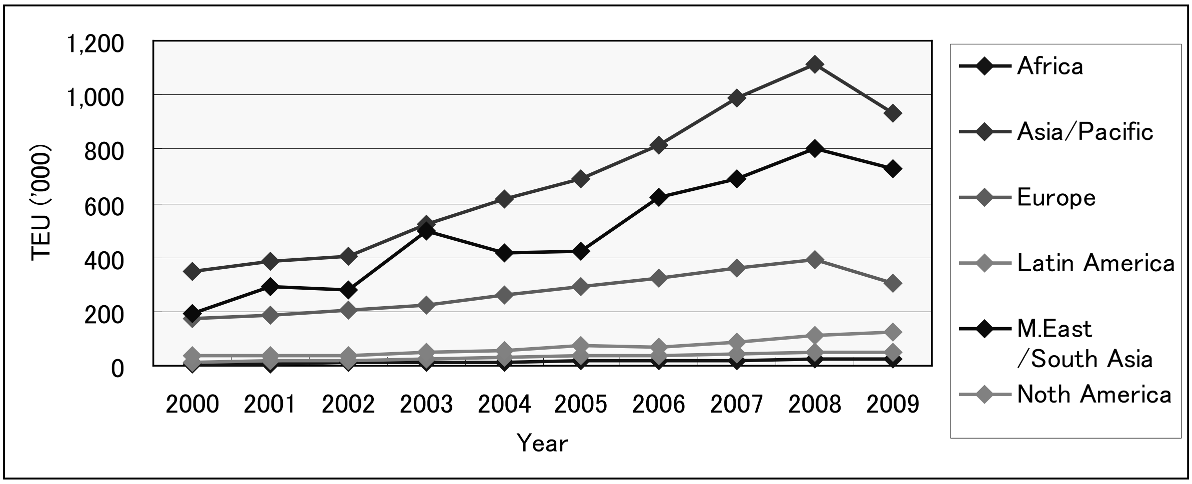
(1) Container Ships

General – Middle East Gulf Trade

In the container trade of Middle East-Gulf, it was realized that Jebel Ali Port and Port Rashid of Dubai, Bandar Abbas of Iran, and Damman of Saudi Arabia are major destinations which are expected to handle more than 70% of the total trade volume for import. Especially, the Jebel Ali Port has functioned significantly as the hub for transshipments and re-exportation to other countries in the Middle East, the Commonwealth of Independent States (CIS), and Africa. The development and expansion of container terminals at Jebel Ali Port have been supported by terminal operators like Dubai Ports World, and such progress has ensured the Jebel Ali Port to function as a hub. Under this port development progress, container carriers have provided their deep-sea services to call at Jebel Ali Port and have operated/arranged feeder vessels to ports in the Arabian Gulf including Iraqi ports.

The Middle East-Gulf trade is recognized as a typical one-way trade for import with heavy imbalance of container equipment. The imbalance ratio (export volume/import volume) is more than 14%. The major imported commodities are used cars/trucks, tires, auto parts, project cargoes, construction machinery, electrical apparatus, chemicals, textiles, frozen food, various consumer goods, etc. Jebel Ali Port has large auction facilities for used cars, used auto parts, and used construction machineries. Iran has been substantially importing jute and materials used for producing Persian rugs or carpets. Saudi Arabia has chemical and construction machineries for its major import items, which include oil refinery products like resin. Such items are expected to expand for container cargo in the future.

Asian countries are the largest trade partners of countries in the Middle East-Gulf, and its scale accounts for more than 40% of the total. For Asian trade, almost half of the cargoes have originated from China. Shown in Figure 4.2.1 are trading statistics for the past ten years from 2000 to 2009 in UAE. UAE has managed the biggest gate ports for import cargoes.



Source: Seabury

Figure 4.2.1 Cargo Origin and Imported Volume in UAE

Due to the trade growth such as in Asia, deep-sea shipping carriers have strengthened their Asia-Middle East-Gulf services by direct calls and increased the tonnage of their fleets. On the other hand, it is noted that Maersk Line, the largest container carriers and one of the major players in the Middle East including military cargoes, has improved their direct services by utilizing larger ships for regional feeder connecting services between Southeast Asia and the Middle East in view of less profitability under higher equipment imbalance costs.

Shown in Table 4.2.1 are the top deep-sea shipping carriers which provide fleet services to ports in the Middle East-Gulf from ports in Asia.

Table 4.2.1 Direct Call Services of Major Deep-Sea Container Carriers to the Middle East (as of January 2012)

Carrier Name	Service Name	DWT	Capacity (TEU)	Asian Origin Ports	Destination Ports
American President Line (APL)	CMX	51,000~52,000	4,000~4,300	Central and South China, and Singapore	Jebel Ali, Shajar, and Sohar
American President Line (APL)	WAX	80,000~100,000	6,350~8,400	Kwangyang, Central China, and Singapore	Jebel Ali, Damman, and Bahrain
Hyundai/MOL	CM 4	63,000~85,000	4,900~6,800	Kwangyang, Central and South China, Singapore, Port Kelang, and Karachi	Jebel Ali
MOL/Evergreen/Lloyd Triestino	CM 2	63,000	5,500	Central China, Leam Chbang, Tanjung Pelepas, and Colombo	Jebel Ali
CMA – CGM	CIMEX 1	100,000~108,000	8,200~8,500	China and Port Kelang	Jebel Ali and Khor Al Fakkan
CMA – CGM/OOCL/COSCO	CIMEX 3	102,000	8,500	Central China, Singapore, and Port Kelang	Jebel Ali and Dmman
United Arab Shipping Corp. (UASC)	AGX 1	50,000~67,000	3,800~5,000	China and Port Kelang	Jebel Ali and Khor Al Fakkan
Maersk Line	Horn of Africa	43,000	3,300	Tanjung Pelepas	Jebel Ali

Source: Shipping Carriers' HP on Website

Some of the above services also have covered India and subcontinent areas which are one of the major export countries for the Middle East.

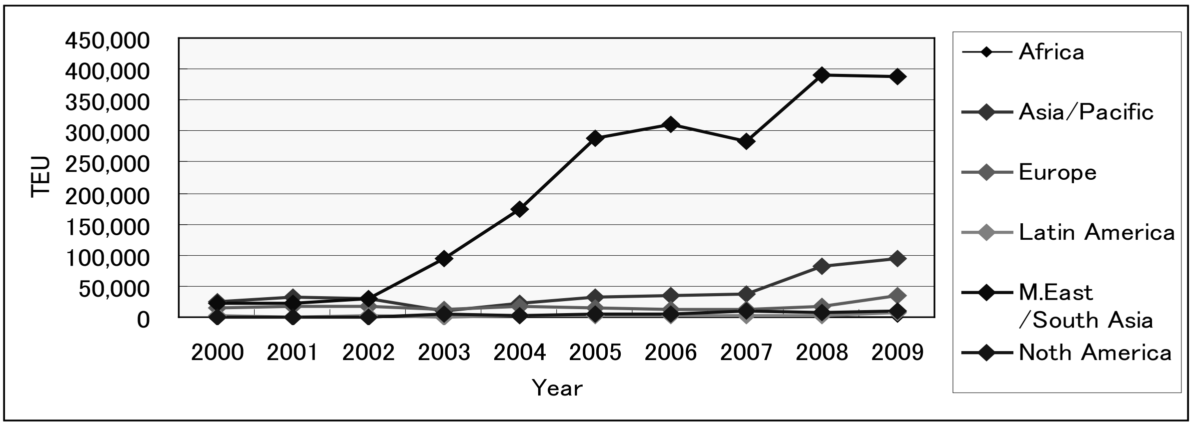
Service fleets are most likely to be continuously replaced by vessels with larger tonnage unless cargo volumes drop. The development and expansion of port facilities can support these replacements without any problem, especially for UAE. However, shipping carriers have faced difficulty in sufficiently increasing freight rates in order to recover the heavy cost of evacuation of equipment from the Middle East. The major import commodities like used parts and cheap consumer goods were not able to carry the burden of high freight cost although the market volume of high valued commodities has been growing every year. Under such trade situations, it is noted that the concentration of direct calls to Jebel Ali Port by large mother vessels will remain unchanged for the time being due to advantages of hub operation handling of more than 10 million TEU and frequent feeder availability to cover the other Gulf ports. The shipping carriers may plan to expand their direct call services to some Gulf ports other than Damman and Bandar Abbas Ports and in addition to Jebel Ali Port. The gate ports promoting potential exports are being considered by important candidates to have direct calls in view of the equipment imbalance issue involved.

Container Traffic through Iraqi Ports

According to the Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project, container traffic toward Iraq has been using three major routes, via Iraqi ports, Aqaba Port in Jordan and land routes through Syria and Turkey. It was also reported in the Middle East Economy in November 2011 that Iraq already accounted for about 40% of the volume of containers handled in Aqaba Port. Also, part of the increase of import volume in Iraq has been channeled through Mediterranean ports including Turkish ports and trucked by land through Syria to Iraq. Under these situations, Iraqi port's activities for container traffic are currently limited due to low handling capacity and operational issues. However as mentioned, the increase of east oriented cargoes from China and India to countries in the Middle East and Gulf areas have definitely induced rapid growth of handling volumes in Iraqi ports as well. West oriented cargoes will continue to rely on Aqaba Port and land routes through Jordan and Syria as customers' logistics requirements for transit.

Import statistics in Iraq shows similar origins of cargoes as that in UAE and the Middle East (mainly UAE). Also, South Asia holds a large portion with a share of more than 70%. It is considered that such large volumes are attributed to re-exportation within countries in the Middle East-Gulf and in India. Also, subcontinent cargoes have contributed to this situation as well. It is also noted that exported cargoes from Asian countries have rapidly increased in the past three years from 2007 to 2009 by 250%, and have entirely routed via Iraqi ports.

It is expected that east oriented cargoes would significantly contribute to traffic volume of Iraqi ports in the future more than trade cargoes generated within countries in the Middle East-Gulf.



Source: Seabury

Figure 4.2.2 Cargo Origin and Imported Volume in Iraq

According to one deep-sea container shipping carrier, their containers are being unloaded at UQP at almost 100%, of which 80% are released at terminal CY. Only about 20% containers are being moved to Baghdad and the other inland delivery points under the carriers' bill of lading. This means that most containers are being transported from the port to a destination in Iraq under the responsibility of local forwarders.

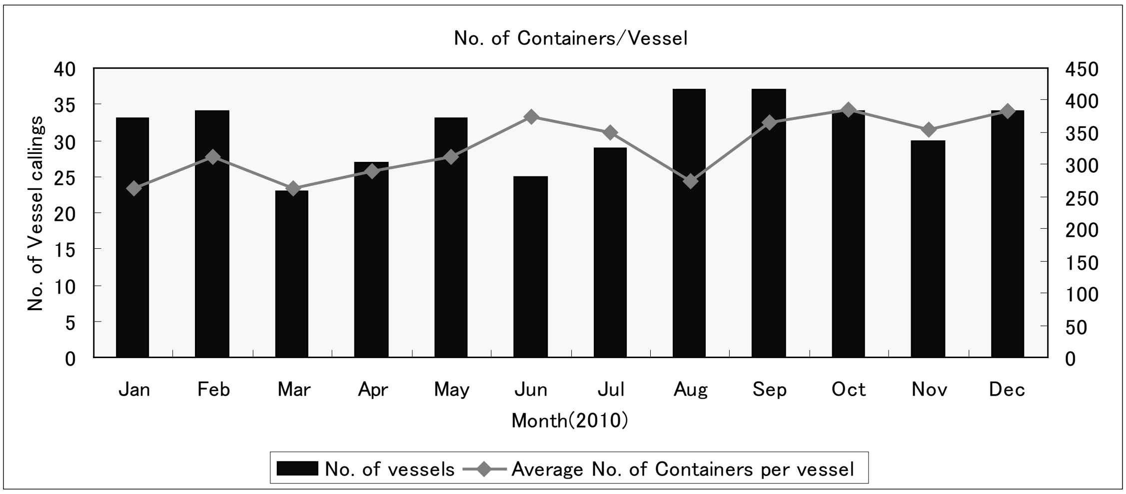
Major deep-sea carriers have provided feeder service to UQP from Jebel Ali Port after transshipping from their mother vessels. Most operated feeder vessels have called not only at UQP but also other Gulf ports including Shuwaikh and Shuaiba in Kuwait and Masleed in Qatar. However, some carriers have operated shuttle feeder vessels between Jebel Ali Port and UQP. The fleet sizes of the major feeder service carriers are shown in Table 4.2.2.

Table 4.2.2 Major Feeder Service Carriers between Jebel Ali Port and UQP (as of January 2012)

Carrier Name	Service Name	DWT	Capacity (TEU)	Other Calling Ports
American President Line (APL)	Umm Qasr Feeder Service	19,000	1,600	Shuttle Service
American President Line (APL)	JMX	-	-	Masaleed and Doha
CMA – CGM	Gulf Emirates Oman Iraq Feeder	15,000	1,100	Shuwaikh and Shuaiba
United Arab Shipping Corp. (UASC)	-	35,600	2,200	-
Maersk Line	Iraq Feeder	14,000	1,200	Masaleed

Source: Shipping Carriers' HP on Website

Port statistics of UQP in 2010 described that the number of loading/unloading of containers per vessel had increased by a monthly average of 4.3% following the growth of the total handling volume. It was realized that the tonnage/capacity of feeder vessels have been upgraded to comply with this demand. It was expected that shipping carriers are continuously increasing the capacity of their feeder vessels as long as the demand is increasing.



Source: GCPI

Figure 4.2.3 Number of Vessel Callings and Number of Containers per Vessel at UQP in 2010

Iraqi ports have also been dealing with the issue of imbalance equipment. Such issue is much more serious at Iraqi ports than at Jebel Ali Port, which is rather comfortable in view of hub ports. Under this situation, the opportunity to have direct calls of mother vessels may be initiated, but it is quite uncertain because the hub port functions of Jebel Ali and Salalar Ports have been working very well due to their geographical advantage for access, efficiency in operations, and capacity.

(2) Oil and Gas Products

Iraq has imported oil refinery products such as benzene, kerosene, gas oil, and gasoline of nearly one million tons through KZP. The maximum size of carriage tankers is about 50,000 DWT (=30,000 GRT) with an unloaded volume of nearly 20,000 tons. No tanker has ever called at UQP. Import volume is expected to increase following Iraq’s economic growth.

(3) Wheat

Iraq is one of the agricultural countries in the region. Demand of wheat in Iraq was previously covered by its domestic production. However in recent years, Iraq has been importing wheat of 3 to 4 million tons a year. More than a half of the import volume has moved through UQP. According to port statistics of UQP by GCPI, 70,000 DWT bulk ships have carried imported wheat, and 54 and 37 vessels have called at UQP for discharge of nearly 50,000 tons per vessel in 2009 and 2010, respectively. The Government of Iraq is encouraging domestic production in order to satisfy domestic demands by 2014 without having to import; however its progress is uncertain because due to the competitive cost of foreign wheat.

(4) Cement

Domestic production of cement was previously achieved at a rate of about 700 million tons, but after several wars it drastically dropped at 2.4 million tons in 2004. The national recovery demands supply sources and currently relied on import of foreign products. Imported cement has been shipped using bulk ships, general cargo ships, and land transportation. It was recognized that UQP and KZP have handled a large portion of imported cement. The United Nations estimated the annual demand at 24 million tons in their past planning. Under this situation, the handling volumes of both ports are expected to increase.

UQP has received large carriage ships with sizes of around 72,000 DWT. Also, various types of vessels (with sizes from 4,000 to 70,000 DWT) loaded with cement have called at the port.

(5) Rice

Iraq has been recognized as one of the biggest rice importing countries as it has been importing nearly 1 million tons of foreign rice per year from South and Southeast Asia. UQP is the gateway for rice import as it has received 50,000 DWT bulk ships in 2010 with discharge of 31,000 tons per vessel.

(6) Vehicle

The market for brand new cars in Iraq is still underdeveloped due to the country's high import tax, however the market for used cars has been expanding and growing as the US government deregulated the export of cars to Iraq. Jebel Ali Port has functioned as the distribution point in the Middle East-Gulf as they have large auction markets at free trade zones. It was reported that UAE has re-exported around 17,000 cars to Iraq in 2007. Iraq is recognized as to be the top country among UAE's re-export customers. Europe has also been also a supply source for shipping used cars.
Port statistics showed that 110 and 92 car carriers called at UQP in 2009 and 2010, respectively. The vessels were of various sizes. The maximum size of ship was 30,000 DWT with a loading capacity of 2,000 cars.

(7) Summary

Table 4.2.4 and Table 4.2.5 show ship size distribution by cargo type at UQP in 2009 and 2010, respectively. Information on tonnage, which indicates ship size, was not included in the port statistics by GCPI, however loaded volumes of cargo were included. Considering that Iraq is the final destination for most of the ships, it was assumed that ship calls at the port carry a full load of cargoes. It means that dead weight tonnage will be 110% of the cargo weight loaded on the ship.
Based on this assumption, the following points are highlighted:

- The percentages of ship calls by cargo type in 2009 were 41.8% for general cargo ships, 31.7% for container ships, and 26.5% for other ships including dry bulk ships. While in 2010, the percentages were 44.1%, 35.3%, and 20.6%, respectively. The trend on the number of container ships and general cargo ships has been increasing, but for other ships it has been decreasing.
- At 64% in 2010, majority of the container ships range between 5,000 to 15,000 tons, and the size of ships has been increasing as compared to the ship size in 2009.
- At nearly 90% in 2009 (and 75% in 2010), majority of the general cargo ships are less than 3,000 tons.
- There has been a decrease in the sizes of the other cargo ships with a maximum cargo weight of over 50,000 tons.

Table 4.2.6 and Table 4.2.7 show ship size distribution by cargo type at KZP in 2009 and 2010, respectively. Gross tonnage is included in the tables. Therefore, gross tonnage is converted into dead weight tonnage using regression equation for each cargo ship.

The following points are highlighted:

- The percentages of ship calls by cargo type in 2009 were 9.5% for tankers, 52.6% for general cargo ships, and 37.9% for, dhows. While in 2010, the percentages were 10.4%, 46.1%, and 43.5%, respectively. The trend on the number of dhows has been increasing, but for general cargo ships it has been decreasing.
- There has been a decrease in the sizes of tankers with a maximum size of 50,000 DWT.
- At 60% in 2009 (and 50% in 2010), majority of the general cargo ships range between 0 and 3,000 DWT with a maximum size of over 30,000 DWT for cement and iron.

Table 4.2.3 shows the main vessels calling at Iraqi ports in 2009 and 2010. According to the table, the maximum vessel sizes are 30,251 DWT for container ships, 27,000 DWT for pure car carriers (PCCs), 41,450 DWT for tankers, and 74,577 DWT for bulk carriers.

Table 4.2.3 Main Vessels Calling at Iraqi Ports in 2009 and 2010

Vessel Name	Vessel Type	DWT	Container Capacity (TEU)	Max. Draft	Port	Port Statistics
AS CASTOR	Container Vessel	18,445	1,129	9.0	UQP	2010
SIMA PRIDE	Container Vessel	16,449	1,221	9.0	UQP	2010
DELMAS SWALA	Container Vessel	15,166	1,049	9.0	UQP	2010
APL ORCHID	Container Vessel	18,437	859	10.0	UQP	2010
MAERSK ARKANSAS	Container Vessel	17,375	1,068	8.0	UQP	2010
LUICINE GA	Container Vessel	16,833	1,221	9.0	UQP	2009
SIMA KAROON	Container Vessel	30,251	1,278	11.0	UQP	2009
SEA WAYS VALOUR	Container Vessel	14,140	1,167	9.0	UQP	2009
LA POLOMA	Container Vessel	21,648	1,661	10.0	UQP	2009
SIMA YAZD	Container Vessel	26,634	1,170	11.0	UQP	2009
ASIAN SUN	PCC	13,293		8.0	UQP	2010
HOEGH MASAN	PCC	12,500		6.8	UQP	2010
PATRIOT	PCC	15,600		7.7	UQP	2010
ALLIANCE BEAUMONT	PCC	27,000		8.5	UQP	2010
HIGH LAND	Tanker	41,450		7.8	KZP	2010
DOBTLESS	Tanker	40,794		10.1	KZP	2010
CAL PRIDE	Bulk Carrier	72,493		7.7	UQP	2010
PLOYNEOS	Bulk Carrier	69,999		12.1	UQP	2010
ISMINAKI	Bulk Carrier	74,577		12.2	UQP	2010

Source: GCPI and Shipping Carrier HP’s Website

Table 4.2.4 Ship Size Distribution by Cargo Type at UQP in 2009

Cargo Volume (tons)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	Ratio
Container Ships														
0~999	11	5	5	13	8	6	8	4	3	4	1	3	71	6.6
1,000~1,999	4	4	4	4	7	5	5	6	6	3	4	2	54	5.0
2,000~2,999	2	0	3	3	2	2	1	1	0	2	1	1	18	1.7
3,000~3,999	6	0	5	1	5	2	1	1	0	1	1	2	25	2.3
4,000~4,900	3	0	4	2	1	1	0	1	0	1	2	1	16	1.5
5,000~9,999	9	6	6	11	7	7	10	10	14	16	15	13	124	11.5
10,000~14,999	1	1	1	0	4	6	5	4	3	0	0	5	30	2.8
15,000~19,999	0	0	0	0	1	1	1	1	0	0	0	0	4	0.4
20,000~29,999	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1
Total Number of Ships	36	16	28	34	35	30	31	28	26	27	24	28	343	31.7
Percentage of Total (%)	3.3	1.5	2.6	3.1	3.2	2.8	2.9	2.6	2.4	2.5	2.2	2.6	31.7	
General Cargo Ships														
0~999	29	2	26	22	24	19	17	18	14	12	13	13	209	19.3
1,000~1,999	11	5	6	21	12	15	15	24	21	22	25	15	192	17.7
2,000~2,000	2	0	2	1	2	4	4	2	1	1	3	3	25	2.3
3,000~3,999	0	0	0	2	0	2	0	1	2	1	0	1	9	0.8
4,000~4,999	0	0	0	0	1	1	0	0	0	0	1	0	3	0.3
5,000~9,999	1	0	1	0	0	1	2	2	1	2	2	1	13	1.2
10,000~14,999	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1
15,000~19,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
20,000~29,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Number of Ships	43	7	35	46	39	42	38	47	39	38	44	34	452	41.8
Percentage of Total (%)	4.0	0.6	3.2	4.3	3.6	3.9	3.5	4.3	3.6	3.5	4.1	3.1	41.8	
Other Ships (bulk, passenger, etc.)														
0~999	2	1	0	5	9	11	6	1	1	5	1	4	46	4.3
1,000~1,999	7	2	6	10	4	6	1	3	6	2	1	1	49	4.5
2,000~2,999	3	1	2	1	1	0	6	7	0	7	7	5	40	3.7
3,000~3,999	0	0	0	1	0	0	0	0	0	0	0	0	1	0.1
4,000~4,999	0	2	0	0	0	0	0	0	0	0	0	0	2	0.2
5,000~9,999	3	3	0	1	1	1	0	1	0	0	0	0	10	0.9
10,000~14,999	0	2	1	2	1	1	1	0	0	0	0	2	10	0.9
15,000~19,999	1	1	2	1	3	1	1	2	2	1	0	1	16	1.5
20,000~29,999	3	0	5	4	2	2	3	6	4	1	3	5	38	3.5
30,000~49,999	0	2	2	3	1	4	5	4	4	3	2	1	31	2.9
50,000~	3	0	4	4	5	6	1	1	6	8	6	0	44	4.1
Total Number of Ships	22	14	22	32	27	32	24	25	23	27	20	19	287	26.5
Percentage of Total (%)	2.0	1.3	2.0	3.0	2.5	3.0	2.2	2.3	2.1	2.5	1.8	1.8	26.5	
Grand Total	101	37	85	112	101	104	93	100	88	92	88	81	1,082	

Source: GCPI

Table 4.2.5 Ship Size Distribution by Cargo Type at UQP in 2010

Cargo Volume (tons)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	Ratio
Container Ships														
0~999	2	0	0	3	2	1	1	0	2	3	3	2	19	1.7
1,000~1,999	2	1	4	1	2	2	3	1	0	1	0	1	18	1.6
2,000~2,999	3	2	4	5	3	1	1	2	4	4	1	3	33	3
3,000~3,999	5	6	1	5	2	0	0	5	3	0	1	0	28	2.5
4,000~4,999	4	2	3	1	3	1	2	2	3	3	3	3	30	2.7
5,000~9,999	13	20	7	8	19	17	23	18	13	11	13	13	175	15.8
10,000~14,999	3	3	3	6	2	7	6	8	10	9	8	11	76	6.9
15,000~19,999	0	0	0	0	0	1	0	2	2	4	1	1	11	1
20,000~29,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Ships	32	34	22	29	33	30	36	38	37	35	30	34	390	35.3
Percentage of Total (%)	2.9	3.1	2.0	2.6	3.0	2.7	3.3	3.4	3.3	3.2	2.7	3.1	35.3	
General Cargo Ships														
0~999	9	19	10	13	11	19	17	14	11	10	11	12	156	14.1
1,000~1,999	25	18	14	16	19	21	20	19	13	18	15	16	214	19.3
2,000~2,999	2	4	2	4	7	5	5	5	3	5	10	6	58	5.2
3,000~3,999	2	1	1	1	0	3	1	1	2	1	1	0	14	1.3
4,000~4,999	1	0	0	2	1	1	0	0	0	1	0	0	6	0.5
5,000~9,999	0	1	1	6	1	3	4	1	1	1	3	2	24	2.2
10,000~14,999	0	0	0	0	2	1	1	0	1	1	3	3	12	1.1
15,000~19,999	1	1	0	1	0	0	0	0	0	0	1	0	4	0.4
20,000~29,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Ships	40	44	28	43	41	53	48	40	31	37	44	39	488	44.1
Percentage of Total (%)	3.6	4.0	2.5	3.9	3.7	4.8	4.3	3.6	2.8	3.3	4.0	3.5	44.1	
Other Ships (bulk, passenger, etc.)														
0~999	3	3	7	0	10	2	6	7	6	5	2	6	57	5.2
1,000~1,999	2	4	1	3	1	0	0	0	2	2	1	0	16	1.4
2,000~2,999	3	4	1	3	3	5	4	5	3	2	4	1	38	3.4
3,000~3,999	0	0	1	0	0	0	0	1	0	0	0	1	3	0.3
4,000~4,999	0	1	0	0	0	0	0	0	0	0	0	0	1	0.1
5,000~9,999	1	1	0	0	0	0	0	0	0	0	1	0	3	0.3
10,000~14,999	3	1	0	0	1	0	1	0	0	0	1	0	7	0.6
15,000~19,999	2	0	0	1	1	3	1	1	2	0	2	1	14	1.3
20,000~29,999	2	1	6	3	4	0	1	3	1	4	1	3	29	2.6
30,000~49,999	1	2	1	1	5	4	4	6	2	4	3	2	35	3.2
50,000~	1	1	1	4	3	4	6	3	2	0	0	0	25	2.3
Total Number of Ships	18	18	18	15	28	18	23	26	18	17	15	14	228	20.6
Percentage of Total (%)	1.6	1.6	1.6	1.4	2.5	1.6	2.1	2.4	1.6	1.5	1.4	1.3	20.6	
Grand Total	90	96	68	87	102	101	107	104	86	89	89	87	1,106	

Source: GCPI

Table 4.2.6 Ship Size Distribution by Cargo Type at KZP in 2009

Ship Size (DWT)	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio
Tanker														
0~9,999	0	2	1	0	0	1	0	0	0	0	0	0	4	0.3
10,000~19,999	2	5	3	6	4	2	2	3	2	2	2	0	33	2.7
20,000~29,999	0	3	2	1	1	2	0	0	0	0	0	0	9	0.7
30,000~39,999	2	3	3	1	1	0	0	1	0	1	1	1	14	1.1
40,000~49,999	2	1	0	1	2	3	3	3	3	1	2	5	26	2.1
50,000~99,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
100,000~	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Number of Ships	6	14	9	9	8	8	5	7	5	4	5	6	86	7.0
Percentage of Total (%)	0.5	1.1	0.7	0.7	0.7	0.7	0.4	0.6	0.4	0.3	0.4	0.5	7.0	
General Cargo Ships														
0~999	12	11	12	13	15	6	6	9	4	5	2	8	103	8.4
1,000~1,999	7	10	9	9	6	6	6	3	2	3	6	5	72	5.9
2,000~2,999	8	7	5	9	7	4	4	6	9	9	12	7	87	7.1
3,000~3,999	1	2	3	5	4	5	5	4	4	6	5	8	52	4.2
4,000~4,999	2	3	2	2	4	2	2	0	0	1	2	3	23	1.9
5,000~9,999	7	5	5	3	4	2	2	3	2	4	2	5	44	3.6
10,000~14,999	2	1	1	4	1	1	1	2	1	2	3	2	21	1.7
15,000~19,999	2	4	2	2	2	3	3	2	3	3	2	4	32	2.6
20,000~	2	2	5	2	2	2	2	1	1	1	2	0	22	1.8
Total Number of Ships	43	45	44	49	45	31	31	30	26	34	36	42	456	37.2
Percentage of Total (%)	0.2	0.2	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.0	1.8	
Dhow Ships														
	30	26	31	51	60	22	10	11	13	21	29	38	342	27.9
Total Number of Ships	30	26	31	51	60	22	10	11	13	21	29	38	342	27.9
Ratio by Total (%)	2.4	2.1	2.5	4.2	4.9	1.8	0.8	0.9	1.1	1.7	2.4	3.1	27.9	
Grand Total	109	111	115	160	173	83	56	59	57	80	99	124	1,226	

Source: GCPI

Table 4.2.7 Ship Size Distribution by Cargo Type at KZP in 2010

Ship Size (DWT)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	Ratio
Tanker														
0~9,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
10,000~19,999	1	1	0	1	3	5	3	2	3	3	3	2	27	3.6
20,000~29,999	0	0	0	0	1	0	0	1	0	2	1	0	5	0.7
30,000~39,999	1	0	0	0	0	0	0	1	0	0	1	1	4	0.5
40,000~49,999	3	5	4	3	3	0	3	5	3	3	2	1	35	4.7
50,000~99,999	0	0	1	1	0	2	1	0	1	0	0	0	6	0.8
100,000~	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Total Number of Ships	5	6	5	5	7	7	7	9	7	8	7	4	77	10.4
Percentage of Total (%)	0.7	0.8	0.7	0.7	0.9	0.9	0.9	1.2	0.9	1.1	0.9	0.5	10.4	
General Cargo Ships														
0~999	3	4	2	7	3	4	3	2	3	3	0	4	209	5.1
1,000~1,999	7	6	4	2	2	5	2	2	2	1	1	2	192	4.9
2,000~2,999	12	7	4	10	7	6	8	8	9	5	3	4	25	11.2
3,000~3,999	5	2	4	3	5	6	4	4	1	3	1	1	9	5.3
4,000~4,999	2	1	1	2	3	1	1	2	2	2	3	2	3	3.0
5,000~9,999	5	2	5	4	5	4	6	3	5	0	4	2	13	6.1
10,000~14,999	1	2	3	2	3	1	2	4	0	4	2	3	1	3.6
15,000~19,999	0	3	2	4	3	3	5	1	3	0	5	2	0	4.2
20,000~	1	1	1	1	2	0	1	2	3	4	2	2	0	2.7
Total Number of Ships	36	28	26	35	33	30	32	28	28	22	21	22	452	46.1
Ratio by Total (%)	4.9	3.8	3.5	4.7	4.5	4.1	4.3	3.8	3.8	3.0	2.8	3.0	46.1	
Dhow Ships														
	33	17	13	35	57	21	9	12	9	50	45	21	322	43.5
Total Number of Ships	33	17	13	35	57	21	9	12	9	50	45	21	322	43.5
Percentage of Total (%)	4.5	2.3	1.8	4.7	7.7	2.8	1.2	1.6	1.2	6.8	6.1	2.8	43.5	
Grand Total	74	51	44	75	97	58	48	49	44	80	73	47	740	

Source: GCPI

Part 2

CARGO TRAFFIC FORECAST AND CONCEPTUAL PLAN OF PORTS DEVELOPMET

5. PROSPECTS OF CARGO TRAFFIC DEMAND

5.1. LATEST CARGO STATISTICS OF PORTS IN IRAQ

5.1.1 TREND OF CARGO VOLUMES IN IRAQ PORTS

According to Table 5.1.1, the total cargo volumes in Iraqi ports reached 10.12 million tons in 2001. After that, the total cargo decreased in volume until 2003 with a handling volume of 1.81 million tons. The total cargo volume then increased after making the lowest volume in 2003 and recorded the highest volume of 11.94 million tons in 2006. The latest cargo handling volume was 10.31 million tons in 2010.

Table 5.1.1 Trend of Cargo Volumes and Ship Calls in Iraqi Ports

Year	Umm Qasr Port			Khor Al Zubayr Port			Total		
	Cargo Volume (x 1,000 tons)	Share by UQP (%)	Ship Calls	Cargo Volume (x 1,000 tons)	Share by KZP (%)	Ship Calls	Cargo Volume (x 1,000 tons)	Annual Growth	Ship Calls
1997	3,173	93	222	248	7	1,264	3,421		1,486
1998	3,913	96	295	163	4	1,101	4,076	19	1,396
1999	3,843	90	287	406	10	1,295	4,249	4	1,582
2000	6,022	86	397	989	14	2,520	7,011	65	2,917
2001	7,001	69	533	3,114	31	4,319	10,115	44	4,852
2002	6,083	77	512	1,804	23	4,258	7,887	-22	4,770
2003	1,682	93	512	129	7	44	1,811	-77	556
2004	2,105	55	894	1,737	45	780	3,842	112	1,674
2005	3,244	64	503	1,857	36	945	5,101	33	1,448
2006	7,659	64	858	4,294	36	1,307	11,953	134	2,165
2007	6,310	59	876	4,395	41	1,069	10,705	-10	1,945
2008	7,595	65	898	4,032	35	1,006	11,627	9	1,904
2009	7,662	70	1,146	3,291	30	900	10,953	-6	2,046
2010	7,513	73	1,106	2,804	27	736	10,317	-6	1,842

Source: GCPI

5.1.2 CARGO STATISTICS OF UMM QASR PORT (UQP) AND KHOR AL ZUBAYR PORT (KZP)

Table 5.1.2 shows cargo handling volumes between 2006 and 2010 in UQP. The total cargo volumes in UQP reached 7.65 million tons in 2006 and the range continued from 6.31 to 7.66 million tons in 2007 until 2010.
It is noted that from 2006 to 2010, the handling volume of container cargoes has been more than three times. Cargoes in UQP are almost imported and the export cargoes have not been recorded for the last five years.

Table 5.1.2 Cargo Handling Volumes in UQP

(Unit: MT)

Cargo Item/Year	2006	2007	2008	2009	2010
Import Cargo					
1. Containers (TEU)	819,573 (69,060)	823,475 (69,956)	1,562,767 (132,118)	1,817,238 (178,378)	2,776,358 (231,014)
2. Conventional Cargo					
(1) Grain (wheat)	2,858,509	2,324,035	3,279,105	2,898,591	1,800,999
(2) Rice	917,806	668,736	960,670	954,342	947,383
(3) Sugar	393,850	734,920	568,310	260,327	455,656
(4) Cement	1,959,179	749,341	444,850	889,980	456,734
(5) Steel & Pipes	67,875	62,692	183,832	121,967	347,461
(6) Vehicles	40,051	3,417	44,326	94,636	100,136
(7) Other Conventional Cargo	601,969	943,796	551,442	624,469	628,330
(Sub-total)	6,839,239	5,486,937	6,032,535	5,844,312	4,736,699
Total Discharged	7,658,812	6,310,412	7,595,302	7,661,550	7,513,057
Export Cargo					
1. Container (TEU)	(69,060)	(69,956)	(132,118)	(178,378)	(231,014)
2. Conventional Cargo	0	0	0	0	0
(1) Grain	0	0	0	0	0
(2) Other Conventional Cargo	0	0	0	0	0
(Sub-total)	0	0	0	0	0

Source: GCPI

Table 5.1.3 shows the cargo handling volumes between 2006 and 2010 in KZP. The import cargoes have increased gradually for the last five years and the export cargoes have decreased sharply. According to port statistics, a marked decrease of the export cargoes was caused by a decrease in fuel oil export.

Table 5.1.3 Cargo Handling Volumes in KZP

(Unit: MT)

Cargo Item/Year	2006	2007	2008	2009	2010
Import Cargo					
1. Containers (TEU)	10,327 (855)	26,634 (2,206)	34,201 (2,832)	16,215 (1,336)	18,216 (1,500)
2. Conventional Cargo					
(1) Grain (wheat)	2,400	6,800	14,043	14,770	10,307
(2) Rice	38,978	19,590	7,903		
(3) Sugar	25,482	109,464	133,727	86,578	91,325
(4) Date	100,000	100,000	107,937	162,761	141,413
(5) Cement	912,417	745,449	585,862	981,981	1,202,245
(6) Iron (steel & pipes)	0	147,425	178,805	328,947	146,251
(7) Vehicles	1,435	0	0	0	0
(8) Other Conventional Cargo	378,483	240,028	300,977	381,400	160,344
(Sub-total)	1,459,195	1,368,756	1,329,254	1,956,437	1,751,885
3. Liquid Bulk (petrochemical products)	649,025	934,276	735,239	574,049	866,164
Total Import	2,118,547	2,329,666	2,098,694	2,546,701	2,636,265
Export Cargo					
1. Containers (TEU)	855	2,205	2,832	1,250	1,440
2. Conventional Cargo					
(1) Date	65,000	65,000	65,000	65,032	65,403
(2) Other Conventional Cargo	119,653	111,481	56,130	19,630	13,884
(Sub-total)	184,653	176,481	121,130	84,662	79,287
3. Liquid Bulk (fuel oil)	1,990,300	1,888,447	1,812,521	660,090	88,077
Total Export	2,174,953	2,064,928	1,933,651	744,752	167,364
GRAND TOTAL	4,293,500	4,394,594	4,032,345	3,291,453	2,803,629

Source: GCPI

5.1.3 OTHER PORTS

Cargo statistics in Al Maqil Port are shown in Table 5.1.4. Entering the port is restricted due to a shallow depth in the Aguarq Cree navigation channel.

Table 5.1.4 Cargo Handling Volumes in Maqil Port

Year	Cargo Volumes (tons)	Ship Calls
2009	49,370	150
2010	184,143	400
2011	497,126	950

Source: GCPI

There are no cargo handling records available for the Abu Flus Port, which mainly handles container cargoes. However, according to the port manager of the Abu Flus Port, about five cargo ships with 140 container boxes come every week from Dubai (140 boxes x 5 ship calls/week x 50 weeks = 35,000 Boxes = approximately 50,000 TEUs).

5.2. FUTURE SOCIOECONOMIC FRAMEWORK FOR THE TARGET YEARS IN IRAQ

5.2.1 POPULATION

The population of Iraq in the year 2010 was estimated to be 31.7 million. The average annual growth rate was 2.87% for the period of 2000-2010. In this demand forecast, the future population growth rates were estimated using the reference World Population Prospects; the 2010 Revision by United Nations. The average annual growth rates towards the respective target years are as follows (see Table 5.2.1):

- Average annual growth rate of 3.15% in the period of 2010-2015;
- Average annual growth rate of 2.83% in the period of 2015-2025;
- Average annual growth rate of 2.40% in the period of 2025-2035.

Table 5.2.1 Population Forecast up to 2035

Year	2000	2005	2010	2015	2020	2025	2030	2035
Population (x1,000)	23,857	27,359	31,672	36,977	42,684	48,885	55,257	61,977
Annual Growth Rate (%)	2.87			3.15	2.83		2.40	

Source: World Population Prospects; The 2010 Revision by United Nations

5.2.2 GROSS DOMESTIC PRODUCT (GDP)

The gross domestic product (GDP) of Iraq in the year 2010 was estimated to be IQD 38,658 billion (USD 23,583 million). The average annual growth rate was -0.9% for the period of 2000-2010. The future annual growth rate of GDP in 2011-2016 is estimated using the IMF Data and Statistics as shown in Table 5.2.2:

- Average annual growth rate of -0.9% in the period of 2000-2010
- Average annual growth rate of 10.1% in the period of 2010-2016 (refer to Table 5.2.2).

Table 5.2.2 Historical Trend and Forecast of Iraqi GDP

Year	GDP, constant prices/base year 1988 (IQD billion)	GDP, constant prices/base year 2000 (USD million)	Annual Growth Rate (%)	GDP per capita (USD)
2000	42,386	25,857	-4.3	-
2001	39,589	24,150	-6.6	-
2002	36,501	22,266	-7.8	-
2003	21,426	13,070	-41.3	-
2004	31,389	19,148	46.5	951
2005	31,160	19,014	-0.73	1,124
2006	33,093	20,193	6.20	1,568
2007	33,588	20,496	1.49	1,926
2008	36,784	22,443	9.52	2,845
2009	38,334	23,386	4.21	2,056
2010	38,658	23,583	0.84	2,531
2011	42,387	25,859	9.65	3,306
2012	47,714	-	12.57	3,528
2013	52,598	-	10.24	4,113
2014	57,534	-	9.38	4,446
2015	62,621	-	8.84	4,823
2016	68,761	-	9.81	5,316

Source: IMF Data and Statistics, and World Bank

The future GDP is estimated using the annual growth rate of 5.5%, 7.5%, and 8.5% for low growth scenario, medium growth scenario and high growth scenario, respectively, based on the Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project by GCPI. The projected GDP is shown in Table 5.2.3.

Table 5.2.3 Future GDP and Growth Rate

(Unit: USD million and 2000 constant prices)

	2010	**2015**	**2025**	**2035**
GDP				
a) Low growth case (5.5% per year)	23,583	30,822	52,648	89,931
b) Medium growth case (7.5% per year)	23,583	33,857	69,780	143,820
c) High growth case (8.5% per year)	23,583	35,461	80,176	181,277
GDP per capita (USD)	2,531	4,823	8,361	11,952

Source: JICA Study Team

5.3. DEMAND FORECAST BY MACRO ANALYSIS

Future cargo demand is closely related to the socioeconomic activities in the port hinterland. The future cargo volume by macro analysis is estimated based on the correlation between GDP in the region and cargo volumes through both ports (UQP and KZP). It is noted that all the cargoes handled at both ports would be international trading cargoes like import or export.

The projected cargo volume except liquid bulk is calculated using the following regression formula. Results are shown in Table 5.3.1.

$$Y = 0.7452X - 8{,}837.2 \ (R = 0.792)$$

Where, X: *GDP in Iraq (million USD)*
Y: *Cargo Volume (MT)*

Table 5.3.1 Demand Forecast by Macro Analysis

Case and Year	GDP (USD million)	Forecast Cargo Volume (x1,000 MT)
Low Case		
2015	30,822	14,131
2025	52,648	30,396
2035	89,931	58,180
Medium Case		
2015	33,857	16,393
2025	69,780	43,163
2035	143,820	98,337
High Case		
2015	35,461	17,588
2025	80,176	50,910
2035	181,277	126,250

5.4. DEMAND FORECAST BY MICRO ANALYSIS

5.4.1 PREMISES AND SUMMARY

The target years in demand forecast have been set to the years 2015, 2025, and 2035. It is expected that the restoration projects are to complete between 2010 and 2015. Subsequently, the short to medium-term development plans will be carried out until 2025 and the target year to implement the long-term development plan is set on 2035.

Based on the above, the cargo demand is estimated generally with the following steps:

Step 1: The entire demand is estimated by commodity such as container cargoes, general cargoes, and bulk cargoes for the target years 2015, 2025, and 2035 based on the relationship with population and GDP in Iraq;

Step 2: The demand is allocated in three regions (northern, middle and southern part of Iraq) depending on the number of population in each region and the location of ports in neighboring countries,

Step 3: The estimated cargo volume is allocated to the objective ports in Iraq in accordance with the present commodity being handled and the ratio of the handling volume in the objective ports.

The resulting figures in the cargo demand forecast are summarized in Table 5.4.1 followed by its breakdown of cargo items.

Table 5.4.1 Forecast Cargo Volumes for Ports in Iraq

Cargo Item/Year	Unit	UQP				KZP			
		2010	2015	2025	2035	2010	2015	2025	2035
Import Cargo									
1. Containers (include Export)	TEU	231,014	628,000	2,120,000	5,194,000	1,584	10,000	34,000	84,000
2. Conventional Cargo									
(1) Grain (wheat)	MT	1,800,999	3,814,000	5,539,000	7,403,000	10,307	15,000	22,000	30,000
(2) Rice	MT	947,383	844,000	1,461,000	1,920,000	0	0	0	0
(3) Sugar	MT	455,656	485,000	641,000	813,000	91,325	92,000	121,000	154,000
(4) Date	MT	0	0	0	0	141,413	0	0	0
(5) Cement	MT	456,734	1,021,000	2,534,000	4,126,000	1,202,245	1,137,000	2,824,000	4,598,000
(6) Steel & Pipes	MT	347,461	886,000	3,044,000	7,489,000	146,251	708,000	2,430,000	5,981,000
(7) Vehicles	unit	15,770	244,000	359,000	491,000	0	0	0	0
(8) Other Conventional Cargo	MT	628,330	955,000	1,974,000	3,449,000	160,344	419,000	867,000	1,513,000
3. Liquid Bulk Cargo (petrochemical products)	MT	0	0	0	0	866,164	1,686,000	1,686,000	1,686,000
Total Import Cargo	MT	4,636,563	8,005,000	15,193,000	25,200,000	2,618,049	4,057,000	7,950,000	13,962,000
Total Import Cargo except Oil	MT	4,636,563	8,005,000	15,193,000	25,200,000	1,751,885	2,371,000	6,264,000	12,276,000
Container	TEU	231,014	628,000	2,120,000	5,194,000	1,584	10,000	34,000	84,000
Vehicle	unit	15,770	244,000	359,000	491,000	0	0	0	0
Export Cargo									
1. Conventional Cargo									
(1) Date	MT	0	0	0	0	65,403	60,000	110,000	312,000
(2) Other Conventional Cargo	MT	0	0	0	0	13,884	65,000	65,000	65,000
2. Liquid Bulk Cargo (fuel oil)	MT	0	0	0	0	88,077	1,046,000	2,253,000	4,851,000
Total Export Cargo	MT	0	0	0	0	167,364	1,171,000	2,428,000	5,228,000
Total Export Cargo except Oil	MT	0	0	0	0	79,287	125,000	175,000	377,000
Container	TEU	231,014	628,000	2,120,000	5,194,000	1,529	10,000	34,000	84,000

Source: JICA Study Team

Comparison of Forecast by Macro and Micro Analyses

The forecast volume excluding liquid bulk cargoes by micro analysis is compared with the result of the low/medium/high case in macro analysis. The container in TEU is converted into metric ton by 11.5 ton/TEU and the vehicle in number by 6.35 ton/unit.

Table 5.4.2 Comparison of Forecast by Macro and Micro Analyses

Year	Macro Analysis (x1,000 ton)		Micro Analysis (x1,000 ton)
2015	(Low) (Medium) (High)	14,131 16,393 17,588	19,502
2025	(Low) (Medium) (High)	30,396 43,163 50,910	48,683
2035	(Low) (Medium) (High)	58,180 98,337 126,250	101,668

Source: JICA Study Team

The forecast volume excluding liquid bulk cargoes by micro analysis in 2015 exceeds the volume in the high case of macro analysis by nearly 10%, while the forecast volume by micro analysis in 2025 and 2035 ranges between the medium case and the high case of macro analysis.

The micro analysis of the traffic forecast based on the commodities is considered to be aggressive in some degree, but is also a reflective of the cargo movements through the ports. Therefore, the micro analysis results will be used for planning the port development and project analysis.

5.4.2 CONTAINER CARGOES

(1) Empty Containers

According to the Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project prepared in the Iraq Port Sector Rehabilitation Project Phase I, GCPI calculated the container volume in metric ton considering the laden container only and recorded the weight in the manifest of the import container document. As a result of the interview survey to the private shipping company, empty containers were loaded (exported) from UQP in 2006, 2007, and 2008. The number of laden and empty containers from 2006 to 2008 is shown in Table 5.4.3.

Table 5.4.3 Proportion of Laden and Empty Container Boxes in UQP

(Container)	2006		2007		2008	
	Laden (Import)	Empty (Export)	Laden (Import)	Empty (Export)	Laden (Import)	Empty (Export)
20 ft	10,920	8,946	N.A.	N.A.	33,250	24,764
40 ft	37,416	31,666	N.A.	N.A.	84,104	68,912
Total boxes	48,336	40,612	74,291	73,225	117,354	93,676
Total TEU	85,752	72,278			201,458	162,588
Total TEU	158,030				364,046	
Ratio	54%	46%	50%	50%	55%	45%

Source: The Study for Development of Southern Ports in Iraq Post-PhaseI Rehabilitation Project by GCPI

In case of KZP, the ratio of laden and empty containers in 2009 and 2010 is shown in Table 5.4.4.

Table 5.4.4 Proportion of Laden and Empty Container Boxes in KZP

(Container)	2009		2010	
	Laden (Import)	Empty (Export)	Laden (Import)	Empty (Export)
20 ft	1,262	1,181	1,416	1,351
40 ft	74	69	84	89
Total boxes	1,336	1,250	1,500	1,440
Total TEU	1,410	1,319	1,584	1,529
Total TEU	2,729		3,113	
Ratio	52%	48%	51%	49%

Source: GCPI

Based on the above table, it is assumed that both ports handle the empty container of nearly 50% out of the total container boxes.

(2) Number of Containers Handled in the Ports

Table 5.4.5 shows the number of containers and the total weight of the container volume from 2006 to 2010 in UQP. According to Table 5.4.3, the 20 ft and 40 ft containers are nearly in the ratio of 1:3 in UQP. This means that the number of TEU is obtained by multiplying the number of boxes by 1.75.

Table 5.4.5 Number and Total Weight of Containers handled at UQP

(Unit: MT)

Year		Number of Containers		Total Weight (MT)	Weight /TEU (MT/TEU)
		Box	TEU		
2006	Laden	39,463	69,060	819,573	11.9
	Empty	39,463	69,060		
	Subtotal	78,926	138,121		
2007	Laden	39,975	69,956	823,475	11.8
	Empty	39,975	69,956		
	Subtotal	79,950	139,912		
2008	Laden	75,496	132,118	1,562,767	11.8
	Empty	75,496	132,118		
	Subtotal	150,992	264,236		
2009	Laden	89,189	178,378	1,817,238	10.2
	Empty	89,189	178,378		
	Subtotal	178,378	356,756		
2010	Laden	132,008	231,014	2,776,358	12.0
	Empty	132,008	231,014		
	Subtotal	264,016	462,028		

Source: GCPI and the Consultants' estimates

According to Table 5.4.4, 20 ft and 40 ft containers are nearly in the proportion of 95% to 5% in KZP. This means that the number of TEU is obtained by multiplying the number of boxes by 1.05. Based on the above assumption, the number of containers handled at KZP is shown in Table 5.4.6. An average weight of containers equal to 11.5 ton/TEU that were handled at UQP was used to calculate the weight of containers in KZP.

Table 5.4.6 Number and Total Weight of Containers handled at KZP

(Unit: MT)

Year		Number of Containers		Total Weight (MT)	Weight /TEU (MT/TEU)
		Box	TEU		
2006	Laden	855	898	10,327	11.5
	Empty	855	898		
	Subtotal	1,710	1,796		
2007	Laden	2,206	2,316	26,634	11.5
	Empty	2,205	2,315		
	Subtotal	4,411	4,631		
2008	Laden	2,832	2,974	34,201	11.5
	Empty	2,832	2,974		
	Subtotal	5,664	5,948		
2009	Laden	1,336	1,410	16,215	11.5
	Empty	1,250	1,319		
	Subtotal	2,586	2,729		
2010	Laden	1,500	1,584	18,216	11.5
	Empty	1,440	1,529		
	Subtotal	2,940	3,113		

Source: GCPI and the Consultants' estimates

(3) Forecast of Container Cargoes

The volume of imported container cargoes has been increasing along with the GDP growth from 2006 to 2010 as shown in Table 5.4.7.

The projected volume of imported container cargoes is estimated by adopting the linear regression analysis by correlating the number of TEUs with the GDP in Iraq.

$$Y = 0.0422X - 791{,}199\ (R = 0.959)$$

Where, *X: GDP in Iraq (x USD 1,000)*
Y: Imported Container Volume (TEU)

Accordingly, the projected volume of container cargoes handled in the ports is as follows.

Table 5.4.7 Forecast of Container Cargoes

Year	2006	2007	2008	2009	2010	2015	2025	2035
GDP (USD million)	20,193	20,496	22,443	23,386	23,583	33,857	69,780	143,820
Container Volume Import (TEU)	69,958	72,272	135,092	179,788	232,598	638,000	2,154,000	5,278,000
Container Volume Export (TEU)	69,958	72,271	135,092	179,697	232,543	638,000	2,154,000	5,278,000
Container Volume Total (TEU)	139,916	144,543	270,184	359,485	465,141	1,276,000	4,308,000	10,556,000

Source: JICA Study Team

5.4.3 CONVENTIONAL CARGOES

(1) Wheat

The consumed volumes of wheat in the future have been estimated by multiplying Iraq's estimated population and consumption per capita in the future. Wheat consumption per capita per annum from 2006-2009 was recorded at 163 to 220 kg, with an average of 190 kg per annum according to Table 5.4.8. In this demand forecast, taking into account the recent consumption, the future consumption of wheat in Iraq is calculated on the assumption that the per capita consumption will increase by 5 kg/yr up to 220 kg/yr and is expected to remain for the succeeding years.

Similarly, the domestic production of wheat from 2006 to 2009 in Iraq was recorded at 1.26 million to 2.2 million MT with an average of 1.81 million MT per annum according to Table 5.4.8. In this demand forecast, taking into account the recent production, the future production volume of wheat in Iraq is calculated on the assumption that the production volume will increase by 50,000 MT/yr up to 2.2 million MT/yr and is expected to remain for the succeeding years.

Table 5.4.8 Historical Trend and Forecast of the Volume of Imported Wheat in Iraq

Year	2006	2007	2008	2009	2010	2015	2025	2035
Population ($x10^3$ person)	28,222	29,084	29,947	30,809	31,672	36,977	48,885	61,977
Consumption per capita (kg)	220	184	163	190	190	215	220	220
Consumption ($x10^3$ MT)	6,220	5,349	4,879	5,859	6,018	7,950	10,755	13,635
Production ($x10^3$ MT)	2,086	2,203	1,255	1,700	1,810	2,060	2,200	2,200
Imported Wheat ($x10^3$ MT)	4,134	3,147	3,624	4,159	4,208	5,890	8,555	11,435

Source: World Population Prospects; the 2010 Revision by United Nation (UN) and FAOSTAT by UN

The volume of imported wheat via the objective ports in the future has been estimated by allocating a part of the entire imported volume (as shown in Table 5.4.8) to the objective ports in proportion to the percentage of the population in the potential hinterland of the objective ports in wheat (flour) distribution.

(2) Rice

The consumed volume of rice in the future has been estimated by multiplying the estimated population and consumption per capita in the future. Rice consumption per capita per annum from 2006 to 2009 in Iraq was recorded at of 30 to 54 kg with an average of 39 kg per annum according to Table 5.4.9. In this demand forecast, taking into account the recent consumption, the future consumption of rice in Iraq is calculated on the assumption that per capita consumption will increase by 1 kg/yr up to 54 kg/yr and is expected to remain for the succeeding years.

Similarly, the domestic production of rice from 2006 to 2009 in Iraq was recorded at 173,000 to 393,000 MT with an average of 294,000 MT per annum according to Table 5.4.9. In this demand forecast, taking into account of the recent production, the future production volume of rice in Iraq is calculated on the assumption that the production volume will increase by 7 MT/yr up to 393,000 MT/yr and is expected to remain for the succeeding years.

Table 5.4.9 Historical Trend and Forecast of the Volumes of Imported Rice in Iraq

Year	2006	2007	2008	2009	2010	2015	2025	2035
Population ($x10^3$ person)	28,222	29,084	29,947	30,809	31,672	36,977	48,885	61,977
Consumption per capita (kg)	54	39	32	30	39	44	54	54
Consumption ($x10^3$ MT)	1,510	1,129	942	929	1,235	1,627	2,640	3,347
Production ($x10^3$ MT)	363	393	248	173	294	329	393	393
Imported Rice ($x10^3$ MT)	1,147	736	694	756	941	1,298	2,247	2,954

Source: World Population Prospects; The 2010 Revision by United Nation (UN) and FAOSTAT by UN

The volume of imported rice via objective ports in the future has been estimated by allocating a part of the entire imported volume shown in Table 5.4.9 to the objective ports proportional to the percentage of the population in the potential hinterland of the objective ports in rice distribution.

(3) Sugar

The consumed volume of sugar in the future has been estimated by multiplying the estimated population and consumption per capita in the future. Sugar consumption per capita and per annum from 2006 to 2009 in Iraq was recorded at 13 to 24 kg with an average of 21 kg per annum according to Table 5.4.10. In this demand forecast, taking into account the recent consumption, the future consumption of sugar in Iraq is calculated on the assumption that per capita consumption will increase by 0.5 kg/yr up to 24 kg/yr and is expected to remain for the succeeding years.

Table 5.4.10 Historical Trend and Forecast of the Volumes of Imported Sugar in Iraq

Year	2006	2007	2008	2009	2010	2015	2025	2035
Population ($x10^3$ person)	28,222	29,084	29,947	30,809	31,672	36,977	48,885	61,977
Consumption per capita (kg)	22	13	24	24	21	24	24	24
Consumption ($x10^3$ MT)	629	372	726	750	665	887	1,173	1,487
Production ($x10^3$ MT)	0	0	0	0	0	0	0	0
Imported Sugar ($x10^3$ MT)	629	372	726	750	665	887	1,173	1,487

Source: World Population Prospects; The 2010 Revision by United Nation (UN) and FAOSTAT by UN

The volume of imported sugar via objective ports in the future has been estimated by allocating a part of the entire imported volume shown in Table 5.4.10 to the objective ports in proportion to the percentage of the population in the potential hinterland of the objective ports in sugar distribution.

(4) Date

<u>Import</u>

The consumed volume of date in the future has been estimated by multiplying the estimated population and consumption per capita in the future. Date consumption per capita and per annum from 2006 to 2009 in Iraq was recorded at 18 to 22 kg with an average of 20 kg per annum according to Table 5.4.11. In this demand forecast, taking into account the recent consumption, the future consumption to date in Iraq is calculated on the assumption that per capita consumption will remain at 20 kg/yr which is an average figure between 2006 and 2009.

The projected volume of date production is estimated by adopting the linear regression analysis by correlating it with the GDP in Iraq.

$$Y = 0.0238X - 52{,}256\ (R = 0.991)$$

Where, X: GDP in Iraq (x USD 1,000)
Y: Date production (MT)

Accordingly, the projected volume of date production is shown in Table 5.4.11.

Table 5.4.11 Historical Trend and Forecast of the Volumes of Imported Date in Iraq

Year	2006	2007	2008	2009	2010	2015	2025	2035
Population ($x10^3$ person)	28,222	29,084	29,947	30,809	31,672	36,977	48,885	61,977
Consumption per capita (kg)	18.9	18.3	19.5	21.7	20.0	20.0	20.0	20.0
Consumption ($x10^3$ MT)	532,360	530,861	584,255	669,763	633,440	739,540	977,700	1,239,540
Production ($x10^3$ MT)	432,360	430,861	476,318	507,002	492,027	754,000	1,609,000	3,371,000
Imported Date ($x10^3$ MT)	100,000	100,000	107,937	162,761	141,413	0	0	0

Source: World Population Prospects; the 2010 Revision by United Nation (UN) and FAOSTAT by UN

The volume of imported date via objective ports in the future has been estimated by allocating a part of the entire imported volume shown in Table 5.4.11 to the objective ports in proportion to the percentage of the population in the potential hinterland of the objective ports in date distribution. It is noted that the imported date will be zero in 2015, 2025, and 2035 because the production rate is expected to exceed the consumption rate of date.

Export

The exported volume of date has been fluctuating and with an increasing trend for the last five years as shown in Table 5.4.12. Therefore, the future volume of date is estimated using an elastic value which is calculated based on the difference of the growth rate between the exported date and the GDP in Iraq. GDP is expected to increase by 7.5%/yr from 2011 to 2035.

Accordingly, the future exported volume of date is calculated at 60,000 tons, 110,000 tons, and 312,000 tons in 2015, 2025, and 2035, respectively.

Table 5.4.12 Forecast of Exported Date

Year	2006	2007	2008	2009	2010	2015	2025	2035
GDP (USD million)	20,193	20,496	22,443	23,386	23,583	33,857	69,780	143,820
Exported Date (MT)	15,900	6,608	18,534	64,513	61,959	60,000	110,000	312,000

Source: JICA Study Team

(5) Cement

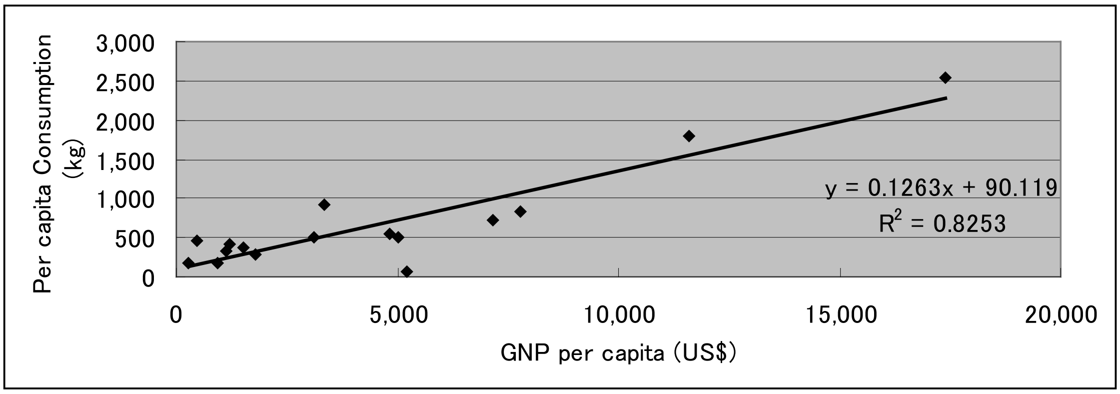
According to the research website, recent cement consumption in Iraq rose by 18 percent annually from 2005 to 2010 and reached over 18 million tons. Iraq continues to import more than 11 million tons of cement, largely from Turkey. The balance (about 7 million tons) between cement consumption and imported volume should be the volume of domestic production.

Table 5.4.13 and Figure 5.4.1 show a relationship between the regional per capita cement consumption and GNP per capita in 1999, based on the data from an Overview of the Iraq Cement Industry 2007 by the United States Agency for International Development (USAID). Figure 5.4.1 demonstrates the relationship between per capita cement consumption and GNP per capita. In general, the relationship for developing countries implies an increased consumption with increasing discretionary wealth. In other words, it is noted that there is a correlativity between the regional per capita cement consumption and GNP/capita.

Table 5.4.13 Regional Per Capita Cement Consumption and GNP/Capita

Country Name	Per Capita Consumption (kg)	GNP/Capita	Country Name	Per Capita Consumption (kg)	GNP/Capita
Iraq	165	950	Oman	550	4,820
Yemen	172	270	Saudi Arabia	718	7,150
Iran	280	1,780	Israel	822	16,180
Syria	318	1,120	Bahrain	841	7,800
Jordan	373	1,520	Lebanon	927	3,350
Egypt	414	1,200	Kuwait	1,111	17,390
Turkey	494	3,130	Qatar	1,792	11,600
Palestine	506	5,000	UAE	2,542	17,400

Source: An Overview of the Iraq Cement Industry 2007 by USAID



Source: An Overview of the Iraq Cement Industry 2007

Figure 5.4.1 Relationship between Per Capita Cement Consumption and GNP/Capita

The projected figure of per capita cement consumption was estimated by adopting the linear regression analysis by correlating it with the GDP per capita in Iraq.

Accordingly, the projected volume of per capita consumption is shown in Table 5.4.14.

$$Y = 0.1263X + 90.119\ (R = 0.908)$$

Where, *X:* *GDP per capita (USD)*
Y: *per capita cement consumption (kg)*

Table 5.4.14 Forecast of Per Capita Cement Consumption in Iraq

Year	2010	2015	2025	2035
GDP per capita (USD)	2,531	4,823	8,361	11,952
Per capita cement consumption (kg)	410	700	1,150	1,600

Source: JICA Study Team

According to an Overview of the Iraq Cement Industry 2007 by the USAID, the total current demand in Iraq can be estimated and forecasted on the basis of its total current supply, comprising domestic production and imports. Orascom Construction Industries Annual Report of 2006 mentioned an estimated 3 million tons of production and an import figure of 7 million tons, giving a total current demand figure of 10 million tons or a per capita consumption of 385 kg/head in Iraq. The Ministry of Industry and Minerals (MIM) suggests that the domestic demand could reach 30 million tons, i.e., a nominal per capita demand of 1,111 kg/head, matching the consumption rate of Kuwait in 1999 and Spain in 2005. Significantly, a demand of 600 kg/head for the rebuilding and reconstruction program to match with Qatar, and additional 1400 kg/head in the light of the massive building and redevelopment program within UAE are to be consumed. This would be equivalent to an additional figure of 16.2 and 37.8 million tons, respectively, on top of the suggested 30 million tons.

In addition to the above, the overall status of the domestic industry reflects the economic constraints evident in the economy as a whole through two Gulf wars and the long period of imposed sanctions. Whereas as the industry was being developed and expanded from the 1970’s through the 1980’s and became a net exporter, the industry was substantially destroyed within a decade. Issues now concerning the industry are lack of consistent sources of power and fuel, outdated technology, lack of servicing, and maintenance. To become a regional force again, the industry needs significant investment. Based on the encouragement of investments, it is expected that the total capacities of new and refurbished plants, with its realization, will be as follows;

- Refurbishment Iraqi Plants: 8.2 million ton/year
- New Licenses-Iraq: 25.6 million ton/year
- Others: 7.2 million ton/year

Total: 41.0 million ton/year

Based on the above expectations, it is assumed that the half and all 41 million tpa cements will be provided by 2025 and 2035, respectively.

According to Table 5.4.15, the imported volume in Iraqi ports fluctuated in the range of 1 million-2.9 million tons with a volume of about 1.7 million tons in 2010, which is about 15% of the total imported volume. It is assumed that the same share of the volume to be handled in Iraqi ports will be applied until 2035.

Table 5.4.15 Cement Consumption and Imported Volume

Year	2006	2007	2008	2009	2010	2015	2025	2035
Population (x10^3 person)	28,222	29,084	29,947	30,809	31,672	36,977	48,885	61,977
Consumption per capita (kg)	-	-	-	-	410	700	1,150	1,600
Consumption (x10^3 MT)	-	-	-	-	18,000	25,884	56,218	99,163
Production (x10^3 MT)	-	-	-	-	7,000	11,500	20,500	41,000
Import in Iraq (x10^3 MT)	-	-	-	-	11,000	14,384	35,718	58,163
Import at Ports (x10^3 MT)	2,872	1,495	1,031	1,872	1,659	2,158	5,358	8,724

Source: JICA Study Team

(6) Steel and Pipes

The volume of steel and pipes have been increasing along with GDP growth in the same period as shown in Table 5.4.16.

The projected volume of steel and pipes are estimated by adopting the linear regression analysis by correlating it with the GDP in Iraq.

$$Y = 0.108X - 2{,}062{,}163 \ (R = 0.975)$$

Where, X: GDP in Iraq (x USD 1,000)
Y: Steel & Pipes (MT)

Accordingly, the projected volume of steel and pipes handled at ports is as follows.

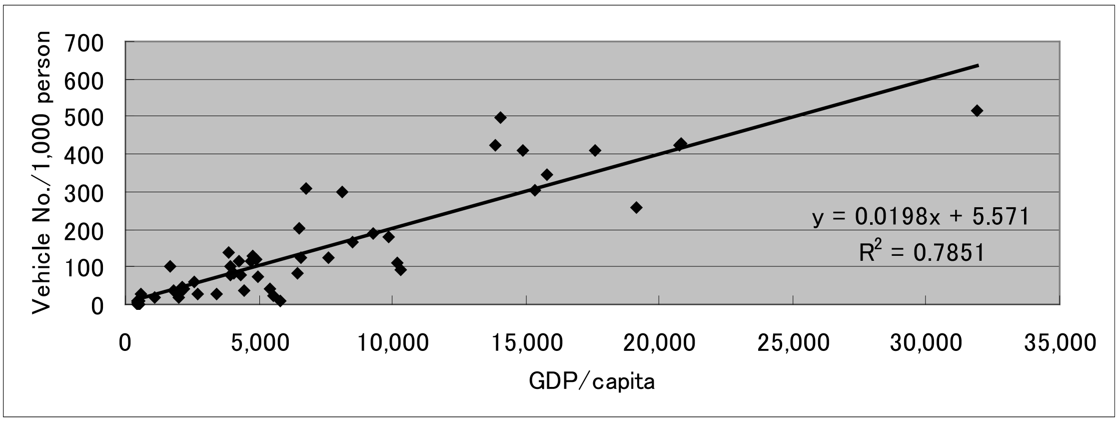
Table 5.4.16 Forecast of Steel and Pipes

Year	2006	2007	2008	2009	2010	2015	2025	2035
GDP (USD million)	20,193	20,496	22,443	23,386	23,583	33,857	69,780	143,820
Steel and Pipes (MT)	6,7875	210,117	362,637	450,914	493,712	1,594,000	5,474,000	13,470,000

Source: JICA Study Team

(7) Vehicles

The relationship between the number of vehicles holding per 1,000 persons and GDP per capita of 2008 in the world is shown in Figure 5.4.2.



Source: World Bank

Figure 5.4.2 Number of Vehicles Holding and GDP per Capita in the World

The number of vehicles holding has been increasing along with GDP per capita growth in the same period as shown in Figure 5.4.2.
The projected volume of vehicle holding per 1,000 persons is estimated by adopting the linear regression analysis by correlating it with the GDP per capita in Iraq.

$$Y = 0.0198X + 5.571\ (R = 0.886)$$

Where, *X:* *GDP per capita in Iraq (USD)*
Y: *Vehicle holding per 1,000 persons (unit)*

Accordingly, the projected volume of vehicle holding is as follows.

Table 5.4.17 Future Vehicle Holding in Iraq

Year	2002	2006	2008	2010	2015	2025	2035
Population (x10^3 person)	25,258	28,222	29,947	31,672	36,977	48,885	61,977
GDP per capita (USD)	742	1,568	2,845	2,531	4,823	19,295	80,816
Number of Vehicle (unit)	950,000	1,070,000	1,497,000	1,764,000	3,737,000	8,365,000	15,012,000
Vehicle Holding per 1,000 persons (unit)	39	37	50	56	101	171	242

Source: The Study for Development of Southern Ports in Iraq Post-Phase 1 Rehabilitation Project and estimates by the JICA Study Team

According to the cargo data supplied by GCPI, 100,136 tons of vehicles imported at UQP in 2010, which is equivalent to 15,770 units of vehicles. GCPI calculated the vehicle weight in metric tons based on the manifest of the import vehicle document (6.35 tons/unit).
Table 5.4.18 shows forecast of the imported vehicles in Iraq based on the number of vehicles holding.

Table 5.4.18 Forecast of Imported Vehicles

Year	2010	2014	2015	2024	2025	2034	2035
Total National Vehicle Demand (x10^3 unit)	1,764	3,361	3,737	7,813	8,365	14,256	15,012
Imported Vehicle Number (x10^3/year)	338	-	376	-	552	-	756

Source: JICA Study Team

(8) Other Conventional Cargoes

The imported volume of other conventional cargoes has been fluctuating and with a decreasing trend for the last five years as shown in Table 5.4.19. However, the proportion of other conventional cargo volume to the total dry cargo volume was stable ranging from 12% to 17% with an average rate of 13% from 2006 to 2010. Therefore, it is assumed that the above proportion will remain at an average rate for future volume of other conventional cargoes.

Accordingly, the future imported volume of other conventional cargoes was calculated at 1.37 million tons, 2.84 million tons and 4.96 million tons in 2015, 2025 and 2035, respectively.

Table 5.4.19 Forecast of Other Conventional Cargoes

Year	2006	2007	2008	2009	2010	2015	2025	2035
GDP (USD million)	20,193	20,496	22,443	23,386	23,583	33,857	69,780	143,820
Other Conventional Cargoes (MT)	910,552	1,123,216	852,419	1,005,869	788,674	1,374,000	2,841,000	4,962,000

Source: JICA Study Team

5.4.4 LIQUID BULK

(1) Import (Petrochemical Products)

According to an interview survey with the oil pipeline company in KZP, it is expected that imported petrochemical products will be decreased once refining capacity in Iraq has improved as mentioned in the country’s most recent ten-year plan (2008-2017).

In reference to Iraq: making its return to the oil and natural gas market on Panorama 2011 report by IFP Energies Nouvelles, Iraq consumes about 687,000 bpd (barrels per day) of petroleum products. Since 2003, Iraq has been relying on imports to meet demand for petroleum products, primarily in the transport sector. In 2007, imports of petroleum products reached a high of 216,000 bpd. Although the situation is gradually improving, the country’s refinery production is inadequate. Production is also out of synchronization, with market trends of decreased fuel oil consumption while road fuel consumption is on the rise. With strong economic growth (10-11% annually between now and 2015, according to the latest projections from the IMF), oil consumption is expected to continue rising at a steady pace of 2.5-3% per year, reaching 900,000 bpd by 2020.

Against this backdrop, increasing Iraq’s refining capacity has emerged as a national priority in the country’s most recent ten-year plan (2008-2017). Iraq currently has refining capacity of about 680,000 bpd, distributed across four major sites such as the Baiji refinery (300,000 bpd), Erbil refinery (400,000 bpd), Basrah refinery (140,000 bpd), and Daura refinery (110,000 bpd). To date, the country has signed detail engineering agreements for new refineries with a total capacity of 750,000 bpd (300,000 bpd in Nassiriyah, 150,000 bpd in Karbala and 150,000 bpd in Kirkuk and Missan). Iraq also has plans to modernize its three major existing refineries, whose utilization rate is quite low at less than 70%. Thus, over the next six years, Iraq has hopes of becoming not only a leading producer and exporter of crude oil, but also a major exporter of refined products.

Based on the above, it is assumed that the future imported volume of petrochemical products is estimated using an elastic value which is calculated based on the difference of the growth rate between petrochemical products and the GDP in Iraq. The annual growth rate of GDP in Iraq will be 7.5%/year from 2011 to 2015.

Accordingly, the future imported volume of the petrochemical products is calculated at 1,686,000 tons in 2015, 2025, and 2035.

Table 5.4.20 Forecast of Petrochemical Product

Year	2006	2007	2008	2009	2010	2015	2025	2035
GDP (Million USD)	20,193	20,496	22,443	23,386	23,583	33,857	69,780	143,820
Imported Petrochemical Product (MT)	649,025	934,276	735,239	574,049	866,164	1,686,000	1,686,000	1,686,000

Source: JICA Study Team

(2) Export (Fuel Oil)

The exported volume of fuel oil suddenly dropped in 2009 and 2010 as well. Fuel oil drop in 2010 was caused by the Iraqi government's decision on the suspension of fuel oil export. In consideration of the above situation for this demand forecast, taking into account the strong intention for Iraq to export fuel oil, the exported volume from 2004 to 2009 will be referred.

The exported volume of fuel oil has been fluctuating and with a decreasing trend for the last five years as shown in Table 5.4.21. Therefore, the future volume of fuel oil is estimated using an elastic value which is calculated based on the difference of the growth rate between fuel oil and GDP in the exported countries. According to an interview survey with the oil pipeline company in KZP, the main exporting countries for fuel oil are Bahrain, Oman, Saudi Arabia, and UAE. It is assumed that the annual growth rate of GDP in these exporting countries would be 4%/year from 2011 to 2035 based on the IMF data and statistics.

Accordingly, future exported volume of fuel oil is calculated at 1.05 million tons, 2.25 million tons, and 4.85 million tons in 2015, 2025, and 2035, respectively.

Table 5.4.21 Forecast of Fuel Oil

Year	2004	2005	2006	2007	2008	2009	2015	2025	2035
GDP (USD million)	19,148	19,014	20,193	20,496	22,443	23,386	33,857	69,780	143,820
Fuel Oil (MT)	421,651	733,487	1,990,300	1,888,447	1,812,521	660,090	1,046,000	2,253,000	4,851,000

Source: JICA Study Team

5.4.5 DISTRIBUTION OF THE TOTAL FORECAST CARGO VOLUME TO PORTS IN IRAQ

According to a report by the United Nations Joint Logistics Centre (UNJLC), it was estimated that 22 million tons of cargoes, equivalent to about 36% of the total imported cargoes in Iraq were sea-borne cargoes in 2002. In addition, 80% and 20% of the total cargoes were transported from the major ports in the neighboring countries to Iraq and imported through ports in Iraq, respectively.

It is planned to reverse the above ratio of the imported cargoes from the neighboring countries into the following ratio by increasing the cargo volume handled at ports in Iraq, which will be realized by the restoration of the port facility and the improvement of cargo handling efficiency.

Table 5.4.22 Proportion of the Import Cargoes Handled at Ports in Iraq

Iraq Region	Province	Population in 2009 (x1,000)	Proportion to Total Population (%)	Target share of Imported Cargoes	
				From 3rd Country	Ports in Iraq
North	Three States	5,678	17.7	100% (17.7%)	(0%)
Middle	Baghdad	7,181	22.4	20% (4.5%)	80% (17.9%)
	Wasit	1,158	3.6	20% (0.7%)	80% (2.9%)
	Diyala	1,371	4.3	20% (0.9%)	80% (3.4%)
	Al Anbar	1,452	4.5	40% (1.8%)	60% (2.7%)
	Others	4,101	12.8	100% (12.8%)	(0%)
South	Basra and Other States	11,164	34.7	0% (0%)	100% (34.7%)
Total		32,105	100.0	38.4%	61.6%

Source: JICA Study Team

Based on Table 5.4.22 and the current on-going restoration projects, it is assumed that 65% of the imported cargoes will be handled at ports in Iraq and 35% will be imported from neighboring countries. As a result, Table 5.4.23 shows the summary of forecast cargoes handled at ports in Iraq.

Table 5.4.23 Summary of Forecast Cargoes handled at Ports in Iraq

Commodity	Unit	2010	2015	2025	2035
Import Cargo					
1. Containers	TEU	232,598	638,000	2,154,000	5,278,000
2. Conventional Cargo					
(1) Grain (wheat)	MT	1,811,306	3,829,000	5,561,000	7,433,000
(2) Rice	MT	947,383	844,000	1,461,000	1,920,000
(3) Sugar	MT	546,981	577,000	762,000	967,000
(4) Date	MT	141,413	0	0	0
(5) Cement	MT	1,658,979	2,158,000	5,358,000	8,724,000
(6) Steel & Pipes	MT	493,712	1,594,000	5,474,000	13,470,000
(7) Vehicles	unit	15,770	244,000	359,000	491,000
(8) Other Conventional Cargo	MT	788,674	1,374,000	2,841,000	4,962,000
3. Liquid Bulk Cargo (petrochemical products)	MT	866,164	1,686,000	6,389,000	24,211,000
Export Cargo					
1. Containers	TEU	232,543	638,000	2,154,000	5,278,000
2. Conventional Cargo					
(1) Date	MT	65,403	60,000	110,000	312,000
(2) Other Conventional Cargo	MT	13,884	65,000	65,000	65,000
3. Liquid Bulk Cargo (fuel oil)	MT	88,077	1,046,000	2,253,000	4,851,000

Source: JICA Study Team

The following commodities are handled exclusively at ports in Iraq.

Table 5.4.24 Commodities Handled at Ports in Iraq

UQP	KZP
Grain (wheat)	Grain
Rice	Sugar
Sugar	Date
Cement	Cement
Steel & Pipes	Steel & Pipes
Vehicle	Petrochemical Products
	Fuel Oil

Source: GCPI

It is assumed that the handling share between UQP and KZP will be maintained up to 2035 based on the average share for the last five years. The average share to be used is shown in Table 5.4.25.

Table 5.4.25 Share between UQP and KZP for Each Commodity

Commodity Item	UQP	KZP
Container	98.4	1.6
Grain (wheat)	99.6	0.4
Sugar	84.1	15.9
Cement	47.3	52.7
Steel & Pipes	55.6	44.4
Other Conventional Cargo	69.5	30.5

Source: JICA Study Team

The total forecast cargo volume is allocated with its share by commodities to each port based on the above assumption and the traffic demands at the target year estimates.. The results are shown in Table 5.4.1.

6. CURRENT PORT DEVELOPMENT PLANS

The following development plan in Iraq, which related key port developments are described in this chapter.

- The National Development Plan (2010 – 2014)
- Post-Phase I Development Plan (The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project)
- New Al Faw Port Master Plan

6.1. THE NATIONAL DEVELOPMENT PLAN

The National Development Plan for the Years 2010-2014 (NDP) by the Iraqi government is referred to.

6.1.1 VISION

The vision of the NDP is for Iraq's main and secondary ports to meet the nation's import and export needs; are able to compete with the ports of neighboring and nearby countries; and act as a starting point for Iraq's dry channel linking Asia, Europe, Turkey, and Syria.

6.1.2 OBJECTIVES

(1) General Objectives

- Increase the capacity of existing ports and shipping lines,
- Utilize the available unused capacities of existing ports, which total about three million tons annually, and reduce dependence on the ports of neighboring and nearby countries for foreign trade by increasing the capacity of current Iraqi ports,
- Transition to constructing major ports capable of receiving the largest ships; reduce transport costs to make Iraqi ports competitive with alternative ports; and equip one of them with the requirements necessary to act as a dry channel, and
- Strengthen the private sector's role in implementing, operating, and providing port services.

(2) Quantitative Objectives

- Increase the design capacity of Iraqi port docks to planned target levels by 2014 (refer to Table 6.1.1),
- Construct the new large port of Al Faw during the plan period (refer to Table 6.1.2), and
- Remove sunken vessels in shipping lanes as well as those close to docks during the plan period (refer to Table 6.1.3).

6.1.3 MEANS OF ACHIEVING THE OBJECTIVES

(1) Construction of the New Large Port of Al Faw

(2) Allocation of Funds Necessary to Develop, Expand, and Modernize Existing Ports or Open Them to Investments

(3) Implementation of Procedures to Enhance Performance, Modernize Operating Methods, and Remove Obstacles to become Activity, Using the Following Means:

- Contracting with a global consulting firm specialized in providing advice, proposals, and solutions to increase the efficiency and performance of GCPI, including its role as regulator and monitor of private sector performance, so it can compete with companies in neighboring and nearby countries,

- Providing maritime services needed by oil ports and liquid gas ports in Khor Al Zubayr,
- Deepening, excavation, and establishment of marine channels leading to the port and establishing visual and electronic control systems for ship and vessel movement,
- Upgrading ground handling equipment to achieve the required cargo handling capacity,
- Upgrading and enhancing the marine unit fleet that provides marine services to ports, provided this upgrade includes offshore excavators, tugboats, signal ships, lead ships, passenger boats, connection boats, and workboats,
- Introducing modern electronic port management and operation systems,
- Preparing a comprehensive plan to train and qualify port staff, develop new qualified staff, and implement a training institute in the ports,
- Recovering all sunken vessels from shipping lanes in Khawr Abd Allah, Khor Al Zubayr, Shatt al-Arab, and Shatt al-Basrah,
- Developing and modernizing shipyards and boat slips in ports, completing projects under construction, and constructing new shipyards that meet ship repair requirements,
- Modernizing ports' provision of housing, water, and public services to importers, exporters, and port workers, and
- Reconsideration of surplus workers and staff.

Table 6.1.1 Current Design Capacity and 2014 Target Levels under the Strategic Development and Modernization

Port Name	2010		2014	
	No. of Docks	Capacity (x1,000 tons)	No. of Docks	Capacity (x1,000 tons)
UQP	22	7,500	41	14,000
KZP	12	6,400	25	10,650
Al Maqil	6	1,500	14	3,600
Abu Flus	3	500	3	750
Total	43	15,900	83	29,000

Source: National Development Plan for the Year 2010-2014 (NDP) by the Iraqi government

Table 6.1.2 Target Quantitative Objectives for the Construction of the New Large Port of Al Faw

Description		2018	2038
Container Docks	No. of Docks	10-11	22
	containers/year (TEU)	3,000,000	7,000,000
General Cargo Docks	No. of Docks	6-7	22
	tons/year	10,000,000	40,000,000

Source: National Development Plan for the Year 2010-2014 (NDP) by the Iraqi government

Table 6.1.3 Quantitative Objectives for Port Activities to Lift Sunken Vessels 2010-2014

Authority	2010	2011	2012	2013	2014	Total
Umm Qasr	3	2	1	2	2	10
Khor Al Zubayr	1	2	2	2	2	9
Khawr Abd Allah	1	1	1	2	2	7
Shatt al-Arab	3	3	2	2	2	12
Removal by Japan's ODA	8	0	0	0	0	8
Total	16	8	6	8	8	48

Source: National Development Plan for the Year 2010-2014 (NDP) by the Iraqi government

(4) Action Plan

The following steps are proposed to achieve the objectives for the port sector in Iraq as mentioned in the NDP:

Step 1. Restoration of Existing Port Facilities and Conduct a Master Plan Study

- In order to handle the present increasing cargo volume, urgent rehabilitation of the existing UQP and KZP will be conducted.
- A master plan study will be conducted in order to organize the short-term/long-term development policy of port sector development.
- The Port Sector Urgent Rehabilitation Project Phases I and II are the important parts of Step 1.

Step 2. Expansion of Existing Ports to Cover Future Increasing Cargo Volume

- The existing ports including Al Maqil and Abu Flus will be effectively reconstructed and expanded to cope with further growth of cargo demand. The utilization of each port and its aims will be analyzed in the master plan study in Step 1.
- UQP will be reconstructed and expanded for containers, general cargoes and car terminals. The actual aims will be analyzed in the master plan study in Step 1.
- KZP will be reconstructed and expanded in the policies such as to support industries, and to complement the functions of UQP by covering future surplus demand.

Step 3. New Port Development (New Al Faw Port)

- Monitoring the growth of cargo volume, new port development will be planned. The master plan study has already been completed for the new Al Faw Port, and the basic infrastructure development will be started at an earlier phase as a proper advanced preparation for the large-scale development.
- The former developed facilities of UQP, KZP, and other ports will be effectively used to carry each role in cooperation with the new port development. The detailed role of each existing port in the future will be studied in the master plan study in Step 1.

6.2. POST PHASE I DEVELOPMENT PLAN

6.2.1 DEVELOPMENT SCENARIO OF PORTS IN IRAQ

Post Phase I Development Project has been prepared by GCPI to make further port development scenario continuous to develop the port sector in the Iraq subsequent to develop the port sector in Iraq after Port Sector Rehabilitation Project Phase I.

The development scenario of ports in Iraq by Post Phase I Development Project is proposed in Table 6.2.1.

Table 6.2.1 Development Scenario of Ports in Iraq

Category	Short-term and Long-term Development Scenarios
Applicable to Ports in Iraq	Conducting the master plan study for the long-term development of national ports in Iraq: 1) Review the present function and identify the future function of each port including traffic forecast 2) Prepare the master plan for Umm Qasr, Khor Al Zubayr, Maqil (Basra), and Abu Flus port including alternative development in the southern region after development of UQP/KZP at a reasonable level 3) Provide the development program of the port facilities and navigational channel development 4) Study the port development and management by PPP 5) Study the introduction of the appropriate and transparent tariff system 6) Study the maintenance dredging strategy in the channels 7) Feasibility study of the alternative port development in UQP/KZP 8) Study the function and restoration program of Maqil Port (Basra) and Abu Flus Port by dredging the channel and removing wrecks in the river 9) Prepare the training and education program of employees in GCPI for cargo handling equipment operation, maintenance, and management of the container terminal operation 10) For port management, study and review the port tariff system, organizational establishment to introduce the port authority system and establishment of the operation company by GCPI
Development of Infrastructures	Restoration and rehabilitation of damaged facilities and cargo handling equipment at KZP Development of berthing facilities for public use at KZP Conducting efficient maintenance dredging of all the channels and port basin by establishing an adequate dredging strategy, and development of inland facilities like yard development and truck control system Procurement of the necessary cargo handling equipment and marine equipment Introduction of the EDI system in trade facilitation
Port Operation and Management Aspects	1) Development of the training institute facilities and establishment of the training program 2) Training for capacity building, development of human resources for maintenance equipment, and port facility management on utility supply 3) Provision of the transparent tariff system

Source: JICA Study Team

6.2.2 URGENT AND SHORT- TO LONG-TERM DEVELOPMENT PLANS IN THE STUDY PORTS

(1) Proposed Development Scenario of the Major Ports

The urgent and short- to long-term development plans for the five major ports are listed in the following Table 6.2.2.

Table 6.2.2 Proposed Projects in the Urgent and Short- to Long-term Development Plans

<table>
<tr><th>Item</th><th>Umm Qasr Port</th><th>Khor Al Zubayr Port</th><th>Maqil Port and Abu Flus Port</th><th>Al Faw Port</th></tr>
<tr><td>Urgent
2007 -2015</td><td>Implementing and completing proposed urgent restoration projects of dredging works and removing wrecks in port and channel,
Rehabilitation of equipment and port facilities,
Restoration and recovery of the port function,
Development of container terminal (11a&b).</td><td>Preparation of implementation program and arranging Japanese ODA loan for the following urgent restoration works:
Dredging of port area and removal of wrecks in port area,
Rehabilitation of equipment and damaged facilities,
Development of a new berth for public use, and
Restoration and recovery of port function.</td><td>Maintain as it is</td><td>Maintain as it is</td></tr>
<tr><td>2012 -2014</td><td colspan="4">Conducting the study of the long-term development plan of national ports:
i) Review the present function and identify the future function of each port;
ii) Prepare the master plan for UQP and KZP;
iii) Feasibility study of urgent and short-term development plans including port management by private participation;
iv) Study maintenance dredging strategy for the channel;
v) Master plan and feasibility study of the alternative port development in UQP and KZP in the southern region;
vi) Study the function and restoration program of Maqil Port (Basra) and Abu Flus Port by dredging the channel and removing wrecks in the river; and
vii) Conduct training and education of employees of GCPI for equipment operation, maintenance, and management of the container terminal operation, cargo handling equipment, pilot services, hydrographic survey.</td></tr>
<tr><td>Short-term
2015-2020</td><td>Development of ro-ro ship berth with passenger terminal and car terminal at UQP,
Development of container terminal by private operators, and
Additional general cargo and bulk cargo berths.</td><td>i) Development of multipurpose berths;
ii) Restoration of export berthing facilities for fertilizer;
iii) Development of general cargo berthing facilities;
iv) Procurement of cargo handling equipment; and
v) Restoration of LPG terminal.</td><td>Restoration of the navigation channel including dredging works and removing wrecks, and
Rehabilitation of the port facilities including equipment.</td><td>Development of a part of new Al Faw Port (western breakwater with staging platform).</td></tr>
<tr><td>Long-term
After 2020</td><td colspan="2">Additional berth development at both ports, especially container terminal and bulk cargo storage facility, as required by regional development and demands of transit cargo to neighboring countries.
Procurement of additional cargo handling equipment, working vessels, dredgers, floating cranes, etc. at both ports.</td><td>Redevelopment of Maqil Port.
Development of the channel of the Shatt Al Arab River by dredging and removal of wrecks.</td><td>Development of the new Al Faw port based on the proposed master plan study.</td></tr>
</table>

Source: JICA Study Team

(2) Short- to Long-term Development Plans for UQP and KZP

a. Development Scenario for UQP

The following components of expansion projects will be required as short- and long-term plans:

- Expansion of container terminal,
- Car terminal development,
- Conventional cargo and bulk terminal,
- Passenger and ro-ro terminal,
- Navigational channel improvement by deepening, widening and removal of wrecks,
- Expansion of on land facility and utility supply,
- Establishment of training institute and continuation of capacity building for GCPI employees, and
- Procurement of additional cargo handling equipment for container yards and ro-ro terminal and marine equipment for channel dredging and removal of wrecks.

b. Development Scenario for KZP

The restoration and rehabilitation works for the existing facilities at KZP are essentially required as an urgent project. These restoration works should be implemented as continuation of the current restoration projects under the Japanese ODA loan. The detailed scope of works and components of the proposed projects for the KZP are described in Chapter 11 and Chapter 12.

Subsequently, the following components of expansion projects will be required as short- and long-term plans after implementing the Port Sector Rehabilitation Project Phase II:

- Expansion of multi-purpose berths,
- Expansion of the conventional cargo handling area for cargo ships,
- Procurement of additional cargo handling equipment,
- Land facilities; utility supply; rehabilitation of power supply and new water supply plants for the port, and
- Rehabilitation of access road and railway behind the port to connect fertilizer plants and steel mill with the port facilities.

6.3. NEW AL-FAW PORT DEVELOPMENT PROJECT

Public-private partnership (PPP) scheme is being considered for the development of the new Al Faw Port. The Government of Iraq estimated that the project would more than recover its costs based on comparable ports elsewhere in the Gulf, and the total volume of Iraq cargo transported through Kuwait, Syrian, and Turkish ports. The Government of Iraq is planning to transform New Al Faw Port to an advanced and modern style port from its original 1970s design. It will be designed with the capacity to handle eighth generation container vessels (post 2006), which the current port facilities are unable to. UQP currently can take vessels up to about 12 m draft, but New Al Faw Port will be designed to take vessels of much deeper draft.

Using loan from the Italian government, an Italian consortium led by THECNITAL submitted a feasibility study report on the New Al Faw Port Master Plan in 2009 which considered the PPP scheme for the implementation of the project. This master plan considered modernized rail connections and up-to-date facilities which could reduce transit times of cargo moving between the Far East and Europe. It satisfies the domestic cargo transport demand in Iraq as an inevitable consequence. In January 2012, the Italian consortium submitted a master plan design on port and cargo transportation infrastructure to the Government of Iraq. According to a Japanese company engaged in business activities in Iraq, they received an invitational offer to invest on this mega port project.

In January 2012, the master plan of the port, following the feasibility study and port layout modifications caused by the introduction of additional facilities within the port limits, were completed and submitted to GCPI/MOT for review.

According to the master plan, the New Al Faw Port will be developed under a two-staged construction. At the final stage the port will have the following cargo handling capacity to meet the forecast cargo demand by the year 2038:

- Container cargo: 66 million tons
- Dry bulk cargo: 33 million tons
- Total cargo: 99 million tons.

The two-staged development will be implemented with the following major works;

(1) First stage development; container cargo 40 million tons (4 million TEU) and 22-25 million tons dry bulk

- Container berth (-17 m): 3,500 m
- Dry bulk berth (-17 m): 2,000 m
- Breakwater construction: Total 23.3 km
- Dredging volume (access channel and port basin): Approx. 154 million m^3
- Reclamation volume: Approx. 47 million m^3
- Land connection (road and railway)
- Buildings and utilities

(2) At the final stage, the port will have the following completed construction;

- Container berth (-17 m): 7,000 m
- Dry bulk berth (-17 m): 3,000 m
- Dredging volume: 241.7 million m^3
- Reclamation volume: 61 million m^3
- Land connection, buildings, and utilities

The staged-out development plans are shown in Figure 6.3.1 and Figure 6.3.2.

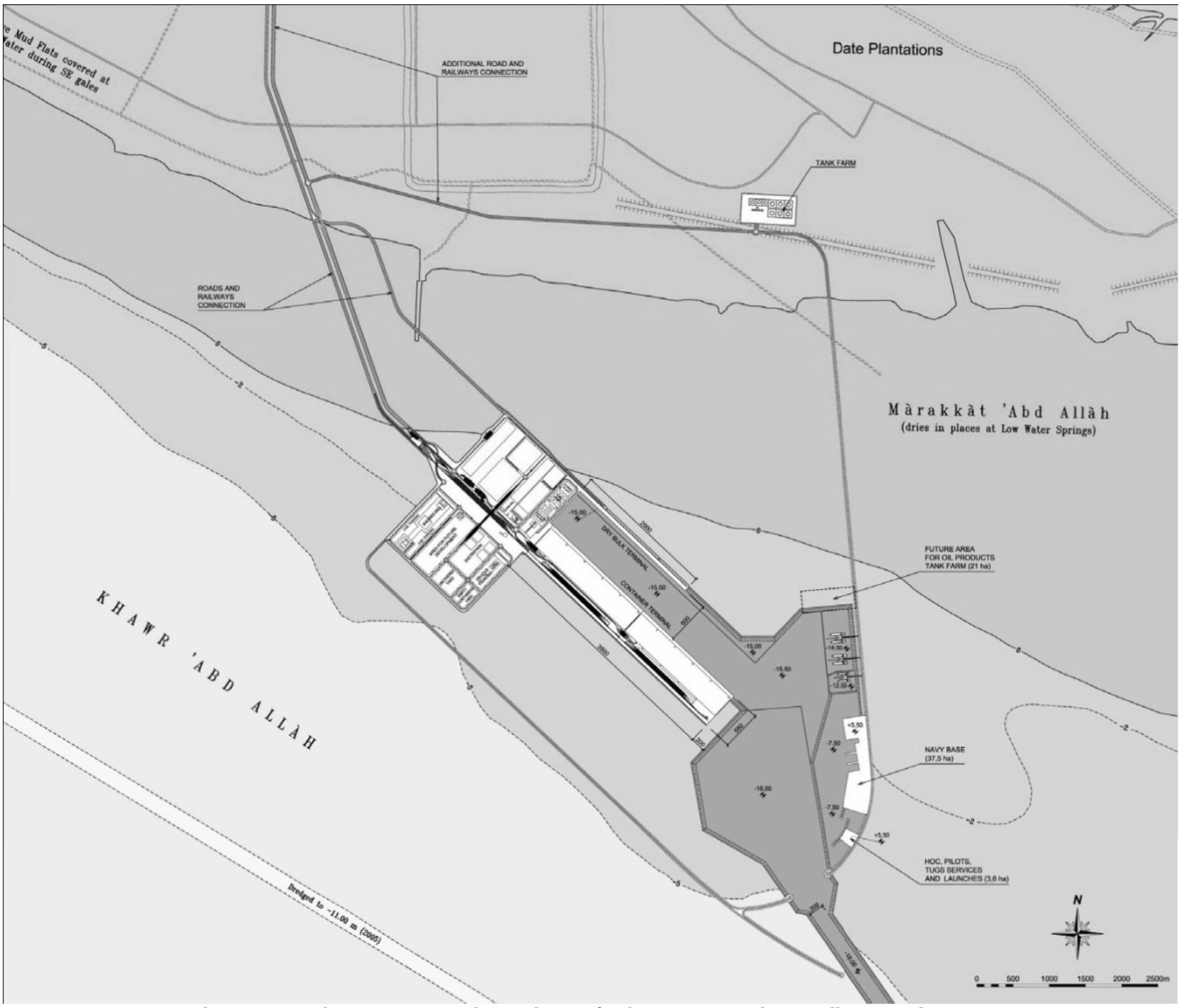
Source: Port Master Plan Report on the Port Layout in the Final Stage for the Container and Dry Bulk Terminal (05/01/2012 Consortium IECAF)

Figure 6.3.1 New Al Faw Port-Final Stage-General Layout

Table 6.3.1 New Al Faw Port-Final Construction Stage Preliminary Costs

Description	Unit	Quantity
Filling	m^3	60,691,716
Quay	m	10,000
Reinforced pavement-container	m^2	3,500,000
Reinforced pavement-dry bulk	m^2	252,000
Other area pavement	m^2	2,951,824
Breakwaters	km	23.3
Dredging-construction		
Port basin	m^3	148,868,000
Navigation channel	m^3	92,820,000

Source: Port Master Plan Report on the Port Layout in the Final Stage for the Container and Dry Bulk Terminal (05/01/2012 Consortium IECAF)



Source: Port Master Plan Report on the Port Layout in the Final Stage for the Container and Dry Bulk Terminal (05/01/2012 Consortium IECAF)

Figure 6.3.2 First Stage-General Layout

Table 6.3.2 New Al Faw Port: Costs of the First Stage of Implementation

Description	Unit	Quantity
Filling	m^3	47,144,544
Quay	m	5,500
Other area pavement	m^2	2,300,000
Breakwaters	km	23.3
Dredging-construction		
Port basin	m^3	104,454,000
Navigation channel	m^3	49,200,000

Source: Port Master Plan Report on the Port Layout in the Final Stage for the Container and Dry Bulk Terminal (05/01/2012 Consortium IECAF)

7. CONCEPTUAL PLAN OF PORTS DEVELOPMENT

7.1. GENERAL

In considering the future development plan of the ports of Iraq, the following two points listed below will be its main key factors;

1) Future cargo demand;
2) Implementation schedule of the new Al-Faw Port development and design capacity.

The realization of the new Al-Faw Port should decide the development plans of other existing ports. This would establish a viewpoint as to whether further investments (for expansion) to other existing ports should or should not be made. It will also depend on the time of completion and the consideration of future utilization of the existing ports after the new Al-Faw Port is completed.

7.1.1 REVIEW OF FUTURE CARGO DEMAND

From the results of the cargo demand forecast review conducted according to the updated cargo data, the future estimated cargo volume may have a possibility to remarkably increase. These are true especially for container cargoes and vehicles when compared with the previous cargo demand forecast made in the Study of Development of Southern Ports in Iraq Post Phase I Rehabilitation Projects (herewith referred to as Post-Phase I Development Plan) as shown in the following table.

Although the Data Collection Survey on Port Sector Development Plan in Iraq (herewith referred as the JICA Study) estimates may have a rather high growth case due to the scenario that the recovery of Iraqi economy continues, but not so far from the estimate of the new Al-Faw Port Master Plan as indicated in the Table 7.1.2.

It is therefore recommended that the future cargo demand to be used for future ports development plans should consider both estimates indicated in the Post Phase I Development Plan results as a lowest case and the JICA Study estimates as a higher possible case.

Table 7.1.1 Comparison of Future Cargo between Post Phase I Development Plan and JICA Study*

Commodity	Unit	2015		2025		2035	
		Post-Phase I	JICA Study	Post-Phase I	JICA Study	Post-Phase I	JICA Study
Import Cargo							
1. Container Cargo(include export)	TEU	601,087	1,276,000	1,101,963	4,307,000	1,809,970	10,556,000
2. Conventional Cargo							
(1) Grain (Wheat)	MT	4,893,852	3,829,000	7,620,431	5,561,000	11,395,083	7,433,000
(2) Rice	MT	2,639,774	844,000	3,278,340	1,461,000	4,071,328	1,920,000
(3) Sugar	MT	0	577,000	0	762,000	0	967,000
(4) Date	MT	0	0	0	0	0	0
(5) Cement	MT	1,216,486	2,158,000	1,510,756	5,358,000	1,876,188	8,724,000
(6) Steel & Pipes	MT	0	1,594,000	0	5,474,000	0	13,470,000
(7) Vehicle	no.	91,914	244,000	258,864	359,000	540,857	491,000
	MT	583,654	1,549,400	1,643,786	2,279,650	3,434,442	3,117,850
(8) Other Conventional Cargo	MT	2,562,135	1,374,000	4,426,071	2,841,000	7,041,775	4,962,000
(9) Dry Bulk	MT	0	0	0	0	0	0
(10) Ro-ro Ferry Cargo	MT	269,616	0	465,759	0	741,012	0
(11) Fertilizer		42,000	0	140,000	0	280,000	0
3. Liquid Bulk Cargo (Petrochemical Products)	MT	3,947,250	1,686,000	27,311,200	1,686,000	135,993,250	1,686,000
Sub Total		16,154,767	13,611,400	46,396,343	29,729,650	164,833,078	52,835,850
Sub Total (except wheat & LB)		7,313,665	8,096,400	11,464,712	18,175,650	17,444,745	33,160,850
Export Cargo							
1. Conventional Cargo							
(1) Date	MT	0	60,000	0	110,000	0	312,000
(2) Other Conventional Cargo	MT	0	65,000	0	65,000	0	65,000
(3) Fertilizer		356,000	0	356,000	0	356,000	0
2. Liquid Bulk Cargo (Fuel Oil)	MT	6,617,850	1,046,000	43,171,450	2,253,000	244,274,250	4,851,000
Sub Total		6,973,850	1,171,000	43,527,450	2,428,000	244,630,250	5,228,000
Sub Total (except LB)		356,000	125,000	356,000	175,000	356,000	377,000
Total (import/export)							
Container Cargo	TEU	601,087	1,276,000	1,101,963	4,307,000	1,809,970	10,556,000
Dry Bulk (Wheat)	MT	4,893,852	3,829,000	7,620,431	5,561,000	11,395,083	7,433,000
Dry Bulk (Others)	MT	7,669,665	8,221,400	11,820,712	18,350,650	17,800,745	33,537,850

*Note: Post-Phase I: The Study of Development of Southern Ports in Iraq Post-Phase I Rehabilitation Projects by GCPI
JICA Study: Data Collection Survey on Port Sector Development Plan in Iraq by JICA
Source: The Study of Development of Southern Ports in Iraq Post Phase I Rehabilitation Projects and Consultant's Estimates)

Table 7.1.2 Cargo Forecast Comparison with New Al-Faw Port Master Plan

Year	Container (Thousand TEU)			Wheat (MT)			Other Dry Bulk (MT)		
	Post Phase I	JICA Study	Master Plan	Post Phase I	JICA Study	Master Plan	Post Phase I	JICA Study	Master Plan
2018 (2015)	601	1,276	2,300	4.9	3.8	4.4	7.7	8.2	10.6
2028 (2025)	1,102	4,307	4,000	7.6	5.6	6.0	11.8	18.4	16.0
2038 (2035)	1,810	10,556	7,500	11.4	7.4	8.0	17.8	33.5	25.0

Note: - Target year 2018, 2028, and 2038 for Master Plan
- Target year 2015, 2025, and 2035 for Post-Phase I and JICA Study
Source: - Post Phase I: The Study of Development of Southern Ports in Iraq Post-Phase I Rehabilitation Projects by GCPI
- JICA Study: Data Collection Survey on Port Sector Development Plan in Iraq by JICA
- Master Plan: Engineering Consultancy Services for the New Al-Faw Port Republic of Iraq/Port Master Plan by the Italian Consortium IECAF

7.1.2 NEW AL-FAW PORT DEVELOPMENT PLAN

As described in Chapter 6, the New Al-Faw Port Master Plan has been completed and currently under review by GCPI. The master plan has been prepared following after its feasibility study with some modifications on its layout plan, but maintaining almost the same scale of the development as follows;

(1) First Stage Development (sufficient until 2028-2030)

- Cargo handling capacity with container cargo of 40 million tons (4 million TEU) and dry bulk of 22-25 million tons.

(2) Second Stage Development (sufficient until 2038)

- As the result, the port capacity is to have a container cargo of 66 million tons (7.5 million TEU) and dry bulk of 33 million tons.

The implementation program of the new Al-Faw Port at present is yet uncertain. However, it is expected that the first stage of construction will be completed between 2018 and 2025. This is in consideration of its importance and urgency as an earliest completion case and the financial restriction as a delayed implementation case (though GCPI expects and desires that the first stage of construction should be completed by 2018).

Since the new Al-Faw Port will, after its first stage completion, handle most forecast container cargo and dry bulk cargo, other ports should consider its roles, functions, and cargo handling shares after the new port realization.

7.2. BASIC CONCEPT FOR THE PORTS DEVELOPMENT

Considering the above mentioned situation and conditions, it is suggested that the following points should be regarded as a sort of pre-requisition in formulating future development plans for ports in Iraq;

1) The roles and functions of the existing ports after the new Al-Faw Port realization should be fully studied and established including the new port realistic implementation schedule.
2) Until the completion of the first stage of the new port, respective port development/improvement plans should be carefully studied to cope with the forecast cargo demand in a manner, for it to be cost effective and realistic, taking into account its future role and utilization.

Although there is no concrete policy on the future role and function of the existing ports, the New Al-Faw Port Master Plan (as conditions and consequence in the feasibility study) describes briefly the roles of the existing ports as follows;

- Umm Qasr Port: dedicated to international commercial traffic with its handling capacity of 10 to 11 MT/yr.
- Khor Al Zubayr Port: dedicated to local industrial traffic.
- Abu Flus Port and Maqil Port: dedicated to local commercial traffic, fed by cargo barges.

Further, the master plan recommends that no new terminals, except for on-going berth construction at Umm Qasr Port, be constructed and no investments for the improvement of Shatt El Arab are to be done.

Some points from the given recommendations above may be acceptable to GCPI as an economical way. It does not however describe how to cope with the increasing cargoes until the completion of the first construction stage of the new Al-Faw Port. The latest National Development Plan (2010-2014) shows the plans to rehabilitate and develop the existing main ports (UQP and KZP) at their utmost capacity. This may include additional berth construction, which might be a contradiction with the earliest development concept of the new Al-Faw Port.

Under such situation, it is strongly recommended to conduct a master plan study for different ports in Iraq. This is important in order to establish the roles of respective ports and the different study required functions, handling cargo types, and capacities until the new port starts its operation.

As a brief concept for future port development plans, the following subsection provides a preliminary recommendation for the roles of the existing ports.

7.3. PRELIMINARY CONCEPT FOR THE RESPECTIVE PORTS DEVELOPMENT PLAN

The following preliminary concepts for major ports development are recommended.

7.3.1 MAQIL PORT

From its geographical situation which is located at the center of Basra City, future development plans should focus on its harmonization with the city and its activities by maximizing the utilization of the adjacent water areas. This implies that the port should play an important role in the future for the beautification and modernization of the city of Basra, providing a useful and convenient waterfront areas and facility for city activities. It is therefore recommended that the future port plans should have the following functions:

- Provide a useful and convenient water front area contributing to city development plans. These include water front parks, floating restaurants, floating hotels, and commercial shops/offices area;
- As a port function, passenger ferry terminals will be provided and strengthened as a main city gate for tourists; and
- Provide mariners and closing boats mooring/berthing facilities.

As a sample waterfront development, the Dubai Creek case in UAE may be useful as shown in the following photos.

Photo 7.3.1 Dubai Creek View (1)

Photo 7.3.2 Dubai Creek View (2)

It is necessary that the Maqil Port functions as a commercial cargo port until the completion of the new Al-Faw Port. This is to assist in handling the increasing cargoes used by small cargo ships, dhows, or barges due to water depth restrictions and shipwrecks along the Shatt Al Arab River.

7.3.2 ABU FLUS PORT

Abu Flus Port is also located at the Shatt Al Arab River Bank, approximately 20 km downstream of Maqil Port. Until 2008, the port had not been functional due to damaged and deteriorated port facilities caused by the Iraq-Iran War. In 2009, a rehabilitation work financed by MOT has commenced in order to supplement the Maqil Port's function and operational handling of its main container cargo which is feeder transported from Dubai. Although further rehabilitation and expansion works are still ongoing, the handled container cargo at the port was around 35,000 boxes (50,000 TEU) in 2011. The berth structures are mainly pile supported steel deck type. Abu Flus Port has the same restrictions in ship size as Maqil Port due to its river's shallow water depth and other previous shipwrecks.

Under the above situation, the Abu Flus Port will continue to function as supplementary port of Maqil Port for container cargo handling until the completion of the new Al-Faw Port.

The long term plan or after completion of the new Al-Faw Port, the Abu Flus Port may function as a coast guard station. It can also function as a passenger boat or cruising ship station in collaboration with the Maqil Port or it can be leased out to private sectors for other commercial purposes.

The improvement and rehabilitation works of Shatt El Arab by removing the sedimentation at the river mouth and shipwrecked boats along the river should be considered for the effective utilization of both Maqil Port and Abu Flus Port.

7.3.3 UMM QASR PORT

Umm Qasr Port, being composed of the North Port and South Port will continue to perform its role and function as an international commercial port, regardless of the new Al-Faw Port construction.. Until the completion of the new port, which will mainly handle container cargo and dry bulk cargo and be considered as the National Hub Port after construction, the Umm Qasr Port should play the primary role in coping with the sharply increasing cargoes, especially container cargoes, conventional cargoes, and vehicles. It is therefore necessary to continue its development according to the estimated cargo forecast after the ongoing rehabilitation project financed by Japan’s ODA loan in an effective and economical manner. To this end, it is important to conduct an optimization study on the most cost-effective development plan considering the new port construction schedule and a realistic cargo demand.

The future development plan will be divided into two phases: a short-medium term plan to be finished until the completion of the new port’s first development stage, and a long-term development plan.

According to the cargo demand forecast review results, 2.0 to 2.5 million TEU containers may be handled by 2020 (at expected early completion of the new port’s first stage), if a high growth rate case is achieved. This implies that almost all of the current South Port must be converted into container terminals/berths. As a consequence, no specialized terminal for vehicles will be possibly provided within the existing port area, which is also an urgent matter to meet the increasing volume.
It is therefore suggested that the specialized terminal for vehicles be shifted to Khor Al Zubayr Port.

7.3.4 KHOR AL ZUBAYR PORT

Originally constructed as an industrial port, the Khor Al Zubayr Port is currently handling liquid bulk (oil refinery products) and break bulk cargoes. It also plays a supplementary function for the Umm Qasr Port in order to ease the increasing cargo handling. However, due to its shallow water depth at port basin, the calling vessels are relatively small, thus, inefficient cargo handling is being done by which a contribution in easing the cargo handling operation of Umm Qasr Port is low and less effective. To this end, it is necessary to carry out an urgent rehabilitation and improvement work for the Khor Al Zubayr Port in order to meet effectively and timely to a sharply, the increasing cargo demand.

The urgent rehabilitation and improvement plan should be made to cope with the expected cargo volume by the year 2015 as suggested by the Post-Phase I Study. Furthermore it should be able to provide a specialized terminal for vehicles under the reason described in Sub-chapter 7.3.3 above.

In the long-term plan, which is after the completion of the new port’s first development stage, the Khor Al Zubayr Port will function as an industrial port, since several oil and gas based industries, steel mills, and other industrial productions are very prospective in and around the adjacent areas.

7.4. ENVIRONMENTAL CONSIDERATION

Upon implementing the planned project, environmental and social consideration for the project is required in the most of the countries based on the country's legal framework. The basic policy of the environmental and social consideration is to conserve 1) natural resources and 2) human life.
Table 7.4.1 summarizes the major laws in Iraq relating to environment.

Table 7.4.1 Summary of Major Laws Relating to Environment

Law name	Outline
Environmental Criteria for Industrial, Agricultural, and Public Service Projects, 1990 (Order number unknown)	Environmental criteria with respect to the location and environmental requirements on industrial, agricultural and public service development.
Law Concerning Ports, 1995 (No. 27 of 1995).	This law regulates navigation and port safety, the prevention of water pollution, the operation of importation and exportation agents, and the registration of ships.
Regulation 25 Preservation of Rivers and Public Water from Contamination, 1967	This regulation relates to the protection of rivers and public water bodies from contamination. The concentration standard for the discharge of wastewater into public water bodies is also regulated.
Wastewater Discharge Quality Requirements Instruction No.(1)	This instruction provides discharge concentration limits for a number of substances contained in wastewater, in accordance with the provisions of Article (16) of Regulation 25.
The New Determinants for the Prevention of Pollution of Rivers No. (25), 1967	This instruction provides physical, chemical and biological guidelines for water quality and wastewater discharges.
Ambient Air Quality Law	This law aims to control emissions to air from a variety of sources (including industrial (factories, power stations, incinerators, oil installations, etc.), non - industrial, and vehicles). It establishes emissions limits for the discharge of certain pollutants to air.
Noise Prevention Law No. (21), 1966	These regulation aims to prevent excessive noise in public places.
Instructions No. (2), 1993	This instruction details the conditions for determining the levels of noise emitted from sound equipment in tourist facilities.
Instructions No. 4, Safe Storage and Handling of Chemicals, 1989	This instruction details the requirements for the safe storage and handling of chemicals, being issued in accordance to the provisions of the sixth and seventh paragraph of Article (3) and Article (105) of the Public Health Law No. 89, 1989.
Iraqi Salvage Law	It focuses on the issue of physical wreck removal.
Law No. 27, 2009	Law for protection and improvement of the environment. This law is replaced version of Law No.3, 1997 for Environment Protection and Improvement. And it aims to protect and improve the environment and natural resources, preserve public health, biodiversity and cultural and natural heritage, to ensure sustainable development and international and regional cooperation in this area.

Source: JICA Study Team

Law No. 27, 2009 shown above requires development projects to obtain an Environmental Compliance Certificate. In order to obtain such a certificate a pre-project environmental evaluation must be conducted so that protection systems are incorporated.

JICA also has a guideline for environmental and social consideration and this guideline is also applied on the JICA project as well as the guideline/laws of the target country.
In this project, former guideline[1] by JBIC (JBIC: Japan Bank for International Cooperation) is supposed to be applied.
According to the JBIC guideline, following principles shall be taken into consideration:

- A wide range of impacts must be addressed.

1 JBIC Guideline for Environmental and Social Consideration, April 2002, JBIC

- Measures for environmental and social considerations must be implemented from an early stage to a monitoring stage.
- JICA is responsible for accountability when implementing cooperation projects.
- JICA asks stakeholders for their participation.
- JICA discloses information.
- JICA enhances organizational capacity.
- JICA makes serious attempts at promptness.

If any laws and guidelines described above do not cover the items of the planned project or no applicable guidelines/laws exit, the environmental policies by the World Bank are referred.

Detailed environmental procedure is discussed in Chapter 14.

Part 3

PORT MANAGEMENT AND OPERATION

8. PRESENT SITUATION ON PORT MANAGEMENT & OPERATION

8.1 PRESENT SITUATION

8.1.1 ORGANIZATION AND STAFFS

Founded in 1997, the General Company for Port of Iraq (GCPI) has been administrating and running the ports in Iraq under the Companies Law No. 22. GCPI's organization is indicated in the Figure 8.1.1. Numbers of employees by gender and by department are shown in Table 8.1.1 and Table 8.1.2 respectively. The total number of employees are at 10, 208 in 2010, and decreased to 8,047 in 2012.

Table 8.1.1 GCPI Personnel (2010)

Jurisdiction	Male	Female	Total
Administrative	2,319	672	2,991
Technical	4,439	271	4,710
Geometric	203	86	289
Marine Engineering	333		333
Nautical	1,885		1,885
Total	9,179	1,029	10,208

Source: GCPI

Table 8.1.2 GCPI Personnel (2012) by Departments

No.	GCPI Sections	Number	No.	GCPI Sections	Number
1	Top Executives	10	13	Marine(Inspection)	215
2	Secretary	7	14	Commercial	44
3	North UQP	1,234	15	Marine Salvage	281
4	South UQP	750	16	Marine Affairs(service)	902
5	KZP	605	17	Computer	98
6	AL Maq.	886	18	Internal Auditing	65
7	Abu Flo.	353	19	GCPI training	96
8	Human Resources	813	20	Planning and Follow	71
9	Financial Affairs	128	21	Legal Section	49
10	Engineering	128	22	Media and Public	123
11	Marine Dry Docks and Industries	717	23	Contracts	34
12	Marine(Dredging)	551	24	IT Dept.	15
A	Sub Total(1-12)	6,054	B	Sub Total(13-24)	1,993
	Grand Total (A+B)	**8,047**			

Source: GCPI

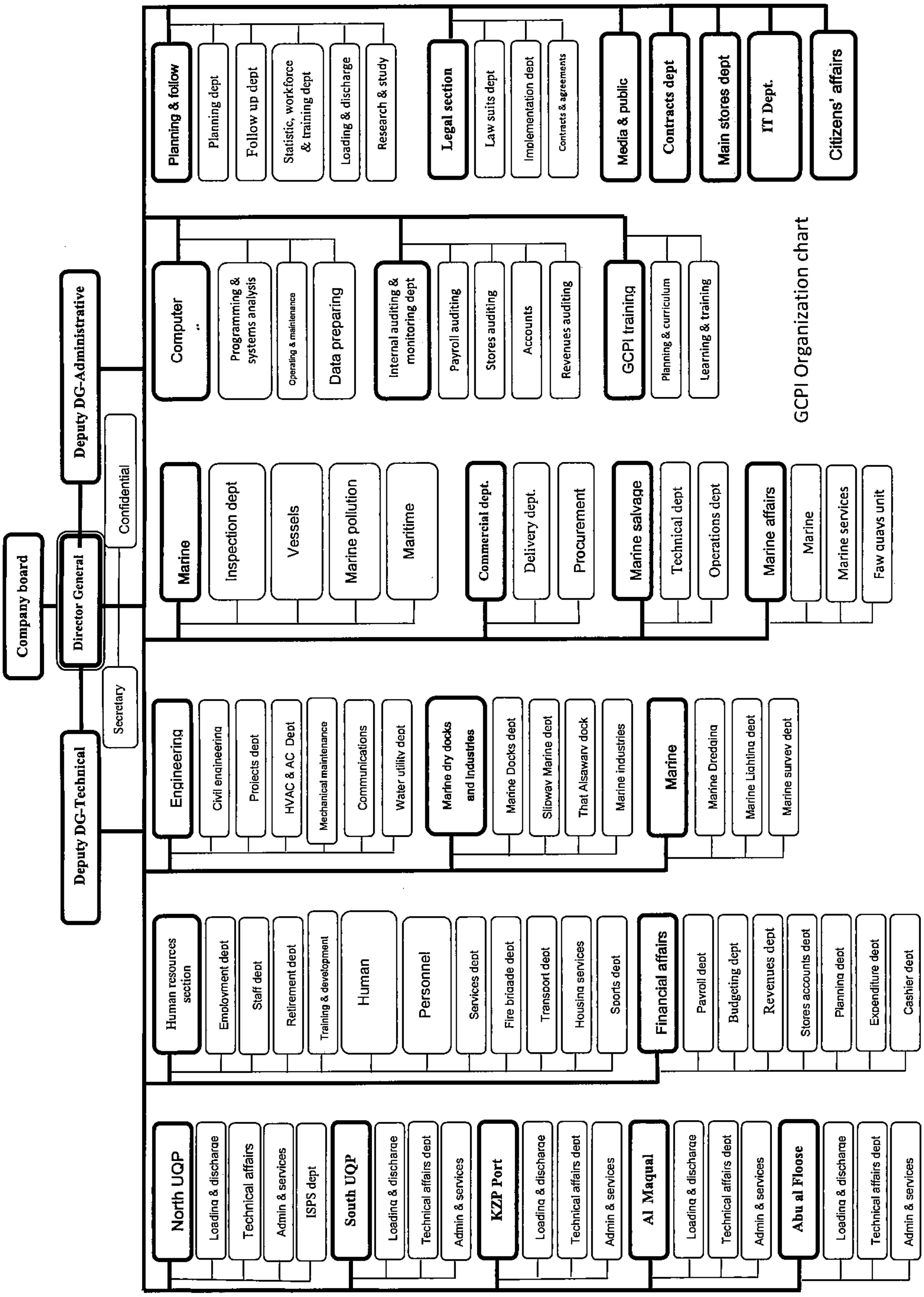


Figure 8.1.1 GCPI Organization Chart

8.1.2 MAJOR ACTIVITIES AND FUNCTIONS

The major activities and functions of the ports of Iraq are as follows.

- Loading and unloading of various exports and imports from/to Iraq through the different ports.
- Berthing operations at the ports of Iraq.
- Signaling to navigating ships in Iraqi territorial waters.
- Carry out investigation and survey, deepening of channel, and furnishing lightings for navigation aids.
- Implementation of projects for the development of ports.
- Acts of dry-docking, maintenance and repair of domestic and foreign ships.
- Provision of services for ships and offshore units. Salvage and rescue work in territorial waters.
- Communications services, housing and other public services.
- Maintenance of the equipment, machinery, vehicles, water and electricity.
- Training and rehabilitation of core personnel for all disciplines and professions and marine unloading and shipping.

8.1.3 ACTIVITIES OF REPRESENTATIVE DEPARTMENTS

Based on annual report in 2010 prepared by GCPI, the activities of representative departments in GCPI relating to the current operation in 2010 are summarized in Table 8.1.3.

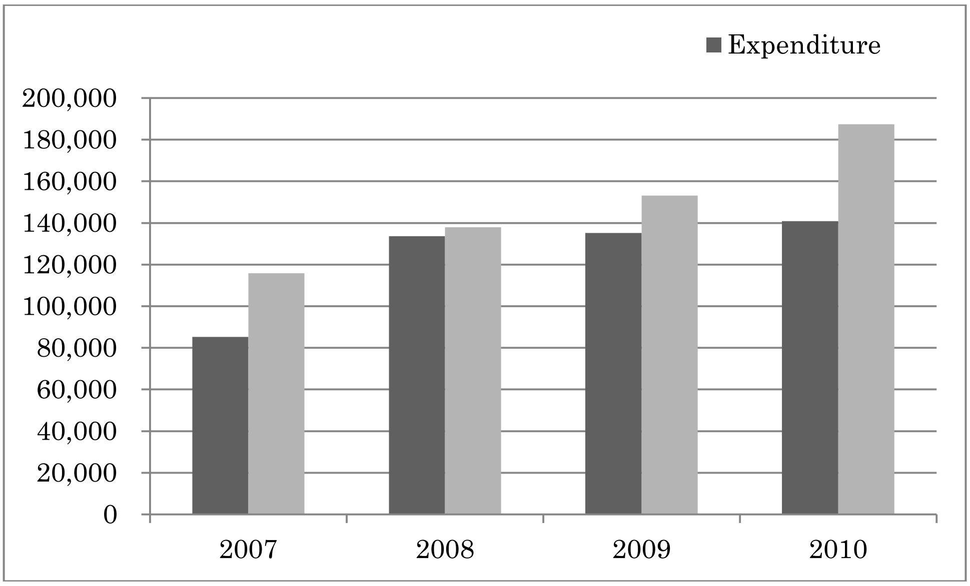
Table 8.1.3 Activities of Representative Departments

Department of Maritime Affairs	- Services for docking and off docking, services for entering and departing port were provided. - A tugboat with a 5,200 ps engine and other service boats were available.
Department of Offshore Drilling	- Marine Survey Division: bathymetric survey and soil investigation has been conducted. - Division of Off-shore Drilling: dredging works of 8,000 m^3 were performed by own operation team. Dredging works of 15 million m3 were executed by contractors. - Division of Marine Enlightenment: 420 units of buoys were installed and maintained.
Department of Rescue	Salvaging, rescue, and mine detection were conducted in 2010.
Department of Engineering	- Division of Communications Engineering: maintenance of various wireless devices were carried out. - Division for Electricity and Cooling: maintenance of electric devices, compressors, lighting devices was conducted. - Division of Civil Engineering: maintenance of the roof of the main office building, pavements of roads and open sheds were executed. - Division of Projects: design of the structures regarding the expansion project of Umm Qasr was conducted. Tendering and implementing of various projects were executed.
Department of Shipyards and Marine Industries	- Maintenance of tugboats, floating dock, etc. was conducted. - Small boats were built by own team.
Department of Planning and Follow-up	- The report of main activities in 2010, 2011 budget action plan, monthly report, quarterly report, annual report were compiled. - Participated in the meetings of the Ministry of Planning and Development and collaborated for budget allocation.
Department of Computer	- IT department was formed in 2010. Internet connection was realized. Some systems are now working. Remodeling of some software is being conducted.
Commercial Section	- This section is in charge of procurement of spare parts, machinery, tools and equipment. Follow up of work committees on procurement problems was carried out.

Source: GCPI

8.1.4 REVENUE AND EXPENDITURE

The revenue and expenditure of GCPI period from 2008 to 2010 is summarized in Figure 8.1.2.
The revenue increased through 2008-2010, while the expenditure remained the same. The revenue has been exceeding the expenditure in recent years.



Source: GCPI

Figure 8.1.2 Revenue and Expenditure of GCPI (million dinar)

Table 8.1.4 summarizes the revenue of respective divisions. According to this table, the revenue of UQP has the largest share among the ports, which has a share of 74% on the cash revenue in January 2012.

Table 8.1.4 Breakdown of Revenue According to Units (Jan 2012)

(Currency Unit: IQD)

No.	Department	Cash Revenue (IQD)	Credit (Governmental Depts.)	Credit (Commercial Vessels)
1.	UQP	9,612,756,919	1,949,629,885	464,955,000
2.	KZP	2,302,608,150	10,804,250	0
3.	Al Maqil Port	639,252,750	0	0
4.	Abu Flus Port	323,804,100	0	0
5.	GCPI Head Office	126,657,380	0	0
6.	Basrah Oil Terminal	0	5,090,720,400	0
7.	Marine Inspection	49,999,325	0	0
8.	Fishing Berths	2,728,500	0	0
	Sub Total	13,057,807,124	7,051,154,535	464,955,000

Source: GCPI

According to the breakdown of revenues in category, service has the largest share which accounts for 99% of the actual revenue, as Table 8.1.5 indicates.

Table 8.1.5 Breakdown of Main Revenue According to Category of Income (Jan 2012)

(Currency Unit: IQD)

Account name	Actual Revenue	Planned Revenue	Variance
Goods handling revenue	10,344,405	15,000,000	-4,655,595
Services rendered revenue	22,187,575,500	18,333,000,000	3,854,575,500
Transferred revenue	1,706,400	15,000,000	-13,293,600
Others	116,923,260	66,666,666	50,256,594
Total	22,316,549,565	18,429,666,666	3,886,882,899

Source: GCPI

The breakdown of the Expenditure on January and three months in 2012 are shown in Table 8.1.6 and Table 8.1.7. The share of the salaries and wages is 78% of the total expenses in January 2012. The expenditure of goods for handling is 8% of the total expense.

Table 8.1.6 Breakdown of the Expenditure on Jan 2012

(Currency Unit: IQD)

No.	Account Name	Actual	Planned	Variance
1.	Salaries and wages	8,042,408,896	10,823,000,000	2,780,591,104
2.	Goods handling expenditure	457,835,294	1,541,000,000	1,083,164,706
3.	Service providing expenditure	157,228,081	627,000,000	469,771,919
4.	Operating services	81,199,800	1,000,000,000	918,800,200
5.	Contribution to main office expenditure	27,975,000	479,000,000	451,025,000
6.	Others	477,653,916	341,000,000	-136,653,916
7.	Capital expenditure	20,985,000	604,000,000	583,015,000
	Total	9,265,285,987	15,415,000,000	6,149,714,013

Source: GCPI

Table 8.1.7 Breakdown of the GCPI Expenditure for Three Months in 2012

(Currency Unit: IQD)

Cost Centre No.	Account Name	Accumulated Expenditure	Consolidated (Aggregated)
112	Buildings, construction, and roads	10,750,000	0
113	Machine and equipment	112,865,000	1,239,233,000
114	Transportation vehicles	0	118,365,000
115	Tools and moulds	12,761,000	2,050,000
116	Furniture and office equipment	108,092,000	74,950,000
		244,468,000	1,434,598,000
3111	Wages and salaries	15,712,263,354	0
3112	Family allowance	2,058,475,765	0
3113	Extra works	311,270,750	0
3114	Encouragement bonuses	113,834,000	0
3115	Qualifications allowances	3,724,238,717	0
3119	Allowances and -others	2,403,452,317	0
3141	Pension (Employees dividend funds)	1,250,519,408	0
		25,574,054,311	0
321	Raw material	18,533,435	3,450,000
323	Spare parts	574,408,667	414,033,000
3221	Petroleum materials	115,831,150	71,551,500
3222	Gas	1,128,500	150,050
3223	Oils and greases	752,865,000	1,020,214,950
3251		299,797,516	227,528,550
3252	Stationery	14,489,244	50,000
3261	Uniforms	36,000,000	0
3262	Food stuff	400,559,000	0
3271		15,573,000	0
		2,229,185,512	1,736,978,050
3312	Buildings and construction maintenance	28,415,000	65,881,000
3313	Machines and equipment maintenance	17,433,000	2,680,000
3314	Transportation vehicles maintenance	47,382,500	25,000,000
3315	Tools and moulds maintenance	35,000	0
3316	Furniture and office equipment maintenance	465,000	0
3331	Advertising	1,687,250	0
3332	Printing and publishing	675,000	115,472,100
3333	Hospitality	8,574,750	0
3334	General communications	10,704,750	12,963,000
3353	Lease of equipment and machines	100,000	0
3354	Lease of transport vehicles	76,771,825	17,915,000
3361	Subscriptions	1,051,500	0
3363	Bonuses	10,325,000	0
3365	Legal services	1,181,650	0
3366	Banking services	12,024,887	0
3367	Training and rehabilitation	2,450,000	0
3369	Expenses -others	6,347,082	31,086,400
334332	Travel	277,855,451	0
		503,479,645	270,997,500
342	Operating services	3,081,981,385	0
		3,081,981,385	0
3832	Compensation and fines	6,669,250	0
		6,669,250	0
391	Previous years	1,374,063,233	0
392	Ad-hoc expenses	857,500	0
		1,374,920,733	0
	Total	33,014,758,836	3,442,573,550

Source: GCPI

8.1.5 INITIATIVES OF PRIVATE PARTICIPATION

In July 2008, MOT selected a US-based consulting company of the Cornell Group to assist in its restructuring, and in introducing concessionaires for UQP that are appropriate and qualified international investors for port development and operations.

The concessionaires were expected to rehabilitate the berth, procure loading/unloading facilities, and operate the berth for a certain period time (five years). After completion of the contract, the Government of Iraq and GCPI will take over the facility and its operation rights. These contracts will be considered for renewal after completion of the original contract period. The current Joint Operating Contracts made in the respective ports are shown in Table 8.1.8.

Table 8.1.8 Joint Operating Contracts of Ports

Port	Berth No.	Concessionaire	Remarks
UQP	4	CMA-CGM (French)	Operation in 2010
	5	Global logistics	
	8	Gulftainer (Dubai)	
	11a, b	Gulftainer (Dubai)	Under preparation
	Dry channel no. 1	Iraq Container Terminal (ICT)	
	South Port	Al-Khamaeil	Under preparation
	North Port	Alrashid	Under preparation
	South Port	Sabaa	At the stage of MOU
KZP	8	Marlog (German)	Contracted in 2010

Source: GCPI

The concessions of the cargo handling yard was also considered and have been made with APL Co. (USA) and Alkamal Company for areas available behind berth nos. 4 and 5 in UQP South Port.

In 2012, GCPI and NAFITH of Jordan agreed on a ten-year contract, which amounted to USD 15 million, for truck control and management of UQP, KZP, and Abu Flus Port, including the Kuwaiti border. NAFITH has a similar truck control and management system in Aquba Port in Jordan. It is aimed to shorten the amount of time currently required, from several days to eight hours.

8.2 ISSUES ON PORT MANAGEMENT AND OPERATION

8.2.1 CONDITIONS OF PORT EQUIPMENT

GCPI has owned many of over 30 years old cargo handling equipment and marine equipment. Accordingly, most of the quay side cranes, service boats, other than some tug boats and one survey boat, are either not-working or already aged and required to be replaced as shown in Table 8.2.1 to Table 8.2.6. This situation is a most critical issue on port operation.

(1) Cargo Handling Equipment in UQP

Table 8.2.1 Cargo Handling Equipment Owned by GCPI (Quayside cranes at UQP South)

No.	Name	Origin	SWL	Quay No.	Condition	Year Installed	Operating Hours
1	Sumitomo	Japan	5	2	working	n/a	n/a
2	Sumitomo	Japan	5	2	working	n/a	n/a
3	Sumitomo	Japan	8	2	working	n/a	n/a
4	SPMP	China	15	6	working	1980	n/a
5	SPMP	China	8	6	not working	1980	n/a
6	SPMP	China	8	7	working	1980	n/a
7	SPMP	China	5	7	working	1980	n/a
8	SPMP	China	15	7	working	1980	n/a
9	Sumitomo	Japan	8	8	not working	n/a	n/a
10	Sumitomo	Japan	8	8	not working	n/a	n/a
11	SPMP	China	8	8	working	1980	n/a
12	SPMP	China	8	8	working	1980	n/a
13	SPMP	China	5	8	working	1980	n/a
14	SPMP	China	15	8	not working	1980	n/a
15	SPMP	China	8	8	not working	1980	n/a

Source: JICA Study Team

Table 8.2.2 Cargo Handling Equipment Owned by GCPI (Quayside cranes at UQP North)

No.	Name	Origin	SWL	Quay No.	Condition	Year Installed	Operating Hours
1	Takraf	Germany	15	12	working	1980	n/a
2	Takraf	Germany	3	12	working	1980	n/a
3	Takraf	Germany	8	13	working	1980	n/a
4	Takraf	Germany	3	14	working	1980	n/a
5	Takraf	Germany	8	14	not working	1980	n/a
6	Takraf	Germany	8	14	not working	1980	n/a
7	Takraf	Germany	3	8	not working	1980	n/a
8	Takraf	Germany	15	14	not working	1980	n/a
9	SPMP	China	8	15	not working	1980	n/a
10	SPMP	China	15	16	not working	1980	n/a
11	Takraf	Germany	3	16	not working	1980	n/a
12	Takraf	Germany	3	16	not working	1980	n/a
13	Takraf	Germany	3	16	not working	1980	n/a
14	Takraf	Germany	15	16	not working	1980	n/a
15	Takraf	Germany	3	17	not working	1980	n/a
16	Takraf	Germany	3	17	working	1980	n/a
17	Takraf	Germany	15	17	not working	1980	n/a
18	Takraf	Germany	3	17	not working	1980	n/a
19	Takraf	Germany	8	18	working	1980	n/a
20	Takraf	Germany	3	18	not working	1980	n/a
21	Takraf	Germany	5	18	not working	1980	n/a
22	Takraf	Germany	3	18	working	1980	n/a
23	Takraf	Germany	3	18	not working	1980	n/a
24	Takraf	Germany	3	18	not working	1980	n/a
25	Takraf	Germany	15	18	not working	1980	n/a
26	Takraf	Germany	8	18	not working	1980	n/a
27	Takraf	Germany	8	18	not working	1980	n/a
28	Takraf	Germany	3	18	not working	1980	n/a
29	Takraf	Germany	15	18	not working	1980	n/a
30	Takraf	Germany	3	18	not working	1980	n/a
31	Takraf	Germany	8	19	not working	1980	n/a
32	Takraf	Germany	3	19	working	1980	n/a
33	Takraf	Germany	15	19	working	1980	n/a
34	Takraf	Germany	8	19	working	1980	n/a
35	Takraf	Germany	15	19	working	1980	n/a
36	ZPMC	China	40	20	working	1997	n/a
37	ZPMC	China	40	20	working	1997	n/a
38	Liebherr	Germany	104	19 and 20	working	2004	n/a
39	Liebherr	Germany	104	19 and 20	working	2004	n/a
40	Takraf	Germany	8	19	working	1980	n/a

Note: Two G/Cs recently arrived for installation at quay nos. 11a & 11b.
Source: JICA Study Team

(2) Cargo Handling Equipment in KZP

Table 8.2.3 On-land Machinery and Equipment (KZP) (1)

On-land Machinery & Equipment (Khor al Zubair Port)(1)

Item	No. on Berths	Capacity	Specification	Purchase Year	Working Area (Berth No)	Condition in 2005 General Condition	Condition in 2005 Detail of Problem	Condition in 2005 Rectification Method	Condition in 2011 General Condition	Condition in 2011 Detail of Problem	Condition in 2011 Rectification Method
Shore crane (Level luffing portal Jib crane)	1	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	2	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	3	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	OutOfOrder	Need Elec. & Mechanical Spare Parts	Repairing			
Shore crane (Level luffing portal Jib crane)	4	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	OutOfOrder	Need Elec. & Mechanical Spare Parts	Repairing			
Shore crane (Level luffing portal Jib crane)	5	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	6	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	7	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	8	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	9	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	OutOfOrder	Need Elec. & Mechanical Spare Parts	Rehabilitation			
Shore crane (Level luffing portal Jib crane)	10	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	OutOfOrder	Need Elec. & Mechanical Spare Parts	Rehabilitation			
Shore crane (Level luffing portal Jib crane)	11	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	12	8 Ton	SUMITOMO Made in Japan	1979	2, 3, 4	Working					
Shore crane (Level luffing portal Jib crane)	13	5 Ton	TAKRAFT Made in Germany	1983	7, 8	Out Of Order (Under Repairing)	Need Elec. & Mechanical Spare Parts	Repairing			
Shore crane (Level luffing portal Jib crane)	14	15 Ton	SUMITOMO Made in Japan	1979	7, 8	Working					
Shore crane (Level luffing portal Jib crane)	15	6 Ton	SUMITOMO Made in Japan	1979	7, 8	Working					
Shore crane (Level luffing portal Jib crane)	16	10 Ton	SUMITOMO Made in Japan	1979	7, 8	OutOfOrder	Need Elec. & Mechanical Spare Parts	Rehabilitation			
Shore crane (Level luffing portal Jib crane)	17	10 Ton	SUMITOMO Made in Japan	1979	7, 8	OutOfOrder	Need Elec. & Mechanical Spare Parts	Rehabilitation			
Shore crane (Level luffing portal Jib crane)	18	6 Ton	SUMITOMO Made in Japan	1979	7, 8	OutOfOrder	Need Elec. & Mechanical Spare Parts	Repairing			
Shore crane (Level luffing portal Jib crane)	19	15 Ton	SUMITOMO Made in Japan	1979	7, 8	OutOfOrder	Need Elec. & Mechanical Spare Parts	Repairing			
Shore crane (Level luffing portal Jib crane)	20	5 Ton	TAKRAFT Made in Germany	1983	7, 8	OutOfOrder	Need Elec. & Mechanical Spare Parts	Repairing			
Forklift		3 Ton	HELI Made in China	2001	Khor Az Zubayr Port	Working			Working		
Forklift		10 Ton	HELI Made in China	2001	Khor Az Zubayr Port	Working			Working		
Forklift		10 Ton	HELI Made in China	2001	Khor Az Zubayr Port	Working			Working		
Forklift		3 Ton	Jonnj Made In India	2001	Khor Az Zubayr Port	Working			Working		
Forklift		7 Ton	Jonnj Made In India	2001	Khor Az Zubayr Port	Out of Work	Need Spare Parts	Repairing	Working		
Forklift		7 Ton	TCM Made In Japan	1986	Khor Az Zubayr Port	Working			Working		
Forklift		24 Ton	TOYOTA Made In Japan	1980	Khor Az Zubayr Port	Out of Work	Need Spare Parts	Repairing	out of work	expire model	
RTG		40 Ton	FANTUZZI Made in Italy	2004	Khor Az Zubayr Port	Working			Working		
RTG		40 Ton	FANTUZZI Made in Italy	2004	Khor Az Zubayr	Working			transfer to upp		
Flat Trailer		35 Ton	MAN Made in Germany	1980	Khor Az Zubayr	Working			out of work	expire model	
Tractor		2 Ton	BELARUS Made in Belarusian	1998	Khor Az Zubayr	Working			Working		
Ship Unloader		1500 Ton/hour	Made in French	1981	Berth no.11	Out of Order	Unknown		Out of Order		
Ship Unloader		1500 Ton/hour	Made in French	1981	Berth no.11	Out of Order	Unknown		Out of Order		
Ship Loader		1500 Ton/hour	Made in French	1981	Berth no.11	Out of Order	Unknown		Out of Order		
Ship Loader	1	600 Ton/hour Bulk	SUMITOMO Made in Japan	1980	Berth no. 5, 6 & 7	Out of Order	Unknown		Out of Order		

Table 8.2.4 On-land Machinery and Equipment (KZP) (2)

On-land Machinery & Equipment (Khor al Zubair Port)(2)

Item	No. on Berths	Capacity	Specification	Purchase Year	Working Area (Berth No.)	Condition in 2005: General Condition	Condition in 2005: Detail of Problem	Condition in 2005: Rectification Method	Condition in 2011: General Condition	Condition in 2011: Detail of Problem	Condition in 2011: Rectification Method
Ship Loader	2	on Bulk150 Ton B	SUMITOMO Made in Japan	1980	Berth no. 5, 6 &7	Out of Order	Unknown		Out of Order		
Ship Loader	3	on Bulk150 Ton B	SUMITOMO Made in Japan	1980	Berth no. 5, 6 &7	Out of Order	Unknown		Out of Order		
Ship Loader	4	150 Ton Bags	SUMITOMO Made in Japan	1980	Berth no. 5, 6 & 7	Out of Order	Unknown		Out of Order		
Stacker		300 Ton/hour	Made in French	1981	Khor Az Zubayr	Out of Order	Unknown		Out of Order		
Stacker		650 Ton/hour	SUMITOMO Made in Japan	1980	Khor Az Zubayr	Out of Order	Unknown		Out of Order		
Water Tanker		22000 L	VOLVO Made In Sweden	1980	Khor Az Zubayr	Working			Out of Order	expire model	
Water Tanker		22000 L	VOLVO Made In Sweden	1980	Khor Az Zubayr	Out of Order		Repairing	Out of Order	expire model	
Fire Fighting Vehicle		5.5 Ton Water1 Ton Fo	Mercedes ACTROS	2002	Khor Az Zubayr	Working			Working		
Fire Fighting Vehicle			FAW Made in China	2001	Khor Az Zubayr	Out of Order	Need Spare Part	Repairing	Out of Order	need spare parts	repairing
Electronic Bridge Scale		100 Ton	Made in Japan and supplied with new equipment European made after the war	1980	Khor Az Zubayr	Working			Working		
Electronic Bridge Scale		100 Ton	Made in Japan and supplied with new equipment European made after the war	1980	Khor Az Zubayr	Working			Working		
Electric Generator		250 KVA	CATERPILLER Made in UK	2003	Khor Az Zubayr	Working			Working		
Electric Generator		250 KVA	CATERPILLER Made in UK	2003	Khor Az Zubayr	Working			Working		
Electric Generator		250 KVA	CATERPILLER Made in UK	2003	Khor Az Zubayr	Out of Work	Need Spare Parts		Working		
Electric Generator		300 KVA	MITSUBISHI Made in Japan	1980	Khor Az Zubayr	Working			Working		
Electric Generator		450 KVA	MITSUBISHI Made in Japan	1979	Khor Az Zubayr	Working			Working		
Electric Generator		250 KVA	TAIYOO		Khor Az Zubayr	Out of Work			Out of Work		
Electric Generator		125 KVA	PERKING		Khor Az Zubayr	Working			Working		
Electric Generator		175 KVA	MITSUBISHI Made in Japan	1980	Khor Az Zubayr	Working			Working		
Electric Generator		63 KVA	DENYO		Khor Az Zubayr	Out of Work			Out of Work		
Electric Generator		1000kv	perkins	2009	Khor Az Zubayr	Working			Working		
Mobile Crane		20 Ton	TADANO Made in Japan	1980	Khor Az Zubayr Port	Working			Out of Work	Expired Model	
Mobile Crane		15 Ton	TADANO Made in Japan	1980	Khor Az Zubayr Port	Out of Work	Unknown		Out of Work	Expired Model	
Mobile Crane		15 Ton	TADANO Made in Japan	1980	Khor Az Zubayr Port	Out of Work	Unknown	Repairing	Out of Work	Expired Model	
Mobile Crane		15 Ton	TADANO Made in Japan	1979	Khor Az Zubayr Port	Out of Work	Unknown	Repairing	Out of Work	Expired Model	
Mobile Crane		10 Ton	TADANO Made in Japan	1979	Khor Az Zubayr Port	Out of Work	Unknown	Repairing	Out of Work	Expired Model	
Mobile Crane		6 Ton	COLSE Made in England	1982	Khor Az Zubayr Port	Working	Need New Battery		Out of Work	Expired Model	
Mobile Crane		6 Ton	COLSE Made in England	1982	Khor Az Zubayr Port	Working	Need New Battery		Out of Work	Expired Model	
Mobile Crane		6 Ton	COLSE Made in England	1982	Khor Az Zubayr Port	Working	Need New Battery		Out of Work	Expired Model	
Mobile Crane		6 Ton	COLSE Made in England	1982	Khor Az Zubayr Port	Working	Need New Battery		Out of Work	Expired Model	

(3) Marine Equipment Owned by GCPI

Table 8.2.5 Marine Equipment of GCPI

Item	Name	Type	Capacity	Specifications	Purchase Year	Condition in 2005 (General Condition)
Tug Boat	Mhejran		4,500 HP	Made in Japan	1975	Out of order
	Albatoul		3,500 HP	Made in Malaysia	2000	Working
	Alshaimaa		3,600 HP	Made in Malaysia	2000	Working
	Aljamhuria		2,500 HP	Made in Japan	1976	Working as guides station
	Umarah		2,500 HP	Made in Japan	1976	Out of order (Under repair in the maintenance workshop in Almaagal)
	Alraia		4,200HP	Made in China	1999	Working
	Ibn Batutah		4,200 HP	Made in China	1999	Working
	Alyarmook		4,200 HP	Made in China	1999	Out of order (Issued for tender for repair)
	Alfatih Almubeen		4,200 HP	Made in China	1999	Out of order (Issued for tender for repair)
	Alurobah		2,500 HP	Made in Japan	1976	Out of order (Under repair in the maintenance workshop in Almaagal)
	Alwihdah		2,500 HP	Made in Holland	1980	Out of order (under repair in Umm Qasr)
Other Vessels	Alnissier	Buoy Boat		Made in Germany	1980	Now under maintenance in Kuwait
	Al shurok	Pilot Boat		Made in Japan	1976	Out of order and need maintenance
	Alfao	Survey Boat	280 HP	Made in Italy L: 42.5 m x W: 7.42 m x H: 2 m	1968	Out of order
	Abarakkah	Survey Boat	700 HP	Made in Denmark L: 22.25 m x W: 15.5 m x H: 2.25 m	2001	Working with one engine
	Alkhayr	Work Boat		Made in Japan	1976	Working in Umm Qasr
	No. 201	Mooring Boat		Made in Malaysia	1976	Need complete maintenance
	No. 304	Mooring Boat		Made in Malaysia	1976	Need complete maintenance
	No. 303	Mooring Boat		Made in Malaysia		Need complete maintenance
	No. 305	Mooring Boat				Wrecked in Umm Qasr
	No. 472	Mooring Boat				Wrecked in Umm Qasr
	No. 203	Mooring Boat		Made in Malaysia		Need complete maintenance
	No. 314	Mooring Boat		Made in Holland	1976	Not working
	No. 342	Moring Boat				Not working and now in maintenance workshop
	No. 386	Mooring Boat				Not working
	No. 338	Passenger Boat		Made in Malaysia	1976	Not working
	No. 318	Mooring Boat				Not working and now in maintenance workshop
	No. 339	Mooring Boat		Made in China		Not working
	No. 340	Mooring Boat		Made in China		Not working and now in maintenance workshop
	No. 316	Mooring Boat		Made in Holland		Not working and now in maintenance workshop
	No. 307	Mooring Boat		Made in Holland	1976	Working percentage is 80% in Umm Qasr
	No. 317	Mooring Boat		Made in Holland	1976	Not working
	No. 312	Mooring Boat		Made in Holland	1976	Not working and now in maintenance workshop
	No. 315	Mooring Boat		Made in Holland	1976	Not working and now in maintenance workshop
	No. 308	Mooring Boat		Made in Holland	1976	Not working
	No. 341	Mooring Boat		Made in China	1999	Need complete maintenance
	No. 329	Mooring Boat				Not working
	Barge No. 1	Tanker		Made in Germany	1980	Need complete maintenance
	Barge No. 2	Tanker		Made in Germany	1980	Not working
Floating Cranes	Himreen		100 tons	Made in Germany L: 22 m x W: 22 m x H: 3.5 m	1976	Working percentage is 75% and requires maintenance
	Sanam		100 tons	Made in Germany L: 22 m x W: 22 m x H: 3.5 m	1976	Not working and all parts were looted
	Khalid ibn al-waleed		350 tons	Made in Spain L: 63 m x W: 31 m x H: 6.5 m	1975	Not working and all parts were looted
	Almusrafa					Not working and wrecked in Basra

(4) Dredgers Owned by GCPI

Table 8.2.6 List and Conditions of Dredgers as of March 2012

No.	Type	Description	Name			Current Condition
1.	TSHD	Al Zubayr	3,000 m^3	1975	IHC	Under repair
2.	TSHD	Al Tahreer	3,000 m^3	1977	IHC	Under repair
3.	TSHD	Teeba	3,500 m^3	2006	China	Working (but need rehabilitation)
4.	TSHD	Al Marbd	2,000 m^3	1993	Germany	Not working (Repair needed)
5.	TSHD	Al Basrah	3,000 m^3	1975	IHC	Under repair
6.	CSD	Saif Al Khar	3,000 m^3	1980	Japan	Not working
7.	CSD	Nasnya	750 m^3	1999	France	Working
8.	CSD	Ram Allah	1,500 m^3	1999	Vietnam	Not working (Repair needed)

Source: GCPI

8.2.2 ISSUES ON PORT OPERATION

According to the findings of the Study, the following points are the main issues on the port operation, in addition to the known physical issues such as damages of port facilities and obstructions in the access channels (shipwrecks and sedimentation);

1) Inefficiency of cargo handling and other port service caused from shortage of cargo handling equipment and marine equipment.
2) Lack of timely repairs and maintenance of Port equipment due to shortage of spare parts.
3) Prolonged stay of vessels at berths, due to time consuming process in the custom clearance.
4) Inappropriate arrangement of port facilities and yards including the maintenance and repairs.
5) Delays in introduction of effective operation systems, especially in computerization, yard management & operation system, etc.
6) Shortage of experienced persons for the works in the port management and operation aspects.

The Items 1) and 2) above may also be caused from the following institutional issues, rather than the budget insufficiency or technical issues in the procurement of equipment and materials;

- Due to the limited authorization in expenditure of Director General or Heads of Divisions and Departments respectively, which is deemed so little amount from the practical view point, most of the purchase requests need to go to MOT in Baghdad.
- Further, its approval procedure also requires to go through Divisions and Sections of both GCPI and MOT with many documents, consequently this has causing a considerable delays till the site receives the requested material, and worsened if formal tenders are required as exceeding a limit.

As to Item 3), the main cause of the issue is understood to be a lack of adequate information sharing/communication system and restricted working hours. However, a lack of necessary facilities near by the Port may also be a major cause, as the testing and inspection of foods and crops imported can only be done in Baghdad by sending samples, thus causing further time wasting.

As the consequent of the inefficient port operation caused from the abovementioned issues, a shortage of berths in the ports is also anticipated, especially in KZP is a critical case.

8.2.3 OTHER ISSUES RELATED TO THE OPERATION

(1) Port Users

Port users have raised the following issues for Iraqi ports;

- The port authority announced that there was enough depth at the berths, however vessels of less draft touched the sea bed in front of the berth;
- Customs clearance takes a very long time since the documentation is complicated and customs officer has little experience in customs procedure;
- Port documents are processed very slowly. The progresses of documents are not traceable. Submitted documents are sometimes go missing;
- Government officials are not accustomed to procurement works. In ODA cases, issuances of letters for the exemption of import tax were not delivered on time.

(2) Capacity Building Report by GCPI

In the capacity building plan prepared by GCPI in September 2010 (under Port Rehabilitation Project Phase 1), the following observations were made.

- The gates of container terminals are congested;
- The main reason for the low operation productivity is due to the stoppage of cranes. There is a lack of spare parts at the maintenance shop. The procurement system of spare parts is inadequate to meet the needs for operation;
- To enhance efficiency, privatization is a good solution;
- The improvement of management system is necessary.
  - Decision making should be shared with other senior managers to expedite the documentation process.
  - The location of GCPI headquarters is too remote to detect the problems that need to be immediately solved at the operation site.

(3) Others

Other problems related to the operation were identified during the JICA training in Tokyo in 2011.

- Road maintenance is needed;
- There are problems with the computer system and internet connection;
- Shortage of buildings and quays;
- Unstable electrical supply;
- Shortage of spare parts;
- Shortage of cargo handling machines; and
- Training is inadequate.

9. IMPROVEMENT PLAN ON PORT MANAGEMENT & OPERATION

9.1 QUESTIONNAIRES SURVEYS

The questionnaire survey to know the current status on port management and operation was conducted to port user. The result of questionnaire survey is summarized in Table 9.1.1.

Table 9.1.1 Answers to Questionnaires Distributed in December 2011

Question	Answer
Are there any problems with collecting port statistics?	Yes, employees are reluctant to give out information, If the head of the department is not available, other staffs do not provide information. Data most of the time are not complete. No central data system. Each department collects their own data
Can GCPI procure cranes and carry out maintenance according to the approved budget without consulting the ministry?	No, there is no law which regulates it. It is at the discretion of the key persons and the ministry to approve the procurement.
Is it possible for a vessel to enter or depart the port 24 hours a day?	For UQP yes, but for KZP it depends on the tide as the depths are shallow
After applying for entry or departure, how long does it take to receive notice?	Two hours
Is there a danger of grounding? Have beacons been installed?	Yes there is danger of grounding; No beacons are installed, only buoys;
Do you have a plan to introduce new cranes?	Not for the quays operated by GCPI
Can the location of a container be traced easily?	No; Source: container quay supervisor
Do you have problems in storage management of containers that affect the loading speed?	Yes; Source: container quay supervisor
If you have a problem, what do you propose for a solution?	• Provide more yards; • Provide RTGs; • Marking of yards; • Yard management training; • Yard management software; • Provide yard operating staff; and • Proper set up of yards.
Are there any difficulties in road maintenance and yard maintenance? If so, please identify the reasons.(i.e. no plans, insufficient funds, no tools or organizations to repair, no repair manuals)	Yes there are: Reasons: • No budget; • No tools; • No equipment; and • Not enough staff, most staff are aged.
Do you conduct the training of employees on a regular basis?(Is there any training scheme?	Only selective short courses for some employees.
Is there any system/framework to consider the environment in the port area?	No-

Source: JICA Study Team

9.2 IMPROVEMENT PLAN

According to the annual report in 2010, GCPI reported the faced issues and the corresponded measures as shown in Table 9.2.1.

Table 9.2.1 Issues and Response Related to the Activities of GCPI

No.	Obstacles and Problems	Solutions and Proposals
1	The lack of equipment to cope with the need for continuous dredging	- Constraints removal- continuous dredging, especially in the channel to Umm Qasr) in order to maintain design depth; - Implementation of offshore dredging project using Japanese loan; Jan De Nur, (Belgium), carried out Dredging work of 5.15 million $m^{3;}$at UQP to maintain the design water depth at -12.5m - Purchase of a dredger with a capacity of 2500 $m^{3;}$ - Tender approval of dredger with a capacity of 2500 $m^{3;}$ - Dredger will be provided by Gulftainer contracted to invest on the quay construction project in Umm Qasr; and - Dredgers will be provided by Japanese aid.
2	Shipwrecks in waterways affecting the entry and exit of vessels coming into Iraqi ports	- There are action plans by the Department of Maritime Rescue to lift and work continuously for this purpose; - Lift project has four objectives under the Japanese loan; and - Approached to the province of Basra for the purpose of buying cranes with capacity of 1500 tons and 1000 tons.
3	The lack of equipment, i.e., dredgers, tractors, forklifts, marine vessels, boats, and lighting vessels, makes the port equipment specialist for handling and communications difficult	- Purchase a number of equipment and machinery within the investment plan as well as the worn-out offshore units and equipment for the shipyards. However, the allocations are not enough to purchase such equipment.
4	Delayed funding for projects	- Accelerate financing.
5	The presence of a large water obstacle floating on the Shatt al-Arab, shipwrecks and sedimentation restricts navigation	- Required to instruct the province of Basra to coordinate with the ports to open the bridge daily and determine the time which do not affect the operations of transit on the bridge; - Identify a dedicated staff to be informed of the vessels coming in and out; and - Increase the lighting in that area.
6	Accumulation of goods in ports, particularly in the ports of Umm Qasr and Khor Al Zubayr	- Direct the implementation of the customs law of public auction sale after 90 days and the arrival of goods in the port; - Instruct the state departments to receive the containers; - The allocation site for the Directorate of Customs is outside the port to lift the container and goods.
7	Unscheduled vessels coming to the ports to create to reduce waiting time by the Ministry of Commerce	- The Ministry of Trade State Company for foodstuff trading ports notifies the agenda including the arrival of ships to avoid congestion in the waiting ships.
8	Delayed laboratory testing of goods supplied to the ports	- It is necessary to build testing laboratories in the province of Basra close to the ports to avoid delays in inspections and to allocate staff by the Ministry of Health and Commerce in each port to speed up inspections.
9	Damaged goods cannot be destroyed until various time-consuming procedures are followed	- Custom requires the formation of special committees for the destruction of damaged goods as well as necessary equipment, staff and -the involvement of stakeholders and a representative of the ports to ensure that damaged materials are not leaked to local markets.
10	Lack of sonar equipment to scan cargo and containers	- The examination of sonar devices belonging to the Ministry of Finance/Customs, is currently available in all ports. However, currently only one device is available, which was not available three years ago and Minister of Finance was to provide two, although this has not yet done. - Declaration of a joint operation to provide sonar devices by our company.
11	Delay in opening of documentary credits for foreign bids	- To instruct the Trade Bank of Iraq TBI to rapidly open credits and determine the timeframe.
12	Overruns on buildings and port facilities	- To instruct the security authorities in the province for the purpose to aware raising abuses.
13	The presence of cars reserved in the port of Abu Flus has not been resolved despite continued assurance to solve by the customs	- Emphasis the parties concerned to resolve the lift car reserved for a long time by a simplified and quicker procedure.

Source: JICA Study Team

Considering the above situation, the JICA Study Team recognizes that the GCPI has the following important tasks:

- Rehabilitation of the facilities that were destroyed during the war, i.e., channel, navigation aids, quays, quay cranes, and dredgers;
- Strengthen the function of basic facilities, e.g., channel, navigation aids, quays, quay cranes, roads and pavements;
- Procurement of large cargo handling machines and maintenance/repair, e.g., RTG, top lifter, forklifts; and
- Utilization of IT, e.g., work planning, recording, and display of address of container stacking, record of gate in/out, loading/unloading, and data linking to tariff calculation, progress of works, displaying of waiting queues, and instructions to the drivers on where to go.

Future needs:

- Port development to meet future cargo demand; and
- Promotion of concession.

Maintenance and repair of facilities is extremely important to prevent work stoppage. To realize a reliable maintenance system, the following measures need to be undertaken:

- Provision of maintenance facilities;
- Establishment of a maintenance system including manpower and education; and
- Securing the supply of parts, and procurement efficiency.

Based on the above, the following issues need to be addressed:

- Priority of solutions; and
- Setting the organization’s target and formulation of its action plan.

Areas to be improved include the following:

- Safety of navigation;
- Improvement of cargo handling productivity and quality of service improvement in the transfer of information; and
- Improvement of document processing.

9.3 OPTIONS FOR IMPROVEMENT IN PORT MANAGEMENT & OPERATION

In order to achieve the abovementioned, the following measures as effective to improve the efficiency of operation are recommended.

(1) Promotion of Containerization

More containerization can reduce the damage of commodity, loss of contents, time for delivery, unnecessary moving of cargo, and unnecessary manpower. Unused sheds should be demolished and space for container yards should be created.

(2) Speedier Bulk Handling

Enhancing the capacity of cranes, using larger buckets, shortening the cycle time of each crane, etc., are useful for speeding up bulk handling works.

(3) Increased Efficiency of General Cargo Handling

Palletizing, belt conveyers, forklifts, and quay cranes are useful for speeding up the general cargo handling works.

To alleviate the shortage of berth, rails on the apron should be relocated to the open yard. Goods can be transported from quays to the wagons using belt conveyer.

(4) Remodeling and Repairing of Roads

Improvement of roads is necessary to decrease the damage of cargo, the number of accidents, and to increase the speed of cargo handling. Pavements should be repaired and crossings along railroad and road pavement should be remodeled to the over passes.

(5) Preventive Measures for the Stoppage of the Cranes

Crane productivity is crucial for loading and unloading operations. To decrease the stoppages of cranes, daily inspection and regular maintenance are indispensable.

Sufficient supply of spare parts is required. Maintenance shop should be fully furnished.

(6) Most Use of IT System

a. Disconnection Works Can be Avoided

The provision of information, such as locations of containers, destination of containers, and conditions of receiving places is important to avoid disconnection of works.

b. Enables the Progress of Works to be Monitored

The monitoring of work is very important to give timely instructions according to the real progress of works since it is a crucial matter in decreasing useless waiting time and useless congestion. People should be able obtain the current information through IT system.

c. Invoice and Receipt Can be Issued Without Delay

Invoice should be issued immediately after the completion of works. Receipt should be issued immediately after payment is made. The documentation process should be monitored.

d. Notice of Entering or Departing Can be Promptly Issued

To avoid unnecessary waiting of ships, ‘IT’ should be used for confirming or monitoring the conditions of departure of ships.

e. Data Can be Shared Among Concerned Parties

The recorded works should be utilized as the base of documentation, and should be shared among concerned parties.

9.4 THE STEPS TO OVERCOME THE DIFFICULTIES

Although all the difficulties need immediate remedy, everything cannot be solved at once. There is no other way than to solve them one at a time. To achieve this, the following steps should be taken.

- Establish the targets;
- Establish the action plan with proper schedule and budget; and
- Implement the action plan.

10. CAPACITY BUILDING PLAN

10.1 GENERAL

As described in the previous chapters, the ports of Iraq has been facing with considerable issues related to the port management & operation, by which rehabilitation/ reinforcing of the port facilities, replacement / improvement of port equipments (cargo handling and marine equipment), introduction of modern operation systems are essentially and urgently required in order to improve such situations and achieve better productivities, as well as the improvement and upgrading of the concerned organizational and personnel capabilities.

To this end, it is essential to formulate a necessary capacity building plan and arrange/assist in its implementation.

Further, it will also be unavoidable to respond to the following aspects and issues in order for the ports in Iraq to be an internationally recognized modern port;

- ISPS Code compliant (in navigation safety, prevention of marine pollution, etc.);
- Due consideration on Environmental Protection;
- Enhancement on Safe Operation and Sanitation;
- Provisions of satisfactory and quick port-related business services (satisfying Port users needs and competitiveness)

Since the above matters will be surely beyond the capacity of section managers and persons in charge, it is necessary to cope with the issues as whole GCPI matters and even involving Ministries concerned, and therefore mostly time consuming.

From the above, it will be important and necessary, in formulating a Capacity Building Plan, to divide the target themes into categories according to the magnitude of importance in responding the issues and solutions, such as matters related to institutional and organizational issues, subjected to managers aspects, or just related to persons in charge, from which a precise and effective plan will possibly be made.

The following table summarizes, using the findings of the Study, a preliminary categorization of the Issues and Target outputs according to the responding levels of the organization.

Table 10.1.1 Categorization of Issues and Target Outputs

Responding Level	Issues to be solved/improved	Outputs
A. GCPI Administration , Ministries concerned	1. GCPI's Budget & Financial issues 2. ISPS compliance 3. GCPI's organizational issues 4. PPP implementation policy and procedures	- Establishment of GCPI's clear authorization and responsibilities on financial aspects. - Basic policies for the compliance to International organizations and requirements. - Prompt decision making. - PPP strategy and regulations.
B. GCPI Management and Key persons	1. Introduction and operation of efficient operation systems 2. Computerization (IT system) 3. Improvement of procurement method of projects and equipment 4. Environment and Safety control improvement 5. Institutional set up on capacity building including such facilities.	- Improved methods/ procedures of efficient port operations. - Set-up of clear and firm roles/ responsibilities and Improved communication in the organization. - Ability & knowledge improvement of responsible persons of sections. - Improvement in conducting Port development plans and equipment procurement. - Improved control procedures for port facilities and equipment maintenance and repair. - Environment protection and safety control procedures.
C. Sections chiefs, Persons in charge and Operation staff	1. Capacity improvement of sections and individuals. 2. Improvement of ability on maintenance and repairs of facilities and equipment, 3. Improvement of cargo handling efficiency 4. Improvement of implementation ability for environment protection and safety.	- Individual ability improvement in performing the works.

10.2 CAPACITY BUILDING THEMES

The questionnaire survey to know the needed subjects or themes related to capacity building were carried out, and received answers from 11 departments of GCPI.

The result of questionnaire survey is summarized in Table 10.2.1, and the following items are suggested by IT Section and Training Center.

- IT Section
  - Ports electronic management
  - Network administration
  - IT servers
  - Installation and maintenance of networks
  - Costing accountant

- Training Center
  - Training of trainer (TOT) is also necessary.

Table 10.2.1 Survey Results on Themes of Capacity Building by GCPI

Subject	Answer (Positive)
Capacity building on financial analysis including the concession management	9
Ability to create a financial action plan	8
Ability to analyze port charges and fees	9
Expediting the procurement of spare parts by eliminating the cause of delay in procurement of spare parts	8
Establishment of a responsibility system at each section. Capacity building related to the plan-do-check-act system	8
Capacity building for collaboration among related sections	6
Enhancing productivity in loading and unloading operations	8
Container yard management	9
Monitoring of channel conditions and improvement of navigational safety,(wireless phone conversations and monitoring of ships’ positions by GPS)	9
Enhancing the capability to analyze sedimentation and carry out efficient maintenance dredging	7
Rehabilitation plan for maintenance shops	9
Enhancing the capability of road maintenance and yard maintenance	7
Monitoring the utilization of port facilities	7
Expediting the issuance of documents, and document check	7
Realization of one-stop services. Expediting customs clearance, immigration procedure and the quarantine clearance	9
Improving the ability to create a security plan	8
Preservation of the environment and improvement of sanitary conditions	7
Prevention of accidents and establishment of safety rules	7

Source: JICA Study Team

10.3 RECOMMENDATION ON IMPLEMENTATION PLAN OF CAPACITY BUILDING

From the abovementioned discussions, the following themes and implementation methods for the capacity building are recommended.

Table 10.3.1 Proposed Subjects of Capacity Building Plan and Implementation Methods

Target Recipient	Subject/ Theme	Implementation Method
A. Responsible Persons ofGCPI, related Ministries	**(Institutional and Organizational Improvement)** 1. Port Management & Operation and Budget & Financial aspects 2. Policies on International organizations & Regulations 3. Privatization/PPP System/Policy	- Study and survey on other countries' system, modern ports. - JICA's workshop/Experts dispatch program - Workshop program by other donor countries or dedicated international organizations.
B. Management and Key Person of Responsible dept./section	**(Port M&O system/method Improvement)** 1. Project and Equipment procurement implementation & control ability 2. Demand forecast, Development planning 3. Port Facilities maintenance & control 4. Equipment maintenance & control 5. Environment protection, Safety 6. Budget & Financial aspects control 7. Capacity Building of Staff	(Training of responsible/key persons, trainers is effective) - Upgrading/improvement of skills/knowledge through JICA training course. - Technology transfer through implementation of projects, studies under JICA. - Training by sub-contracted specialist firms. - By providing facilities for survey/monitoring/inspection (Environment Unit) - Enhancement of GCPI Training Center.
C. Persons in Charge, Operation Staff	**(Upgrading of Individual skills and ability** 1. Facilities/Equipment operation skills 2. Facilities/Equipment maintenance skills 3. Systems running/operating skills 4. Environment protection/ operation safety skills	- System suppliers training by contract. - Equipment suppliers training program by contract. - Third Country Training - Training at GCPI Training Center.

The abovementioned Subjects/ Themes are to be further divided into more specific items in finalizing the Implementation Plan. It will however be necessary to further study and re-confirm the above needs before the preparation of the Implementation plan, since some themes/items may be under on-going status being arranged by GCPI or on a list for the planned program by JICA or other international organizations.

Part 4

REVIEW OF KZP DEVELOPMENT PLAN

11. REVIEW OF LONG TERM DEVELOPMENT PLAN FOR KZP

11.1. GENERAL

In accordance with the development concept for KZP according to Port Phase I Development Plan, the following major components have been selected for implementation towards 2035:

- Improvement of the navigational condition,
- Development of the multi-purpose berth for public services,
- Development of the container handling terminal,
- Development of the working area for relatively small ships, and
- Development of the port access road from the existing berthing area to the new port development area.

11.1.1 IMPROVEMENT OF THE NAVIGATIONAL CONDITION

(1) Concept

a. Long-term

- Widening the entrance of the port area in the main channel (400 m width and -12.5 m depth) to secure two-way traffic of the main channel between UQP and KZP (300 m width and -12.5 m depth).
- Removal of all wrecks as identified in the main channel from UQP and port basin of KZP to clear the channel and port basin for smooth and safe traffic navigation.

b. Urgent

- Widening the entrance of the port area in the main channel (300 m width and -12.5 m depth) to secure one-way traffic as well as widening the turning basin (450 m diameter) to accommodate larger vessels.
- Removal of wrecks located in the main channel and port basin of KZP so as to make all berths available to be maximally utilized.
- Installation of proper and necessary navigation aids in the main channel and leading light at the KZP access channel to make night sailing safe.

(2) Dredging Works

a. Long-term

The dredging works in the long-term plan will be widened to 300 m at the bottom of the channel and deepened to -12.5 m at the access channel in order to make the channel navigable for 50,000 DWT under two-way traffic.

Based on the hydrographic survey conducted in 2005 under the JETRO Study of Feasibility of Ports Development of Southern Iraq, the dredging volume for the long-term plan was calculated, as shown in Table 11.1.1 below, assuming that the channel would be dredged at a depth of -12.5 m with a side slope angle of 1:6.

Table 11.1.1 Total Dredging Volume of the Channel and Port Basin of KZP

Area	Length (m)	Width (m)	Dredging Volume (1000 m^3)			
			West Slope	Bottom (km^2)	East Slope	Total
South Channel	11,270	300	1:6	1.476	1:6	2,530
LPG Terminal Area	1,710	600	1:3	0.908	1:6	4,640
North Channel	5,136	300	1:6	1.555	1:6	7,340
Sub-total	22,403			3.939		14,510
Approach to KZP	435	200-400	1:6		1:6	
KZP Berth Front	2,618	400	1:3		1:6	
Turning Basin	710	200	1:3		1:6	
Oil Berth Area	524	400	1:3		1:6	
Sub-total	4,287			1.835		8,750
Total	26,690			5.774		23,260

Source: The Study for Development of Southern Ports in Iraq Post Phase I Rehabilitation Projects by GCPI

According to the above table, the total dredging volume for full scale dredging is approximately 23.3 million m^3.

b. Urgent

It was proposed to carry out the dredging works at the limited dredging area for the urgent development plan of Phase II.

Area: at the approach parts of the port in the channel and turning basin, port basin, and berthing areas along the berth (total length is approximately 3.6 km, width is 300 m and diameter of turning basin is 450 m).

Volume: the total dredging volume is estimated at around 5.4 million m^3.

(3) Removal of Wrecks

a. Long-term

In Table 11.1.2, GCPI listed up 41 wrecks in the Khaw Abdula Channel from the entrance of the approach channel to UQP, Khawr Al Zubayer Channel from UQP to KZP, and port basin of KZP, which are obstacles for ship navigation.

Out of 41 wrecks, GCPI removed or contracted to remove 29 units up to the end of 2012 (including planned removal under Port Sector Rehabilitation Project Phase I). GCPI plans to remove the remaining 12 wrecks from the channels and KZP basin area under the long-term plan.

Table 11.1.2 Shipwrecks and Record of Removal

SR No.	NAME	TYPE	LENGTH (m)	BREADTH (m)	DEPTH	WEIGHT (ton)	LOCATION	POSITION Lat. (N)	POSITION Long. (E)	CONDITION & REMARKS	RISK	OLD LIST No.
1	Amuryah	Tanker	285	44.2	22.4	21,900	2 mile South East Baker Ter.	29 39.52	048 50.52	Upright at depth 30 meter	P, N, X	35
2	Noor Mohamdy	Wooden Dhow	25	5	5	220	KA Channel Buoy No. 7	29 45.6	048 35.00	Buried 150m East of the channel	D, N	33
3	Unknown	Pantoon	60	20	5	600	KAC between buoys 10&11	29 48.5	048 28.87	Buried	D, N	34
4	Al-Ramady	Tug Boat	42.7	10.2	4.3	450	KA Channel buoy No.11	29 48.6	048 28.85	Laying on her keel .Buried	D, P, N	20
5	Dokan	Water Tanker	42	10	4.3	450	KAC East Buoy No.11	29 48.60	048 29.10	Laying on her Stbd side sink in 1992	D, P	22
6	Al-Mothana	Dredger	40	10	5	1,800	KA Channel between buoys 17&19	29 59.15	048 27.17	Buried on port side of the channel	D, P, N	21
7	Rumaila	Tanker	201	28.5	14	8,777	East Entrance of Khawr Bubyan	29 58.58	048 13.08	Upright. Broken by missile in the middle	P, X	2
8	Ain Zalah	Tanker	201	28.5	14	8,777	East Entrance of Khawr Bubyan	29 58.60	048 13.55	Upright. Broken by missile in front of Engine room	P, X	1
9	Hilla	Dredger	110	18	14	1,200	South Hajam Island	30 00.07	047 59.70	Laying on her keel perpendicaler to channel	D, P, N	11
10	Navy boat	Patrol Boat	30	6.5	3.5	100	South Hajam Island	30 00.07	047 59.70	Laying upright beside Hakmony	P, N, X	12
11	Noor	Old Tug Boat	25	8	3	250	South Hajam Island	30 00.07	047 59.70	Laying on her side sunk beside Hakmony	D, P, N	10
12	Hakmony (Lucky)	cargo vessel	135	17	12.2	2,900	South Hajam Island	30 00.07	047 59.70	Laying on her Stbd side sink in 1987	P	9
13	Navy boat	Patrol Boat	30	10	3.5	100	UQP Berth No.9	30 02.04	047 57.13	REMOVED		7
14	Barge No.03	Fuel Barge	35	10	3	300	UQP south Berth No.9	30 02.04	047 57.13	Along side south side of the berth. Buried	D, P, B	4
15	Barge No.04	Fuel Barge	30	10	3	180	UQP 40m East of south Berth No.9	30 02.04	047 57.13	Buried 40m away from south of Berth	D, P, B, N	5
16	Barge No.05	Fuel Barge	48	9	2.8	250	UQP 40m East of north Berth No.9	30 02.04	047 57.13	Buried 40m away from north of Berth	D, P, B, N	6
17	Al-Waleed	Buoy laying vessel	52	10.5	3.7	650	UQP North Berth No.9	30 02.10	047 57.10	Cut to two pieces and REMOVED		3
18	Sihan	Tug Boat	45.7	11	5.4	550	Entrance of UQ River No.1	30 02.52	047 57.02	Buried 3m under sea bed opposite berth 10	D, P,N	8
19	Barge	Old Barge	-	Removed	-	-	UQ Between Berths 11&12	REMOVED	REMOVED	Berths under construction		36
20	BFC II	Tanker	110	16	8	2,600	KZC near Dredger Palestine	30 06.00	047 56.58	Sunk due to collision. Loaded 7000 ton crude oil	P, D, N	38
21	Palestine	Dredger	90	16.4	7.4	2,737	KZ Channel	30 06.11	047 56.51	Capsized	D, N, P	32
22	Gasa	Dredger	82	14.7	5.6	1,820	KZ Channel	30 08.19	047 54.42	Capsized	D, N, P	31
23	Tadmur	Tanker	82	13	6.9	1,594	KZ Channel REMOVED	30 09.35	047 54.00	Cut to several pieces removed to shore		23
24	Queen Mary	Cargo vessel	80	12	5.5	1,600	KZP Berth No.1	30 10.90	047 53.70	sunk due to collision. Loaded 2300 ton cement	D, P, N, B	37
25	Barge06	Fuel Barge	48	9	2.8	150	KZP Berth No.1	30 10.94	047 53.72	Upright buried sunk2001 beside south dolphin	D, P, N, B	17
26	Barge 03	Fuel Barge	43	8.5	2.2	130	KZP Berth No.1	30 10.94	047 53.72	Upright buried sunk2001 beside south dolphin	D, P, N, B	16
27	Barge 02	Fuel Barge	40	8	2	120	KZP Berth No.1	30 10.94	047 53.72	Up right buried sunk2000 beside north dolphin	D, P, N, B	15
28	Barge 01	Fuel Barge	40	8	2	120	KZP Berth No.1	30 10.94	047 53.72	Up right buried sunk2000 beside north dolphin	D, P, N, B	14
29	Barge05	Fuel Barge	48	8	2.4	150	KZP Berth No.1 REMOVED	30 10.97	047 53.75	REMOVED		19
30	Barge (Piling Barge)	Spud leg Barge	40	10	3	450	KZP south Berth No.2	30 11.12	047 53.50	Laying away the channel between berths 1&2		18
31	Navy Boat	Missile Boat	35	8	4	220	KZP between berths 3&4	30 11.45	047 53.50	Buried along side the berth	D, P, N, B, X	26
32	Al- Bahith	Research vessel	42	10	4.2	450	KZP Berth No.4	30 11.20	047 53.65	Two Pantoons belong to floating crane Kaleed	D, P, N.B	25
33	Pontoon1	Khalit Bin Waleed					KZP Berth No.4	30 11.20	047 53.65	is sunk during refloating Al-Bahith		
34	Pontoon 2	Khalit Bin Waleed					KZP Berth No.4	30 11.20	047 53.65			
35	Barge07	Fuel Barge	48	8	2.2	500	KZP berth No.5	30 11.53	047 53.87	Upright buried sunk 1995	D, P, N, B	27
36	Hannan	Cargo vessel	85	12	4.5	800	KZP Berth 11 REMOVED	30 12.20	047 52.58	cut to several pieces		39
37	Al-Aboor	Dredger	41	10	3	700	KZP between berths 11&12	30 12.20	047 52.58	REMOVED		24
38	Huziran (Athar)	Bunker Barge	57	12	5	999	KZP North Berth No.11	30 12.24	047 52.64	Upright 50% appear above the water	P, D	28
39	Boat	Fishing Boat	27	7.5	3	175	KZP Berth No.12	30 12 030	047 52.58	Buried 40 m away from jetty laying on her STBS	D, P, N, B	40
40	Al- Nasr	Bunker Barge	57	12	5	999	KZP Turning basin	30 12.23	047 25 58	Up right buried sunk1991	D, N, P	13
41	Navy boat	Patrol Boat	30	6.5	3.5	100	KZP Turning basin	30 12.23	047 25 58	Near Bunker Barge Al-Nasr	D, P, N, B, X	29
42	Navy boat	Patrol Boat	30	6.5	3.5	100	KZP Turning basin	30 12.23	047 25 58	Near Bunker Barge Al-Nasr	D, P, N, B, X	30
43	Tel Alzter	Cutter Dredger	40	10	3.5	550	Front of Naval Base Slipway	30 00.07	047d59.67	Up-right		
44	Mouna	Pontoon	45	15	4.5	600	Front of Naval Base Slipway	30 00.07	047d59.67	Up-right		
45	Noor Al Madina	Dhow					Near Buoy No.23					
46	Michal Dhow	Dhow	(informed by GCPI, 20 Mar. 2012)				Near Buoy No.23					
47	Unknown Dhow	Dhow	(informed by GCPI, 20 Mar. 2012)				KZP south of Berth 1					

Summary Key :

KZP: Khawr Al-Zubayer Port
KZC: Khawr Al-Zubayer Channel
KAC: Khawr Abdula Channel
P: Pollution Risk
D: Dredging Obstruction
X: UXO Risk
N: Navigation Hazard
B: Berthing Obstruction

: Removed by GCPI until 2008
: Removed by GCPI during 2008-2010
: Removed by GCPI during 2009-2010
: Removed by GCPI during 2010-2012
: Removed by Phase 1
: Removed by Others

b. Urgent and Short-Term

Wrecks listed for Phase I were located mainly at Berth No. 9 and North Port area of UQP and are planned to be removed as part of the Phase I project under Japanese ODA.

According to the latest information from GCPI in June 2012, it is expected that three wrecks near Berth No. 9 included in the Phase I project will remain. As a result, the total wrecks to be removed in the long-term plan will be 15 units.

GCPI has proposed to remove 12 units of wrecks except the above three units as part of the Phase II project under Japanese ODA.

11.1.2 DEVELOPMENT OF BERTHING FACILITIES FOR PUBLIC SERVICE

(1) Concept

In order to reinforce the port capacity, KZP needs to develop adequate number of multi-purpose berths including container berths for public use to meet the cargo demand generated from national economic recovery and development.

(2) Requirements of the Multi-purpose Berths

The multi-purpose berths should be developed for public service to accommodate various commodities like container cargoes and conventional cargoes such as general cargoes, bagged cargoes, etc. The dimension of the multi-purpose berth depends on the target vessels as shown in the following Table 11.1.3.

Table 11.1.3 Dimensions of the Multi-purpose Berth

Item	Length of Berth* (m)	Depth of Berth** (m)	Terminal Width
General Cargo (design ship 30,000 DWT)	240	-12	around 300 m for multi-purpose use
Container Ships (design ship 20,000 DWT)	200	-11	

Note: * Length of ship (L) + Allowance (B)
** Draft of ship (D) + Allowance (D*10%)

a. Planned Berth Dimensions

For the long-term plan, the multi-purpose berth should be developed to accommodate 30,000 DWT class cargo ships. The berth length shall be planned based on the above target ship and will be 240 m with a depth of -12 m.

For the requirement of the container terminal, the containers will be handled at the multi-purpose berth during the short-term period. But for the long-term plan, an exclusive berth for the container cargoes should be planned with a length of 200 m and a depth of -11 m.

b. Required Number of Berths

Required number of berths in each year based on the demand is calculated as shown in Table 11.1.4.

Table 11.1.4 Berth Planning (Multi-purpose Berth)

Year	No. of Berth	Berth Length (m)	Throughput (x1,000 ton)	Ton/Berth (x1000)
2011-2015	5	1,200	2,500	500
2016-2020	9	2,160	4,500	500
2021-2025	13	3,120	6,400	492
2026-2030	20	4,800	9,600	480
2031-2035	26	6,240	12,700	488

Source: JICA Study Team

11.1.3 REQUIREMENTS OF CONTAINER TERMINAL DEVELOPMENT

(1) Concept

Establishment of high grade container terminal service to meet the increase of import/export container demand in the region as well as to function as a complementary port of UQP.

(2) Requirements of the Terminal

a. Berth Dimensions

Target maximum ship size is set as 20,000 DWT based on the analysis of regional ship size distribution. The length and depth of the berth is set as 200 m and -11.0 m, respectively, based on Technical Standards and Commentaries for Port and Harbour Facilities in Japan.

b. Berth Handling Capacity

The capacity of a newly developed berth in KZP is set as 140,000 TEUs/berth based on the following conditions:

- Target BOR (Berth Occupancy Ratio) = 60%
- Crane productivity (BCH) = 25 boxes/crane/hour
- Idling time = 4 hours
- Operation ratio = 95% (considering non-operating time due to weather condition and other factors)

c. Required Number of Berths

One berth is required up to 2025 and additional second berth will be required to meet the demand between 2030 and 2035.

d. Container Yard

For the container yard, a 230 m wide terminal including apron is planned. Yard capacity will be 100,000 TEUs/berth and the necessary yard area will be 230 m x 200 m = 46,000 m^2 per berth.

11.1.4 DEVELOPMENT OF EXCLUSIVE SMALL SHIP WORKING AREA

Berth No. 6, which was developed for exporting fertilizer products, is being used by dhow ships. It is anticipated that the present arrangement of using berthing facilities for dhow ships will be closed once export of fertilizer products has resumed through the berth around 2015.

(1) Necessity of Small Ship Working Area Development

Dhow ships transported about 249,000 tons and 211,000 tons of conventional cargoes in 2009 and 2010, respectively, which were about 14% of the total conventional cargo volume in KZP. In addition, there were 342 and 322 ship calls by dhow ships in 2009 and 2010, respectively. The proportion to the total ship calls in KZP is about 28% in 2009 and about 44% in 2010.

Considering that the cargo volume handling and trend of traffic of dhow or such small ships may continue, it is proposed to develop small ship working area with berthing facilities and cargo stock yards separately from the other cargo ships operation area.

(2) Requirement of Berths and Dimensions

The traffic demand is estimated using the following assumptions based on the cargo data at KZP in 2009 and 2010:

- About 14% of the total conventional cargo volume excluding containers, vehicles, and oil products transported by cargo ships will be transported by dhow ships.
- Average loading volume of dhow ships is estimated at 700 ton/ship, which was the actual traffic data in 2009 and 2010.
- Typical dhow ship dimensions are set at LOA = 50 m, beam = 9.0 m and draft = 3.3 m. The present productivity is six days for 700 ton/ship, which can be improved to four days for 950 ton/ship by introducing equipment and separate berthing area.

The abovementioned multi-purpose terminal may not be sufficient to accommodate such small ships traffic and cargo volumes. For that reason, potential spaces for dhow ships should be reserved in the development plan with the following dimensions:

Table 11.1.5 General Size of Dhow Ship

Item	Berth Length (m)	Depth of Berth (m)	Terminal Width (m)
Dhow Ship (500 GT)	60	-7.0 (*)	200

(*): Berth depth of -7.0 m is recommended considering future increase of ship size to 3,000 GT class.

Table 11.1.6 Berth Planning of Dhow Ships

Year	No. of Berth	Berth Length (m)	Throughput (x1,000 ton)	Ton/Berth (x1000)
2011-2015	2	120	350	175
2016-2020	3	180	630	210
2021-2025	4	240	900	225
2026-2030	6	360	1,350	225
2031-2035	8	480	1,780	223

Source: JICA Study Team

11.1.5 DEVELOPMENT OF PORT ACCESS ROAD TO NEW PORT AREA

The port has a potential land area to develop the new port facilities at the opposite side of the present berthing area or alternatively, at the southern area along the coast of the access channel from the existing berthing area.

11.2. SUMMARY OF LONG-TERM DEVELOPMENT PLAN FOR KZP

The proposed project components of the long-term development plan for KZP are summarized in Table 11.2.1.

Table 11.2.1 Long-term Project Components for KZP

Project		Contents
Navigational Condition Improvement (capacity and safety)		- Widening of the main channel from UQP to KZP and development of a new turning basin around the LPG terminal area - Widening of the channel and port basin at KZP area - Removal of 12 wrecks in the channel and port basin at KZP urgently, and all wrecks in the access channel and basin in the short- to long-term
Container Terminal Development - one berth with terminal area in the short-term - two berths with terminal area in the long-term as extension of the first berth		
Multi-purpose Terminal Development - 9 additional berths with yard in the short-term - 22 additional berths with yard in the long-term		
New Small Ship Operation Terminal - four berths with yard in the short-term - eight additional berths with yard as extension of the first four berths in the long-term		
Re-organization of Land Use in the Existing Port		
	Providing suitable and sufficient spaces for better port management	- Inland yard development - Development of a new land by reclamation - Development of the back-up area along new berths toward the southern direction from Berth No.1
New Port Area Development		- Development of the small boat basin for government services - Development of the access road
Environmental Improvement		- Ecological waterfront development with mangrove planting
Port Access Road/Railway Development		- Inner port road improvement - Truck control yard development - Improvement of the utilization of the railway transport

Source: JICA Study Team

12. URGENT DEVELOPMENT PLAN

12.1. THE PROPOSED COMPONENT FOR THE PROJECT

The summary of the project components of the Port Sector Rehabilitation Project Phase II is summarized in Table 12.1.1

Table 12.1.1 Project Components of Port Sector Rehabilitation Project Phase II

Project Component	Outline of Scope of Works	Remarks
(Construction Works)		
1. Dredging Works at KZP	Dredging of Port Basin, front of berthing areas, a limited area of Access Channel, Dredging volume: 5,400,000 cu.m, Depth: -12.5m, Width: Access Channel & Berthing areas 300m, and Turning basin 450m wide.	From UQP to KZP (including KZP port area), no maintenance dredging has been done for a long time. Especially the port basin and berth front areas are serious. The Channel (UQP-KZP) is also shallow and narrow in places, and widening and deepening are required, which can be done after the dredging works in the port area by GCPI own dredgers together with the planned rehabilitation and improvement of the LNG plant berth area.
2. Shipwrecks Removal Works	Total 12 wrecks removal located in the Main Channel and KZP basin.	6 wrecks located at KZP port basin area and KZP channel, the other 6 are along the Channel to UQP. Therefore, 6 wrecks located in KZP basin and access channel are the most critical.
3. Rehabilitation of Port Facilities	Damaged Fender Replacement: 60 pcs. (KZP) Repair of Tug berth structure (KZP), Yard pavement rehabilitation (KZP), Corrosion Protection (UQP)	According to the investigation results, total 97 pcs of Fenders were lost or damaged and need replacement. Some fenders are replacing by KZP. Thus 68 pcs of appropriate and suitable fenders will be replaced. Tug berth maintenance and corrosion protection. Yard pavement repair and maintenance including drainage. All North port berths (No.12-No.21), Total Cathode 1,845 pcs.
4. Expansion of Berth at KZP	300m Extension of the existing berth No.2 to South, and utilize as Multi-purpose Berth (KZP), Also connected to Berth No.1, Design depth -12.5m	In order to handle overflowed cargoes from UQP, it is necessary to extend the existing general cargo berth at least 300m. Design ship: 20,000-30,000 DWT max.
5. Navigation Aids Works	Procure and Install 20 Light Buoys along the Channel between UQP and KZP, 2 Leading lights installation at KZP Access Channel, AIS/VTS system installation	At present only 10 light buoys are installed along the channel between UQP and KZP, whilst 25 required as minimum. It is therefore recommended to provide 20 light buoys. At present no leading light is provided for the access to KZP, thus essential for safe navigation to KZP. Necessary to install the system according to the Strategy approved and required for ISPS compliant ports.
6. Utility Works	Rehabilitation/repair works at KZP, (Water supply, electricity cables, etc.)	Water supply system, electrical cables and pits rehabilitation A part of such works cam be done by the Port (GCPI). 40 quay cranes exist at UQP North, of which 24 cranes are not working. The work target is to remove total 14 nrs at Berth No.17,18 & 19 urgently for container cargo handling.
7. Removal of Unused Facilities & Equipment	Unused rail mounted quayside cranes at UQP	
(Procurement of Equipment)		
8. Cargo Handling Equipment	KZP: Container cargo handling equipment (21nrs.) , KZP: Maintenance works equipment (4nrs.) , UQP: RTG (4nrs)	**Refer Table 12.2.15**
9. Marine Equipment (UQP/KZP)	Dredger (3), Tug (3), Survey boat(1), Mooring boat (2), Anti-pollution/monitoring vessels(3), Others (7)	**Refer Table 12.2.16**

Source: JICA Study Team

12.2. DETAILS OF EACH COMPONENT

12.2.1 DREDGING WORKS

(1) Design Ship Size

According to the ship call data of GCPI in 2010, 740 ships, which include 77 tankers, 341 general/bulk cargo ships, and 322 dhow ships, called at KZP. Also, the maximum ship size for tankers and general/bulk cargo ships are shown in the Table 12.2.1.

Table 12.2.1 Maximum Ship Size Calling at KZP in 2010

Type of Ship	Dead Weight Tonnage (DWT)	Length Overall (m)	Molded Breadth (m)	Full Load Draft (m)
Tanker	47,076	182	32	11.0
General/Bulk	26,849	174	27	5.6

Source: GCPI

Based on the above table, the tanker whose dimensions are LOA=182 m, W=32 m, D=11.0 m and DWT= 47,076 will be considered as the design ship size in the port basin and navigation channel. As a result, the channel should be restored by dredging and removal of wrecks to obtain the original depth of -12.5 m and a channel width of 200 m for one-way traffic of the maximum tanker size.

(2) Scope of Dredging Works

GCPI is responsible for the safety of the channel navigation and effective utilization of the port facilities. Recently, few large-sized tankers a month are calling at KZP to export fuel oil and import petrochemical products.

It is considered economical that the expected maximum size of tankers will be accommodated at once by channel dredging and removal of wrecks for the two-way traffic, without the need for phased development, because the volume of maintenance dredging is less and the cost of the additional equipment mobilization is minimized.

The above dredging strategy should be determined based on budget availability and the GCPI policy. It is proposed to carry out the hydrographic survey in the related area to trace the location of sedimentation and to work out the maintenance dredging strategy for the long-term as a part of the consulting services.

a. Design of Channel Depth and Width

Design Conditions:

Design Ship Size	:	30,000~50,000 DWT
Draft	:	-11.0 m~-11.8 m
Length Overall	:	200 m
Tide	:	HWL 5.35 m /LWL +0.00 m

Design Depth for Access Channel and Port Basin:
The channel depth and width are designed based on the PIANC suggestion. According to PIANC, the gross under-keel clearance is 10% of the draft for the less exposed channel.

Maximum draft of the design ship size	:	11.4 m
Required depth of the channel	:	11.4 + 1.1 = 12.5 m

Design Width of the Channel:

According to "Technical Standards and Commentaries for Port and Harbour Facilities in Japan", the channel width will be determined by multiplying the design ship length by 0.5 to 1.0 for one-way traffic and by 1.5 to 2.0 for two-way traffic. In case of one-way traffic and two-way traffic, the channel widths for the expected maximum size of tankers will be 100 m to 200 m and 300 m 400 m, respectively. In addition, the diameter of the turning basin should be equal to or greater than two times (400 m) of the design ship size. In this project, considering the case of passing each other by ships in front of the berths, 300m for the channel width and 450 m for the diameter of the turning basin will be adopted.

Scope of Dredging Works

The scope of dredging works for restoration of the access channel and port basin is proposed as follows:

Ship sailing conditions:	The channel shall be made navigable at any time for the maximum size of tankers.
Depth of access and basin:	12.5 m from LWL
Width of access and basin:	300 m at bottom of the channel and 450 m for the turning basin

It is noted that the channel will have more in proportion to its depth and width, while sedimentation materials were not heavily accumulated within the channel area according to the past hydrographic survey in the channel.

It is needed to monitor the trace of the sedimentation materials by hydrographic survey in the channel area and to study the long-term dredging strategy to minimize the maintenance dredging volume.

The dredging location and dumping area of the dredged material are shown in Figure 12.2.1 and Figure 12.2.2. The total dredging volume was estimated at around 5.4 million m^3.

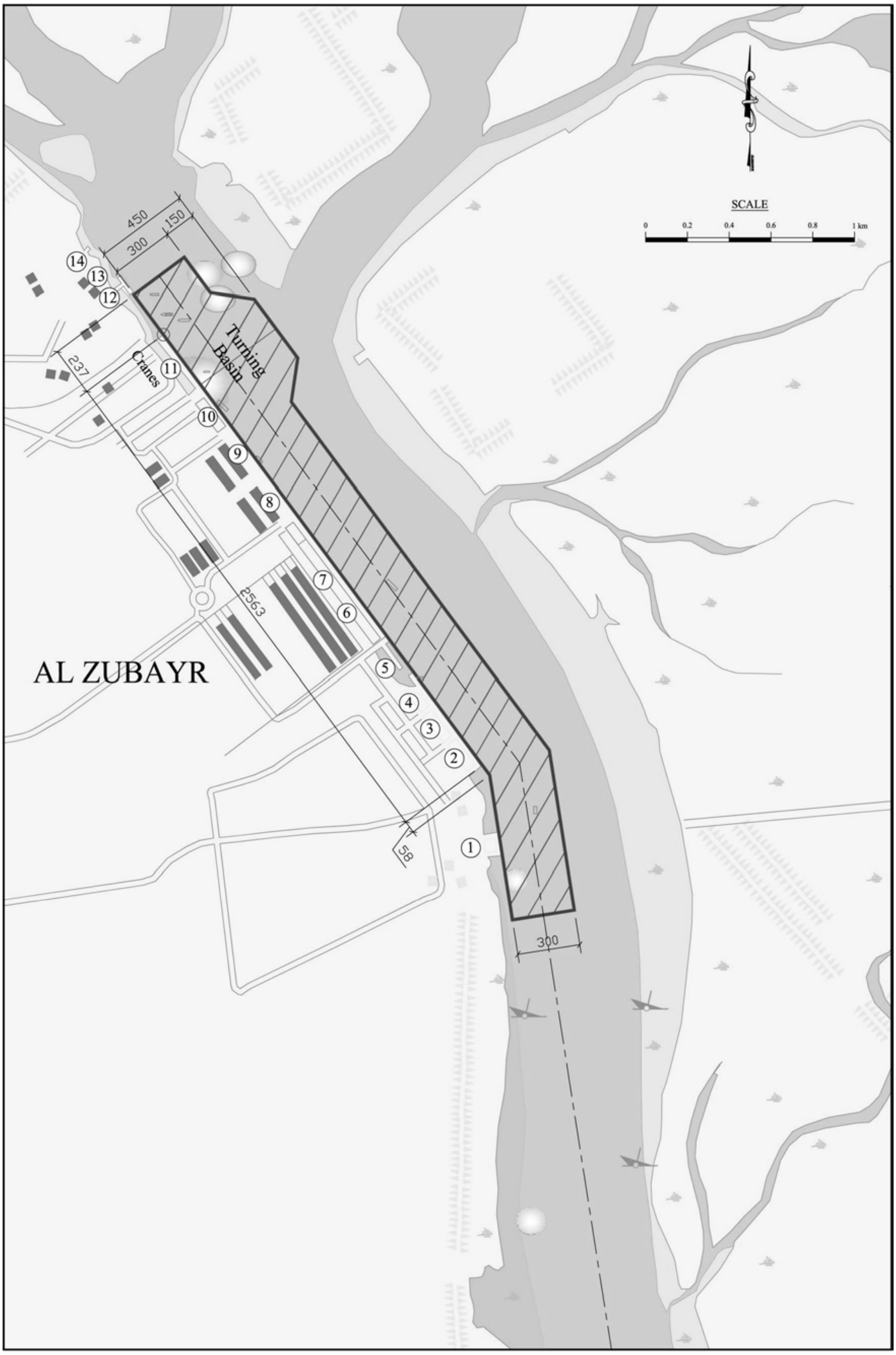


Figure 12.2.1 Location of Dredging Area in KZP

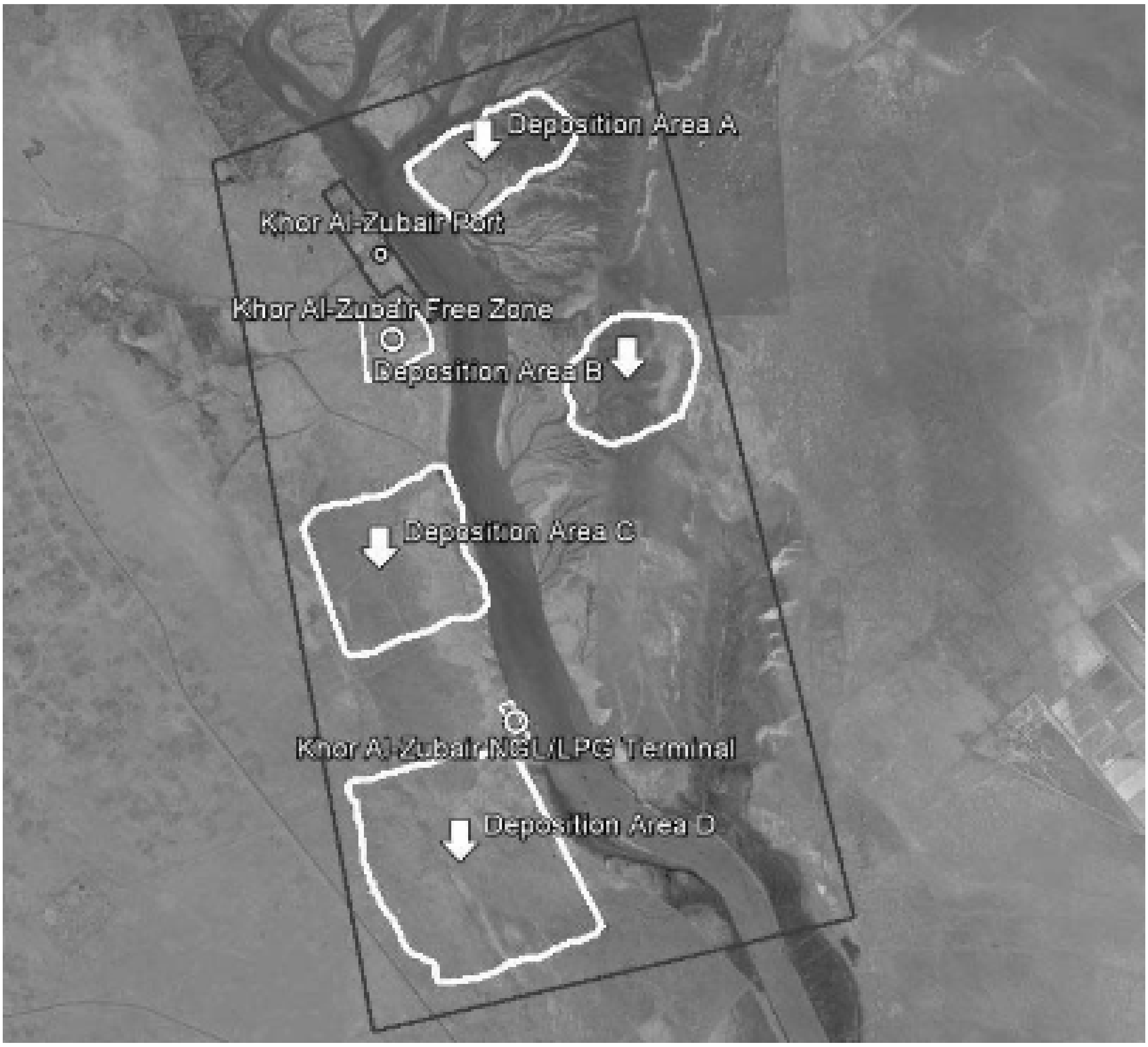


Figure 12.2.2 Location of Dumping Area in KZP

12.2.2 SHIPWRECKS REMOVAL

Regarding the removal of shipwrecks, GCPI indicated that 12 shipwrecks identified along the channel are necessary to be removed. It is proposed to remove identified wrecks (12 units) according to priority. First priority is to obtain the required depth of -12.5 m and width of 200 m/300 m in the KZP channel and basin.

a. Scope of Removal Works

It is proposed by the Study to remove wrecks along the berths in KZP as first priority and wrecks in/near UQP as second priority, and that the priority wrecks in the navigation channel may be removed by GCPI after the procurement of the lifting equipment under the Japanese ODA loan.

b. Environmental Measures

It is generally experienced in the removal works that oil left inside the bilge comes out into the seawater even if it is drained completely from fuel tanks. Therefore, the following measures should be taken to reduce the oil leakage as much as possible.

Prevention measures on oil and toxic substances leakage

At first, oil and toxic substances will be drained off thoroughly with pumps to reduce the oil leakage as much as possible during the removal work. Ideally, it is not desired to cut up the shipwreck, but if needed, the cutting point of the wreck is selected and it is cut up into fewer pieces.

Measures in case that oil leaks out

Prevention measures for diffusion of oil that will leaked out should be taken. It is common to deploy oil fences or protectors as a prevention measure against the oil diffusion, but when a local tide is moving faster than 2 knots in the working area, the oil fences do not function. Any oil which leaks out from the fence must be collected by the oil skimming boat as soon as possible. However, the oil skimming operation may be difficult when the tidal current is so fast.

Measures in case that explosive substances are found

When any explosive substances and cannon balls are detected by the metal detector, this will be notified to the harbor office for immediate action. During the treatment of any explosive substances or cannon balls, the removal work of the wreck concerned will be suspended and equipment and workforce will be transferred to the location of another wreck.

c. Work Plan for Removal

Removal method

It is preferable that the whole body of a vessel will be lifted by the floating crane. The vessel's hull weight, which is observed from the list of wrecks in KZP provided by GCPI in 2005, ranges between around 500 t and 1,000 t. If the hull weight is more than 500 t, it should be cut into pieces less than 500 t.

Selection of removal

The shipwrecks requested for priority removal are shown in Table 12.2.2.

Table 12.2.2 Prioritized List of Wrecks to be Removed

No.	Name	Length (m)	Breadth (m)	Depth (m)	Weight (ton)	Type	Location	Position		Condition	Remarks	Risk Summary	Priority
								North	East				
1	Al-Nasr	57	12	5	990	Bunker/ B	KZP	30 12.234	47 52.586	Upright	50% buried	P ,X	1
2	Navy boat/B07	30	6.5	3.5	250	Iraqi Navy	KZP B No. 11	30 12.240	47 52.640	Upright	50 m out from shore	D, P ,X, B	1
3	Navy boat/B08	30	6.5	3.5	250	Iraqi Navy	KZP B No. 11	30 12.240	47 52.640	Upright	50 m from shore	D, P, X, B	1
4	Unknown	40	12	3	550	Fuel Barge	KZP B. No. 9-10	30 12.084	47 52.754	Upright	Iraqi	2003	1
5	Fuel/B 07	55	15	3.5	550	Fuel Barge	KZP B5	30 11.530	47 53.310	Upright	Sunk in 1995	D, P, X, B	1
6	Nigakie Karam	25	5	3	N/A	Dhow	Khawr KZP	-	-	-	-	N, P	1
7	Hilla	110	18	14	2,737	Dredger	Khawr U/Q	29 59.994	47 59.994	Upright	Debris both sides	P	2
8	Hakmony	135	17	12.2	2,900	Cargo	Khawr U/Q	30 00.068	47 59.689	On STBD	90% buried	N, P, X, D	2
9	Noor Tug	25	8	3	250	Supply/V	Khawr U/Q	30 00.068	47 59.689	N/A	Under the Hakmony	P	2
10	Partrol/B 02	30	6.5	3.5	250	Iraqi Navy	Khawr U/Q	30 00.068	47 59.689	Upright	Port side/ Hakmony	X	2
11	Dhow	25	5	5	Unknown	Dhow	Buoy 7	29 48.846	48 28 890	Buried	100% buried	N	2
12	BFC II	110	16.33	9.93	4093	Tanker	Khawr U/Q	30 10.070	47 59.700	Capsized	7000 ton crude oil	N, P	2

Summary Key: D: Dredging, P: Pollution, X: UXO, N: Navigation, B: Berths

The location map of the shipwrecks to be removed is shown in Figure 12.2.3.

Figure 12.2.3 Location Map of Shipwrecks to be Removed

12.2.3 REHABILITATION OF PORT FACILITIES

The port facilities in KZP were constructed from 1975 to 1983. They had been used under hot tropical climate and with soil condition containing sulfuric acid. They had been damaged by the war between Iran and Iraq. As it is not reported that the major facilities were damaged by the latest war, it is assumed that these facilities have naturally deteriorated and became decrepit with the lapse of time.

It is important and necessary that the detailed investigation on damaged parts of the facility in the port should be carried out to determine the required scope of repair works and to identify the level of deterioration. It is quite difficult to assess the suitable scope and methods for the rehabilitation works without the detailed site investigation. The as-built drawings of berthing structures except of berth nos. 2, 3, and 4 had not been secured by the Japanese contractor who was involved in the project. GCPI has kept the as-built drawings of berth nos. 2, 3, and 4, which were supplied to the JICA Study Team for assessment of damaged conditions compared with the present conditions.

Therefore, the facilities which need rehabilitation works were assessed and their cost and methods were also worked out based on the assumption and experiences of the JICA Study Team.

a. Assessment of Repair Works Depending on Causes of Damages

Damages by wars

- The fertilizer factory damaged by the bombardment during the Iran and Iraq war
- Cracks on the concrete block walls
- The ceiling made of asbestos and aluminiferous sheets in the warehouse and the shed damaged by the bombardment

Damages by accidents and robbery

After the war between Iran and Iraq, it was reported that there were a lot of damaged keys, loss of taps of the water supply pipe, damaged mirrors in the buildings, and troubles on signal facilities of the railway. These damages were repaired in 1990 and since then, there has been no report of damages.

b. Scope of Rehabilitation Works

Rubber fenders along the berths in KZP

A lot of the fender facilities were damaged and lost. It is required to install new fender facilities. GCPI carried out the damaged survey on the conditions of the rubber fender for all the berths except for berth nos. 1 and 12 from May to August in 2009. The results are shown in Table 12.2.3.

Table 12.2.3 Condition Survey for Fender Facilities in KZP

(Berth 2, 3 & 4: Fender Type 1000 H x 1700 L)

Block No.	Fender 1	Fender 2	Fender 3
1	Good	Good	No data
2	Good	Lost	Lost
3	Lost	29% damaged	Good
4	Arm broken	25% damaged	25% damaged
5	25% damaged	Good	Good
6	Damaged	Good	Good
7	Good	50% damaged	Good
8	Good	Good	Good
9	25% damaged	20% damaged	Good

(Berth 5, 6 &7: Fender Type 1500 H x ø 1200)

Block No.	Fender 1	Fender 2	Fender 3
1	Good B	Good A	Good B
2	Good A	Good A	Good B
3	Good A	Good A	Good A
4	Good A	Good A	Good A
5	Good B	Good B	Good A
6	25% damaged	Good A	Good A
7	Good A	Good A	Good A
8	Good A	Good A	Good A
9	Good A	Good A	Good A
10	Good A	Good B	Good A
11	Good A	Good A	Good A
12	Good A	Good A	Good B

Note: Good A: No damage; Good B: No damage but the chain is lost

(Berth 8 & 9: Cylinder Type)

Block No.	Original No.	Damaged	Damaged No.	Remarks
1	12 Nos.	1,5,6,7,8,10	7 Nos.	Existing cylinder type of fender is not suitable conditions such as limited capacity.
2	12 Nos.	6,10,12	3 Nos.	
3	12 Nos.	1,5,7,9	4 Nos.	
4	12 Nos.	1,5,6,7,8,9,10,11,12	9 Nos.	
5	12 Nos.	1,3,8,10,11,12	6 Nos.	
6	12 Nos.	3,5,7,9,10,11,12	7 Nos.	
7	12 Nos.	1,2,3,5,7,9,11	7 Nos.	
8	12 Nos.	2,4,7,9	4 Nos.	
9	12 Nos.	1,2,4,5,6,8,12	7 Nos.	
10	12 Nos.	10,11,12	3 Nos.	

(Berth 10: Fender Type 800 H x 3000 L)

Block No.	Fender 1	Fender 2
A	Damaged	25% damaged
B	Damaged	Damaged
C	Lost	Lost
D	Lost	Damaged
E	Damaged	Damaged
F	Damaged	Damaged

(Berth 11: Fender Type C-1600 H)

Block No.	Fender 1	Fender 2	Fender 3	Fender 4
1	Good	25% damaged		
2	Damaged	Good		
3	Lost	Damaged		
4	Damaged	Damaged		
5	Damaged	Damaged		
6	Damaged	Lost	Damaged	
7	Damaged	Lost	Damaged	Damaged

The number of the fender facilities to be replaced is summarized in Table 12.2.4. As the new fender for berth nos. 2, 3, and 4 has been ordered by GCPI, the number to be replaced for these berths is not accounted. In addition, the fender system for berth nos. 8 and 9 is not suitable. Therefore, adequate types of the fender facilities will be adopted for these berths.

Table 12.2.4 Number of Fender Facilities to be Replaced

Berth No.	Fender Type	Quantity to be Replaced
2, 3, 4	1000 H x 1700 L (K2)	0
5, 6, 7	1500 H x ø1200	1
8, 9	To be replaced by the adequate types of fender	40
10	800 H x 3000 L	12
11	C-1600 H	15
Total		68

Source: Estimates by the JICA Study Team

Other rehabilitation works in KZP

The following defects on structural materials, which will directly affect the port operation services, have been caused by natural deterioration:

- Deterioration of underground parts of the concrete structure caused by sulfate in soil,
- Deterioration of PVC materials by strong ultraviolet rays,
- Crack on the ceiling by stress caused from the differences in air temperature,
- Weathered slope of the land reclaimed for road and railway and whole reclaimed land,
- Deterioration of equipment of building, machine, and electricity, and
- Subsidence of the reclaimed land for the long-term period after construction.

Initially, this port was developed by reclamation on the swamp area together with the industrial area behind. The navigation channel and port basin were dredged along the creek of the swamp area. In 1983, the warehouse area for the exported fertilizer was developed through preloading in the reclamation area until the achievement of 90% consolidation settlement. Further settlement of the land was reported.

Based on the above phenomenon of the reclaimed land, it is expected that further settlement of the land through second stage consolidation or lateral liquidation of the reclaimed soil will occur. As a result, the following rehabilitation works are proposed:

- Rehabilitation of buildings and warehouses, and
- Rehabilitation of yard pavement and drainage system.

Apart from the above, repair of the tug berth (berth no. 5) structure is also proposed for the berth maintenance and corrosion protection.

Corrosion protection for piles in UQP

The cathodic protection works in UQP are added because serious loss was observed on the galvanic anode materials installed at the berths in UQP. The subject of the rehabilitation works is ten berths consisting of berth no. 12 to berth no. 21.

12.2.4 EXTENSION OF BERTH AT KZP

(1) Cargo Demand and Capacity of Port

KZP has handled container cargoes, conventional cargoes including general cargoes and bulk cargoes, and liquid bulk cargoes. The traffic demand by commodity through KZP excluding liquid bulk cargoes is shown in Table 12.2.5.

Table 12.2.5 Summary of Traffic Demand in KZP

Cargo Item	Unit	2015	2025	2035
1. Containers				
Import	TEU	10,000	34,000	84,000
Export	TEU	10,000	34,000	84,000
Total	TEU	20,000	68,000	168,000
2. Conventional Cargoes				
Import	MT	2,371,000	6,264,000	5,981,000
Export	MT	125,000	175,000	377,000
Total	MT	2,496,000	6,439,000	6,358,000

Source: JICA Study Team

Table 12.2.6 and Table 12.2.7 show the cargo handling capacity for conventional cargoes by each berth in 2009 and 2010 at KZP. The Tables below are used for estimating the cargo handling capacity at each berth based on the actual cargo handling volume in 2009 and 2010.

Table 12.2.6 Cargo Handling Capacity for Conventional Cargoes in 2009

	Handling Volume in 2009 (MT)	Handling Capacity (MT)	Berth Utilization Rate (%)
Berth No. 4	432,918	657,000	65.9
Berth No. 6	426,915	702,000	60.8
Berth No. 7	260,382	400,000	65.2
Berth No. 8	909,082	1,351,000	67.3
Total	2,029,000	3,110,000	65

Source: JICA Study Team

Table 12.2.7 Cargo Handling Capacity for Conventional Cargoes in 2010

	Handling Volume in 2009 (MT)	Handling Capacity (MT)	Berth Utilization Rate (%)
Berth No. 4	379,261	691,000	54.8
Berth No. 6	298,987	565,000	52.9
Berth No. 7	242,560	502,000	48.3
Berth No. 8	842,002	1,196,000	70.4
Total	1,763,000	2,954,000	60

Source: JICA Study Team

According to the above tables, the cargo handling capacities for conventional cargoes in 2009 and 2010 are about 3.1 million MT and 3.0 million MT, respectively. Considering the conventional cargo volume in 2015 (nearly 2.5 million MT), it is expected that the conventional cargoes could be handled by the present berthing facilities at a berth utilization ratio of about 80%. However, this berth utilization ratio is quite high and not economical. According to the report “Port Development, a Handbook for Planners in

Developing Countries (UNCTAD)", the berth occupancy ratio (BOR) should be set so as not to exceed the figures shown in Table 12.2.8 below, which are based on a ratio of ship cost to berth cost of 4 to 1.

Table 12.2.8 Recommended Maximum Berth Occupancy for Conventional Cargo Operations

Number of Berths in the Group	Recommended Maximum Berth Occupancy (%)
1	40
2	50
3	55
4	60
5	65
6-10	70

Source: Port Development, a Handbook for Planners in Developing Countries (UNCTAD)

In March 2012, GCPI informed that it recently removed the wreck near Berth No. 2 and No. 3 and that normal berth operation in these berths resumed by the end of 2011. In addition, GCPI made a concession contract on Berth No. 8 with the private operator and the operation commenced in late 2011. This means that the cargo handling capacity in KZP should be reconsidered based on the above situation (Berth Nos. 2 and 3 are available but Berth No. 8 is not available for use). Therefore, several options will be proposed and a comparative study of these cases shall be made. In this study, it is assumed that the cargo handling capacity will be 700,000 MT/berth/year based on the actual performance in 2009 and 2010. In the following Table 12.2.9, Case 1 shows the present condition at KZP, and when the fertilizer export will be resumed, it is expected that Berth Nos. 6 and 7 will not be available for public use, as shown in Case 2.

Table 12.2.9 Available Berth and Expected Cargo Handling Capacity for Conventional Cargoes

	Available Berth	Expected Handling Capacity (MT)
Case 1	Berth No. 2, No. 3, No. 4, No. 6, and No. 7	3.5 million/year
Case 2	Berth No. 2, No. 3, and No. 4	2.1 million/year

Source: JICA Study Team

Based on the above, the following issues will be pointed out:

- When the fertilizer export will be resumed, an embarrassing situation on shortage of berth will occur.
- Even though the fertilizer export will not be resumed up to 2015, the BOR is too high and not economical.

The proposed scale under the development plan should be in accordance with the cargo volume to be handled. The port facilities necessary to handle these cargoes are determined by referring to the past performance in the existing ports.

a. Container Berth in 2015

To cope with an increase in cargo, ports should be capable to exclusively handle containers, general cargoes, and bulk cargoes through effective cargo handling operations. The following principles are highly important for the above terminal operations: 1. Simplicity, 2. Safety, 3. Flexibility, 4. Efficiency, 5. Cost-effectiveness, 6. Selectivity, 7. Land Availability, 8. Handling Capability, 9. Storage Capacity, and 10. Terminal Productivity. These aspects are taken into account when determining the capacity needs for the container terminal.

The required number of container cargo berth is calculated based on the procedures as shown in Table 12.2.10.

Table 12.2.10 Required Number of Container Berth for Urgent Development in 2015

No.	Item	Unit	Calculation	Container Cargo
a	Number of Containers	TEU		20,000
b	Average Cargo Volume Handled*	TEU/vessel		886
c	Number of Vessel Calls	call/year	a/b	23
d	Cargo Handling Productivity	TEU/hour/vessel	12.3 TEU/h*	12.3
e	Total Berthing Hours	hour/year	(b/d) x c	1,716
f	Available Hours for Using Berths	hour/year	(6* x 365)	2,190
g	Berth Occupancy	%	e/(f x B)	78
	B (Number of Berth)	no.		1

Note: * The Study of Development of Southern Ports in Iraq Post Phase I Rehabilitation Projects by GCPI
Source: JICA Study Team

One container cargo berth is planned, considering an adequate berth occupancy rate for the container berth. Practically, a new container berth need not be developed because Berth No. 8 will be available for container cargo handling under the concession contract.

b. Multi-purpose Berth in 2015

Main cargoes transported by general cargo vessels which are expected to be handled at this terminal will be non-containerized cargoes such as steel products, machines, construction materials, and bagged cargoes such as rice, flour, fertilizer, grain, etc. Dry bulk cargoes are classified into two categories, namely, dirty bulk cargoes and clean bulk cargoes. The former includes clinker, coal, copper, phosphate and other mining products while the latter includes fertilizer, rice, flour and other agricultural products. Generally, small amounts of dirty bulk cargoes are expected to be handled at the multi-purpose berth together with the above break bulk cargoes, while it is assumed that large amount of bulk cargoes will be handled at the specialized berth.

The required berth number is calculated to supplement the cargo handling capacity for Case 2 in Table 12.2.9. According to Table 12.2.11, one new multi-purpose berth can handle cargo volumes at a rate of 500,000 MT. This means that KZP will have cargo handling capacity of 2.6 million MT, which can cope with the conventional cargo demand in 2015.

Table 12.2.11 Required Number of Multi-Purpose Berth for Urgent Development in 2015

No.	Item	Unit	Calculation	General Cargo
a	Cargo Volume Handled	‘000 ton		500
b	Average Cargo Volume Handled	ton /vessel		5,000
c	Number of Vessel Calls	call/year	a/b	100
d	Cargo Handling Productivity	ton/hour/vessel	40 t/h x 4g x 0.7	112.0
e	Total Berthing Hours	hour/year	(b/d+6) x c	5,064
f	Available Hours for Using Berths	hour/year	(24 x 365 x 0.95)	8,322
g	Berth Occupancy	%	e/(f x b)	61
	B (Number of Berth)	no.		1

Source: JICA Study Team

The BOR is calculated at 61% in Table 12.2.11. Judging from Table 12.2.8, this BOR is reasonable because the recommended BOR is 60% in case of four berths in the group (berth nos. 2, 3, 4, and a new berth).

As the development strategy for KZP, the port urgently needs the implementation of the rehabilitation project to recover the port capacity of all the berths available at reasonable investment cost and to provide bigger benefits to port users. Then, the following additional berthing facilities by commodities should be developed to meet the traffic demands.

Table 12.2.12 Required Number of Berth in 2015

Facilities Development	Required Number of Berths
Reinforcement and rehabilitation of the existing berth nos. 2, 3, 4 for public service including removal of wrecks	3 berths
Development of a new multi-purpose berth	1 berth (L: 300 m, D: 12.5 m)

Source: JICA Study Team

12.2.5 NAVIGATION AIDS WORKS

a. Essential Requirements for Navigational Facilities

Since GOI joined the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), GOI authorized GCPI, as government delegate, to be a member of the International Maritime Organization (IMO) in 2007.

One of the principal objectives of the Iraqi government is to fulfill the international obligations regarding the safety navigation and protection of the marine environment and be a proactive member of the maritime community.

The GOI is categorized as a party to SOLAS 74 of the IMO international convention. Therefore, Iraq has an international obligation on the safety requirements defined by this convention. The main requirements are as follows:

- Navigational Warnings, Search and Rescue Services, Hydrographic Services, Vessels Traffic Services, Aids to Navigation Services, Long Range, Identification and Tracking, etc.

The national legislative instruments to give effect to SOLAS 74 in the country's national law are still under development.

It is therefore recommended to conduct a further study on the risk analysis specified by IALA to identify the required improvement of navigational facilities in the entire navigational channels in Iraq, in compliance with the IALA regulations, as part of the proposed master plan study.

Improvement of navigational facilities by GCPI and other donors

The GCPI is entrusted with the responsibility for the implementation of governmental policies on the safety navigation and protection of the marine environment in Iraq.

The GCPI recognized that the port access channel would lack the monitoring facilities for effective traffic in the following navigational channels in Iraq and has potential threats to the safety navigation in Iraqi waterways:

- The fairway having more than 168 miles of navigable channels leading from the main ports of Umm Qasr and Khor Al Zubayr to the offshore oil terminal,
- About 11 nautical miles from KZP to UQP in the Khor Al Zubayr Channel,
- About 54 nautical miles from UQP to the offshore oil terminal and to Khawr abd Allah Channel,
- About 25 nautical miles from Al Kafka oil terminal "BOT" to the fairway buoy in Khoa Al Kafka Channel, and
- About 76 nautical miles from Al Amayah oil terminal through Abu Flus Port to Al Maqil Port in Basra in Shatt Al Irab Channel.

Improvement of the navigation aids facilities by other donors

- The GCPI requested about USD 6 million to install 150 light buoys in the above access channels and procure workshop equipment in 2010. The Danish International Development Assistance (DANIDA), the assistance agency of the Danish government, agreed to provide USD 2 million as an initial assistance of starting the project to procure 30 light buoys and purchase the workshop equipment. This work was scheduled to start in September 2010 and equipment (buoys) were delivered by the end of the first quarter of 2011.
- US Army considered that it is important to secure safety navigation in the fairway channel area, and provided funds to procure ten light buoys. In the Khor Al Zubayr Channel from UQP to KZP, there were 18 light buoys in 1990s, but all buoys in the channel were lost in August 2010. Practically, there is no navigational buoy in the channel. These 40 (30+10) light buoys will be provided to GCPI, which can select buoys which have high priority for the channel navigation to replace the lost or damaged buoys.
- There are two deep draft oil exporting terminals offshore of the Al Faw Port. The MOT considers that it is important to provide safety navigation for oil carriers promoting the oil export business. There is no navigational buoy along the access channel to the oil terminals. The MOT procured 22 light buoys with their own budget to be installed in the Khawr abd Allah Channel and Khoa Al Kafka Channel, which connect the offshore oil exporting terminals at the Al Amaya and Al Basrah.

Introduction of AIS and VTS

- In the absence of the designated maritime authority in Iraq, GCPI is presently the government organization responsible for enforcing maritime legislation in Iraq to fulfill the international obligation regarding safe navigation and protection of the marine environment.
- GCPI acknowledged that the introduction of the automated identification system (AIS) and vessel traffic services (VTS) would be effective means to mitigate these threats and improve the safety navigation in Iraq.

b. Plan of Navigation Aid Facilities in the Khor Al Zubayr Channel

Light buoys along the channel

It was planned to install 25 units of buoys along both sides of the channel and at the port basin in KZP and two leading lights at the extension of the centerline of River 1 in UQP. The existing buoys were installed for indicating the existing sunken wrecks to secure safe navigation. Once all the wrecks are removed, the existing buoys will be replaced by the new buoys with the specified colors and flashing interval lamps.

At present, only ten light buoys have been installed along the channel between UQP and KZP, while 25 buoys are required as minimum for the safety navigation. Therefore, it is recommended to provide 20 light buoys in the channel. In addition to the above, no leading light, which is essential for the safety navigation, is presently provided for the access to KZP. Accordingly, installation of two leading lights in the access channel to KZP is recommended.

AIS and VTS

(Basic Strategy)

According to the reference study by DANIDA, the following provisions of SOLAS 74 on navigation safety in compliance with coastal state obligations as defined by the IMO have to be fulfilled by the GOI as a member country of IMO:

- Navigation Warnings (Regulation 4 of SOLAS 74-Chapter V);
- Meteorological Services and Warnings (Regulation 5);
- Search and Rescue Services (Regulation 7);
- Life Saving Signals (Regulation 8);
- Hydrographic Services (Regulation 9);

- Ships Routing (Regulation 10);
- Ship Reporting System (Regulation 11);
- Vessel Traffic Services (Regulation 12);
- Aids to Navigation Services (Regulation 13); and
- Long Range, Identification and Tracking (Regulation 19.1).

Among the above, Iraq’s compliance with Regulations 4, 7, 10, 11, 12, and 13 of Chapter V is particularly relevant to the safety of navigation, and thus has been considered in the referred study. Further, the provisions of Regulation 5 of Chapter IV (Radio-communication Services) should also be taken into account.

(Scope of Works)
In order to achieve the requirements on the safety of navigation, the Study suggests the following scope of works, for which GCPI should be responsible due to the absence of a national legislative organization (i.e., maritime authority):

- Perform initial studies and SOLAS compliance analysis;
- Establish shore-based AIS by procuring AIS with necessary training;
- Improve visual aids by providing additional buoys and leading lines;
- Strengthen Maritime Operation Centre; and
- Establish VTS in the following four steps:
  - VTS Phase 1:
    Perform VTS operator training for Maritime Operation Centre according to IALA recommendations, and conduct full scale risk analysis (FSA under IMO Formal Safety Analysis) in order to assess the need for higher level of VTS.
  - VTS Phase 2:
    In accordance with the results of the FSA analysis, procure and implement full scale VTS-Navigational Assistance Services in the approaches to UQP and KZP.
  - VTS Phase 3:
    When desirable, procure and implement full scale VTS-Navigation Assistance Service in the approach to Shatt al Arab and along the river to Maqil Port in Basra.
  - VTS Phase 4:
    If desirable, procure and implement full scale vessel traffic management information system (VTMIS) for all areas.

12.2.6 UTILITY WORKS

a. Water Supply

<u>Issues to be identified</u>
(Water supply system)
- The existing system is not built according to the original design.
- The transmission main to the port is made of asbestos and cannot be used anymore.
- The source of raw water used in the port is from the water treatment plant (WTP) at the steel factory. The WTP needs maintenance and is not operating. Thus, water pumped to the port is raw and not treated.
- The water system inside the port is badly corroded and needs the stand pressure.

(Stormwater system)
- The stormwater system is constructed according to the design drawings.
- The system suffers from blockages and structural damages.
- The system can be restored through rehabilitation.

(Firefighting system)

- System is constructed according to the design drawings.
- Fire hydrants under the berths are in good condition.
- Fire hydrants outside the berth areas are in bad condition and need to be restored.

(Sewerage system)

- There is an old system with foul lines.
- The system includes a wastewater treatment plant (WWTP) that was installed 30 years ago and never used. This WWTP can neither be used nor restored.
- The septic tanks are used to discharge sewerage from administration buildings.

Recommendations

- The water supply system needs to be rebuilt. New system needs to be installed with a new design to accommodate current and future water needs.
- There is no water source available to support the port with its fresh water needs. New reverse osmosis RO plant might be the most suitable solution for the time being. (New RO plant is planned to be installed through GCPI funding.)
- New meters need to be installed at the berths.
- The stormwater system covers the port area. It needs to be rehabilitated and cleaned by water flushing.
- Maintenance civil works need to be made at the six outfalls.
- The fire system for areas outside the berths needs to be maintained. Maintenance activities include maintaining the pump house, checking the pumps, and replacing the fire hydrant chamber for all hydrants outside the berths.
- The septic tanks need to be cleaned and maintained. It is not feasible to restore the old WWTP.

Scope of rehabilitation works

(Water supply system)

As it was planned to install a new RO plant, which is the most urgent work, using GCPI's own budget, the rehabilitation works can be limited to the repair and restoration of the water supply pipelines and pits.

(Stormwater system)

The proposed work entails cleaning all the stormwater segments designated for rehabilitation. Cleaning of the stormwater shall consist of the removal of all grease, sand, silt, solids, rags, roots, and other debris from each stormwater segment, including sags within any stormwater segment and manholes. Selection of cleaning equipment and the method for cleaning shall be based on the condition and/or pipe materials of the stormwater segment at the time the work commences, and shall comply with this specification. Flushing of any stormwater line to facilitate cleaning activities shall be done according to the enforced environmental regulations.

The hydraulic means shall be used to accomplish cleaning activities. When hydraulic or high velocity cleaning equipment is used, a suitable sand trap, weir, or dam shall be constructed in the downstream manhole in such a manner that all solids and debris are trapped and removed thereby preventing such materials from passing into the next stormwater segment.

(Firefighting system)

The work entails replacing the underground fire hydrants and surface box frames and covers according to BS 750. The estimated total number of underground fire hydrants is 99. In addition, the work covers the intake suction pipe with a length of 330 m. This pipe needs to be replaced with a new one. A new design for the intake needs to be carried to accommodate the sand accumulation at the intake. The two pumps at the pump house need to be replaced with new ones.

b. Power Supply

Rehabilitation requirements

According to the director of the technical department of GCPI, urgent rehabilitation of the following electric power supply facilities is required to provide a reliable power supply aiming at improvement of the operational status of the port facilities:

- Installation of a new 11/0.4 kV substation (S/S) which consists of one 1000 kVA, 11/0.4 kV transformer complemented with all the necessary cables, 11 kV high tension switchgear and 0.4 low tension panel complemented with all the necessary circuit breakers, protective relays, metering equipment such as kW, kWh, kVAr, power factor, voltmeter, ammeter, etc. in addition to necessary grounding of the substation equipment.
- Expanding S/S No. 3 by adding an 11 kV section (3x11 kV circuit breakers), and connecting to the existing 11 kV section by a bus section and to be supplied from the 11 kV cable.
- Three underground cables are needed, i.e: one 33 kV with a length of 6 km and size of 3cx300 mm² to feed the 33/3.3 kV (the name of Japanese substation) substation, and two 11 kV cables each with a length of 6 km and size of 3cx300 mm² to feed the 11/.4 kV French substation (the name of French substation).
- In the steel structure berth substation, there is a need to replace the low tension panel including the switch fuses because they are in bad condition. The substation building needs rehabilitation as well.
- The direct current (DC) system which is installed in S/S No. 1 is central for the eleven substations. The battery sets were out of service because they were damaged and not replaced. Consequently, the DC supply for the protection equipment is obtained directly from the battery charger without any smoothing. This way of supplying DC affected badly the operation of the protection equipment, so there is an urgent need to install a new DC system to achieve reliable operation of the protection and metering equipment.
- Oil circuit breakers and high tension panels in most substations are presently in bad condition because they are old and have already passed their designed life span. Thus, they need replacement by SF6 breakers.
- Replacement of the 400/230 V, 240 kVA ship-shore transformer which is located in S/S No. 8.
- There is an urgent need to provide the technical department with testing instruments like cable tester and cable path finder and with maintenance equipment like mobile lifter which can reach a place higher than 30 m for maintaining the lighting towers with a height of 30 m.

Proposed rehabilitation works

The scope of rehabilitation works will be proposed as shown in Table 12.2.13.

Table 12.2.13 Proposed Scope of Rehabilitation Works for Power Supply

Work Item	Scope of Works
Underground Cables	Install and commission the 33 kV cable and two 11 kV cables which will extend from the harbor S/S 132/33/11 kV to the Japanese S/S and the French S/S, respectively. This project is highly recommended for the rehabilitation project.
Japanese Substation	- Replace the 33 kV switchgear by a new set including the oil circuit breakers by SF6 breakers. This can be done by stages as the current situation does not need an urgent replacement of these breakers. - Install a new DC system to serve the whole Japanese S/S. - The 3.3 kV switchgear panel must be replaced but it can be postponed as it is currently not used. However, the replacement should also be done by stages as mentioned above.
11/0.4 kV substations	Replace the 11 kV oil circuit breakers by SF6 breakers. This could be done by stages that comply with the GCPI annual investment plans. Replace the 0.4 kV knife switches by molded case circuit breakers. The replacement could be carried out as mentioned in the previous item. Install a new DC system. Replace the 400/230 V ship-shore transformer in S/S No. 8. - Rehabilitate the substation building.
Steel Structure Berth Substation	This cable will come from the harbor substation passing through the new proposed substation at the main gate and S/S No. 3 and thereafter to the steel structure berth substation.
Crane Sockets and Ship-shore Sockets	Rehabilitation of the existing socket outlets by installing new circuit breakers instead of switch fuses. Replacing the damaged terminal boxes of the sockets. Testing the existing cables and replacing them if necessary depending on the condition of each cable. However, it is preferable to replace all feeders to crane and ship-shore sockets through any rehabilitation project or through any annual maintenance program, because some of these cables are in bad condition.

Source: The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Projects by GCPI

12.2.7 PROCUREMENT OF CARGO HANDLING EQUIPMENT

a. Cargo Handling Efficiency in KZP

According to the traffic records of KZP in January/March 2008, the average and maximum berthing times of ships by commodity and used berths were shown in the following Table 12.2.14.

Table 12.2.14 Average and Maximum Berthing Time of Ships at KZP

Type of Ship	Average Berthing Time	Berth Number Used	Maximum Berthing Time	Berth Number Used
Tanker Fuel Oil Export	13.8 days	9,10,11, & 12	37 days (Loading 27,000 tons)	9
Tanker Petro Product Import	7.4 days	11	11 days (Unloading 17,485tons)	11
Cargo Ship for Cement	11.2 days	4,6,7, & 8	26 days (Unloading 8,981 tons)	4
Cargo Chip for Containers	5.4 days	8	9days (Unloading 175 boxes)	8
Cargo Ship for General Cargoes	7.9 days	4,6, & 8,	14 days (Unloading 4,200 tons)	8

Source: GCPI

Container handling time at berth

The containers are unloaded by using the ship gear from the ship to the apron. Then, the containers are loaded to trucks to be transported directly to their inland destination or to the container yard behind the wharf for storage.

It took 5.4 days for the unloading operation of 175 container boxes. Usually, it takes two to three days on average to unload 300 to 400 boxes. The reason why the unloading operation took a long time was the shortage of trucks to transport containers from the apron to the yard, and handling equipment along the wharf and in the yard.

The container handling flow is not systematically organized yet at the port. It is necessary to procure additional handling equipment in the wharf and in the yard.

General cargo handling time at berth
In the case of cargo ships transporting cement, one mobile crane or ship gear is working for unloading the bagged cement from the ship on the berth. The unloading operation for the bagged cement and general cargoes took an average of 11.2 days and 7.9 days, respectively.

Liquid bulk handling time at berth
In the case of tankers transporting fuel oil for export, the unloader for liquid bulk is working for loading oil through pipelines to the ship. The loading operation took an average of 13.8 days and 7.4 days for fuel oil and petrochemical products, respectively.

b. Cargo Handling Equipment Proposed for the Port Sector Rehabilitation Project Phase II

Based on the experience of procuring equipment for UQP through Japanese ODA loan, the requested cargo handling equipment for Phase II including equipment for UQP are selected and listed in Table 12.2.15.

It is noted that the cargo handling equipment at UQP procured under Phase I is not sufficient to meet the traffic demands in 2010. Therefore, it is necessary to procure cargo handling equipment urgently required for UQP and KZP as a part of the Phase II project.

Table 12.2.15 List of Cargo Handling Equipment Proposed for the Phase II Project

Port	Equipment	Spec.	Quantity	Remarks
KZP	Reach stacker	42 t	2 units	For handling container (1 for quay & 1 for yard)
	Straddle Carrier	42 t	2 units	For handling container
	Forklift	20 t	2 units	For handling general cargo
	Trailer		3 units	For handling container
	Chassis	20’~45’	6 units	For handling container
	Mobile cranes	50 t	1 unit	For handling container & general cargo Tire-mounted type
		15 t	1 unit	
	Workshop vehicle		1 unit	For maintenance & cleaning
	Sweeping vehicle		1 unit	
	Back Hoe		1 unit	
	Dumping Lorry	20 t	1 unit	
UQP	RTG	40 t	4 unit	UQP North Container Berth

Source: JICA Study Team

12.2.8 PROCUREMENT OF MARINE EQUIPMENT

The GCPI has requested the purchase list of marine equipment shown in Table 12.2.16 for the Port Sector Rehabilitation Project Phase II.

Table 12.2.16 Marine Equipment List

Port	Equipment	Spec.	Quantity	Remarks
UQP/KZP	Mooring boat	< 10 m long	4 units	
	Service boat	< 10 m long	2 units	
	Pilot boat	< 10 m long	1 unit	
	Cutter dredger (CSD)	1,500 m^3/hr	1 unit	
	Grab dredger	1,500 m^3	1 unit	
	Trailing suction H. dredger (TSHD)	3,500 m^3	1 unit	
	Lightning vessel		1 unit	
	Survey boat	> 12 m long	1 unit	With suitable lifting crane
	Service pontoon for salvage dep't	2,000 t class	2 units	20 m (W) x 60 m (L) x 3 m (D) equipped with 80 t crane
	Firefighting boat	2,000 HP	2 units	
	Anti pollution boat		1 unit	Standard type with treatment plant
	Anti pollution monitoring boat	High speed boat	2 units	
	Tug boat	3,000~4,000 HP	3 units	

Source: JICA Study Team

The above-listed equipment are all necessary for the replacement of the aged or non-working ships in order to maintain the existing port operation.

Especially, dredgers are the most urgently required in order to carry out regular maintenance dredging for all the access channels and port basins.

Dredgers

GCPI had owned in the past more than 20 dredgers as described in Chapter 8. However, only eight dredgers are presently owned, and only one or two dredgers are working.

Required number of dredgers for maintenance dredging

In order to maintain the channels to UQP and KZP and both port basins, the following number of dredgers are at least required, on the assumption that minimum siltation volume is 6 million m^3/year (although there is no accurate data for siltation is available, it is anticipated between 6 million~9 million m^3/year). Monthly average dredging capacities for 24 hours (3-shifts) operation are as follows:

- TSHD (3,000~3,500 m^3 capacity) : 300,000~350,000 m^3/month
- CSD (4,000 HP class) : 700,000 m^3/month
- CSD (8,000 HP class) : 1,500,000 m^3/month

Therefore, if normal working shift of GCPI, i.e., one shift of six hours a day, is considered, the required dredgers are as follows:
(At least one CSD is necessary to dredge the areas difficult to dredge using TSHD with shallow or hard soil conditions.)

- By one CSD, 8,000 HP : 1/3 x 1,500,000 m^3/month = 500,000 m^3/month
- Annual dredging volume : 500,000 x 12 x 0.65 = 3,900,000 m^3

However, CSD will not be so efficient when used for maintenance dredging of channels and basin.

Therefore, capacity is considered at around 2,000,000 m^3/year.
Remaining volume of 4,000,000 m^3 (minimum) will be dredged by TSHD; then, required number of TSHD is:

$$4{,}000{,}000\ m^3 \div (110{,}000\ m^3/month \times 12 \times 0.65) = 4.7 \fallingdotseq 5.0$$

Even two-shift operation is adopted, minimum of three nos. of TSHD are necessary. From the above, the following dredging fleet is at least required:

- Three TSHD of 3,000~3,500 m^3 class
- One CSD of 6,000~8,000 HP
- One GHD for berth front area or spot dredging

Anti-pollution boat and monitoring boat (2)
These boats are essentially necessary for environmental aspect control, especially for the removal of shipwrecks to be done by GCPI upon the completion of the floating crane and diver boat under the Phase I project.

Other service boats
Most of the service boats, other than some tug boats and one survey boat, owned by GCPI are either not working or already aged and required to be replaced as described in Chapter 8.

13. PROJECT COST AND IMPLEMENTATION SCHEDULE

13.1. PROJECT COST

13.1.1 BASE OF THE COST ESTIMATE

(1) Base Year

The base year considered for the project cost estimate is year 2012.

(2) Exchange Rates

The following exchange rates have been considered.

- USD 1 = JPY 78.50
- USD 1 = ID 1,166
- ID 1 = JPY 0.07

(3) Price Escalation

Price escalations for foreign currency and local currency considered are as follows:

- 2.10 % per annum for foreign currency
- 6.70 % per annum for local currency

(4) Physical Contingency

Physical contingency for each component has been applied at the following percentages based on the experiences on the Phase I project.

- Construction Works : 20 %
- Procurement of Equipment : 20 %
- Consulting Services : 5 %

(5) Value Added Tax (VAT) and Taxes

The value added tax (VAT) and income tax were not considered.

(6) Administrative Costs

Administrative costs including duties and taxes were assumed at least 5 % as non-eligible portion.

13.1.2 COMPONENTS FOR PROJECT COST ESTIMATION

The proposed components are summarized in Table 13.1.1, which have been considered for project cost estimation.

Table 13.1.1 Components for Project Cost Estimation

No.	Project Component	Scope of Works (Full Scale)	Remarks
1	Dredging Works at KZP	Dredging of port basin, front of berthing areas, a limited area of access channel, dredging volume: 5,400,000 m^3, depth: -12.5 m, width: access channel and berthing areas 300 m, and turning basin 450 m wide	
2	Shipwrecks Removal	Total 12 wrecks removal located in the main channel and KZP basin	
3	Rehabilitation of Port Facilities	Damaged fender replacement: 68 pcs (KZP) Repair of tug berth structure (KZP), yard pavement rehabilitation (KZP), corrosion protection (UQP).	
4	Extension of Berth at KZP	Extension of the existing berth No.2 to south, and utilize as multi-purpose berth (KZP), also connected to surrounding berth, design depth -12.5 m	
5	Navigation Aids Works	Procure and install 20 light buoys along the channel between UQP and KZP, 25 buoys required. Of which, 10 buoys installed. For UQP/KZP channels, two leading lights installation at KZP access channel, AIS/VTS system installation	
6	Utility Works	Rehabilitation/repair works at KZP (water supply, electricity cables, etc.)	
7	Removal of Unused Facilities and Equipment	Removal of unused rail mounted quay side cranes at UQP	
8	Cargo Handling Equipment	KZP: container cargo handling equipment (21 nrs), KZP: maintenance works equipment (4 nrs), UQP: RTG (4 nrs)	
9	Marine Equipment (UQP/KZP)	Dredger (3), tug (3), survey boat(1), mooring boat (2), anti-pollution/monitoring vessels(3), and others (7)	

Note: The detail of the proposed components is referred in Chapter 14 of the Urgent Development Plan.
Source: JICA Study Team

13.1.3 PROJECT COSTS

The summary of the project costs is shown in Table 13.1.2.

- Base Year for Cost Estimation : 2012
- Exchange Rates : USD 1 = JPY 78.50
  : USD 1 = ID 1,166
- Price Escalation : 2.1 % for foreign currency
  : 6.7 % for local currency
- Physical Contingency : 20 % for construction works
  : 20 % for procurement of equipment
  : 5 % for consulting services

Table 13.1.2 Summary of Estimated Project Costs

	Acutual Proportion		Total (Equivalent to JPY)			Total (Original)		
	FC	LC	FC 1,000JPY	LC 1,000JPY	Total 1,000JPY	FC 1,000JPY	LC 1,000USD	Total 1,000JPY
A. ELIGIBLE PORTION								
I) Construction and Procurement			**64,993,870**	**8,464,082**	**73,457,952**	**64,993,870**	**107,822.70**	**73,457,952**
I.1 Dredging Works at KZP	83.3%	16.7%	5,318,117	1,067,670	6,385,788	5,318,117	13,600.90	6,385,788
I.2 Shipwrecks Removal Works	79.6%	20.4%	4,434,617	1,135,329	5,569,946	4,434,617	14,462.79	5,569,946
I.3 Rehabilitation of Port Facilities	59.0%	41.0%	1,291,849	898,383	2,190,232	1,291,849	11,444.37	2,190,232
I.4 Extension of Berth at KZP	70.5%	29.5%	5,311,607	2,221,822	7,533,429	5,311,607	28,303.46	7,533,429
I.5 Navigation Aids Works	97.3%	2.7%	2,247,750	62,100	2,309,850	2,247,750	791.08	2,309,850
I.6 Utility Works	0.0%	100.0%	0	362,954	362,954	0	4,623.62	362,954
I.7 Removal of Unused Facilities and Equipment	83.7%	16.3%	332,517	64,780	397,296	332,517	825.22	397,296
I.8 Procurement of Cargo Handling Equipment	99.1%	0.9%	1,952,730	16,980	1,969,710	1,952,730	216.31	1,969,710
I.9 Procurement of Marine Equipment	99.1%	0.9%	30,728,625	285,848	31,014,472	30,728,625	3,641.37	31,014,472
Base Project Cost for (I.1 to I.9)			51,617,811	6,115,865	57,733,677	51,617,811	77,909.11	57,733,677
Price Escalation			3,052,496	1,125,044	4,177,540	3,052,496	14,331.77	4,177,540
Physical Contingency			10,323,562	1,223,173	11,546,735	10,323,562	15,581.82	11,546,735
II) Consulting Services			**1,520,074**	**1,442,043**	**2,962,116**	**1,520,074**	**18,369.97**	**2,962,116**
Base Project Cost for (E/S)			1,391,513	1,210,543	2,602,056	1,391,513	15,420.93	2,602,056
Price Escalation			58,985	170,972	229,958	58,985	2,177.99	229,958
Physical Contingency			69,576	60,527	130,103	69,576	771.05	130,103
Total of A. (I + II) : BASE PROJECT COSTS			**66,513,943**	**9,906,125**	**76,420,068**	**66,513,943**	**126,192.67**	**76,420,068**
B. NON ELIGIBLE PORTION								
a. Land Acquisition and Compensation Cost		**0.00%**	0	0	0	0	0.00	0
b. Administration Cost		**5.00%**	0	3,821,003	3,821,003	0	48,675.20	3,821,003
c. VAT		**0.00%**	0	0	0	0	0.00	0
d. TAX and Duties		**0.00%**	0	0	0	0	0.00	0
Total of B. (a. + b. + c. + d.)			**0**	**3,821,003**	**3,821,003**	**0**	**48,675.20**	**3,821,003**
TOTAL (A. + B.)			**66,513,943**	**13,727,128**	**80,241,071**	**66,513,943**	**174,867.87**	**80,241,071**

Source: JICA Study Team

13.2. IMPLEMENTATION SCHEDULE

13.2.1 WORK DURATION OF EACH COMPONENT

The work duration of each component of the proposed project is summarized in Table 13.2.1.

The total project implementation period is estimated about 66 months including 12 months of maintenance period.

Implementation schedule has been estimated according to the experiences of Phase I project and is shown in Table 13.2.2.

Table 13.2.1 Estimated Duration of the Project Components

No.	Project Components	Construction Period
1.	Dredging Works at KZP	12 months
2.	Shipwrecks Removal Works	24 months
3.	Rehabilitation of Port Facilities	17 months
4.	Extension of Berth at KZP	28 months
5.	Navigation Aids Works	24 months
6.	Utility Works	17 months
7.	Removal of Unused Facilities and Equipment	12 months
8.	Procurement of Cargo Handling Equipment	26 months
9.	Procurement of Marine Equipment	31 months
10.	Consulting Services	66 months

Source: JICA Study Team

13.2.2 PRELIMINARY CONSTRUCTION PLAN

Preliminary construction plans for the project are assumed as follows:

(1) Dredging works at KZP: 12 months in total

1) Preparation works such as bathymetric survey: two months;
2) Mobilization of the dredgers: three months;
3) Dredging works: six to seven months by trailer and cutter suction dredger or grab dredgers; and
4) Completion of works including post-survey and demobilization: two months.

(2) Wreck Removal Works: 22-24 months (Table 13.2.4)

1) Preparation works such as outfitting, mobilization of lifting cranes, and dredgers: three months;
2) Removal works: 18 to 20 months by dredging, patching, de-watering, re-floating, cutting, transport to scrap area, and dismantlement works; and
3) Completion of works including demobilization: one month.

(3) Rehabilitation of Port Facilities: 16-18 months in total

1) Preparation works: two to three months;
2) Survey works for damaged facilities: two months;
3) Procurement of required material: three to six months;
4) Rehabilitation works: ten to twelve months; and
5) Completion of works including demobilization: one month.

(4) Extension of Berth at KZP: 28-30 months (Table 13.2.3)

1) Preparation works: two to three months;
2) Survey works for construction: two months;
3) Procurement of construction materials (SPP, accessories): six to fifteen months;
4) Trestle construction works: six to eight months (piling works by piling barge, concrete works, etc.);
5) Jetty construction works: 20 to 22 months (piling works by piling barge, concrete works, etc.);
6) Revetment and other land facilities: 18 to 22 months (soil improvement, pavement, etc.); and
7) Completion of the works including demobilization: three to four months.

(5) Navigation Aids Works: 24 months

1) Preparation works: two to three months;
2) Procurement of navigation aids and leading towers: ten to twelve months;
3) Procurement of VTS/AIS: 14 to 16 months including system design by manufacturers;
4) Installation works: six-eight months; and
5) Completion of works including system training and demobilization: two to four months.

(6) Utility Works: 12-14 months

1) Preparation works: two to three months;
2) Survey works for damaged facilities: two months;
3) Rehabilitation works: eight to ten months; and
4) Completion of works including demobilization: one month.

(7) Removal of Unused Facilities: 12 months

1) Preparation works such as mobilization of lifting cranes and barge or trailers: three months;
2) Removal works: six to eight months by crane barge, patching, removal works (cable, pits etc.) on barge and quayside; and
3) Completion of works including cleaning and demobilization: one month.

(8) Procurement of Cargo Handling Equipment: 26 months (Table 13.2.5)

1) Preparation works such as preparing production drawings and meeting: three to four months;
2) Producing, assembling, machinery, and electrical installation: 16 to 20 months;
3) Delivery, inspection test, and trainings: eight months; and
4) Completion of works including final certificates: one month.

(9) Procurement of Marine Equipment: 31 months (Table 13.2.6)

1) Preparation works such as preparing production drawings and meeting: four to eight months;
2) Producing, assembling, machinery, and electrical installation including hull, keeling, launching: 23 to 25 months;
3) Delivery, inspection test, and trainings: eight to fifteen months; and
4) Completion of works including final certificates: one month.

Table 13.2.2 Implementation Schedule of the Project

Years	1st Year												2nd Year												3rd Year												4th Year												5th Year											
	2012												2013												2014												2015												2016											
Task Name	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Prior Notification					×																																																							
Exchange of Note														×																																													
Loan Agreement															×																																											
Selection of Consultant															1	1	1	1	1	1	1	1	1	1																																				
Consulting Services																									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Field Survey and Investigation																									1	1	1	1	1	1	1	1																												
Review Works for draft bidding documents																										1	1	1	1	1																														
Detailed Design																									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																		
Bidding Assistance																										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
Construction Supervision																									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Defect Period (Construction)																																																												
Bids for Procurement (Construction and Equipment)																																																												
(A) Port Related Rehabilitation Works																																																												
1. Dredging Works at KZP									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																				
- Pre-qualification (incl. JICA's Concurrence)									1	1	1																																																	
- Preparation of Bidding Documents									1	1	1																																																	
- Bidding Period												1	1	1	1																																													
- Bid Evaluation																1	1	1																																										
- JICA's Concurrence for Bid Evaluation																			1																																									
- Negotiation of the Contract																				1	1																																							
- JICA's Concurrence for the Contract																						1																																						
- Opening of L/C and L/COM																						1	1	1																																				
2. Shipwrecks Removal Works									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																				
3. Rehabilitation of Port Facilities																																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
4. Extension of Berth at KZP																																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
5. Navigation Aids Works																																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
6. Utility Supply Works																																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
7. Removal of Unused Facilities and Equipment																																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										
(B) Procurement of Equipment																																																												
8. Procurement of Cargo Handling Equipment																										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																			
9. Procurement of Marine Equipment																											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																	
- Pre-qualification (incl. JICA's Concurrence)																											1	1	1																														
- Preparation of Bidding Documents																											1	1	1																														
- Bidding Period																													1	1	1	1	1	1																										
- Bid Evaluation																																			1	1	1																							
- JICA's Concurrence for Bid Evaluation																																						1																						
- Negotiation of the Contract																																							1	1																				
- JICA's Concurrence for the Contract																																									1																			
- L/C opening, L/Com Effectuate																																									1	1	1																	
Construction and Procurement																																																												
(A) Port Related Rehabilitation Works																																																												
1. Dredging Works at KZP																									1	1	1	1	1	1	1	1	1	1	1	1																								
2. Shipwrecks Removal Works																									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
3. Rehabilitation of Port Facilities																																																			1	1	1	1	1	1	1	1	1	1
4. Extension of Berth at KZP																																																			1	1	1	1	1	1	1	1	1	1
5. Navigation Aids Works																																																			1	1	1	1	1	1	1	1	1	1
6. Utility Supply Works																																																			1	1	1	1	1	1	1	1	1	1
7. Removal of Unused Facilities and Equipment																																																			1	1	1	1	1	1	1	1	1	1
(B) Procurement of Equipment																																																												
8. Procurement of Cargo Handling Equipment																																										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9. Procurement of Marine Equipment																																												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Years	6th Year												7th Year												8th Year												9th Year												10th Year												Months
	2017												2018												2019												2020												2021												
Task Name	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Prior Notification																																																													0
Exchange of Note																																																													0
Loan Agreement																																																													0
Selection of Consultant																																																													10
Consulting Services	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																															66
Field Survey and Investigation																																																													8
Review Works for draft bidding documents																																																													5
Detailed Design																																																													18
Bidding Assistance																																																													25
Construction Supervision	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																											54
Defect Period (Construction)															1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																															16
Bids for Procurement (Construction and Equipment)																																																													0
(A) Port Related Rehabilitation Works																																																													0
1. Dredging Works at KZP																																																													16
- Pre-qualification (incl. JICA's Concurrence)																																																													3
- Preparation of Bidding Documents																																																													3
- Bidding Period																																																													4
- Bid Evaluation																																																													3
- JICA's Concurrence for Bid Evaluation																																																													1
- Negotiation of the Contract																																																													2
- JICA's Concurrence for the Contract																																																													1
- Opening of L/C and L/COM																																																													3
2. Shipwrecks Removal Works																																																													16
3. Rehabilitation of Port Facilities																																																													16
4. Extension of Berth at KZP																																																													16
5. Navigation Aids Works																																																													16
6. Utility Supply Works																																																													16
7. Removal of Unused Facilities and Equipment																																																													16
(B) Procurement of Equipment																																																													0
8. Procurement of Cargo Handling Equipment																																																													16
9. Procurement of Marine Equipment																																																													17
- Pre-qualification (incl. JICA's Concurrence)																																																													3
- Preparation of Bidding Documents																																																													3
- Bidding Period																																																													6
- Bid Evaluation																																																													3
- JICA's Concurrence for Bid Evaluation																																																													1
- Negotiation of the Contract																																																													2
- JICA's Concurrence for the Contract																																																													1
- L/C opening, L/Com Effectuate																																																													3
Construction and Procurement																																																													0
(A) Port Related Rehabilitation Works																																																													0
1. Dredging Works at KZP																																																													12
2. Shipwrecks Removal Works																																																													24
3. Rehabilitation of Port Facilities	1	1	1	1	1	1	1																																																						17
4. Extension of Berth at KZP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																											28
5. Navigation Aids Works	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																															24
6. Utility Supply Works	1	1	1	1	1	1	1																																																						17
7. Removal of Unused Facilities and Equipment	1	1																																																											12
(B) Procurement of Equipment																																																													0
8. Procurement of Cargo Handling Equipment	1	1	1	1	1	1	1																																																						26
9. Procurement of Marine Equipment	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																															31
																																																													0
																																																													0

Note; This is prepared according to JICA general procurement schedule. However, on implementing stage this can be re-scheduled due to urgency of the Project, if possible.

DISBURSEMENT SCHEDULE

Task Name	1st Year 2012	2nd Year 2013	3rd Year 2014	4th Year 2015	5th Year 2016	6th Year 2017	7th Year 2018	8th Year 2019	9th Year 2020	10th Year 2021	Months
(A) Port Related Rehabilitation Works											
1. Dredging Works at KZP	0.00%	25.00%	75.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
2. Shipwrecks Removal Works	0.00%	12.50%	50.00%	37.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
3. Rehabilitation of Port Facilities	0.00%	0.00%	0.00%	5.88%	70.59%	23.53%	0.00%	0.00%	0.00%	0.00%	100%
4. Extension of Berth at KZP	0.00%	0.00%	0.00%	3.57%	42.86%	42.86%	10.71%	0.00%	0.00%	0.00%	100%
5. Navigation Aids Works	0.00%	0.00%	0.00%	4.17%	50.00%	45.83%	0.00%	0.00%	0.00%	0.00%	100%
6. Utility Supply Works	0.00%	0.00%	0.00%	5.88%	70.59%	23.53%	0.00%	0.00%	0.00%	0.00%	100%
7. Removal of Unused Facilities and Equipment	0.00%	0.00%	0.00%	8.33%	91.67%	0.00%	0.00%	0.00%	0.00%	0.00%	100%
(B) Procurement of Equipment											
8. Procurement of Cargo Handling Equipment	0.00%	0.00%	0.00%	38.46%	46.15%	15.38%	0.00%	0.00%	0.00%	0.00%	100%
9. Procurement of Marine Equipment	0.00%	0.00%	0.00%	25.81%	38.71%	35.48%	0.00%	0.00%	0.00%	0.00%	100%

Source: JICA Study Team

Table 13.2.3 Preliminary Work Schedule of Extension of Berth at KZP

No.	Work	Working Days
	Contract Effective	
1.	Preparation	
1-1	Transport Material	120
1-2	Mobilization and Demobilization	90
1-3	Site Office	90
2.	Dredging Slope	75
3.	Access Bridge	
3-1	Piling (90 Piles)	35
3-2	Upper Structure	330
4.	Jetty	
4-1	Piling (532 Piles)	244
4-2	Upper Structure (7 Blocks)	215
		215
		215
		215
		215
		215
		90
5.	Earth Work, Sea Wall	

Source: JICA Study Team

Table 13.2.4 Preliminary Work Schedule of Wreck Removal (12 vessels)

No.	Work	Working months
	Contract Effective	
1.	Preparation Works	
1-1	Domestic Preparatory Works of Outfitting	
1-2	Mobilization of Equipment vessels to the Site	
1-3	Dismantlement and Preparatory works at site	
2.	Removal Works of Wrecks & sunken ships	
2-1	Vessel No.1	1.0
2-2	Vessel No.2	2.0
2-3	Vessel No.3	2.0
2-4	Vessel No.4	1.5
2-5	Vessel No.5	1.0
2-6	Vessel No.6	1.0
2-7	Vessel No.7	1.5
2-8	Vessel No.8	2.0
2-9	Vessel No.9	2.0
2-10	Vessel No.10	2.0
2-11	Vessel No.11	2.0
2-12	Vessel No.12	2.0

Source: JICA Study Team

Table 13.2.5 Preliminary Work Schedule of Cargo Handling Equipment

No.	Work	Q'ty	Working months	Month (1–36)
	Contract Effective			
1.	Preparation			
1-1	Production drawings			
1-2	Order arrangements, delivery, test, training, etc			delivery period, test and training at site
1-3	Production meeting, inspection, etc			
2.	Reach Stacker, 42ton	2 units	11	
	Top Lifter, 42ton	2 units	11	
	Fork Lift, 10ton	1 unit	11	
	Fork Lift, 7ton	1 unit	11	
	Fork Lift, 3ton	1 unit	11	Completion 26 month
	Trailer	3 units	6	
	Chassis, '20' - 45'	6 units	6	
	Mobile Crane, 40tons	1 unit	12	
	Mobile Crane, 15tons	1 unit	12	
	Workshop Vehicle	1 unit	12	
	Sweeping	1 unit	7	
	Back Hoe	1 unit	7	
	Dumping Lorry, 20tons	1 unit	7	
	Rubber Tired Gantry Crane (RTG)	4 units	20	

Source: JICA Study Team

Table 13.2.6 Preliminary Work Schedule of Marine Equipment

No.	Work	Q'ty	Working months	Month (1–36)
	Contract Effective			
1.	Preparation			
1-1	Preparation of shipduilds			
1-2	Hull, blocks assembling, painting			
1-3	Production drawings			
1-4	Machinery and electrical installation			
1-5	Production meeting, inspection, etc			
2.	Mooring Boat, < 10m long	2 units	14	
	Services Boat, < 10m long	1 unit	14	
	Pilot Boat, 20-25tons, < 10m long	1 unit	14	
	Dredger (Cutter Suction Dredger), 4,000ps	1 unit	22	
	Dredger (Grab Dredger)	1 unit	18	
	Dredger (Trailer Suction Hopper Suction)	1 unit	22	
	Lightening Vessel	1 unit	12	Completion 31 month
	Survey Boat	1 unit	14	
	Services Pontoon for Salvage Dep't	2 units	14	
	Fire Fighting Boat	1 unit	14	
	Anti-Pollution Boat	1 unit	14	
	Anti-Pollution Monitering Boat	2 units	20	
	Tug Boat, 3,000 - 4,000HP	3 units	14	
3.	Training program		15	
	Delivery voyage		10	

Source: JICA Study Team

13.3. PROJECT SCOPE OPTIONS

The following project scope options have been examined considering the proposed priorities of respective components:

Option 1: Base case (full scale option).

Option 2: Shipwrecks removal work, removal of unused facilities/equipment, and marine equipment are minimized according to the priority, as follows;

- Shipwrecks removal: six wrecks identified as Priority 2 are excluded,
- Removal of unused facilities/equipment: ten quay cranes (24 total) are deleted as uncertain for removal (may be repaired), and
- Marine equipment: depending on the priority of dredger type requirement, this item is further divided into two cases.

Note:

GCPI has a plan to purchase new dredgers, instead of repairing some dredgers, of type either TSHS or CSD, or both. Therefore, Option 2A, Option 2B and Option 3as stated below reflects such selection of dredger types, if decided to purchase.

Option 2A: Exclude the following marine equipment in addition to the above.

Two dredger (GHD, TSHD); and

- Two of mooring boats and services boats, one each of fire-fighting boat, anti-pollution monitoring boat, and tug boat.

Option 2B: Exclude some marine equipment, but dredger type excluded is CSD (instead of GHD).

Option 3: In addition to Option 2B work component, further exclusion of the marine equipment;

- Grab dredger (Priority 2).

Option 4: Further exclusion of the following works from Option 3;

- One each of lighting boat, survey boat, two tug boats

The above examined options and the estimated project costs are summarized in Table 13.3.1 and Table 13.3.2, respectively.

Table 13.3.1 Project Scope Options

No.	Items	Option-1 (Base Case)	Option-2A	Option-2B	Option-3	Option-4
1.	Dredging (KZP)	5.4 million m^3	5.4 million m^3	5.4 million m^3	5.4 million m^3	5.4 million m^3
2.	Shipwrecks Removal	12 wrecks (all)	6 wrecks, (Priority-1)	6 wrecks, (Priority-1)	6 wrecks, (Priority-1)	6 wrecks, (Priority-1)
3.	Port Facilities Rehabilitation	Full scale	Full scale	Full scale	Full scale	Full scale
4.	Extension of Berth at KZP	Included	Included	Included	Included	Excluded
5.	Navigation Aids	Included	Included	Included	Included	Excluded AIS/VTS
6.	Utility Works	Included	Included	Included	Included	Included
7.	Removal of Unused Facilities and Equipment	Removal of 24 Jib cranes	14 Jib cranes as Priority-1	14 Jib cranes as Priority-1	14 Jib cranes as Priority-1	14 Jib cranes as Priority-1
8.	Cargo Handling Equipment	All included	All included	All included	All included	All included
9.	Marine Equipment (total 18 ships)	All included	Selected item, (Priority 2 and 3)	Selected item, (Priority 2 and 3)	Selected item, (Priority 2 and 3)	Selected item, (Priority 2)

Source: JICA Study Team

Table 13.3.2 Summary of Project Costs of Options

（Unit: JPY million）

Options	Scope	FC	LC	Total
Option-1	Original (full scope)	66,514	13,727	80,241
Option-2A	Delete six shipwrecks, 8 kinds & 10 no. of ships (GHD, TSHD), and ten sets of Jib crane removal from the original	39,785	11,056	50,841
Option-2B	Delete six shipwrecks, 8 kinds & 10 no. of ships (CSD, TSHD), and ten sets of Jib crane removal from the original	35,891	10,819	46,710
Option-3	Delete six shipwrecks, nine kinds & 11 no. of ships (CSD, GHD, TSHD), and ten sets of Jib crane removal from the original	30,798	10,508	41,307
Option-4	Delete six shipwrecks, eleven & 15 no. kinds of ships (CSD, GHD, TSHD), ten sets of Jib crane removal from the original	27,580	10,312	37,892

Source: JICA Study Team, Note: Exclude Interest during Construction

14. ENVIRONMENTAL CONSIDERATION ON URGENT DEVELOPMENT PLAN

14.1. INTRODUCTION

The environmental baseline survey at KZP was conducted in the Phase I project and an initial environmental examination (IEE) report was prepared. Supplemental study for the IEE report was also conducted[1]. Through these studies and based on the rehabilitation plan, the necessity for another study was realized.

Based on the situation, a field survey at KZP was conducted in this study to obtain additional information for the purpose of understanding the present environmental conditions for dredging works and removal of wrecks. The survey was commissioned to a local based environmental consultant. Jordanian based local assistants were also employed to conduct selection of the consultant, supervision of works, examination of the results during the field survey, and preparation of the report.
A schedule of the field survey is shown in Table 14.1.1.

Table 14.1.1 Schedule of Field Survey

Item	Duration (Month)
Selection of Contractors	Dec. 2011–Jan. 2012
Preparation of the Survey	Jan. 2012–Feb. 2012
Field Survey	Feb. 2012
Laboratory Tests and Report	Mar. 2012

The contents of the field survey are shown in Table 14.1.2.

Table 14.1.2 Contents of the Field Survey

Content	Item	Point/Layer	Number
Water Quality	Water temperature, salinity (conductivity), SS, pH, DO, BOD, T-N, T-P, oil and grease, Coliform bacteria, cyanide (CN), arsenic (Ar), cadmium (Cd), chromium (Cr)+6, lead (Pb), mercury (Hg), total PCBs	12 x 2	2 (high tide, low tide)
Sediment Quality	Specific gravity, water content, particle size distribution, total organic carbon (TOC), oil (total petroleum hydrocarbon), phenol, total nitrogen, total phosphorus, total sulphur (TS), cyanide (CN), arsenic (Ar), iron (Fe), manganese (Mn), cadmium (Cd), chromium (Cr)+6, lead (Pb), mercury (Hg), copper (Cu), nickel (Ni), zinc (Zn), total PCBs, total DDT, dioxins, tributyltin (TBT)	12 x 1	1
Disposal Area	Oil (total petroleum hydrocarbon), cyanide (CN), arsenic (Ar), tin (Sn), iron (Fe), manganese (Mn), cadmium (Cd), chromium (Cr)+6, lead (Pb), mercury (Hg), copper (Cu), nickel (Ni), zinc (Zn), total PCBs, total DDT, dioxins fauna and flora	4 areas	1
Stakeholder Meeting	meeting memo	1	1
Collection of Information	Related laws/regulations	1	1

Upon conducting the field survey, desk-based study was also carried out to gather related information from previous study, literatures, and internet.
Environmental laws and regulations in Iraq were also examined and updated to understand the process of the environmental impact assessment (EIA).

1 Port Sector Rehabilitation Project Marine Environmental Survey at Umm Qasr & Khor Al Zubayr Port, Final Report, Marine Science Center, University of Basrah, July 2009.

Based on the studies mentioned above, the IEE report prepared in the SAPROF study was updated. Although the stakeholder meeting is not conducted yet, it is scheduled to be held in order to notify the related people/organizations about the project and to reflect their opinions on the project implementation.

Updated IEE is shown in *Appendix C*. Outline of the updated IEE is introduced in the following sections.

14.2. LEGAL FRAMEWORK

14.2.1 GENERAL LAWS/REGULATIONS

Laws and regulations relating to the environmental and social considerations in Iraq were studied and are summarized in Table 14.2.1.

Table 14.2.1 Summary of Major Laws Relating to Environment

Law	Outline
Environmental Criteria for Industrial, Agricultural, and Public Service Projects, 1990 (Order number unknown)	Environmental criteria with respect to the location and environmental requirements on industrial, agricultural, and public service development.
Law concerning Ports, 1995 (No. 27 of 1995)	This law regulates navigation and port safety, the prevention of water pollution, the operation of importation and exportation agents, and the registration of ships.
Regulation 25 Preservation of Rivers and Public Water from Contamination, 1967	This regulation relates to the protection of rivers and public water bodies from contamination. The concentration standard for the discharge of wastewater into public water bodies is also regulated.
Wastewater Discharge Quality Requirements Instruction No.(1)	This instruction provides discharge concentration limits for a number of substances contained in wastewater, in accordance with the provisions of Article (16) of Regulation 25.
The New Determinants for the Prevention of Pollution of Rivers No. (25), 1967	This instruction provides physical, chemical, and biological guidelines for water quality and wastewater discharges.
Ambient Air Quality Law	This law aims to control emissions to the air from a variety of sources (including industrial (factories, power stations, incinerators, oil installations, etc.), non - industrial, and vehicles). It establishes emissions limits for the discharge of certain pollutants to the air.
Noise Prevention Law No. (21), 1966	These regulation aims to prevent excessive noise in public places.
Instructions No. (2), 1993	This instruction details the conditions for determining the levels of noise emitted from sound equipment in tourist facilities.
Instructions No. 4, Safe Storage and Handling of Chemicals, 1989	This instruction details the requirements for the safe storage and handling of chemicals, being issued in accordance to the provisions of the sixth and seventh paragraph of Article (3) and Article (105) of the Public Health Law No. 89, 1989.
Iraqi Salvage Law	Focuses on the issue of physical wreck removal.

14.2.2 PROJECT CATEGORIZATION

Other than the laws listed in the previous section, laws in Iraq and international guidelines related to EIA were studied to understand the project categorization.

(1) Law No. 27, 2009: Protection and Improvement of the Environment

This law is the replaced version of Law No. 3, 1997 on Environment Protection and Improvement. Its aim is to protect and improve the environment and natural resources, preserve public health, biodiversity, cultural and natural heritage, in order to ensure sustainable development, international and regional cooperation in this area.

This law requires development projects to obtain an Environmental Compliance Certificate (ECC). In order to obtain such a certificate a pre-project environmental evaluation must be conducted so that protection systems are incorporated. Figure 14.2.1 summarizes the main steps to obtain an ECC.

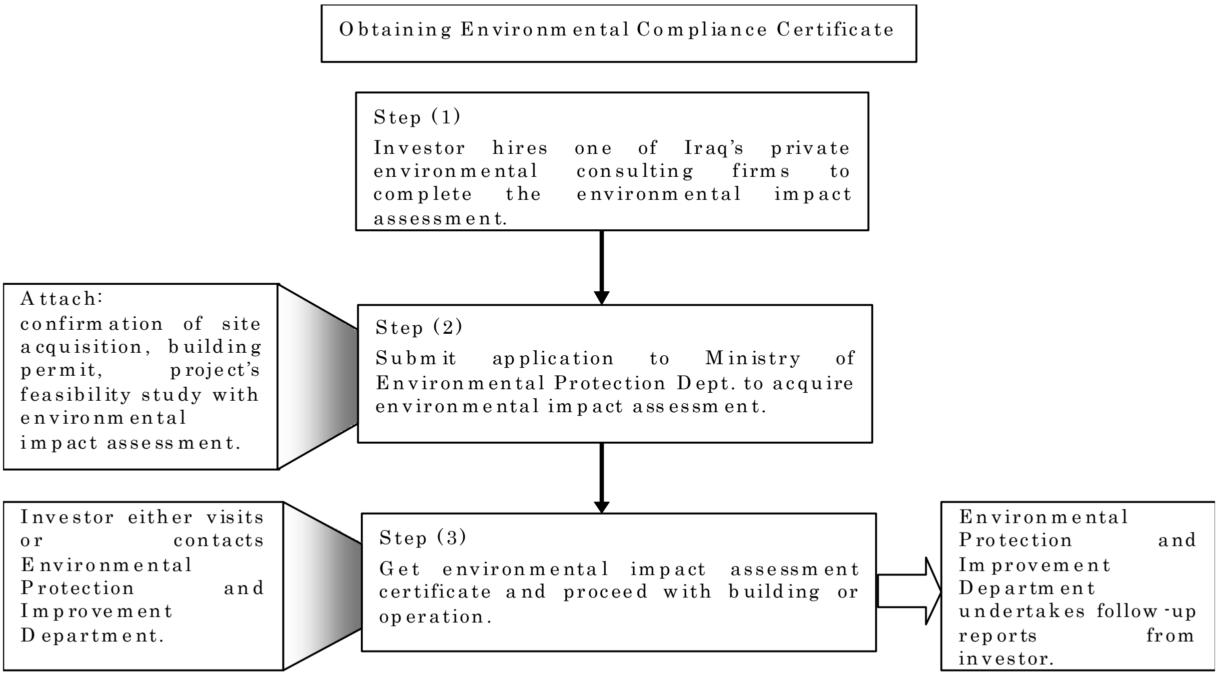


Figure 14.2.1 Environmental Procedure

In terms of project classifications as it relates to their environmental impacts, the law does not provide details as it relates to the level of detail of the environmental evaluation needed for obtaining a compliance certificate. Projects are classified into three main categories from an environmental perspective:

- Environment Polluting Activities Category (A)
  This category is for intensive environmentally polluting activities, including major agricultural or industrial projects that could result in significant impacts on environment quality over large areas. Such activities should be located away from villages, towns, cities, etc., including areas of cities, districts, sub districts and villages, etc. nominated for development under a rural settlement plan. This category of projects requires a detailed EIA Study.

- Environment Polluting Activities Category (B)
  This category relates to activities which have less potential to result in pollution than those in Category (A). Such activities include industrial, agricultural, or other activities which can result in site contamination which can be controlled. Such activities can therefore be established within city boundaries and within the development plots allocated for them, provided that pollution control equipment/treatment units are installed in accordance with relevant national regulations and instructions. ***This category of projects requires a less detailed study (e.g., IEE or EIS).***

- Environment Polluting Activities Category (C)
  This category relates to activities which cause minor levels of pollution that can be treated i.e., industrial factories that do not result in significant contamination, and small-scale agriculture and residential complexes, hotels, and hospitals, which generate pollution with mainly organic content that can be treated easily using pollution control equipment/treatment units. This category of projects does not require a study.

The listed activities, however, pertain only to ***new projects*** and not rehabilitation projects. Furthermore, among all the projects listed, port projects are not mentioned at all. Given that port projects are usually secluded and placed away from communities, there is enough reason to believe that a detailed EIA is not required, especially that this is a rehabilitation project.

(2) Consultation with the Environmental Authority

Consultations were undertaken by members of the JICA Study Team with the Ministry of Environment, who emphasized that port rehabilitation projects are not stipulated in the law. It was also confirmed that an EIA is most probably not required as the law does not specify its need for such projects. It was indicated, however, that a proper environmental management plan is needed to be in place during the project implementation. While official correspondence with the ministry is yet to take place, it is believed that an IEE should suffice.

(3) JICA Guidelines

According to the JICA guidelines, projects are screened in one of the three categories for environmental impact assessment purposes.

- Category A:
  The project is likely to have significant adverse environmental impact on the environment. A project with complicated impact or unprecedented impact which is difficult to assess is also classified as Category A. The impact of Category A may impact broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors (i.e., sectors that are liable to cause adverse environmental impact) or with sensitive characteristics (i.e., characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas.

- Category B:
  The project potential adverse environmental impact is less than Category A projects. Typically this is site-specific. Few, if any impacts are irreversible. In most cases, normal mitigation measures can be designed more readily. Projects funded by the Engineering Service Loans for survey and design are classified as Category B, with the exception of those belonging to Category C.

- Category C:
  These are projects with no impact or minimum impact.

Although ‘port’ sector is listed as a candidate project for Category A, the guideline also limits to large scale sector.

A screening form completed by the SAPROF study concludes that the project should be screened as a Category B project primarily because the project comprises only by rehabilitation works on existing sites. It does not require a change in land use or any resettlement of population.
Further review and assessment of the criteria utilized for assessing the project’s EIA category are provided in Table 14.2.2, which also suggests that the project should be screened as Category B.

Table 14.2.2 Project Categorization

Definition	Comment	Conclusion
Category A		
A proposed project is classified as Category A if it is likely to have significant adverse environmental impact on the environment.	Project does not have significant impact to the environment.	Not applicable
The impact of Category A may impact broader than the sites or facilities subject to physical construction.	Project impacts will extend beyond immediate areas of work but in all cases impacts will be previously predicted. Dredging has been ongoing since 1970s. International channel in some parts of Kuwait and parts of Iraqi waters. Existing disposal sites are in both Kuwaiti and Iraqi waters.	Not applicable
A project with complicated impact or unprecedented impact which is difficult to assess is also classified as Category A.	Only wreck removal program may be considered complicated. However, most wrecks have been subject to survey since 1993 and full data is available. To date, 39 wrecks have been removed from project areas since 1993. Experience gained from these projects is available to SAPROF team.	Not applicable
Sectors that are liable to cause adverse environmental impact or with sensitive characteristics, i.e., characteristics that are liable to cause adverse environmental impact.	Port sector would normally be considered sensitive. However, project works are confined to rehabilitation infrastructure already in place.	Not applicable
Projects located in or near sensitive areas.	No sensitive sites (environmental or man-made) have been defined in the vicinity of the project works.	Not applicable
Category B		
A proposed project is classified as Category B if its potential adverse environmental impact is less than Category A projects. Typically they are site-specific, few, if any, are irreversible and in most cases normal mitigation measures can be designed more readily.	Environmental adverse impact is not significant. The impact is limited to site-specific.	Applicable

(4) World Bank Guidelines

World Bank supports the rehabilitation projects in Iraq using the Environmental and Social Screening and Assessment Framework (ESSAF).

ESSAF was developed to assist the project implementing agencies in screening all the subprojects for their likely social and environmental impacts, identifying documentation and preparation requirements, and prioritizing the investments. In applying WB OP 4.01, the environmental assessment argued that:

- Works focusing on repair, rehabilitation, reconstruction, and upgrading (where necessary) of damaged buildings, roads, railways, bridges, and infrastructure of critical importance including power generation and distribution, agricultural infrastructure, irrigation, and drainage networks would not trigger other OP including OP 4.04 on natural habitats.
- The nature and magnitude of potential environmental impacts from reconstruction works is such that they were likely to be classified as Category B.
- The requirement to carry out an environmental analysis as part of project preparation can therefore be waived for subprojects with potential adverse impacts. A limited environmental analysis is required during project implementation and at the same time, prior to appraisal the implementing agency is required to agree to apply the following minimum standards during implementation:

- Inclusion of standard environmental codes of practice (ECOP) in the repair and reconstruction bid documents of all subprojects;
- Review and oversight of any major reconstruction works by specialists;
- Implementation of environmentally and socially sound options for disposal of debris; and
- Provisions for adequate budget and satisfactory institutional arrangements for monitoring effective implementation.

All these latter requirements will be met by the updated IEE for the project and the proposed EMP.

14.3. FIELD RECONNAISSANCE

Upon conducting the environmental field survey, field reconnaissance was carried out to know the situation about the target area. Refer to the report (hereinafter referred to as the Reconnaissance Report) in Appendix B: Environmental Baseline Survey Report for the details.

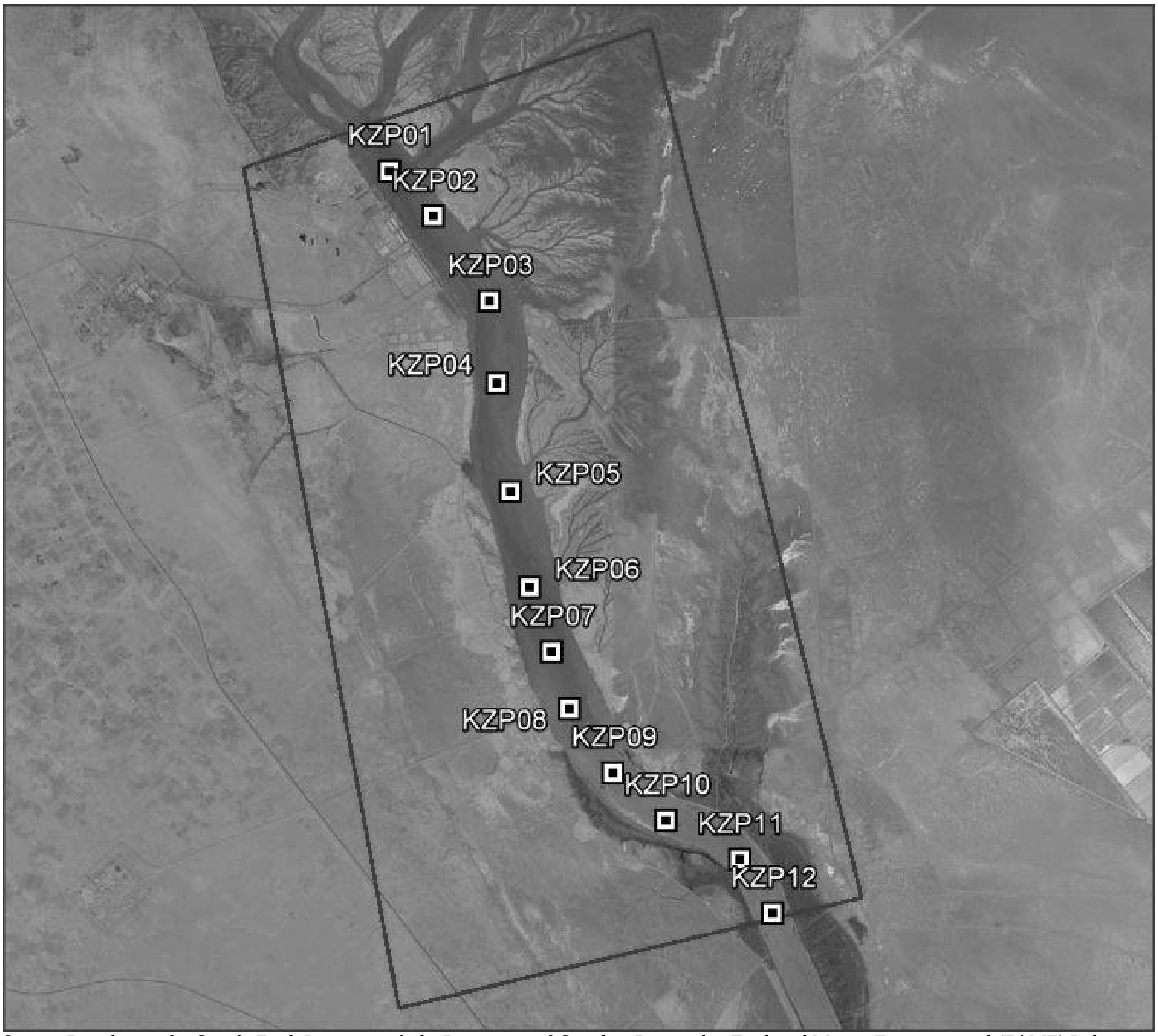
14.3.1 PORT AND SEA ROUTE

The original plan of the port rehabilitation was to conduct salvage of wrecks alongside the sea route/channel and in the port area. However, an environmental survey of sediment and water quality were planned to confirm whether harmful substances are contained in sea water and sediment around the wrecks and to evaluate the impact on salvage activity. The field reconnaissance was conducted on 19-20 January 2012, it was revealed that almost wrecks have been salvaged, although there are several debris of wrecks still existed. This suggested that remained debris should be removed in the near future.


Source: Earth and Marine Environmental (EAME) Ltd.

Photo 14.3.1 Remained Debris of Wrecks Alongside of the Sea Route

Therefore, the target of environmental survey was changed to understand the present environmental situation of sediment and water. Survey locations were also modified and distributed equally in the target area along with the sea route as shown in Figure 14.3.1.

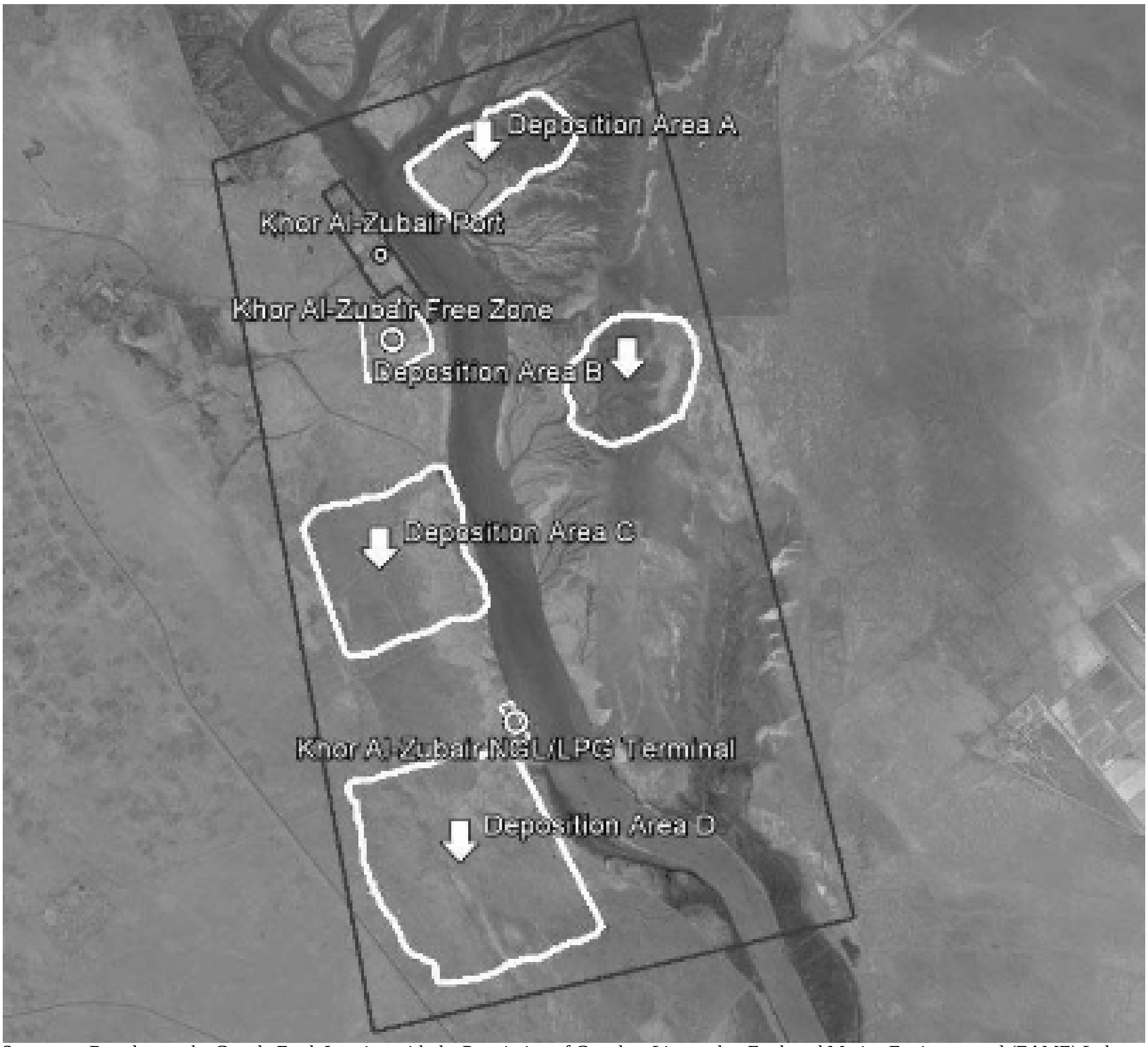


Source: Based upon the Google Earth Imaging with the Permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 14.3.1 Distribution of Survey Points

14.3.2 DUMPING SITE

After salvaging, the wrecks will be demolished and disposed in one of the candidate sites, where measures will also be necessary upon disposal. The field reconnaissance of the survey area, however, has indicated that the majority of the wrecks have been removed from the Khor Al Zubayr (or are buried in the sediment). But the dredged materials from maintenance dredging of the sea route and debris from the wreck clearance will be disposed at one of the four candidate sites. Thus, the field reconnaissance for the dumping site was conducted from the above mentioned viewpoints.



Source: Based upon the Google Earth Imaging with the Permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 14.3.2 Four Candidate Sites for Dumping

14.4. LITERATURE SURVEY

14.4.1 COASTAL ECOSYSTEM

Available information indicates that oil pollution remains a constant threat to coastal ecosystems although the area has largely recovered from the huge oil spills of the First Gulf War and from more recent large spills (e.g., bombing of tankers and the Mina al-Bakr offshore oil terminal).
No existing protected areas will be affected by the project. However, two sites in Basra Region are identified as important wetland in the Directory of Wetlands in the Middle East[2];

- Khawr Zubayr site; Location: 30012'N, 47054'E, Area: 20,000 ha
- Khawr Abdallah and the Fau area; Location: 29055'N, 48026'-48034'E, Area: 126,000 ha

14.4.2 FAUNA AND FLORA

According to IUCN Red List[3], ten animal species were recognized as being threatened with extinction at the global level can be found in Kuwait and Iraq Regions.
Within the marine and coastal habitats of the Gulf, 17 animal species are regarded as globally threatened.
There are no known fish nurseries in the directly affected area.
No existing survey data indicates the presence, or possibility of presence of sea grasses in project affected areas.
There are no records of surveys of flora in the area.
There are no corals and mangroves in project affected area.

14.4.3 COASTAL HYDRODYNAMICS

The natural hydrological system of Khawr Abd Allah (KA) has been significantly artificially modified. During the Iran-Iraq War (1980-88), the Shatt Al Basrah canal was constructed as a safer shipping route to Basra, leading northwards from the gulf directly through Khawr Zubayr (KZ) to connect with the extreme eastern end of Haur Al Hammar near its discharge into the Shatt Al Arab. This is likely to have led to a major and permanent flooding of the Khawr.
Since December 1992 the "Third River" canal has been discharging saline water into the Shatt Al Basrah and hence into the Khawr. The volume of this discharge may increase substantially in the future. It is not known what impact all of these developments have had on the hydrology of the Khawr and its wildlife (Evans, 1994).
Tides at the head of the Gulf are termed ‘irregular semi-daily tides’ with two highs and lows per day each with markedly differing height. The Admiralty Chart 1238 lists the following:

- CLW: ±0.0 m
- MHHW: + 4.6 m
- MHW: + 4.0 m
- MLLW: + 1.0 m
- MLW: + 1.9 m

This implied a maximum tidal range of about five meters.

No recorded wave data existed for any study area but observations by GCPI indicated that wave heights in excess of 1 m do not generally occur in KZ.

2 Directory of Middle East Wetlands, Wetlands International, (www.wetlands.org)
3 IUCN Red List of Threatened Animals, 1990, compiled by WCMC

No current records are available from GCPI. The Arabian Gulf Pilot states that for this region, currents are variable and tidal streams predominate. The magnitude of the currents/tidal streams is not quantified in the Arabian Gulf Pilot. However, data from UQ indicated that the tidal currents are set mainly on the north north west (NNW) and the south south east (SSE) which could reach up to three knots (1.5 m/sec). Data reported by USAID (2003) recorded tidal currents of up to four knots (2.1 m/sec).

14.4.4 WATER QUALITY

No water quality sampling program is underway for project affected water bodies.

14.4.5 SEDIMENT QUALITY

Two survey programs have been undertaken since 2002 to assess the contamination in KAZ and KA. Over 200 samples were taken from 40 sites, 35 wreck sites, and five mid-channel sites.
The characteristics of the sediment at shipwreck site are summarized as follows:

- The sediments collected around the shipwrecks comprised of calcium carbonate and aluminosilicates, with unknown contributions of quartz. The sediments in this estuarine zone were predominantly derived from the river systems which contained high levels of suspended particulate material.
- Cadmium and mercury concentrations were generally low. This was also true for lead, except for one sample collected inside a wreck. For arsenic, copper, and zinc, sporadic samples exceeded the sediment quality guideline values, but represented no pollution threat when considering the average metal content in the sediments around these wreck sites.
- Both chromium and nickel exhibited consistently high concentrations, interpreted due to the mineralogy of the suspended sediment in the river.
- The uranium concentrations were consistent with the crustal abundance and 235 U:238 U ratios also reflected a natural source for this element.
- It is clear that there was oil pollution at a number of (non-project target) wreck sites distributed throughout project affected waters. Further contamination may be expected at other sites not yet surveyed.
- Results from a subset of 24 sediment samples indicated that the distribution for total PAHs[4] differed to that of total oil. Only two samples had concentrations that exceeded North American Guideline values and these sites were not remarkable in terms of total oil contamination. The situation with regard to petroleum contamination was therefore not completely clear.
- There was no evidence of pollution from organochlorinated compounds. None of the 24 samples tested for a range of chlorinated pesticides and several PCB congeners gave results that exceeded North American Guideline values.

And the characteristics of the sediment at the center of the channel are summarized as follows:

- Compared to North American sediment quality criteria, cadmium, copper, lead, mercury, and zinc concentrations were generally low. For arsenic, one sample exceeded the sediment quality guideline values, but represented no pollution threat when considering the average metal content in the sediments from the vicinity. Both chromium and nickel exhibited consistently high concentrations, interpreted due to the mineralogy of the suspended sediment in the river.

4 Total polyaromatic hydrocarbons are the best indicator of the potential toxicity of oil spilled to water-column organisms. There are three major types of PAH, which differ by their genesis: petrogenic, biogenic and pyrogenic. PAHs of petrogenic origin are related to petroleum, including crude oil and its refined products. The presence of naphthalene in sediments is characteristic of unweathered petroleum (Robertson, 1998). PAHs of biogenic origin are generated by biological processes or by the early stages of diagenesis in marine sediments (e.g. perylene) (Venkatesan, 1988). PAHs with four- to six-ring hydrocarbons are generally of pyrogenic origin and generated by the combustion of fossil fuels and of recent organic material.

- The uranium concentrations were consistent with the crustal abundance and 235U:238U ratios also reflect a natural source for this element.
- TPH (total petroleum hydrocarbon) content at one mid-channel site, near the entrance to KA, was high and suggested that there is contamination of the site even though the concentration of total PAHs at all locations did not exceed the North American Guideline value (Long et al. 1995).
- There is no evidence of organochlorinated compound pollution. The concentrations were generally low for both wide range of chlorinated pesticides and several PCB congeners. Total levels of DDTs and PCBs including the Aroclor 1254 mixture, did not surpass North American Sediment Quality Guideline values.

14.4.6 SOCIO ECONOMIC CONDITION

There are no residential areas in the immediate vicinity of project activities. The town of Umm Qasr is located around 4 km from the port area and has a population of around 50,000.
There are no known sites of architectural or historical heritage and archaeological site in the project area.
Although the project area is theoretically restricted, where fishing is prohibited, fishing activities are being performed and it is an important economic activity to local population.

14.5. FINDINGS BY THE FIELD SURVEY

In this section, findings from field reconnaissance and field survey are summarized (refer to Appendix B: Environmental Baseline Survey Report for the details).

14.5.1 PORT AND SEA ROUTE

(1) Water Quality

- The chemical data showed that pollution indicators like oil (petroleum hydrocarbons), nitrogen, phosphate, and BOD were generally low and did not indicate significantly polluted waters.
- Overall, the marine waters did not seem to be displaying signs of pollution or environmental degradation in relation to the parameters being assessed and the water quality could generally be described as good.
- Comparing with the result from previous survey[5] conducted at similar locations, the situation of water environment seems to have recovered in good condition with less pollution and less eutrophication.

(2) Sediment Quality

- The sediment samples collected throughout the survey period at all locations showed no evidence of significant contamination.
- The Particle Size Distribution (PSD) results from the survey indicated predominantly comprised of silt and clay fractions with minor sand components.

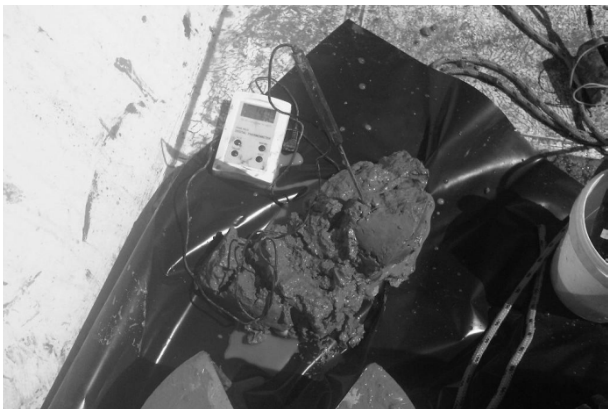


Photo 14.5.1 Condition of Sediment

- DDT and PCBs were not detected while total dioxins and total furans were detected at several sampling points. The detected concentrations of both parameters were below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (21.5 ng-TEQ/kg for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans).

14.5.2 DUMPING SITE

(1) Soil

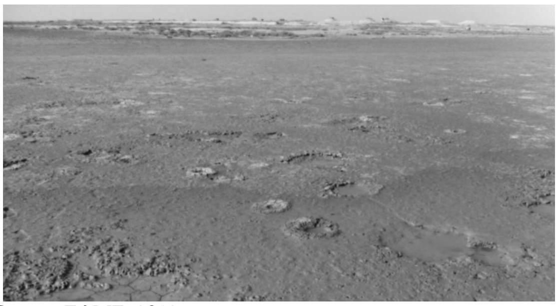
- None of the concentration of tested parameters was significantly high, although concentrations of nickel exceeded the stringent Canadian Soil Quality Guideline for the Protection of Environmental and Human Health. This exceedance may represent elevated background concentrations rather than a pollutant source.

5 Port Sector Rehabilitation Project Marine Environmental Survey at Umm Qusr and Khor Al Zubayr Ports -Final Report- July 2009, Marine Science Center, University of Basrah.

- With regards to PAH, the elevated concentrations recorded in Area A were likely to be a result of accidental spills at KZP.
- No field evidence of any hydrocarbon contamination was noted during the collection of these samples.
- Analysis of the mean concentrations of metals for each area showed a spatial trend with respect to copper, nickel, lead, zinc, iron, and manganese.
- The highest mean concentrations were consistently recorded in Area A, followed by Area B, Area C, and then Area D.
- Mean arsenic concentrations were found to be highest in Area B, followed by Areas C, A, and D.
- The presence of dioxins and furans were recorded in all areas, with the highest total concentrations being recorded in Area A. The toxic equivalent upper bound concentrations (worst case scenario) for both the total dioxins and furans were below the Canadian Marine Sediment Quality Guidelines for the protection of aquatic life (21.5 ng TEQ/kg for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans) and therefore not considered to be significant.

(2) Ecological Characteristics

- Areas A and B provide important intertidal areas. A habitat for amphibians and crustaceans, and thus, provide a food source for migratory and permanent residual birds.



Source: EAME, 2012

Photo 14.5.2 Intertidal Area (Area A)

- Areas C and D predominantly comprise alluvial plains and *sabkhas* which are only able to support particular vegetation and, thus, have a smaller area to support watering birds.

Source: EAME,2012

Photo 14.5.3 Alluvial Plain (Area C: Left) and Sabkha Area (Area D: Right)

- None of the vegetation observed during the site visit is of conservation importance.
- Overall, Areas C and D are considered to be the least ecologically sensitive of the four areas, and would be the most favorable sites for the deposition of the dredged material.

- Khor Al-Zubayr has been included as one of Iraq's key biodiversity areas and has been classified as an important bird area (IBA). The IBA comprises all of Areas A and B, as well as the intertidal zones of C and D.
- The habitat maps produced during desk study have proven to be very accurate and have been slightly updated following the field surveys.
- The highest mean concentrations of contaminants were consistently recorded in Areas A and B (copper, nickel, lead, zinc, iron, manganese, TPH, and dioxins). For this reason, it may also be preferable to deposit dredging materials in Areas C and D to reduce the contaminant loading on Areas A and B.

14.6. ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

Table 14.6.1 shows the list of project impacts and its mitigation measures.
Although all considerable impacts by the project are low, measures to reduce the impacts are recommended.

Table 14.6.1 Impact and Mitigation Measures

Source	Impact Significance	Impact	Mitigation
1.0 WATER-RELATED IMPACTS 1.1 Dredging (1) Dispersal and settlement of re-suspended sediments; release of toxic, harmful substances to water column; reduce available oxygen; sunlight penetration; smothering bottom biota	Low/Nil	KZ Lower levels of material are in suspension in the natural system but it is still sufficient to suggest temporary changes to environmental conditions during the actual dredging and the settlement period immediately. Thereafter, it will not affect the existing systems. Existing data indicated that the dredge material is unlikely to be toxic or harmful. However, survey data is limited to surface sediments and the provided pictures of deeper sediments to be dredged are incomplete. Channel has been repeatedly dredged since the 1970s. Existing bottom biota will be re-established as previously. River 1 Sufficient levels of natural material in suspension suggest temporary changes to environmental conditions during the actual dredging and the settlement period immediately, thereafter, it will not affect the existing systems. Existing data indicated that the dredge material is unlikely to be toxic or harmful. However, survey data is limited to surface sediments and the provided pictures of deeper sediments to be dredged are incomplete. Channel has been repeatedly dredged since the 1970s. Existing bottom biota will be re-established as previously.	1) Dredge Management Plan is required for each contract to: i. Continually assess contamination risk from sediments; ii. Ensure that the dredging is confined to defined channels and that disposal is confined to existing sites; iii. Ensure the use of internationally accepted dredging techniques; iv. Confirm the disposal capacity and desired post project bathymetry of disposal sites; and v. Undertake monitoring surveys to establish the contaminant profile of sediments at dredge and disposal sites. 2) Dredge companies are to be contracted using international procurement guidelines and any following pre-qualification process. This should ensure that only internationally reputed companies are to undertake the works. Application of project's EMP should further minimize risks. 3) Long Term Management Plan Preparation of dredge management plan based on the scientific determination of the most appropriate dredge regime and selection of disposal sites. The study will include the following: - a hydrodynamic study of the KZ river system and Northern Gulf, - a baseline habitat survey; and - an assessment of options for on-land disposal within Iraq.
(2) Change of bathymetry; influence on tidal and river flows; altered salt wedge intrusion; accelerated natural sediment deposition; attraction of desirable or undesirable fisheries; altered bottom biota	Low/Nil	KZ Continued indefinite use of the Hisham Island dump site for maintenance dredge disposal may be problematic. River 1 River 1 is a man-made channel established between 1979 and 1984. Hydrological systems have evolved over that period. The channel has been repeatedly dredged since the 1970s. Any cumulative impact from proposed works is considered minimal. Existing bottom biota will be re-established as previously	
(3) Shoreline configuration; change in current patterns; shore zone and beach erosion; accelerated sediment deposition-shoaling	Low/Nil	KZ Shorelines have stabilized since the original port construction in KZ and UQ South. There is no evidence of erosive activity. Sediment patterns will be modified by dredging but this will not affect system dynamics. River 1 River 1 is a man-made channel established between 1979 and 1984.	

Source	Impact Significance	Impact	Mitigation
		Hydrological systems will have evolved over that period. All shorelines are artificial and will remain unaltered.	
(4) Loss of bottom habitat; shellfisheries, and fishery food resources; exposure of subsurface materials not conducive to decolonization; lost attachment potential for aquatic biota; current pattern changes	Low/Nil	KZ The channel has been subject to repeated capital and maintenance dredging. It contains no significant undisturbed habitats. Existing biota will be re-established as previously River 1 River 1 has been subject to repeated capital and maintenance dredging. It contains no significant undisturbed habitats. Existing biota will be re-established as previously	
(5) Change of groundwater flows; salt water intrusion; accelerated groundwater flow to estuary; undermining of land-edge sediments; saltwater intrusion to potable water supplies	Nil	All sites are long established dredge sites. No new additional impacts can be expected.	
1.2 Disposal of dredging material (1) All sites	Nil	Re-use of existing sites is required to ensure that EIA is not required. All existing sites in used since 1970s.	
(2) Disposal on land	Medium	Some habitats of ecological value are believed to remain within the wetland systems that surround the project areas. These would be irrevocably damaged by their use for dredge spoil disposal. There is a considerable risk of sediment recirculation if spoil is not confined to the disposal site. Heavy metals and toxic substances in the dredged soil will be discharged through outlet to environment. Seepage water from dumping site will contaminate the groundwater artery.	All potential disposal sites must be subjected to ecological survey prior to use. All sites must be adequately engineered. This will require site preparatory works including: - surveys to delimit the proposed site and provide basis for site engineering; and - design and construction of site. All sites to be subjected to monitoring according to project EMP requirements. Discharged water from dumping site shall be monitored and treated, if necessary. Ground water shall be monitored. And seepage water shall be isolated to be treated, if necessary.
(3) Disposal in water	Low	KZ Lower levels of materials in suspension in the natural system but still sufficient to suggest temporary changes to environmental conditions during the actual disposal processes, and the settlement period immediately thereafter will not affect the present systems. Possible long term impacts of continued maintenance dredging in	KZ and River 1 Development and application of dredging management plan are required. Management plan to be approved by MOE.

Source	Impact Significance	Impact	Mitigation
		channel and possible threats to other habitats – in Bubiyan and Warbah Islands may need to be assessed. Phase 1 dredge disposal is unlikely to have any affect sedimentation and current patterns. However, continued indefinite use of Hisham Island dump site for maintenance dredge disposal may cause permanent modification. River 1 No disposal is proposed in River 1.	
(4) Characteristics of dredged material	Low	Existing data indicates that dredged spoil is unlikely to be toxic or harmful, but continued assessment is required.	Monitoring of dredge material within the framework of dredge management plan.
(5) Disposal methods	Low	Inappropriate disposal of waste materials has the potential to generate significant adverse ecological impacts and also economic costs if material re-circulates to the dredged site.	Application of international procurement guidelines and pre-qualification of contractors should minimize risks. Application of dredging management plan.
1.3 Alteration of harbor/port ship traffic patterns: (1) Relocation of navigation markers and moorings; assurance of location precision; designation of channels for arrival/departure traffic	Positive	Project includes substantial component to improve port navigation and marine support capacity.	None
(2) Improved procedures for vessel traffic control; shore based radar reflectors; improved pilotage, etc.	Positive	Project includes substantial component to improve vessel control within IPA waters.	None
(3) Increased provision for vessel handling and servicing	Positive	Project includes substantial component to improve marine support capacity and improve maritime safety. Project will not include vessel repair facilities, dry-docks or graving docks.	None
1.4 Ship discharges- oily ballast; bilge water; and sewage (1) Implementation of regulations controlling cleaning procedures	Positive	Regulations are in place. One issue is with regards to enforcement and management. The present widespread of non-compliance with regulations will not be tolerated. Project proposals call for improved management of port and control of illegal discharge.	Preparation of port waste management plan to be approved by MOE. Support for proposed environmental unit
(2) Environmental sensitivity to discharges from ships	Medium	Existing data shows the good condition in water quality. Discharged water from ships might impact to the environment. Project aims to improve water quality by improved port management.	Support for proposed environmental unit
(3) Development of shore facilities for	Nil	Project proposals do not call for port to accept solid waste, sewage, or	None

Source		Impact Significance	Impact	Mitigation
	receiving ship generated sewage and garbage waste		other liquid wastes from ships.	
1.5 (1)	Spills detection and clean-up of spills Type of spills Oils, lubricants, hydraulic oils, fuels, and liquid and solid chemicals	Nil	No change in type of spills anticipated.	Support for proposed environmental unit
(2)	Spill clean-up measures	Positive	Project includes component to improve emergency planning and spill response capability.	Establishment of spill response capability within environmental unit.
(3)	Dry cargo releases	Low/Nil	Project will permit increased dry cargo throughput but few dry bulk cargoes would be expected and even the loading and unloading will not be a continuous activity. No habitats within the vicinity of operations are sensitive to either impacts on water clarity or contamination of water column.	None
(4)	Hazardous cargoes	Nil/Positive	Port regulations in Chapter 5 paragraph 19, Chapter 6 paragraph 25 etc., deal with hazardous cargoes. Any issues will relate to the implementation of regulations.	Support to environmental unit in application of Port Guidelines.
1.6 (1)	Waterfront activity discharges - sanitary and non-sanitary Sanitary wastes	Positive	Project will not increase the threat from sanitary wastes, however, extent of existing threat is unknown.	Waste management plan to include risk assessment.
(2)	Sanitary treatment facilities	Positive	Project proposals do not include sanitary treatment facilities. Therefore, some risk will remain from potential continued disruption of disposal systems beyond port perimeter.	Waste management plan to address this issue.
(3)	Discharges/spills reaching harbor/ river waters	Positive	All potentially affected habitats will have been subjected to contaminated discharge for 15 or more years and repeated dredging. Project construction and installation activities will not modify present storm drainage patterns nor will they increase the risk of contamination of storm water. Project will not increase threat to receiving waters by increased discharge volume, increased level of contaminant or increased toxicity of contaminant. Some reduction in contaminant load is anticipated from a reduction in leakages and spills resulting from improved management of port activities and the use of new equipments, and also from an improved spill management and clean up capacity. Project offers opportunity to clean up known existing sources of discharge notably loading and unloading of oil, and oil products at Khor Al Zubayr.	Provision of support for proposed environmental unit. Engineered solution to KZ oil export and import to be operational before start of Phase 2.
1.7	Wreck removal	Low	Even a worst case wreck clearance spill event will be relatively easily	Wreck management plan to contain oil spill

Source	Impact Significance	Impact	Mitigation
(1) Spill		handled by a basic spill management plan and associated spill clean-up capability.	contingency plan.
(2) Contamination	Low	Contaminated sediments were identified at only one project target wreck, the Al Waleed, which had levels of total PAH in exceedance of US guideline values. Al Waleed is located in UQP adjacent to Berth Number 9 which in turn is immediately adjacent to the proposed wreck cleaning site giving little scope for contaminant transfer.	Wreck management plan - good management of operations will limit extent of possible contamination transfer.
2.0 LAND-RELATED IMPACTS 2.1 Natural values (1) Ecological value of wetlands; Waterfowl use; use by domestic animals; use by other fauna; unique vegetation; food source for aquatic or non-aquatic biota; irrigation water source	Nil	(i) Project will not directly affect any inter-tidal areas beyond port perimeters and all sites within port perimeters have already been heavily modified. (ii) There are potentially important inter-tidal habitats areas north of KZP and on the eastern bank of KZ opposite the port. These areas are considered to be valuable habitats for migratory birds and will support reasonably diverse ecosystems. (iii) Other land based sites, River 1 dredge disposal area and wreck clean-up site are heavily modified. Any existing colonies or users will continue to do so after project use.	(i) and (ii) within framework of dredge management plan to undertake surveys of wetlands areas to delineate ecological values. Once site values are defined, ensure no port activities take place in defined areas of value or elsewhere in such a manner as to affect sites of value. Clean up of KZP oil exporting facility to reduce contamination of KZ. (iii) None
(2) Floodplain functions	Nil	Not directly affected by project works.	None
(3) Watershed/groundwater source quality	Nil/Positive	Not directly affected by project works. Possible clean up of port areas may reduce contamination threat.	None
2.2 Land Uses	Nil	No change	None
2.3 Noise from ports and harbor side industry	Nil	Ports are existing facilities. Project does not propose significant change in land use or increase number of noise sources.	None
2.4 Effects of dust and other airborne emissions (1) Dust and other non-combustion particulates	Low	Project does not propose increase in number of emission sources. Very limited emissions increase from construction activities and land side receivers distant (>2 km) from site. Project will permit increase in dry cargo throughput but nevertheless relatively few bulk dry cargoes will be expected. Principal source will be grain. In all cases, loading and unloading will be intermittent. During project period bulk dry handling is expected to be confined to berths that are relatively isolated from port boundaries and potential receivers.	None
(2) Smoke and other combustion products	Low	General No addition in number of industrial sources. Some increase in road traffic and low probability that regulatory limits will be applied strictly but overall increase in vehicle numbers will be marginal. Some increase in number of vessels using facilities and low probability	IPA to create interim operational guidelines for storage and handling of hydrocarbons in import and export operations. Environmental unit to monitor implementation of guidelines.

Source	Impact Significance	Impact	Mitigation
		that regulatory limits will be applied strictly. However, threat remains low as land side receivers are distant from site and no increase in toxicity of emissions is anticipated. KZP KZP will continue to operate as an oil exporting and refined product importing facility with a number of potential sources of vapor or liquefied gas emission such as storage facilities and holding tanks. With crude oil, it is also possible that there will be gases within ship holding tanks that will be displaced during filling operations.	
(3) Odor	Nil	No additional sources of odor nuisance are proposed.	None
2.5 Traffic Impact	Low	Ports are existing facilities with supporting land side road infrastructure in place. Increase in traffic volume will be relatively slight.	None
2.6 Handling and disposal of shore generated solid (1) Ships/waterfront activities	Low	Some increased goods throughput of waste.	Implementation of waste management plan; Plan must include measures to improve classification, handling, and storage of wastes.
(2) Disposal methods	Low	Although the Waste Management Plan should improve classification, handling, and storage of wastes, the risk remains from potential continued disruption of disposal systems beyond port perimeter.	Waste management plan to address issue of disposal of wastes and risks from potential continued disruption of disposal systems beyond port perimeter.
(3) Runoff from raw material storage	Low/Nil	Aside from possible temporary storage of materials during construction, project will not promote increase in open storage of materials.	None
(4) Exposure effects	Positive	Existing storage conditions are very variable but generally poor. Project would be expected to improve port management and condition, and management of storage facilities.	Support for proposed environmental unit
2.7 Waterfront drainage (1) Drainage components Contaminants (toxins) Volumes, oils (hydraulic, etc.)	Positive	No expected increase in volume of contaminants or hazardous materials from project activities. Project would be expected to improve port management and reduce risk of cross contamination with surface drainage.	Assessment required of existing liquid storage facilities. Support for proposed environmental unit.
(2) Drainage collection systems	Nil/Positive	Although existing drainage systems are considered to be in reasonable condition, some maintenance and rehabilitation is required. Project does not include specific component to upgrade/rehabilitate collection systems. No expected increase in threat from project activities. Project would be expected to improve port management and reduce risk of contamination of surface drainage and will improve spill management and clean up capacity.	None

Source	Impact Significance	Impact	Mitigation
(3) Biological effects by drainage	Positive	No expected increase in threat from project activities and reduction in contaminant load expected from improved port management, (reduced risk of contamination of surface drainage) and improved spill management and clean up capacity.	None
3.0 AIR-RELATED IMPACTS 3.1 Construction.	Low	During construction, project may increase number of dust sources and dust emissions on a temporary basis. Simple management measures and relative distance to sensitive receivers should minimize the threat.	Application of good construction management via construction management plan.
3.2 Port operations	Nil	Project will not directly increase industrial contributions. Vehicle emissions may increase as a result of increased truck traffic and regulatory limits may not be applied. However, any traffic increase will have a marginal effect. UQ Port has few operational point sources of air pollution. KZ Port has oil terminal and grain receiving berth. These affect only very limited area around each facility and there are no sensitive receivers within possible impact areas.	None
4.0 HAZARDOUS MATERIALS / CARGOES 4.1 Hazardous cargoes	Low–Nil	No anticipated increase in threat from cargoes even with increased overall throughput. Improved equipment and port management should reduce existing threats.	Support to environmental unit in application of Port Guidelines. Port regulations Chapter 5 paragraph 19, Chapter 6 paragraph 25 etc. to deal with handling hazardous cargoes.
4.2 Unexploded ordinance	Nil–Positive	Project will require rationalization of UXO hazard including stipulation of known hazard areas, an operational policy and ERP.	Development of UXO management plan;
4.3 KZ oil exporting facility	Significant	Present oil import and export operations at KZ posed significant hazard. Project will promote increase product throughput.	Project proposals should provide interim engineered solution to reduce contamination and health and safety risks from hydrocarbon export and import. IPA to create operational guidelines for crude oil export operations.
4.4 Navigation hazards	Positive	Wreck clearance in channel will reduce hazards to shipping operations.	None
4.5 Hazardous waste (Asbestos and other hazardous materials commonly used in construction and infrastructure engineering (such as PCBs,) in the 1970s)	Low	Project will not require demolition or refurbishment of port buildings. However, some work cannot be ruled out at this stage.	Proposed waste management plan to include component to deal with hazardous wastes.
5.0 SOCIO-CULTURAL IMPACTS 5.1 Involuntary resettlement	Nil	Project requires no resettlement.	None
5.2 Livelihoods	Low–Nil	The productivity of fisheries will not be affected by project activities. No	None

Source	Impact Significance	Impact	Mitigation
(1) Fisheries		known nursery or important breeding area is directly affected. No long term effect on fishing activity is expected. Some temporary dislocation of fishing activities in offshore disposal areas may occur during project works but this should not have any adverse effects on fishing communities.	
(2) Dhow traders	Nil	Trading activities of these vessels are important to the economy of Iraq at the present time. Project activities should not significantly affect these vessels. Some temporary impacts such as the temporary closure of marine areas are possible, but these can be easily managed.	None
5.3 Heritage	Nil	No heritage sites will be affected by project related construction/installation operations.	None
5.4 Landscape	Nil	No landscape or related amenity values will be affected by project related construction/installation operations.	None
5.5 Ethnic minorities and indigenous peoples	Nil	Construction/installation activities will not adversely affect the economic, political,or social status of ethnic minorities or indigenous peoples.	None
5.6 Utilities	Nil	Project proposals do not affect the provision of utilities such resources to local populations.	None
5.7 Impacts on tourist or recreational areas	Nil	No tourist and recreational areas will be affected by the project.	None
5.8 Economic benefits (1) National	Positive	The project will generate the following benefits at the national level: Save in excess of USD 200 million per annum in transport costs; Reduce the cost of goods imported to Iraq; Facilitate increased export of key foreign exchange earning goods; Promote economic activity; Increase revenue from port activities thereby increasing the capacity of IPA to fund its own activities and also provide foreign exchange for the central government; and Significantly reduce pollution in national waterways and reduce the threat of contamination of international waterways.	None
(2) Local	Positive	The project will promote economic activity in sectors servicing the ports.	None

Legend: Nil: No impact is considered. Low: The impact is considered low. Medium: Certain degree of impact is considered. Significant: The impact is significant.
Positive: Positive impact is considered.

14.7. ENVIRONMENTAL MANAGEMENT PLAN AND MONITORING PLAN

14.7.1 ENVIRONMENTAL MANAGEMENT PLAN

An environmental management plan (EMP) is one of the requirements of EIA procedure. EMP provides safety management policy for environment and human health on project activity.
Table 14.7.1 summarizes the proposed EMP.

Table 14.7.1 Summary of the Environmental Management Plan

Management Plan	Outline
Construction Management Plan	This addresses general construction management such as waste including oil and lubricants, maintenance of equipment, control of noise and dust, and so on.
Waste Management Plan	Management plan of pre-existing wastes (excluding UXO), wreck decontamination wastes, and future operational wastes.
Dredging Management Plan	Environmental management plan on dredging
Wreck Management Plan	Plan for individual salvage operation
Salvage Health and Safety Plan	This plan is intended to help prevent accidents, illnesses, and injuries, to increase safety awareness, to reduce institutional liability, and to establish safety responsibilities for individuals within the area.
Oil Spill Contingency Plan	The overall objective of the plan is to prevent and to limit as far as practicable the adverse consequences of any spill that might arise from the wreck recovery operations.

14.7.2 MONITORING PLAN

Monitoring plan is also one of the requirements in EIA process.

Table 14.7.2 Draft Monitoring Plan

Sub–plan	Activity	Location	When/Frequency	Parameter	Baseline Status
Environmental Quality Monitoring	Monitoring of surface water quality	Seven sites in Iraqi waters KZP (two sites) KZ Channel UQP (two sites) River 1 entrance KZ downstream River 1 confluence.	Monthly throughout project operations.	pH, conductivity, temperature, coliform, T-N, T-P, heavy metals, TOC, TDS, and TPH.	
	Groundwater quality and level	Two wells UQP Two wells KZP	Quarterly	Water level, pH, conductivity, temperature, T-N, T-P, TOC, TDS, heavy metals, dioxins and TPH.	
Wreck Management Plan	Post removal hydrographic surveys of site	Each wreck		Channel bathymetry; Bathymetry of dump sites	
	Sediment contaminants	Each wreck	Every 50 cms of sediment removal including sample from vessel bottom layer	As per UNDP study	UNDP 2004 survey provides snapshot assessment
Dumping Site	Discharge of water from outlet	Outlet form dumping area	Monthly	pH, conductivity, temperature, ammonia and ammonium, TOC, TDS, heavy metals, dioxins and TPH	
Coastal Area	Ecosystem	Both sides of the channel	Occasionally	Visual inspection of change at intertidal zone	

The dredging management plan (DMP) includes a program for monitoring of affected sites. This is required to ensure that the environmental integrity of the disposal site and the areas surrounding the site is maintained. The program also verifies the compliance with site designation criteria, defined special management conditions, permitting requirements, and other elements.
This proposes the following:

- Sediment (sieve analysis) at sites in River 1 and KZC at different dredge depths;
- Analysis of sediment contamination at sites in River 1 and KZC at different dredge depths;
- Sediment (sieve analysis) at the Hisham Island dump site;
- Analysis of sediment contamination at the Hisham Island dump site;
- Water quality (pH, temperature, T-N, T-P, coliform, TOC, TDS, heavy metals, and TPH) in River 1, KZC and the Hisham Island dump site;
- Visual inspections of any turbidity plumes at operational sites;
- Assessments of characteristics in water plume (e.g., effects of currents, tides and wind on horizontal transport, and vertical mixing); and
- Post dredge and post deposition hydrographic surveys at the completion of dredging activities.

In addition, to ensure compliance with the DMP, this data will be utilized to:

- Determine levels of present and past contamination in KZ and River 1;
- Establish the characteristics of materials already being dredged and the characteristics of materials that may potentially be dredged in the future;
- Assist in determining the requirement for post dredge monitoring programs; and
- Assist in the determination of likely future dredging.

It may also serve as a basis for future management actions, for example, in determining the capacity of dredge disposal sites or the planning of corrective actions.

14.8. INSTITUTIONAL RESPONSIBILITY

A summary of the primary activities of each agency is provided below in Table 14.8.1.

Table 14.8.1 Proposed Responsibility for the Implementation of the Environmental Management

Action No.	Task	Responsible Agency							
		MOT	IPA-EU	PMT	CONST	POC	ROPME	CONT	MOE
Pre-Construction									
1	Establish EU within IPA; identify and train relevant staff	R		E	S	N			N
2	Define and demarcate all UXO exclusion zones and develop UXO ERP; Confirm all affected land areas are within the port boundaries		N	E	N			N	N
3	Confirm the requirement for any additional survey and management planning; finalize details of additional requirement			E	S				
4	Finalize the communication strategy	R		E	S				
5	Implement the external communications strategy			E	S		N		
6	Finalize the EMP for inclusion in the tender documents for dredging, wreck removal, and general construction works	R	R	E	E		S		
7	Undertake the preparatory surveys			E	S				
Wreck Removal (each wreck)									
8	Undertake the familiarity training with contractor	R	R	E	E			S	
9	Supervise the construction of on shore cleaning area		E	R	S				
10	Undertake the ERP exercise training for land sites		E	R	S				
11	Prepare the monitoring program: shore and offshore		E	R	S				
12	Undertake the monitoring		E	R	S				
13	Prepare the final report for each wreck		E	R	S		N		
14	Prepare the progress reports for the PMT, POC, and JBIC	N	E	R	S		N		N
Dredging									
15	Undertake familiarity training with contractor		R	E	E			S	
16	Monitor the preparation of on shore dump area		E	R	S				
17	Undertake the ERP exercise training								
18	Prepare the monitoring program: shore and offshore		E	R					
19	Undertake the monitoring		E	R					
20	Prepare the final report		E	R			N		
21	Prepare the progress reports for the PMT, POC, and JBIC	N	E	R			N		N
Construction Management Plan									
22	Prepare the monitoring program		E		S			N	
23	Undertake the monitoring		E						
24	Prepare the final report		E	R					
25	Prepare the progress reports for the PMT, POC, and JBIC		E	R					N
Waste Management Plan									
26	Inventory of existing sites		E						
27	Prepare waste receiving areas and define operating criteria		R	E					
28	Specify the handling and storage procedures to be adopted to minimize loss or leakage, and for clean up of small spills and general hazards to public health		E	R					
29	Provide appropriate clothing and equipment			E					
30	Develop plan for the transfer, storage, and eventual disposal of		E	R					

Action No.	Task	Responsible Agency							
		MOT	IPA-EU	PMT	CONST	POC	ROPME	CONT	MOE
	salvage and waste materials from wreck.								
31	Supervise the decontamination plan		E						
32	Prepare the progress reports for the PMT, POC and JBIC	N	E	R					N
33	Sign-off the decontamination site		E	R					N
34	Prepare the hazardous waste management plan		E	R					
Khawr Abdullah Management Plan									
35	Prepare the scope of work for management plan		R	R	E		R		R
36	Prepare the tender		R	R	E		R		R
37	Award the contract-dependent on agreed executing body and agreed client								
38	Prepare the report		S				S	E	
39	Review the management plan		R	R			R		R
40	Implement the management plan		S	E			N		n

Key: R= Review/clear, E= Execute, S= Support, N= Notified
Legend:
PMT: Project Management Team
MOT: Ministry of Transport Safeguard Focal Point
IPA-EU: Environmental Unit IPA
CONS: Project Consultants
JICA: Japan International Cooperation Agency
POC: Project Oversight Committee at the Ministry of Planning and Development Cooperation
CONT: Contractor
ROPME: Regional Organization for the Protection of the Marine Environment

14.9. STAKEHOLDER MEETING

To date, the team has completed the following activities:

- Review of the legislative requirements of environmental protection in Iraq;
- Recruitment of a consultant to conduct the baseline survey for water and sediment in the project area;
- Completion of the selection of data collection points and scheduling of the sampling activities;
- Review of the general environmental conditions of the project area; and
- Examination of the proposed disposal sites for the dredging activities proposed in the project.

Once all documents are circulated and the IEE report is confirmed, a meeting is planned to be held in Basra.

- To inform the result of study
- To inform the environmental and social consideration
- To obtain agreement to the project
- To inform the project schedule

14.10. CONCLUSIONS AND RECOMMENDATIONS

Supplemental study to update the IEE prepared in the SAPROF study was carried out. The major points in this study are as follows:

- Desk-based study was carried out to supplement the baseline data.
- Legal framework was studied to update the information for environmental and social considerations.
- A series of study for EIA procedure based on Iraqi's law, JICA Guideline and World Bank Guideline concluded that this project would be categorized as Category B, which requires the preparation of an IEE.
- According to Iraqi environmental law, the ECC shall be obtained to start the project. IEE in this case is necessary to obtain the certificate.
- Water quality survey along the sea route did not show any major pollution including nutrient and oil.
- The results of the survey and the analysis of information gathered during the desk-based study suggested a dynamic and active environment with substantial mixing and movement of water and sediments over across seasons and over longer periods of time.
- Comparing with previous study results conducted in 2009, the water environment seems to have recovered as less pollution and less eutrophication.
- Sediment quality however, indicated some contaminations such as dioxins, furans, arsenic, total nitrogen, total sulphur, copper, and nickel.
- The rehabilitation project clearly has the potential to increase sediment load in the water column during the construction (and especially) dredging phases. Given the dynamic environment, however, and the fact that a large part of the study area is subject to regular high suspended sediment loads from natural processes, the impact of sediment mobilized by the construction activity is likely to be short-lived and of limited significance.
- With regards to the overall ecological sensitivity of the four areas, Areas C and D are the least sensitive, and therefore considered to be the most suitable for the deposition of the dredged material. The habitat maps produced during the desk-based study have proven to be very accurate and have been slightly updated following the field surveys.
- The highest mean concentrations of contaminants were consistently recorded in Areas A and B (copper, nickel, lead, zinc, iron, manganese, TPH, and dioxins). For this reason, it may also be preferable to deposit dredging in Areas C and D to reduce the contaminant loading on Areas A and B.
- Soil quality in candidate dumping site showed minor contamination in dioxins, furans, and arsenic, although these concentrations satisfy the guideline values.
- Therefore, measures to discharge water from dumping site and establishment of monitoring plan are recommended.
- As intertidal zone is ecologically important, change of the zone shall be avoided as much as possible. In case change is necessary, effort for recovery of the zone is recommended.
- The ecology of the intertidal zones in areas C and D (if used) should be monitored again after the deposition works have been completed to determine if significant impacts have been successfully avoided.

Part 5

RECOMMENDATION ON STEP FORWARD

15. RECOMMENDATION ON STEP FORWARD

In response to the request of the Government of Iraq, the Government of Japan through the Japan International Cooperation Agency (JICA) has been considering a further financial and technical assistance/cooperation to the Iraqi port sector, as a subsequent support to the Port Sector Rehabilitation Project, which are:

1) Port Sector Rehabilitation Project Phase II under Japan's ODA loan scheme
   (as the Urgent Development Project for KZP, having been re-named at the workshop held in Amman on Interim Report in March 2012); and
2) Port Master Plan Study under Japan's technical cooperation (grant scheme).

This Study has been carried out in order to collect necessary and useful information to be provided for further Japanese assistance. It aims to enhance the efficiency of port management and operations, and to review the requested scope and contents of such port sector rehabilitation and improvement projects by collecting, analyzing, and updating the available data and information related to the projects.

Based on the result of the review works and consequent findings, the Study has made recommendations for the next steps as hereinafter described.

15.1. PORT SECTOR REHABILITATION PROJECT PHASE II

Through the Study, latest information and data related to transport and port sectors have been collected as much as possible, and the present situation of the existing ports and cargo traffic forecast have been updated utilizing those data as the base for the review and evaluation of the required Urgent Development Project described in the report for Post Phase I Port development Plan.

The review works on the scope of the Urgent Development Project were carried out in the following manner:

1) Update the cargo traffic forecast at target years 2015, 2025, and 2035 using the collected cargo data up to year 2010;
2) Also, update the current conditions of the study ports such as berths utilization and productivity, availability or workability of port facilities and equipment, cargo handling capacity, problems/ issues currently facing, and so on;
3) Using the above updated results, the required port facilities and equipment of the objected ports (UQP and KZP) have been reviewed according to the cargo demand and ship calls forecast at respective targeted years;
4) Based on the above analysis and updating, the requested scope and work component of the urgent project have been evaluated/modified and have been proposed as shown in Table 15.1.1, and
5) The estimated total project cost under the proposed scope was approximately JPY 80 billion as indicated in Table 15.1.2.

Table 15.1.1 Proposed Scope and Work Components of the Phase II Project

No.	Project Component	Scope of Works (Full Scale)	Remarks
1	Dredging Works at KZP	Dredging of port basin, front of berthing areas, a limited area of access channel, dredging volume: 5,400,000 m^3, Depth: -12.5 m, Width: access channel and berthing areas 300 m, and turning basin 450 m wide	Most critical
2	Shipwrecks Removal	Total 12 wrecks removal located in the main channel and KZP basin.	Most critical
3	Rehabilitation of Port Facilities	Damaged fender replacement: 68 pcs (KZP) Repair of tug berth structure (KZP), yard pavement rehabilitation (KZP), corrosion protection (UQP)	Critical
4	Extension of Berth at KZP	Extension of the existing Berth No.2 to south, and utilize as multi-purpose berth (KZP), also connected to surrounding berth, design depth -12.5 m	Container berth construction deleted as not so critical
5	Navigation Aids Works	Procure and install 20 light buoys along the channel between UQP and KZP, 25 buoys required. Of which, 10 buoys installed. For UQP/KZP channels, two leading lights installation at KZP access channel, AIS/VTS system installation	Navigation Aids are critical AIS/VTS need a further study
6	Utility Works	Rehabilitation/repair works at KZP (water supply, electricity cables, etc.)	Critical
7	Removal of Unused Facilities and Equipment	Removal of unused rail mounted quay side cranes at UQP	Need for further study of the status
8	Cargo Handling Equipment	KZP: container cargo handling equipment (21 nrs) , KZP: maintenance works equipment (4 nrs.), UQP: RTG (4 nrs)	Critical
9	Marine Equipment (UQP/KZP)	Dredger (3), tug (3), survey boat(1), mooring boat (2), anti-pollution/monitoring vessels(3), others (7)	Dredger(s) is most critical

Source: JICA Study Team

Table 15.1.2 Summary of Estimated Project Costs

	Acutual Proportion		Total (Equivalent to JPY)			Total (Original)		
	FC	LC	FC 1,000JPY	LC 1,000JPY	Total 1,000JPY	FC 1,000JPY	LC 1,000USD	Total 1,000JPY
A. ELIGIBLE PORTION								
I) Construction and Procurement			**64,993,870**	**8,464,082**	**73,457,952**	**64,993,870**	**107,822.70**	**73,457,952**
I.1 Dredging Works at KZP	83.3%	16.7%	5,318,117	1,067,670	6,385,788	5,318,117	13,600.90	6,385,788
I.2 Shipwrecks Removal Works	79.6%	20.4%	4,434,617	1,135,329	5,569,946	4,434,617	14,462.79	5,569,946
I.3 Rehabilitation of Port Facilities	59.0%	41.0%	1,291,849	898,383	2,190,232	1,291,849	11,444.37	2,190,232
I.4 Extension of Berth at KZP	70.5%	29.5%	5,311,607	2,221,822	7,533,429	5,311,607	28,303.46	7,533,429
I.5 Navigation Aids Works	97.3%	2.7%	2,247,750	62,100	2,309,850	2,247,750	791.08	2,309,850
I.6 Utility Works	0.0%	100.0%	0	362,954	362,954	0	4,623.62	362,954
I.7 Removal of Unused Facilities and Equipment	83.7%	16.3%	332,517	64,780	397,296	332,517	825.22	397,296
I.8 Procurement of Cargo Handling Equipment	99.1%	0.9%	1,952,730	16,980	1,969,710	1,952,730	216.31	1,969,710
I.9 Procurement of Marine Equipment	99.1%	0.9%	30,728,625	285,848	31,014,472	30,728,625	3,641.37	31,014,472
Base Project Cost for (I.1 to I.9)			51,617,811	6,115,865	57,733,677	51,617,811	77,909.11	57,733,677
Price Escalation			3,052,496	1,125,044	4,177,540	3,052,496	14,331.77	4,177,540
Physical Contingency			10,323,562	1,223,173	11,546,735	10,323,562	15,581.82	11,546,735
II) Consulting Services			**1,520,074**	**1,442,043**	**2,962,116**	**1,520,074**	**18,369.97**	**2,962,116**
Base Project Cost for (E/S)			1,391,513	1,210,543	2,602,056	1,391,513	15,420.93	2,602,056
Price Escalation			58,985	170,972	229,958	58,985	2,177.99	229,958
Physical Contingency			69,576	60,527	130,103	69,576	771.05	130,103
Total of A. (I + II) : BASE PROJECT COSTS			**66,513,943**	**9,906,125**	**76,420,068**	**66,513,943**	**126,192.67**	**76,420,068**
B. NON ELIGIBLE PORTION								
a. Land Acquisition and Compensation Cost		**0.00%**	0	0	0	0	0.00	0
b. Administration Cost		**5.00%**	0	3,821,003	3,821,003	0	48,675.20	3,821,003
c. VAT		**0.00%**	0	0	0	0	0.00	0
d. TAX and Duties		**0.00%**	0	0	0	0	0.00	0
Total of B. (a. + b. + c. + d.)			**0**	**3,821,003**	**3,821,003**	**0**	**48,675.20**	**3,821,003**
TOTAL (A. + B.)			**66,513,943**	**13,727,128**	**80,241,071**	**66,513,943**	**174,867.87**	**80,241,071**

Source: JICA Study Team, Note: Above amount excludes interest during construction.

Based on the estimated project cost, the total project cost as full scope is estimated approximately 80 Billion JPY.

It is expected to utilize new loan that a case study has been carried out to determine a reasonable loan amount according to the priority of the respective work components, as a part or whole. In order to restore and improve both port facilities and functions to cope with the increasing cargo traffic demand, the proposed scope and work components of the project are all deemed necessary. As such, the priority has been determined mainly through urgency.
The results of the case study are shown in the Table 15.1.3.

Table 15.1.3 Results of the Case Study for Loan Amount Options

(Unit: JPY million)

Options	Scope	FC	LC	Total
Option-1	Original (full scope)	66,514	13,727	80,241
Option-2A	Delete six shipwrecks, 8 kinds & 10 no. of ships (GHD, TSHD), and ten sets of Jib crane removal from the original	39,785	11,056	50,841
Option-2B	Delete six shipwrecks, 8 kinds & 10 no. of ships (CSD, TSHD), and ten sets of Jib crane removal from the original	35,891	10,819	46,710
Option-3	Delete six shipwrecks, nine kinds & 11 no. of ships (CSD, GHD, TSHD), and ten sets of Jib crane removal from the original	30,798	10,508	41,307
Option-4	Delete six shipwrecks, eleven & 15 no. kinds of ships (CSD, GHD, TSHD), ten sets of Jib crane removal from the original	27,580	10,312	37,892

Source: JICA Study Team, Note: Above amount excludes interest during construction.

From the above review results, it is recommended that the proposed Urgent Development Project needs to be implemented at an earliest possible time, as Port Sector Rehabilitation Project Phase II, by discussing with MOT/GCPI and the ministry in charge on the selection of loan type and amount.

In selecting loan type, the following categorization together with the packaging of the work component is suggested:

Table 15.1.4 Project Package and Loan Type

Package	Project Component	ODA Loan Type
PACKAGE-1	DREDGING & WRECK REMOVAL	Un-tied loan
1.1	Dredging Work	
1.2	Shipwrecks Removal	
PACKAGE-2	MARINE/CIVIL WORKS	Tied (STEP)
2.1	Rehabilitation of Port Facilities	
2.2	Berth Extension	
2.3	Navigation Aids	
PACKAGE-3	EQUIPMENT	Tied (STEP)
3-1	Cargo Handling Equipment	
3-2	Marine Equipment	
PACKAGE-4	UTILITY & REMOVAL	Un-tied loan (by local competitive bidding)
4.1	Removal of Un-used Facilities and Equipment	
4.2	Utility Works	

Source: JICA Study Team

15.2. PORT MASTER PLAN STUDY

The Post Phase I Development Plan expresses the necessity and importance of a Master Plan Study for the Southern Ports of Iraq, especially UQP and KZP, taking into consideration the following factors and circumstances:

1) Development potential of the existing ports and future role of each port;
2) Cargo demand forecast and regional market trends;
3) Government policy and strategy on port management and operation including tariff system and privatization aspect;
4) Individual port development plans including a new port development; and
5) Neighboring country's port development plans, especially in Mubarak Port, Kuwait.

To be noted in the above factors, the new Al-Faw Port is under engineering design stage, and is expected to start its realization soon. Further, the Mubarak Port at Bubyan Island in Kuwait is almost at the final stage of construction. Therefore, it would be very likely that the port will soon become operational.

Considering the above situation, it is of utmost importance and necessity to implement a comprehensive and overall study on ports of Iraq development, formulating not only a port master plan, but also including an improvement/development study for port management and operation efficiency since existing studies such as the New Al-Faw Port Master Plan did not sufficiently discuss the overall development plan of the port sector as a whole.

Accordingly, it is recommended to conduct the Port Master Plan Study under re-naming as Port Sector Development Study, which will be composed of;

1) Formulation of the port master plan,
2) Improvement plan of port management and operation, and
3) Capacity building plan.

15.2.1 PORT MASTER PLAN STUDY

The outline of Port Master Plan Study will be as follows;

(1) Objectives and Study Ports

a. To identify development potential and define the future role of the study ports.
b. To prepare a port development strategy of the study ports comprising demand forecast, roles and functions, and a concept of the long-term development plan including a privatization scheme.
c. To prepare a master plan for comprehensive development of UQP and KZP taking into account the functional allotment between two ports.
d. To prepare a short term development plan for UQP and KZP.

The study ports are Umm Qasr Port (UQP), Khor Al Zubayr Port (KZP), Maqil Port, Abu Flus, and new Al-Faw Port.

(2) Scope of the Study

In order to achieve the objectives, the Study will cover the following items;

a. Analysis of the present conditions and review of the existing studies and related development plans including but not limited to;
    - Transport Master Plan by Italian Consortium,
    - Basrah Refinery Project (under Japan's ODA),
    - Khor Al Zubayr Fertilizer Plant Rehabilitation Project (under Japan's ODA), and

- Crude Oil Export Facility Rehabilitation/Reconstruction Plans including Sealine Construction Project under Japan's ODA.

b. Preparation of a port development strategy of the study ports other than Al-Faw Port including cargo demand forecast (target year 2035).
c. Formulation of Long-term Port Development Plans for UQP and KZP including conceptual designs (target year 2035).
d. Formulation of Short-term Development Plans for UQP and KZP including preliminary designs and cost estimates (target year 2025).
e. Overall project evaluation and recommendation.
f. Environmental impact consideration.

15.2.2 IMPROVEMENT OF PORT MANAGEMENT AND OPERATION

As described in Chapters 9 and 10, the Iraqi port sector is facing various issues and challenges in port management and operation aspects. In order to have well modernized and efficient ports in the region, these issues and challenges need to be addressed. To achieve such target, the Study will focus on the following aspects by reviewing the present situation/issues and proposing an appropriate improvement measure respectively:

a. Review and study the institutional system of the port sector including GCPI's organizational structure.
b. Review and study the port tariff system.
c. Study the privatization strategic program for specialized terminals operation.
d. Formulation of the port management improvement plan including measures to be compliant with ISPS code.
e. Formulation of the port operation improvement plan including a necessary study on computerization and EDI system.
f. Study on the strategic capacity building plan taking into account the on-going or planned capacity building schemes by donor countries and by own budget.

15.2.3 CAPACITY BUILDING PLAN

Based on the study results of the strategic capacity building plan, a detailed capacity building plan will be prepared as discussed with GCPI. It will be finalized as a capacity building program, by which its implementation methodologies are defined and divided into the scope covered under the Study or by other donor countries.

As stated in Chapter 10, the capacity building plan contains the following issues and improvement areas and items:

- Capacity building on financial analysis including the concession management;
- Ability to create the financial action plan;
- Ability to analyze the port charges and fees;
- Expedite the procurement of spare parts, removal of the cause of delay in procurement of spare parts;
- Establishment of responsibility system of each section. Capacity building related to the Plan-Do-Check system;
- Capacity building for collaboration among the related sections;
- Enhancing productivity in loading and unloading operations;
- Container yard management;

Table 15.2.1 Proposed Subjects of Capacity Building Plan and Implementation Methods

Target Recipient	Subject/ Theme	Implementation Method
A. Responsible Persons of GCPI, related Ministries	**(Institutional and Organizational Improvement)** 1. Port Management & Operation and Budget & Financial aspects 2. Policies on International organizations & Regulations 3. Privatization/PPP System/Policy	- Study and survey on other countries' system, modern ports. - JICA's workshop/Experts dispatch program - Workshop program by other donor countries or dedicated international organizations.
B. Management and Key Person of Responsible dept./section	**(Port M&O system/method Improvement)** 1. Project and Equipment procurement implementation & control ability 2. Demand forecast, Development planning 3. Port Facilities maintenance & control 4. Equipment maintenance & control 5. Environment protection, Safety 6. Budget & Financial aspects control 7. Capacity Building of Staff	(Training of responsible/key persons, trainers is effective) - Upgrading/improvement of skills/knowledge through JICA training course. - Technology transfer through implementation of projects, studies under JICA. - Training by sub-contracted specialist firms. - By providing facilities for survey/monitoring/inspection (Environment Unit) - Enhancement of GCPI Training Center.
C. Persons in Charge, Operation Staff	**(Upgrading of Individual skills and ability** 1. Facilities/Equipment operation skills 2. Facilities/Equipment maintenance skills 3. Systems running/operating skills 4. Environment protection/ operation safety skills	- System suppliers training by contract. - Equipment suppliers training program by contract. - Third Country Training - Training at GCPI Training Center.

The abovementioned Subjects/ Themes are to be further divided into more specific items in finalizing the Implementation Plan. It will however be necessary to further study and re-confirm the above needs before the preparation of the Implementation plan, since some themes/items may be under on-going status being arranged by GCPI or on a list for the planned program by JICA or other international organizations.

15.2.4 RECOMMENDATION ON THE IMPLEMENTATION SCHEME FOR THE PORT SECTOR DEVELOPMENT STUDY

The Government of Iraq through its implementing ministry requested the Japanese government for the implementation of Port Master Plan Study under the Japan's technical cooperation scheme as essentially important and urgent.

Considering the abovementioned expected scope of the Port Sector Development Study that contains various study aspects, it is recommended to implement the Study by utilizing a **Project Based Technical Cooperation Scheme** as appropriate.

APPENDICES

APPENDIX A
COLLECTED INFORMATION
AND
DATA (LIST)

APPENDIX A: COLLECTED INFORMATION AND DATA (LIST)

A1. GCPI

1. GCPI Annual Report 2008
2. GCPI Annual Report 2009
3. GCPI Annual Report 2010
4. GCPI Organization chart
5. Number of Personnel in GCPI
6. Company assets such as work vessels, cargo handling equipment, etc
7. Development plans by GCPI
8. Charts Navigational Channel

A2. AL MAQIL PORT

1. Port Plan
2. Organization chart (in Arabic)

A3. ABU FLUS

1. Port Plan
2. Port Expansion Planning of Container Terminal
3. Port Expansion Planning of artificially-excavated berth (upstream)
4. Port Expansion Planning of new berth (downstream)

A4. KHOR AL-ZUBAYR PORT

1. Yearly Report on Cargo volume by commodity 2006- 2011
2. Vessels Called at KZP 2009 – 2010
3. Cargo Volume and Ship Calls
4. Quay Cranes and Land Equipment 2011
5. Ship Size Distribution by Commodities 2009 – 2010
6. Ship GRT 2009 – 2010
7. Berth Occupancy and Tonnage
8. Drawing of Port Facilities
9. Technical report on "Piles Investigation and anodes measurement of Khor Az Zubayr Port, Nov. 2009" submitted to NK and IdRC, prepared by Al Hour Company
10. Present Situation of Electrical Works (ppt presentation)
11. Present Situation of Water Supply (ppt presentation)

A5. UMM QASY PORT

1. Cargo volume by commodity and ships calls on 2009 and 2010
2. Breakdown of Ro-Ro Cargo of 2006 – 2010
3. Cargo Detail 2011
4. South Port Cargo Detail 2011
5. Passengers and Traffic Movement 2008-2010
6. Quay and Shore Cranes and Equipments
7. Vessels Called 2009-2010
8. Ship Size Distribution by Commodities 2009 – 2010
9. Ships GRT 2009 - 2010
10. "Ten Berths on Um Qasr River, Contract Drawings, Volume 5 of 5"
11. General information of berth (specification, shed and yard, etc)
12. Example of daily report on coming vessels on Nov. 4, 2011
13. Cargo volume by commodity and ships calls on 2009 and 2010

14. General information on Q/C and Cargo Handling Equipment

A6. AL FAW PORT

1. Executive Summary of Development Plan by CIITI
2. Al Faw Report(1)
3. Al Faw Report (2)

A7. ENVIRONMENTAL ISSUES

1. “Basic Oil Spill Response Plan for Territorial Water of Iraq, Apr. 2011, Iraq Study Committee”
2. “Updated Environmental Impact Assessment Report for Crude Oil Export Facility Reconstruction Project in Iraq, Nov. 2011, South Oil Company, Iraq”
3. “Feasibility and Development Plan for Basrah Industrial Zone, Final Environmental Assessment Report, Feb. 2012” submitted to Ministry of Planning and Development Cooperation, Baghdad, Iraq
4. Environmental Survey

A8. OTHERS

1. Regulations for Implementing Government Contracts (2008)
2. Coalition Provisional Authority Order Number 28, Reconstruction Levy
3. Coalition Provisional Authority Order Number 54, Trade Liberalization Policy 2004
4. Coalition Provisional Authority Order Number 70, Amendment to Reconstruction Levy
5. A Concession contract between GCPI & CMA-GCM of France (SAMPLE)
6. Concession Regulation & Conditions by MOT-GCPI
7. Custom Law (translated by Mr.Mohanad)
8. Custom Law (in Arabic)
9. Law No. 21 of 1997 (as amended in 2004)
10. Law No.22 of 1997 on State Companies
11. Iraqi Port Tariff
12. Annual Bulletin 2010, Central Bank of Iraq
13. National Development Plan for the years 2010 – 2014, MOP
14. Iraq Energy Data, Statistics and Analysis, Energy Information Administration
15. Iraq FAOSTAT,
16. Iraq Cement Market, The Vision Corporation
17. Fertilizers Report
18. Inflation rate by CIA World Factbook
19. Population Past and Future Projection
20. Ports Agents list

APPENDIX B

ENVIRONMENTAL BASELINE SURVEY REPORT

APPENDIX B: ENVIRONMENTAL BASELINE SURVEY REPORT

This report was prepared based on the report by the sub-contractor[1].

B1. SURVEY IMPLEMENTATION PLAN

(1) SCOPE OF WORKS

The survey involves the following primary tasks:

- Study for background information;
- Field Reconnaissance;
- Water quality sampling (twelve sample locations, two depths undertaken at high and low tide);
- Sediment sampling (twelve locations);
- Soil sampling of the four potential areas of deposition for dredging (Areas A – D);
- Ecological survey of the four potential areas of deposition for dredging (Areas A – D); and
- Reporting.

The objective of the survey is to characterize the water and sediments around a number of wrecks that need to be removed as part of the Ports rehabilitation project.

(2) STUDY FOR BACKGROUND INFORMATION

To collect baseline data and information on environmental and social circumstances, desk based research and literature reviews on commencement of the project in order to obtain relevant environmental and social baseline data was carried out. This includes a review of publicly available information, including book reports, articles, journals, periodicals and web articles, and telephone interviews and communications with knowledge managers and key stakeholders such as Iraqi Government Ministry Officials, Iraqi council officials, General Company for Ports in Iraq (GCPI), etc. This study also refers to the following sources:

- Iraqi Environment Ministry;
- United Nations Environment Program;
- World Bank and WHO Publications;
- EIA and SEA studies that may be relevant to the area, where available;
- Industry specific studies; and
- Other relevant information sources and studies that come to light.

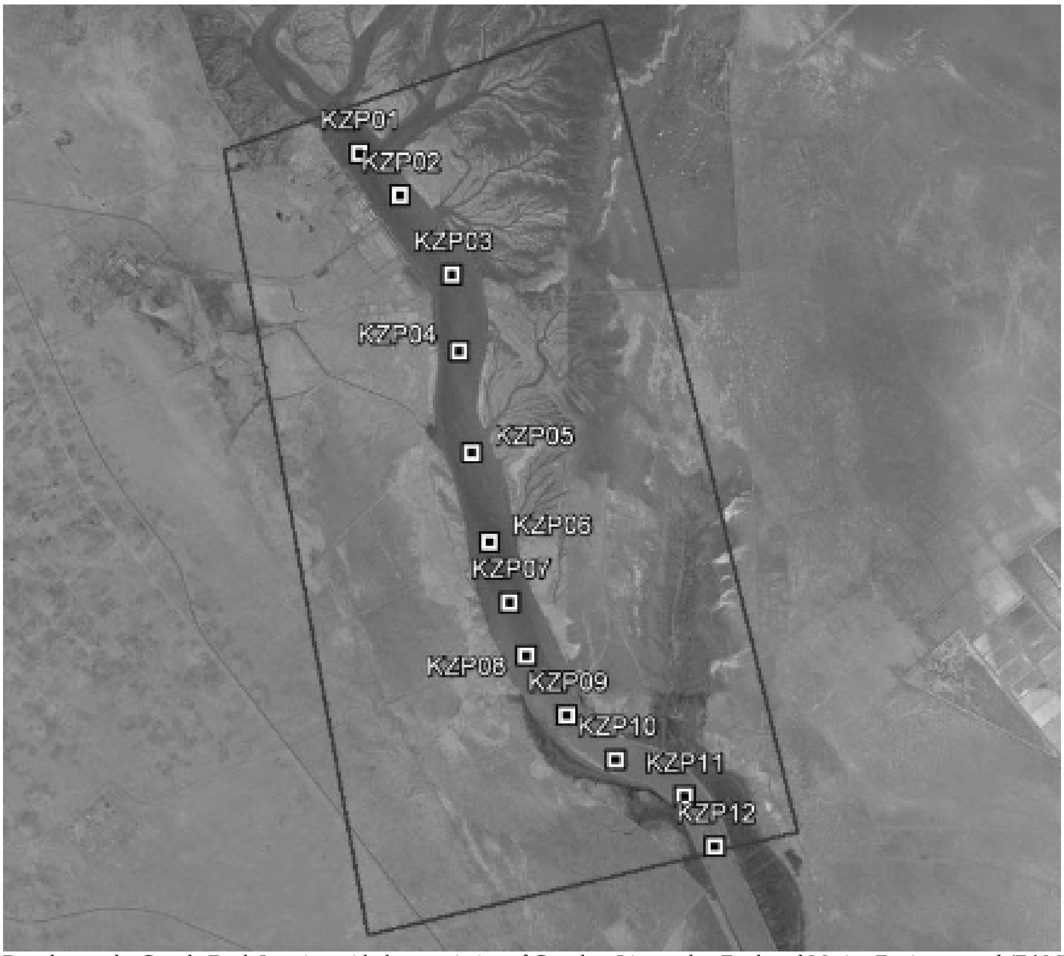
There are numerous social and environmental organizations (national and international) operating in Iraq, many of which are concentrating their efforts on humanitarian and development needs to improve the social situation within the country. The study on comprehensive overview of the environmental and social organizations and institutions currently operating in Iraq to collect and update organizations and regime, institution on environmental and social in the country was conducted.

Related environmental regulations and laws on EIA and/or IEE were also updated. As part of the research consultation with the Iraqi Environment Ministry, who is responsible for the establishment and enforcement of environmental law was also carried out.

(3) WATER QUALITY AND SEDIMENT SAMPLING

Based on the result of the field reconnaissance, the twelve sample points were distributed evenly down the survey area of the Khor Al Zubayr. The same sample points (S7 – 12) of previous study relating to Phase 1 project were basically used. The sampling locations are depicted in Figure 1.1.

[1] Project Execution Plan on Environmental Survey – Data Collection, Port Sector Development Plan, Iraq, February 2012, Earth and Marine Environmental (EAME) Limited



Source: Based upon the Google Earth Imaging with the permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 1.1 Survey locations for water and sediment

And the coordinates for each sampling position are set out in Table 1.1.

Table 1.1 Coordinates of Each Sampling Location

Sampling Location	Rational	Approximate Latitude	Approximate Longitude
KZP01	Previous sampling point (SP12)	30.199044	47.887453
KZP02	Spatial coverage and targeting wreck in the main channel	30.186684	47.896867
KZP03	Spatial coverage	30.158944	47.900432
KZP04	Previous sampling point (SP11)	30.135637	47.907325
KZP05	Spatial coverage and targeting effluent channel from the nearby Fertilizer Plant	30.118013	47.917650
KZP06	Previous sampling point (SP10)	30.105399	47.938934
KZP07	Spatial coverage	30.097569	47.944465
KZP08	Previous sampling point (SP09)	30.111095	47.926540
KZP09	Spatial coverage	30.127307	47.910333
KZP10	Previous sampling point (SP08)	30.145012	47.903668
KZP11	Spatial coverage	30.174752	47.898150
KZP12	Previous sampling point (SP07)	30.205587	47.880083

The water and marine sediment sampling surveys was carried out simultaneously from a survey vessel. Surface sediment samples (from the bottom surface within the first 10 - 15 cm deep) were collected at each of the sample locations using a Van Veen grab sampler.

Water samples were collected at the designated sample locations using a remotely operated Niskin water sampler.
During water sampling events, physical parameters such as temperature, pH, and conductivity (salinity) and dissolved oxygen of each sample were measured using a hand-held field meters and recorded along with any other observations of the water samples. These devices were calibrated with manufacturer supplied buffer solutions of calibration solutions prior to use in the field.
In addition, a small aliquot of each water sample was obtained in order that field testing for Coliform bacteria.

All sediment and water samples were collected in pre-cleaned sample jars or bottles of appropriate size and type for each laboratory analysis to be performed. Sampling equipment was decontaminated between sampling events by washing with AlconoxTM (or equivalent) soap and de-ionized water and rinsing with de-ionized water.

(4) SOIL SAMPLING IN CANDIDATE AREAS

The surface soil samples were obtained at each designated sampling location using a stainless steel trowel which was cleaned and decontaminated between sampling locations so as to prevent any cross contamination. Nitrile gloves were worn during the sampling itself and were changed regularly to further prevent any anomalies in the data via contaminate transfer. The GPS co-ordinates of each sample point location were recorded.
The samples were examined and inspected for visual and olfactory evidence of hydrocarbon contamination. The condition, color, odor and temperature of each sample will be noted and recorded in the field log and the soils logged in accordance with accepted international logging nomenclature.

Five surface soil samples were collected from each of the four candidate sites, equaling twenty samples in total. The samples were preserved in dedicated containers and cool boxes.

Each of the 5 samples were a bulk composite sample made up from 10 sub-samples from across accessible parts of each site collected from as wide an area as is safe to do so. The 10 sub samples were placed on a clean plastic sheet and were thoroughly mixed using the cone and quarter method. Once the composite sample is fully mixed a sub sample were taken and placed in the sampling jar for dispatch to the analytical laboratory.
All samples were preserved in temperature controlled sample boxes throughout the sampling and transit process.

(5) ECOLOGICAL SURVEY

This survey includes surveys for:

- Birds;
- Mammals;
- Insects;
- Reptiles; and
- Flora

During the field reconnaissance, it has been assumed that the field surveyors will only access the parts of these sites that are safe to do so, given that proposed dumping sites have been sites of armed conflict and thus UXO and mines could still be present. It will not be possible to openly walk-over these sites and any surveys will have to be performed from previously travelled roadways or vantage points. Given,

however, the generally flat nature of these sites and their generally consistent topography and habitat type, this will not necessarily limit the representativeness of the survey.
Photographic logs with GPS information were taken of every area inspected and any observations of species that were made.

(6) CHEMICAL ANALYSIS

The obtained samples were brought and analyzed in a UK laboratory, i2 Analytical. This is the laboratory which undertook the majority of the chemical analysis. The laboratory is accredited to the current version of the European and International Standard, ISO/IEC 17025. The ISO/IEC 17025:2005 specifies the general requirements for competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, non-standard methods, and laboratory developed methods and is applicable to all laboratories. i2 Analytical holds UKAS and Monitoring Certification Scheme (MCERTS) accreditation and also partake in Industry Proficiency Testing Schemes.

For the transportation of the samples, Enviro Sampling Kits were utilized; these are fully recyclable (carbon neutral) transportation boxes that protect and enhance sample integrity during transport due to built-in ice pack storage areas, built-in preservatives kit for water analysis and a unique bar coded reference, which is scanned in and out of the laboratory to enable sample tracking. Despite the use of these temperature controlled units and preservatives, some of the contents (such as organic chemicals) may still suffer some degradation. In order to try and compensate the results of analysis, some samples made up in the laboratory using certified reference material of a known concentration. These were then shipped with the empty sample bottles and returned with the collected samples to the laboratory. These laboratory prepared samples were then be retested to determine the amount of sample degradation that has might occurred. The percentage degradation of the control samples can then be used as an adjustment factor for the field samples.

(7) PERMITS AND APPROVALS

In order to conduct the surveys, a number of permits or approvals from various organizations were obtained:

- Iraqi Immigration Clearance (Visas) for UK staff visiting Iraq;
- Permission from UK Customs to import collected samples;
- GCPI permission to enter Khor Al Zubayr port and adjacent lands;
- South Gas Company Permission to access Area D; and
- Iraqi Coastal Defense Force clearance to use the survey vessel.

B2. REPORT ON FIELD RECONNAISSANCE

According to the United Nations Development Program (UNDP), there are 282 shipwrecks within the Umm Qasr region of which, since 2003, a total around forty shipwrecks have been salvaged under UNDP and Coalition Provisional Authority (CPA) controlled projects2. Thirty five wrecks are identified to be yet salvaged, of which fifteen are within the area of the baseline study. Of the fifteen wrecks in the study area, twelve have been selected as priority wrecks on the basis of pollution risk, berthing obstruction, dredging obstruction, navigation hazard and/or unexploded ordnance risks. The wrecks within the study area, as highlighted within the JBIC SAPROF report are outlined in Figure.2.1 and Table 2.1.

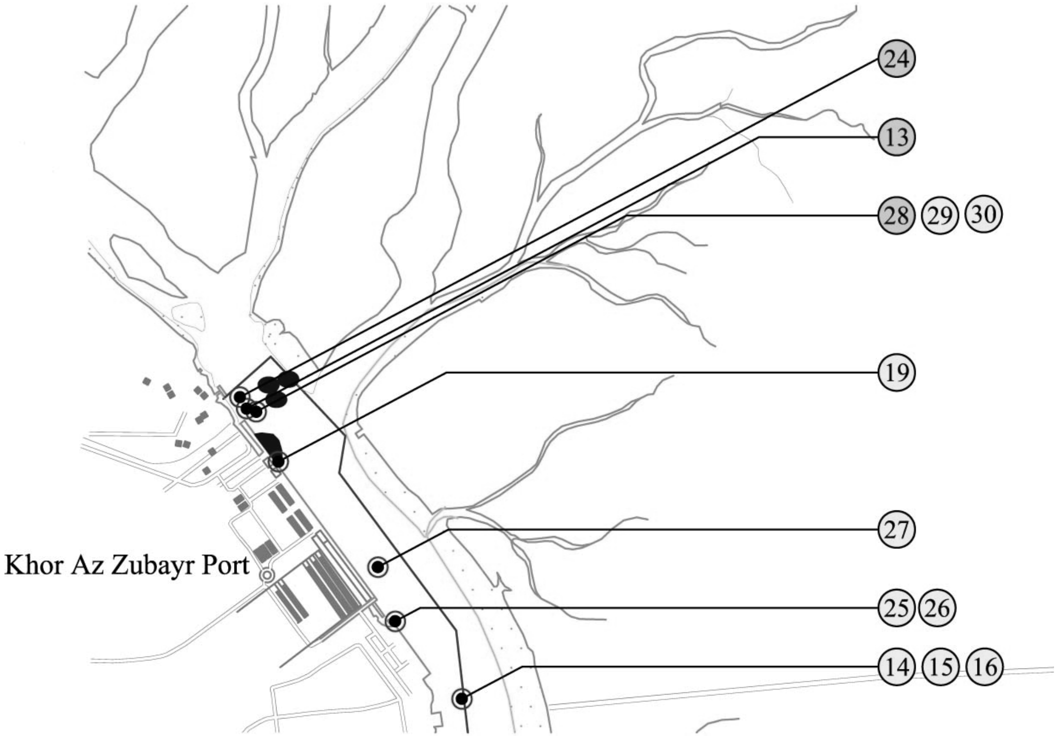


Figure 2.1 Location of Shipwreck in the Study Area

[2] Special Assistance for Project Formation (SAPROF) Study on Port Sector Rehabilitation Project in the Republic of Iraq (2005), Japan Bank for International Cooperation (JBIC)

Table 2.1 List of Shipwrecks

SR No.	Name	Length (m)	Breadth (m)	Depth (m9	Weight (tones)	Type	Location	Position: North	Position: East	Condition	Remarks	Risk Summary	IPA Priority	Survey Record
1	Ain Zalah	201.02	28.55	14.00	8,777	Tanker	Bubiyan Island	29 58.60	048 13.55	Upright	Broken In Front ER/Sunk	N, P, X	4	Yes
2	Rumaila	201.02	28.55	14.00	8,777	Tanker	Bubiyan Island	29 58.58	048 13.08	Upright	Broken In Middle / Sunk	N, P, X	4	Yes
3	Al Waleed	51.82	10.50	3.66	650	Buoy laying vessel	U/Q (old) B9	30 02.04	047 57.13	Upright	Partiall buried	D,B,P	1	Yes
4	Barge 03	50.00	12.00	3.00	500	Barge	U/Q (old) B9	30 02.04	047 57.13	Upright	Partiall buried	D,B,P	1	Yes
5	Barge 04	50.00	12.00	3.00	500	Barge	U/Q (old) B9	30 02.04	047 57.13	Upright	Buried	D,B,P	1	Yes
6	Barge 05	50.00	12.00	3.00	500	Scrap Barge	U/Q (old) B9	30 02.04	047 57.13	Capsized	Partiall buried	D,B,P	1	Yes
7	Navy tug 01	15.00	4.00	1.50	110	Iraqi	U/Q (old) B9	30 02.04	047 57.13	Buried	100% covered	D,B,P	1	Yes
8	Sihan	45.70	11.00	5.40	550	Navy tug	U/Q (New port)	30 02.52	047 57.02	Buried	Covered	D,N,X,P	4	Yes
9	Hakmony	135.00	17.00	12.20	900	Cargo	Khawr U/Q	30 00.068	047 59.689	Capsized	90% buried	N,P,X,D	4	Yes
10	Noor	25.00	8.00	3.00	450	Supply/V	Khawr U/Q	30 00.068	047 59.689	N/A	Under the Hakmony	P	4	Yes
11	Hilla	110.00	18.00	14.00	1,200	Dredger	Khawr U/Q	29 59.994	047 59.994	Upright	Debris both sides	P	4	Yes
12	Partrol/B 02	30.00	6.50	3.50	100	Iraqi Navy	Khawr U/Q	30 00.068	047 59.689	Upright	Port side/ Hakmony	X	4	Yes
13	Al-Nasc	57.00	12.00	5.00	999	Bunker/B	Zubayr/P	30 12.234	047 52.586	Upright	50% buried	P,X,	4	Yes
14	Fuel/B 01	35.00	15.00	3.00	500	Fuel barge	Zubayr/P B1	30 10.943	047 53.723	Buried	100% buried	P,B	1	Yes
15	Fuel/B 02	35.00	15.00	3.00	500	Fuel barge	Zubayr/P B1	30 10.943	047 53.723	Buried	100%buried	P,B,	1	Yes
16	Fuel/B 03	35.00	15.00	3.00	500	Fuel barge	Zubayr/P B1	30 10.943	047 53.723	Buried	100%buried	P,B,	1	Yes
17	**Removed**													
18	Spud Leg	40.00	10.00	3.00	550	Dredger	U/Q (old)/P B1	30 00.882	047 57.212	Upright	Visible high &low water	P,D,B,	4	Yes
19	Fuel/B 05	65.00	15.00	5.00	550	Fuel barge	Zubayr/P B11	30 12.001	047 52.803	Buried	100%buried	D,P,B,	1	Yes
20	Al Ramady	42.72	10.27	4.30	450	Tug boat	Buoy 11	29 48.846	048 28.890	Buried	100%buried	P,N,D,	1	Yes
21	Al Mothana	40.00	10.00	5.00	1,800	Dredger	Buoy17/18	29 48.846	048 28.890	Buried	100%buried	P,N,D,	1	Yes
22	Dokan	42.00	10.00	4.30	450	Tug boat	Buoy 11	29 48.846	048 28.890	Buried	100%buried	D,N,P,	1	Yes
23	Tadmur	82.71	13.03	6.90	1,594	Product/T	Zubayr channel	30 09.356	047 53.984	Capsized	? Fuel oil onboard	D,N,P,	1	Yes
24	Aloboor	41.00	10.00	3.00	700	Dredger	Zubayr/P B11	30 12 281	047 52.610	Good	Sunk recently	D,P,N,B,	4	Yes
25	Al Bahith	35.00			200	Research/V	Zubayr/P B4	30 11.294	047 53.390	Buried	100% buried	D,P,B,X,	1	Yes
26	Torpedo/B	30.00	8.00	4.00	210	Iraqi Navy	Zubayr/P B3/4	30 11.270	047 53.490	Buried	100%buried	D,P,X,B,	1	Yes
27	Fuel/B 07	55.00	15.00	3.50	550	Fuel barge	Zubayr/P B5	30 11.53	047 53.31	Upright	Sunk 1995	D,P,X,B,	1	Yes
28	Ardaz	57.00	12.00	5.00	990	Bunker/B	Zubayr/P B11	30 12.24	047 52.64	Upright	50mtr from shore	D,P,	4	Yes
29	Patrol/B 07	30.00	6.50	3.50	100	Iraqi Navy	Zubayr/P B11	30 12.24	047 52.64	Upright	50mtr out from shore	D,P,X,B,	1	Yes
30	Patrol/B 08	30.00	6.50	3.50	100	Iraqi Navy	Zubayr/P B11	30 12.24	047 52.64	Upright	50mtr from shore	D,P,X,B,	1	Yes
31	Gasa	82.00	14.70	5.60	1,820	Dredger	Zubayr channel	30 08.19	047 54.42	Capsized	High current area	D,N,P,	1	Yes
32	Palestine	90.00	16.40	7.40	2,737	Dredger	Zubayr channel	30 06.11	047 56.51	Capsized	High current area	D,N,P,	1	Yes
33	Dhow	25.00	5.00	5.00	Unknown	Dhow	Buoy 7	29 480.846	048 280 890	Buried	100%buried	N,	1	Side scan
34	Wreck?	?	?	?	?	?	Buoy 10/11	29 48.846	048 280.890	Buried	Possibe Patrol/Barge	N,	1	Side scan
35	Amuriyah?	285.02	44.2	22.43	21900	Tanker Built 1977	2NM South East of Al Bakr Terminal	29 39 52	048 50 52	Upright	Condition: Poor large and small UXO onboard. Covered with extensive marine growth. Sunk during 1991 Gulf war Fuel oil onboard and still a large amount of crude cargo remaining in the aft tanks	P,X,N,	4	?
36	Un-known	?	?	?	?	?	U/Q (new) B12	-	-	?	No detail is available			

SUMMARY KEY:

D Dredging Obstruction
P Pollution Risk
X UXO Risk
N Navigational Hazard
B Berthing Obstruction

Note: 1) Wreck No. 17 has been removed (by IPA)
2) Wreck No. 36 has been added based on the comment of IPA
3) "?" Unknown / N.A. : Not Available

Source: SAPROF study report

On the 19th and 20th January 2012, a reconnaissance of the general project area, the Khor Al Zubayr and the four potential dumping sites (Areas A – D) was conducted. The reconnaissance was undertaken with the full permission of the General Company Ports of Iraq (GCPI), Iraqi Port Authority (IPA) and Iraqi Coastal Defense Force (ICDF). The reconnaissance was intended to determine the location and condition of the wrecks, thereby, aiding the design of the sampling rationale. The boat-based reconnaissance was done at high tide.

(1) GENERAL PROJECT AREA

KZP is located in the southeast of the Iraq and to the northeast of the city of the Umm Qasr and is situated approximately 14km from the Iraqi Port of Umm Qasr (see Figure 2.2). KZP, which is located at 30o11.663'N 47o52.990'E, lies on the western banks of the Khor Al Zubayr and is situated at the confluence of the Khor Abddullah with the Khor Al Zubayr. The Khor Al Zubayr is a well protected natural tidal inlet port and the channel is approximately 150 - 300m wide at the Port.

Photograph 2.1 Khor Al Zubayr Port

While the reconnaissance of the Khor Al Zubayr was carrying out, routine dredging was being undertaken to the south of the KZP. This is predominately undertaken as a general maintenance measure, on behalf of Marine Affairs Department of the Iraqi Port Authority (IPA). According the SAPROF report, 3 to 4 million m3 of maintenance dredging is required per year, in order to maintain the existing channels and basins regularly.

Photograph 1.2.2 Routine dredging of the Khor Al Zubayr during the reconnaissance

Directly to the south of the KZP, the Khor Al Zubayr Free Zone is sited, here; goods imported and exported are exempt from all taxes and fees, except when imported through customs.

Photograph 2.3   View, northwards, towards the Free Zone and KZP

Approximately 5 km downstream from the main Port area is the LPG/NGL terminal operated by the South Gas Company (SGC).   According to SGC information, the Khor Al Zubayr LPG/NGL plant was built to recover a broad cut from raw gas. The plant provides liquid products (such as propane, butane mixture) and dry gas for domestic use. The liquid products are pumped to the Storage Terminal (IST)[3].

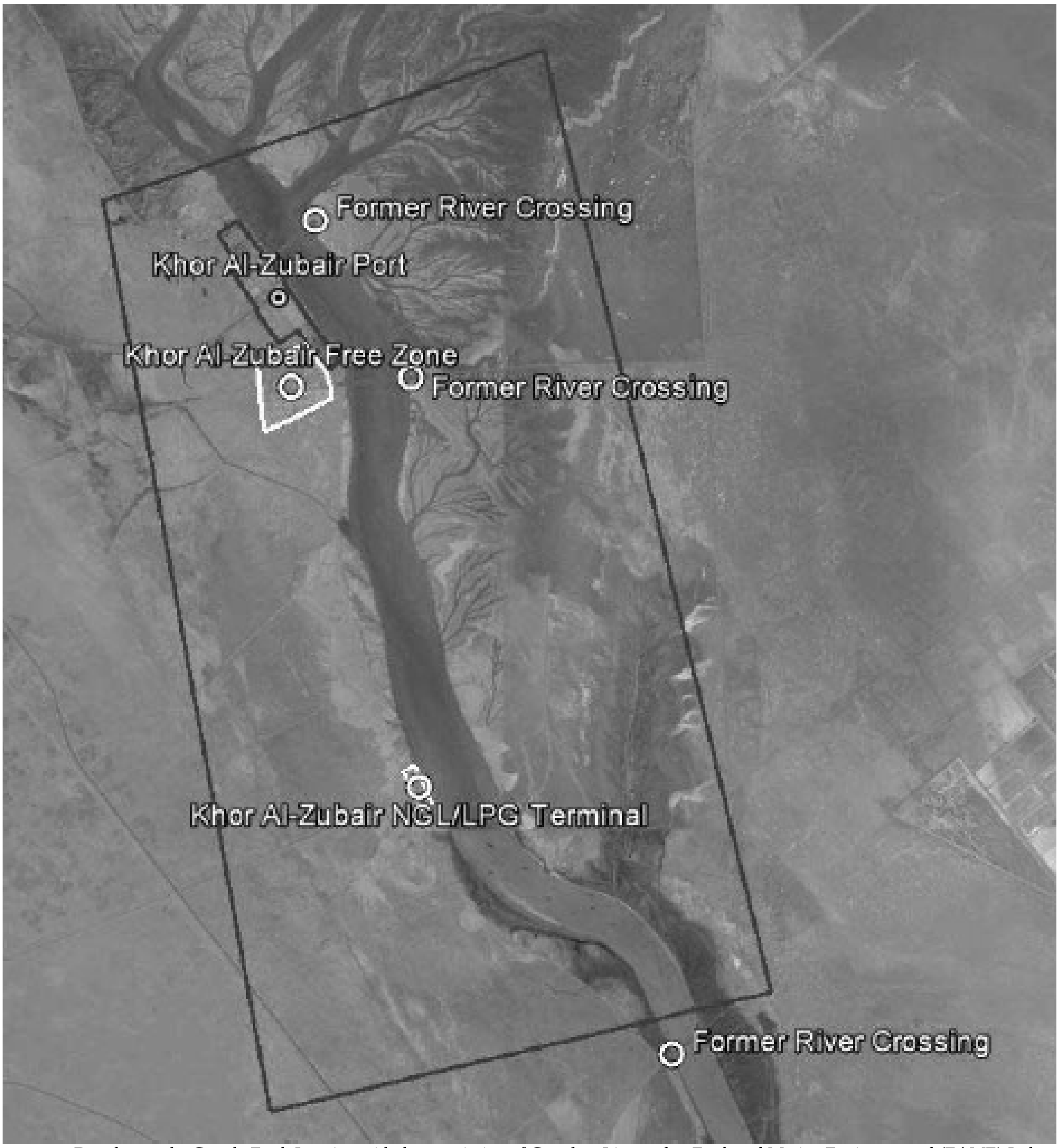
Photograph 2.4   SGC LPG/NGL Terminal

According to anecdotal evidence, prior to the Iraq – Iran War (and the construction of the KZP), at least three bridges were located across the Khor Al Zubayr.   Evidence of the bridgeheads was noted during the reconnaissance. Photographs of these bridgeheads are presented below and the locations are annotated in Figure 2.2.

Photograph 2.5   Former bridgehead located at Area A (eastern riverbank of the Khor Al Zubayr), also note the deposition of dredged material (see Section 2.4)

[3] http://www.basrahgas.com/about/company

Photograph 2.6 Former bridgehead located near Area B (eastern bank)



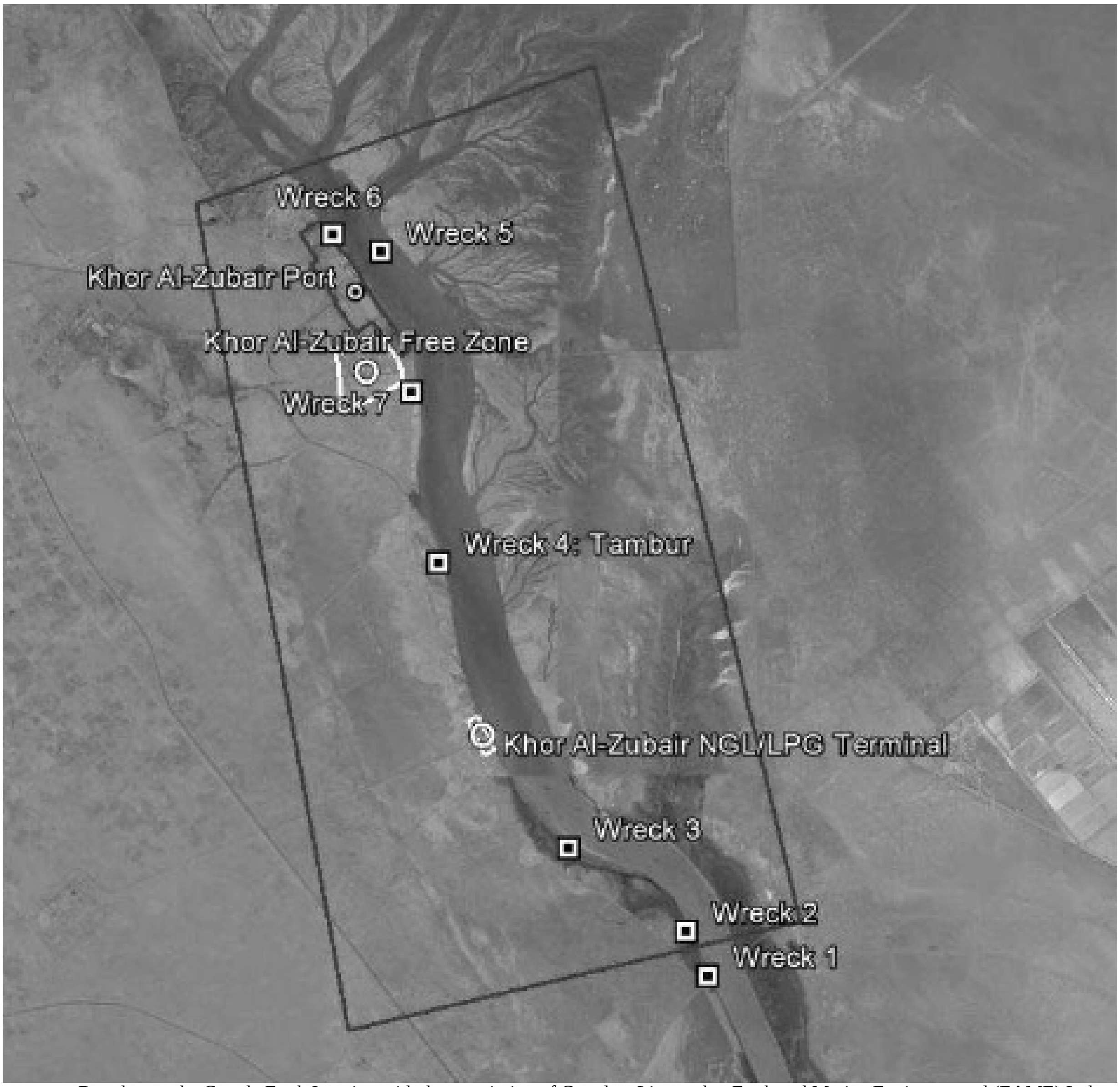
Source: Based upon the Google Earth Imaging with the permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 2.2 Location of the observed wrecks within the survey area

(2) SHIPWRECK LOCATIONS

The boat-based reconnaissance indicated there to be no major or large wrecks in the main channel any longer. Anecdotal evidence interviewed by reconnaissance team to Iraqi associates indicates that a number of these wrecks have been recently removed from the channel and during the reconnaissance a number of 'broken-up' wrecks were noted on the western riverbank.

In total, seven wrecks (in various pieces) were noted during the reconnaissance, all but one were located on the western riverbank. This exception was located in the main channel near to Area A. The location of the observed wrecks is depicted in Figure 2.3 with pertinent information provided in Table 2.2 overleaf.



Source: Based upon the Google Earth Imaging with the permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 2.3 Location of the Observed Wrecks within the Survey Area

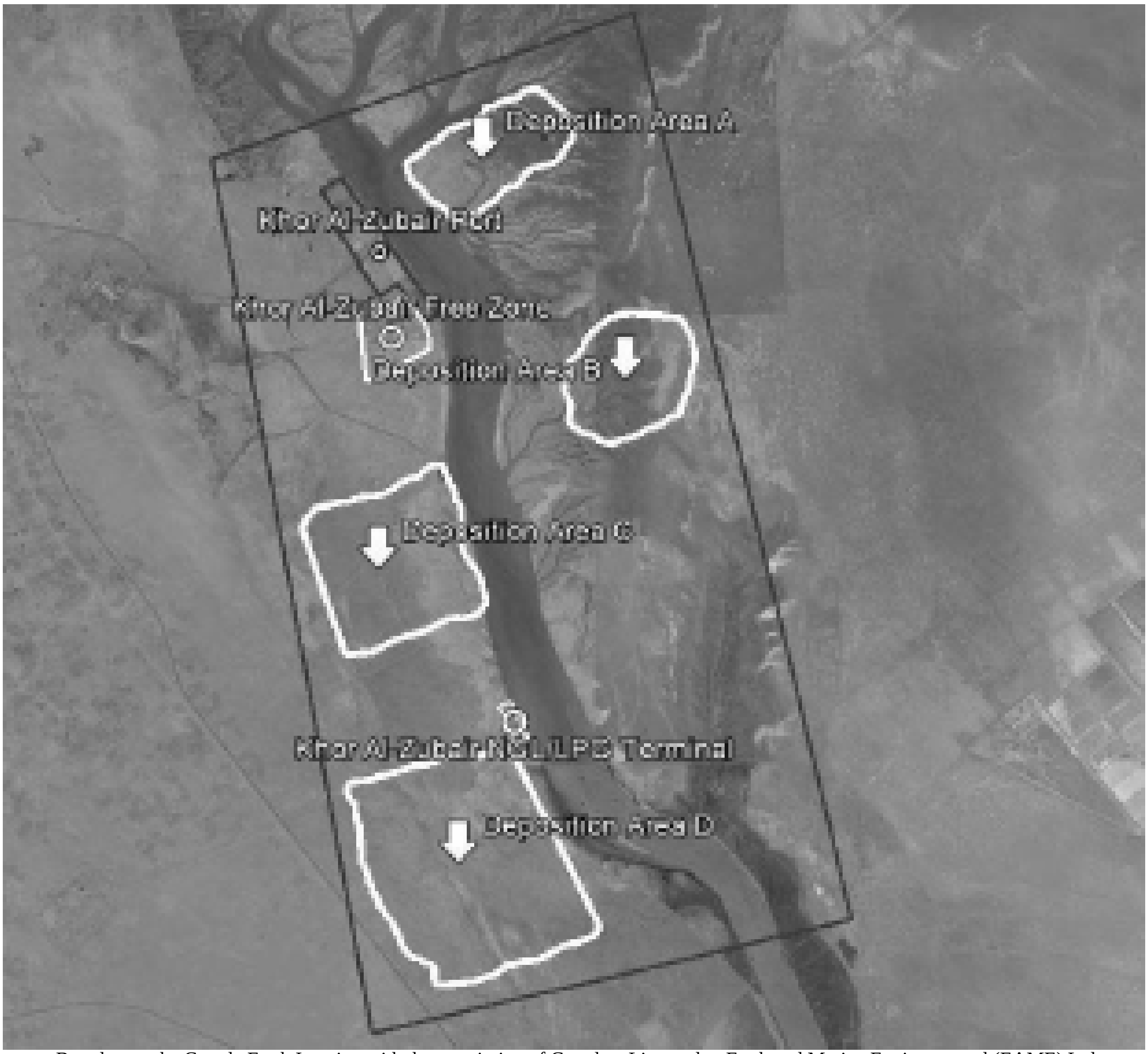
Table 2.2 Shipwrecks within Khor Al Zubayr

Wreck ID	Ship Name	Location and Other Details	Number of Pieces	Photograph
1	Unknown	Just outside the survey area, adjacent to the launch point of the reconnaissance boat Majority of the wreck is located outside the channel	1	
2	Possibly Palestine	Western Bank Two pieces in the channel and one on the river bank	3	
3	Possibly Palestine	Two pieces located predominantly in the river channel	2	
4	Tambur	Located in Area C Two pieces located on the riverbank and two in the channel itself	4	
5	Unknown	Close in Area A Two masts above water level	Unknown	 In the background is the former bridge head, scrap metal, military emplacements and buidings of Area A
				

(3) POTENTIAL AREAS OF DEPOSITION

The four potential areas of deposition were reconnoitred by boat and car in order to provide additional information. During the reconnaissance, evidence of previous deposition of dredged material was noted, including at potential Deposition Areas A and B.

Pertinent information is provided in Table 2.3 and annotated in Figure 2.4.



Source: Based upon the Google Earth Imaging with the permission of Google – Licensed to Earth and Marine Environmental (EAME) Ltd.

Figure 2.4 Location of the four areas of potential deposition

Table 2.3 Details of the Four Potential Areas of Deposition

Area	Approximate Size	Access	General Observations	Photographic Plate
Area A	3.3km^2	Limited, boat only	Military emplacements and buildings Potential for landmines, UXO and AXO Evidence of dredged material already emplaced Former bridgehead (see *Photograph 2.5*) Scrap metal on riverbank Large intertidal area	 *Area A:* Please note the military embankments and buildings, evidence of deposited dredged material and scrap metal on the riverbank
Area B	2.8km^2	No issues	Predominantly mudflats, large intertidal area Quite a distance from the main river channel Evidence of dredged material already emplaced	 *Area B:* View from the Khor Al-Zubair
Area C	5.9km^2	No issues	Wreck of the Tambur locate on-site (Wreck ID 4) Minimal intertidal area	 *Area C:* View of the foreshore, the wreck of the Tambur is located in the background  *Area C:* Inland view
Area D	8.6km^2	Limited, access road is patrolled by SOC and Oil Police. Area D observed from the river.	Adjacent to the SGC LPG terminal Evidence of dredged material deposition Minimal interaction area	 *Area D:* Please note the mounds of dredged material in the background

(4) INITIAL ECOLOGICAL ASSESSMENT OF THE FOUR POTENTIAL AREAS FOR DEPOSITION

Upon the initial reconnaissance, none of proposed areas of deposition appear to be ecologically diverse or sensitive. However, the potential exists for the intertidal (foreshore areas) to be sensitive, Areas A and B were observed to have significant areas of tidal interaction and likely that these areas will support birds (both migratory and resident), mudskippers, invertebrates and crustaceans. If deposition was to occur at these two areas, any ecological receptors will be smothered.

However, the Areas C and D appear to have limited intertidal zones as they support minimal coastal vegetation. In this situation, the ecological receptors likely to be affected are bird species and invertebrates should any deposition be undertaken, but the bird species would find similar alternative habitat on adjacent land parcels.

The ecological surveys of the four areas of potential deposition will provide additional information on each site's suitability for deposition.

B3. FIELD SURVEY DATES

The date of each individual survey is presented in Table 3.1 below:

Table 3.1 Field Survey Dates

Survey	Date
Soil Sampling of Potential Areas of Deposition	9th and 10th March 2012
Ecological Surveys	9th and 10th March 2012
Marine Sediment Sampling	10th March 2012
Low Tide Marine Water Sampling	10th March 2012
High Tide Marine Water Sampling	10th March 2012

Water samples were collected at the designated sample locations, at high and low tide. Due to the tidal conditions on the day of sampling, both the low and high tide sampling was undertaken on the same day (see Table 3.2).

Table 3.2 Tide Table of Sampling Day for Water Quality

Date	1st tide	2nd Tide	3rd Tide	4th Tide
Saturday 10th March 2012	1:30	8:05	13:55	20:30
	High tide	Low tide	High tide	Low tide

B4. RESULTS OF THE FIELD SURVEY

(1) WATER QUALITY

Data from MSC (Marine Science Center) 2009 survey[4] is compared if the parameter is applicable.

a. Physical Parameters Measured by Equipment

During the marine water sampling, the pH, temperature, conductivity (salinity) and dissolved oxygen (DO) of the samples was recorded on-board (see Table 4.1 and 4.2).
The coliform count was prepared at the end of the sampling and immediately placed in an incubator for 24 hours.

Table 4.1 Physical Parameters Measured by Equipment (at Low Tide)

Location	Depth (m)	Sample Time	pH	Temperature (°C)	Dissolved Oxygen (mg/l)	Conductivity (field result) (μs/cm)	Conductivity (lab result) (μs/cm)	Total Coliform
KZP01	Surface	10:45	8.47	14.9	7.4	>3,999	66,000	TNTC
KZP01	2.9		8.48	14.9	7.1	>3,999	67,000	TNTC
KZP02	Surface	10:35	8.45	14.9	6.7	>3,999	65,000	TNTC
KZP02	3.1		8.44	15.1	6.4	>3,999	65,000	TNTC
KZP03	Surface	10:15	8.51	14.8	6.0	>3,999	65,000	TNTC
KZP03	3.4		8.55	15.2	7.3	>3,999	68,000	TNTC
KZP04	Surface	10:00	8.5	14.8	7.3	>3,999	72,000	TNTC
KZP04	2.8		8.49	15.2	6.2	>3,999	72,000	TNTC
KZP05	Surface	9:50	8.43	14.7	7.5	>3,999	65,000	TNTC
KZP05	3.3		8.42	15.0	7.5	>3,999	70,000	TNTC
KZP06	Surface	9:25	8.43	15.0	7.1	>3,999	67,000	TNTC
KZP06	2.9		8.43	15.4	6.9	>3,999	67,000	TNTC
KZP07	Surface	9:10	8.42	15.1	6.8	>3,999	65,000	TNTC
KZP07	3.3		8.42	15.1	6.6	>3,999	64,000	TNTC
KZP08	Surface	8:55	8.43	14.6	6.7	>3,999	66,000	TNTC
KZP08	4.1		8.43	14	7.4	>3,999	64,000	TNTC
KPZ09	Surface	8:45	8.43	14.5	6.5	>3,999	68,000	TNTC
KZP09	3.6		8.41	15.4	6.4	>3,999	67,000	TNTC
KZP10	Surface	8:35	8.49	14.4	6.5	>3,999	67,000	TNTC
KZP10	3.8		8.46	14.8	7.3	>3,999	69,000	TNTC
KZP11	Surface	8:25	8.41	15.1	7.4	>3,999	66,000	TNTC
KZP11	4.9		8.46	15.2	6.5	>3,999	70,000	TNTC
KZP12	Surface	8:00	8.34	15.0	7.0	>3,999	62,000	TNTC
KZP12	3.5		8.39	15.4	6.5	>3,999	65,000	TNTC
Notes:								

TNTC = Too Numerous To Count

[4] Port Sector Rehabilitation Project marine Environmental Survey at Umm Qusr and Khor Al Zubair Ports -Final Report-, July 2009, Marine Science Center, University of Basrah

Table 4.2 Physical Parameters Measured by Equipment (at High Tide)

Location	Depth (m)	Sample Time	pH	Temperature (°C)	Dissolved Oxygen (mg/l)	Conductivity (field result)	Conductivity (lab result)	Total Coliform
						(µs/cm)	(µs/cm)	
KZP01	Surface	14:00	8.45	14.4	6.9	>3,999	64,000	TNTC
KZP01	7.7		8.46	14.6	6.6	>3,999	67,000	TNTC
KZP02	Surface	14:30	8.49	14.3	6.8	>3,999	63,000	TNTC
KZP02	7.8		8.46	14.2	6.5	>3,999	65,000	TNTC
KZP03	Surface	15:05	8.36	14.6	7	>3,999	65,000	TNTC
KZP03	8.4		8.4	14.9	6.6	>3,999	63,000	TNTC
KZP04	Surface	15:15	8.38	14.4	6.3	>3,999	64,000	TNTC
KZP04	7.6		8.39	14.3	5.8	>3,999	63,000	TNTC
KZP05	Surface	15:30	8.44	14.4	6.1	>3,999	66,000	TNTC
KZP05	8.1		8.39	14.1	6.2	>3,999	59,000	TNTC
KZP06	Surface	15:40	8.38	14.2	5.7	>3,999	65,000	TNTC
KZP06	7.7		8.38	14.1	5.7	>3,999	63,000	TNTC
KZP07	Surface	15:50	8.37	14.2	4.2	>3,999	65,000	TNTC
KZP07	8.3		8.37	14.2	4	>3,999	63,000	TNTC
KZP08	Surface	15:55	8.36	14.4	3.8	>3,999	64,000	TNTC
KZP08	9.3		8.36	14.1	4	>3,999	64,000	TNTC
KPZ09	Surface	16:00	8.36	14.1	3.8	>3,999	66,000	TNTC
KZP09	8.4		8.36	14	3.9	>3,999	77,000	TNTC
KZP10	Surface	16:10	8.3	14.1	3.7	>3,999	63,000	TNTC
KZP10	8.6		8.39	14.1	3.9	>3,999	64,000	TNTC
KZP11	Surface	16:25	8.37	14	4	>3,999	64,000	TNTC
KZP11	9.9		8.36	14.1	4	>3,999	64,000	TNTC
KZP12	Surface	16:40	8.36	14	3.4	>3,999	66,000	TNTC
KZP12	8.5		8.36	14	3.5	>3,999	63,000	TNTC
Notes:								

TNTC = Too Numerous To Count

The pH values measured in the field were all slightly alkaline and very consistent; between 8.30 – 8.55 pH.

The Khor Al-Zubair is an estuarine environment heavily influenced by the hypersaline Persian Gulf; this is confirmed by the conductivity measurements which were all beyond the capability of the field instrument. Conductivity testing at the laboratory shows a range of 59,000 to 77,000 µs/cm.

The dissolved oxygen concentrations and temperatures were consistently lower in the high tide measurements than the low tide; this is likely to be attributable to the influx of colder (and therefore less oxygenated) saline water entering the Khor Al-Zubair from the Persian Gulf.

With regards to any stratification of the water body, the deeper samples taken at low tide were slightly warmer than the surface samples suggesting that the surface layers are a more dynamic and fluid environment with more mixing occurring, whilst deeper in the water body, the environment is more stable and less prone to mixing. At high tide the situation was reversed with predominantly higher temperatures in the surface samples than the deeper samples, indicating widespread mixing in the whole water body. The higher temperature in the surface sample is likely to be related to the direct influence of the sun and the ambient air temperature.

Coliform bacteria, the number of observed gas bubbles associated with coliform bacterial growth, was observed to be ‘too numerous to count’ (TNTC) for all samples. Although the total coliform count does not differentiate between coliform types, i.e. innocuous coliforms and faecal coliforms (such as E.Coli), it would be expected that due to the lack of proper sanitation in Iraq, faecal coliforms are likely to represent a significant proportion of the overall coliform count. These elevated levels would, under the European Union (EU) guidance values, render the water as unsuitable for bathing (recreational swimming).

b. Suspended Solid

Comparing with Iraq standard (60mg/l, 1967), all data exceeds this guideline value. This is not, however, unexpected as the northern Persian Gulf is a active and dynamic, highly sedimentary environment.

Table 4.3 Survey Result (Suspended Solid, Unit: mg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	330	610	130 – 434
KZP01	Depth	610	590	254 - 623
KZP02	Surface	700	450	N/A
KZP02	Depth	630	550	N/A
KZP03	Surface	610	460	N/A
KZP03	Depth	690	470	N/A
KZP04	Surface	620	430	129 - 349
KZP04	Depth	640	450	248 - 807
KZP05	Surface	440	410	N/A
KZP05	Depth	670	440	N/A
KZP06	Surface	610	410	145 - 337
KZP06	Depth	640	460	291 - 711
KZP07	Surface	590	400	N/A
KZP07	Depth	640	390	N/A
KZP08	Surface	620	420	118 - 308
KZP08	Depth	890	470	209 - 681
KPZ09	Surface	700	140	N/A
KZP09	Depth	650	440	N/A
KZP10	Surface	590	420	118 - 521
KZP10	Depth	610	360	357 - 772
KZP11	Surface	590	340	N/A
KZP11	Depth	600	490	N/A
KZP12	Surface	540	520	121 - 466
KZP12	Depth	650	360	314 - 692

c. pH

The pH values were all slightly alkaline ranging 8.30 – 8.55 pH. The laboratory pH results were lower than the field results; the majority of the field results recorded neutral and slightly alkaline conditions, however three results were found to be slightly acidic, recording a maximum value of 6.7 pH. The discrepancy may be due to the microbial metabolism of organic acids or other chemical changes that occur through transport, processing, and handling (Latysh and Gordon, 2003[5]).

The Iraqi 1967 Water Quality Standards Law and the Canadian Marine Water Quality Guideline forthe Protection of Aquatic Life also states a pH guideline range, 6.5 – 8.5 pH and 7.0 -8.7 pH respectively. The survey results are in the rage.

[5] Investigation of Differences between Field and Laboratory pH Measurements of National Atmosphere Deposition Program/National Trends Network Precipitation Samples, N. Latysh and J. Gordon, Water, Air and Soil Pollution, Volume 154, 249 - 270, 2003

Table 4.4 Survey Result (pH, Unit: -)

Location	Depth	Low Tide Data		High Tide Data		MSC 2009 Data
		Field Result	Lab Result	Field Result	Lab Result	
KZP01	Surface	8.47	6.9	8.45	7.5	7.90 - 8.23
KZP01	Depth	8.48	7.4	8.46	7.4	7.91 – 8.23
KZP02	Surface	8.45	7.2	8.49	7.5	N/A
KZP02	Depth	8.44	7	8.46	7.1	N/A
KZP03	Surface	8.51	6.9	8.36	7.2	N/A
KZP03	Depth	8.55	7.6	8.4	7.4	N/A
KZP04	Surface	8.5	7.7	8.38	7.7	7.88 – 8.20
KZP04	Depth	8.49	7.1	8.39	6.9	7.89 – 8.20
KZP05	Surface	8.43	7.4	8.44	7.5	N/A
KZP05	Depth	8.42	7.6	8.39	7.9	N/A
KZP06	Surface	8.43	7.6	8.38	7.7	7.91 - 8.21
KZP06	Depth	8.43	7.4	8.38	7.9	7.91 - 8.18
KZP07	Surface	8.42	6.7	8.37	7	N/A
KZP07	Depth	8.42	7.2	8.37	6.5	N/A
KZP08	Surface	8.43	7.4	8.36	7.9	7.96 - 8.17
KZP08	Depth	8.43	7.6	8.36	7.7	8.01 - 8.16
KPZ09	Surface	8.43	7.1	8.36	6.6	N/A
KZP09	Depth	8.41	7.7	8.36	7.5	N/A
KZP10	Surface	8.49	7.1	8.3	7.4	8.01 - 8.17
KZP10	Depth	8.46	7.6	8.39	7.5	8.05 - 8.16
KZP11	Surface	8.41	7.3	8.37	7.4	N/A
KZP11	Depth	8.46	7.4	8.36	7.8	N/A
KZP12	Surface	8.34	7.6	8.36	6.6	8.03 – 8.20
KZP12	Depth	8.39	7	8.36	7.4	8.01 – 8.26

d.

e. Biological Oxygen Demand (BOD)

Majority of the high tide samples showed below the limit of detection of the laboratory method. This indicates a very low, or absence, of biologically active organic pollutants in the water. BOD at low tide was generally slightly higher (maximum 6.1mg/l) but all of the samples were well below the 1967 Water Quality Standards of <40mg/l, suggesting a relatively unpolluted water body.

Table 4.5 Survey Result (BOD, Unit: mg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	3.6	4	15.0 – 69.0
KZP01	Depth	3.4	6.6	12.1 – 41.0
KZP02	Surface	3.6	<3.0	N/A
KZP02	Depth	<3.0	3.2	N/A
KZP03	Surface		<3.0	N/A
KZP03	Depth	3.3	3.5	N/A
KZP04	Surface	<3.0	<3.0	12.9 – 25.0
KZP04	Depth	3.2	<3.0	10.9 – 38.0
KZP05	Surface	3.1	<3.0	N/A
KZP05	Depth	3.4	<3.0	N/A
KZP06	Surface	3.2	<3.0	12.0 – 29.8
KZP06	Depth	3.7	<3.0	10.0 – 32.0
KZP07	Surface	4.9	<3.0	N/A
KZP07	Depth	4.8	<3.0	N/A
KZP08	Surface	<3.0	<3.0	12.2 – 58.2
KZP08	Depth	5.4	<3.0	10.7 – 26.0
KPZ09	Surface	4.7	<3.0	N/A

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP09	Depth	6.1	<3.0	N/A
KZP10	Surface	5.1	<3.0	10.3 – 49.3
KZP10	Depth	5.3	<3.0	13.5 – 36.5
KZP11	Surface	5.3	<3.0	N/A
KZP11	Depth	5.5	<3.0	N/A
KZP12	Surface	3.4	<3.0	10.0 – 42.9
KZP12	Depth	4.2	<3.0	12.7 – 38.2

f. Total nitrogen

All of the samples from this survey were significantly below the average seawater total nitrogen concentration (15.5 mg/l[6]), the United States Environmental Protection Agency's (US EPA) drinking water guideline value for nitrate (10 mg/l) and the WHO guideline value for nitrate (50 mg/l).

The high tide samples obtained from KZP06, KZP07 and KZP08 showed higher concentrations than the other samples. These higher concentrations may be due to the effluent discharge channel from the nearby fertilizer plant, which is located in the vicinity of sampling points KZP06 – KZP08.

Table 4.6 Survey Result (Total Nitrogen, Unit: mg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	1.3	0.8	14.0 – 56.0
KZP01	Depth	1.9	0.7	14.0 – 84.0
KZP02	Surface	1.4	0.8	N/A
KZP02	Depth	0.7	0.9	N/A
KZP03	Surface	1.1	0.8	N/A
KZP03	Depth	1.2	0.8	N/A
KZP04	Surface	0.7	0.6	14.0 – 98.0
KZP04	Depth	1	0.5	14.0 – 84.0
KZP05	Surface	0.5	1	N/A
KZP05	Depth	0.5	1	N/A
KZP06	Surface	0.7	7	14.0 – 70.0
KZP06	Depth	0.7	1.6	14.0 – 70.0
KZP07	Surface	0.5	4.1	N/A
KZP07	Depth	0.7	4.4	N/A
KZP08	Surface	0.5	2.6	14.0 – 70.0
KZP08	Depth	0.6	2.9	14.0 – 56.0
KPZ09	Surface	0.6	1.5	N/A
KZP09	Depth	0.9	0.8	N/A
KZP10	Surface	0.6	1.4	14.0 – 56.0
KZP10	Depth	0.7	1.2	14.0 – 70.0
KZP11	Surface	0.6	1.8	N/A
KZP11	Depth	0.8	1.2	N/A
KZP12	Surface	0.7	1.9	14.0 – 112.0
KZP12	Depth	0.9	1.5	14.0 – 84.0

g. Total Phosphorous

Eighteen samples out of the twenty-four samples were found to have a higher contaminant concentration at low tide than at high tide suggesting that the influx of additional seawater at high tide dilutes, and lowers, the total phosphate concentration.

There does not appear to be an appropriate Iraqi, WHO or US EPA guideline value for total phosphate, however, according to Karl (1976)[6], a typical phosphate value of seawater is 88 µg/l, however, it should

[6] Oceans, K. Karl, Prentice-Hall, 1976

be noted that this value is related to salinity. The majority of the samples were elevated above this concentration, suggesting nutrient-enriched waters, which is likely to be related to nearby industry, partially treated and untreated sewage in the channel, erosion and sedimentation and run-off of chemicals from agricultural sites.

As with total nitrogen, the results from 2009 were higher than the 2012 dataset; suggesting an improvement in water quality, or less of an influence from anthropogenic inputs such as the fertilizer plant was evident during this survey.

Table 4.7 Survey Result (Total Phosphorous, Unit: μg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	140	330	2,030 – 24,960
KZP01	Depth	64	120	2,420 – 29,100
KZP02	Surface	120	54	N/A
KZP02	Depth	88	380	N/A
KZP03	Surface	96	57	N/A
KZP03	Depth	180	110	N/A
KZP04	Surface	120	74	2,130 – 8,250
KZP04	Depth	180	95	2,650 – 15,210
KZP05	Surface	68	70	N/A
KZP05	Depth	220	120	N/A
KZP06	Surface	120	91	1,440 – 16,130
KZP06	Depth	220	150	1,820 – 26,050
KZP07	Surface	66	77	N/A
KZP07	Depth	250	75	N/A
KZP08	Surface	150	130	2,430 – 27,430
KZP08	Depth	300	70	3,630 – 19,990
KPZ09	Surface	150	<30	N/A
KZP09	Depth	250	68	N/A
KZP10	Surface	120	120	1,310 – 14,880
KZP10	Depth	120	170	3,270 – 23,920
KZP11	Surface	110	<30	N/A
KZP11	Depth	130	70	N/A
KZP12	Surface	110	<30	3,720 – 47,300
KZP12	Depth	190	39	1,980 – 32,640

h. Oil and Grease

The concentration of oil and grease was determined by analyzing the samples for Total Petroleum Hydrocarbons (TPH).

No hydrocarbons were found above the analytical detection limit in any of the samples, this suggests the area is a generally unpolluted water body (as far as oil based products are concerned).

Table 4.8 Survey Result (TPH, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	<10	<10	0.599 - 4.498
KZP01	Depth	<10	<10	0.538 – 4.979
KZP02	Surface	<10	<10	N/A
KZP02	Depth	<10	<10	N/A
KZP03	Surface	<10	<10	N/A
KZP03	Depth	<10	<10	N/A
KZP04	Surface	<10	<10	0.569 – 3.341
KZP04	Depth	<10	<10	0.613 – 5.853
KZP05	Surface	<10	<10	N/A
KZP05	Depth	<10	<10	N/A
KZP06	Surface	<10	<10	1.067 – 2.696
KZP06	Depth	<10	<10	1.031 – 6.140
KZP07	Surface	<10	<10	N/A
KZP07	Depth	<10	<10	N/A
KZP08	Surface	<10	<10	0.661 – 3.260
KZP08	Depth	<10	<10	1.083 – 7.241
KPZ09	Surface	<10	<10	N/A
KZP09	Depth	<10	<10	N/A
KZP10	Surface	<10	<10	0.960 – 7.298
KZP10	Depth	<10	<10	0.960 - 8.787
KZP11	Surface	<10	<10	N/A
KZP11	Depth	<10	<10	N/A
KZP12	Surface	<10	<10	1.261 – 5.368
KZP12	Depth	<10	<10	1.828 – 8.798

i. Cyanides

Cyanide was not found above the laboratory detection limit.
During the 2009 survey elevated concentrations of cyanide were recorded, with a maximum concentration of 950µg/l recorded from the deep sample at KZP04. Cyanides are often used as an insecticide for fumigating ships and the removal of wrecks since the 2009 survey may indicate a possible reason for the decrease in cyanide concentrations.

Table 4.9 Survey Result (Cyanides, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	<10	<10	ND – 316
KZP01	Depth	<10	<10	ND – 675
KZP02	Surface	<10	<10	N/A
KZP02	Depth	<10	<10	N/A
KZP03	Surface	<10	<10	N/A
KZP03	Depth	<10	<10	N/A
KZP04	Surface	<10	<10	ND – 341
KZP04	Depth	<10	<10	41 – 950
KZP05	Surface	<10	<10	N/A
KZP05	Depth	<10	<10	N/A
KZP06	Surface	<10	<10	60 - 460
KZP06	Depth	<10	<10	ND – 280
KZP07	Surface	<10	<10	N/A
KZP07	Depth	<10	<10	N/A
KZP08	Surface	<10	<10	ND - 315
KZP08	Depth	<10	<10	ND – 290
KPZ09	Surface	<10	<10	N/A
KZP09	Depth	<10	<10	N/A

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP10	Surface	<10	<10	3 – 440
KZP10	Depth	<10	<10	ND – 525
KZP11	Surface	<10	<10	N/A
KZP11	Depth	<10	<10	N/A
KZP12	Surface	<10	<10	ND - 270
KZP12	Depth	<10	<10	ND – 401

j. Arsenic

All samples were be below the 1967 Iraqi Water Quality Standards (50 µg/l), the Canadian Marine Water Quality Guideline for the Protection of Aquatic Life (12.5 µg/l) and the WHO drinking water guideline (10 µg/l).

Arsenic is known to be released into the environment during ship-scrapping and despite the large number of known wrecks in the Khor Al-Zubair; the scrapping does not appear to have released a significant loading of arsenic.

Arsenic is also used as an insecticide and pesticide, and the low concentrations do not indicate a significant issue with run-off from agricultural land.

Table 4.10 Survey Result (Arsenic, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	2.5	<1.1	22 – 729
KZP01	Depth	3.8	<1.1	124 – 746
KZP02	Surface	3.2	2.6	N/A
KZP02	Depth	<1.1	2.2	N/A
KZP03	Surface	3.2	3	N/A
KZP03	Depth	1.7	3.1	N/A
KZP04	Surface	2.8	1.7	86 - 633
KZP04	Depth	3.9	<1.1	ND – 601
KZP05	Surface	4.9	<1.1	N/A
KZP05	Depth	4.2	<1.1	N/A
KZP06	Surface	2.4	4.1	ND – 534
KZP06	Depth	<1.1	2.3	ND – 796
KZP07	Surface	2.9	1.6	N/A
KZP07	Depth	3.7	1.1	N/A
KZP08	Surface	4.4	2.9	23 - 752
KZP08	Depth	3	2.1	ND – 682
KPZ09	Surface	3.7	3.9	N/A
KZP09	Depth	1.4	2.3	N/A
KZP10	Surface	2.3	3.5	48 - 665
KZP10	Depth	4.1	<1.1	ND - 664
KZP11	Surface	3.9	<1.1	N/A
KZP11	Depth	1.8	<1.1	N/A
KZP12	Surface	3.5	<1.1	15 – 454
KZP12	Depth	2	<1.1	61 – 724

k. Cadmium

Cadmium is a heavy metal used as a pigment and in corrosion resistant plating on steel; furthermore, on a smaller-scale, domestic sewage and wastes may be a significant source.
Cadmium was not found above the laboratory detection limit, the 1967 Iraqi Water Quality Standard for cadmium (10µg/l) or the WHO drinking water guideline value (3 µg/l).

According to the UNEP Regional Seas Reports and Studies 112 – State of the Marine Environment in the ROPME Sea Area[7], mean cadmium levels of 0.2µg/l with a range of 0.1 - 0.4µg/l have been observed in the north-west Persian Gulf.
A comparison of the 2009 and 2012 datasets shows higher concentrations were recorded in 2009. This may be due to the removal (and potential burial) of wrecks since the first survey.

Table 4.11 Survey Result (Cadmium, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	<0.1	<0.1	ND – 988
KZP01	Depth	<0.1	<0.1	ND – 784
KZP02	Surface	<0.1	<0.1	N/A
KZP02	Depth	<0.1	<0.1	N/A
KZP03	Surface	<0.1	<0.1	N/A
KZP03	Depth	<0.1	<0.1	N/A
KZP04	Surface	<0.1	<0.1	ND – 823
KZP04	Depth	<0.1	<0.1	ND – 873
KZP05	Surface	<0.1	<0.1	N/A
KZP05	Depth	<0.1	<0.1	N/A
KZP06	Surface	<0.1	<0.1	49 - 899
KZP06	Depth	<0.1	<0.1	127 – 873
KZP07	Surface	<0.1	<0.1	N/A
KZP07	Depth	<0.1	<0.1	N/A
KZP08	Surface	<0.1	<0.1	137 – 643
KZP08	Depth	<0.1	<0.1	ND - 938
KPZ09	Surface	<0.1	<0.1	N/A
KZP09	Depth	<0.1	<0.1	N/A
KZP10	Surface	<0.1	<0.1	ND - 673
KZP10	Depth	<0.1	<0.1	ND - 980
KZP11	Surface	<0.1	<0.1	N/A
KZP11	Depth	<0.1	<0.1	N/A
KZP12	Surface	<0.1	<0.1	ND - 676
KZP12	Depth	<0.1	<0.1	34 – 748

l. Hexavalent Chromium

Hexavalent chromium was not found above the laboratory detection limit nor above the 1967 Iraq Water Quality Standard (10 µg/l) and the WHO drinking water guideline (50 µg/l).

Hexavalent chromium is used as an anti-corrosion coating as well as in the manufacturing of stainless steel and other alloys.
A comparison between the 2009 and 2012 datasets indicates a much higher concentration of hexavalent chromium in 2009 than 2012.

[7] State of the Marine Environment in the ROPME Sea Area, UNEP Regional Seas Reports and Studies 112, O. Linden et al, 1990

Table 4.12 Survey Result (Hexavalent Chromium, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	<5	<5	77 – 893
KZP01	Depth	<5	<5	125 – 787
KZP02	Surface	<5	<5	N/A
KZP02	Depth	<5	<5	N/A
KZP03	Surface	<5	<5	N/A
KZP03	Depth	<5	<5	N/A
KZP04	Surface	<5	<5	68 – 703
KZP04	Depth	<5	<5	ND – 781
KZP05	Surface	<5	<5	N/A
KZP05	Depth	<5	<5	N/A
KZP06	Surface	<5	<5	193 - 832
KZP06	Depth	<5	<5	91 – 814
KZP07	Surface	<5	<5	N/A
KZP07	Depth	<5	<5	N/A
KZP08	Surface	<5	<5	83 – 873
KZP08	Depth	<5	<5	ND – 810
KPZ09	Surface	<5	<5	N/A
KZP09	Depth	<5	<5	N/A
KZP10	Surface	<5	<5	112 – 844
KZP10	Depth	<5	<5	98 – 748
KZP11	Surface	<5	<5	N/A
KZP11	Depth	<5	<5	N/A
KZP12	Surface	<5	<5	ND - 787
KZP12	Depth	<5	<5	120 – 878

m.

n. Lead

Lead is a heavy metal and due to its high density and resistance from corrosion it is used for ballast and to paint metal structures (such as bridges) and ships. Therefore, the potential exists for lead contamination within the Khor Al-Zubair as a result of the shipwrecks as well as the known metal structures, such as the former bridgehead.
Lead was not found above the laboratory detection limit in any of the samples collected during low tide and in twenty out of the twenty-four samples collected at high tide. The four samples exceeding the detection limit with a maximum concentration of 2.1µg/l were below any relevant guideline values; the 1967 Iraq Water Quality Standard (100 µg/l) and the WHO drinking water guideline (10 µg/l). According to the UNEP Regional Seas Reports and Studies 112, mean lead levels of 2.2µg/l and a range of 1 µg/l to 3.7µg/l have been observed in the north-west Persian Gulf.

A comparison between the 2009 and 2012 datasets indicates a much higher concentration of lead in 2009 than 2012.

Table 4.13 Survey Result (Lead, Unit: µg/l)

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP01	Surface	<1.0	2.1	999 – 9,901
KZP01	Depth	<1.0	<1.0	1,202 – 10,287
KZP02	Surface	<1.0	<1.0	N/A
KZP02	Depth	<1.0	<1.0	N/A
KZP03	Surface	<1.0	<1.0	N/A
KZP03	Depth	<1.0	<1.0	N/A
KZP04	Surface	<1.0	<1.0	ND – 12,210
KZP04	Depth	<1.0	<1.0	ND – 12,090
KZP05	Surface	<1.0	<1.0	N/A

Location	Depth	Low Tide Data	High Tide Data	MSC 2009 Data
KZP05	Depth	<1.0	<1.0	N/A
KZP06	Surface	<1.0	<1.0	ND – 9,123
KZP06	Depth	<1.0	<1.0	ND – 10,298
KZP07	Surface	<1.0	<1.0	N/A
KZP07	Depth	<1.0	1.5	N/A
KZP08	Surface	<1.0	1	ND – 9,116
KZP08	Depth	<1.0	<1.0	ND – 9,910
KPZ09	Surface	<1.0	1.9	N/A
KZP09	Depth	<1.0	<1.0	N/A
KZP10	Surface	<1.0	<1.0	ND – 12,981
KZP10	Depth	<1.0	<1.0	ND – 9,986
KZP11	Surface	<1.0	<1.0	N/A
KZP11	Depth	<1.0	<1.0	N/A
KZP12	Surface	<1.0	<1.0	2,001 – 11,279
KZP12	Depth	<1.0	1.8	ND – 9,309

o. Mercury

Mercury was not found in excess of the laboratory detection limit in twenty-one of the twenty-four samples submitted for analysis. The three samples found to contain detectable mercury levels were all collected at low tide, indicating that the influx of sea water at high tide provides dilution or different levels of mixing of the freshwater and seawater bodies in the channel.
None of the samples were found to exceed the 6 µg/l WHO drinking water guideline. According to the UNEP Regional Seas Reports and Studies 112, mean mercury levels of 0.09µg/l with a range of 0.1 to 0.428 µg/l have been observed in the north-west Persian Gulf.

The levels observed in this study, whilst higher than this, are not in themselves a cause for concern. The source of these elevated levels is likely to relate to industry along the Khor AlZubair and, potentially, the shipwrecks within the channel.

Table 4.14 Survey Result (Mercury, Unit: µg/l)

Location	Depth	Low Tide	High Tide
KZP01	Surface	<0.5	<0.5
KZP01	Depth	<0.5	<0.5
KZP02	Surface	0.9	<0.5
KZP02	Depth	<0.5	<0.5
KZP03	Surface	<0.5	<0.5
KZP03	Depth	<0.5	<0.5
KZP04	Surface	0.6	<0.5
KZP04	Depth	<0.5	<0.5
KZP05	Surface	<0.5	<0.5
KZP05	Depth	<0.5	<0.5
KZP06	Surface	<0.5	<0.5
KZP06	Depth	<0.5	<0.5
KZP07	Surface	<0.5	<0.5
KZP07	Depth	0.6	<0.5
KZP08	Surface	<0.5	<0.5
KZP08	Depth	<0.5	<0.5
KPZ09	Surface	<0.5	<0.5
KZP09	Depth	<0.5	<0.5
KZP10	Surface	<0.5	<0.5
KZP10	Depth	<0.5	<0.5
KZP11	Surface	<0.5	<0.5
KZP11	Depth	<0.5	<0.5
KZP12	Surface	<0.5	<0.5
KZP12	Depth	<0.5	<0.5

p. Total PCBs

No PCBs were found above the laboratory detection limit.

PCBs were widely used as dielectric and coolant fluids in such machinery as electric motors, transformers and capacitors. As a result of the shipwrecks in the channel, PCB contamination is a potential issue, however, the data set indicates that PCB contamination does not exist at the survey stations. It should be noted that this does not mean that contamination hotspots do not exist elsewhere in the Khor Al-Zubair.

Table 4.15 Survey Result (Total PCBs, Unit: μg/l)

Location	Depth	Low Tide	High Tide
KZP01	Surface	<7.0	<7.0
KZP01	Depth	<7.0	<7.0
KZP02	Surface	<7.0	<7.0
KZP02	Depth	<7.0	<7.0
KZP03	Surface	<7.0	<7.0
KZP03	Depth	<7.0	<7.0
KZP04	Surface	<7.0	<7.0
KZP04	Depth	<7.0	<7.0
KZP05	Surface	<7.0	<7.0
KZP05	Depth	<7.0	<7.0
KZP06	Surface	<7.0	<7.0
KZP06	Depth	<7.0	<7.0
KZP07	Surface	<7.0	<7.0
KZP07	Depth	<7.0	<7.0
KZP08	Surface	<7.0	<7.0
KZP08	Depth	<7.0	<7.0
KPZ09	Surface	<7.0	<7.0
KZP09	Depth	<7.0	<7.0
KZP10	Surface	<7.0	<7.0
KZP10	Depth	<7.0	<7.0
KZP11	Surface	<7.0	<7.0
KZP11	Depth	<7.0	<7.0
KZP12	Surface	<7.0	<7.0
KZP12	Depth	<7.0	<7.0

(2) SEDIMENT QUALITY

a. Physical Observation

Table 4.16 Survey Result (Physical Observation)

Location	Temp. (°C)	Munsell Colour Chart	Lithological Description
KZP01	14.3	10YR 4/1 Dark grey	Grey-brown silty CLAY
KZP02	14.2	5Y 4/2 Olive grey	Grey – brown SILT
KZP03	14.9	5Y 3/2 Dark olive grey	Grey - brown clayey SILT
KZP04	14.8	5Y 5/1 Grey	Light brown clayey SILT with occasional shell fragments
KZP05	14.8	10YR 4/2 Dark greyish brown	Brown – grey slightly clayey SILT
KZP06	14.5	2.5YR 4/2 Dark grayish brown	Light brown to light grey clayey SILT
KZP07	14.6	5Y 5/2 Olive grey	Grey – light brown SILT
KZP08	14.2	5Y 5/2 Olive grey	Brown - grey SILT
KZP09	15	5Y 5/2 Olive grey	Grey – brown silty CLAY
KZP10	14.2	7.5YR 5/2 Brown	Brown – grey clayey SILT with occasional sand lenses
KZP11	15	10YR 5/3 Brown	Brown – reddish brown slightly silty loose medium SAND with occasional shell fragments
KZP12	14	5Y 4/1 Dark grey	Grey – brown clayey SILT

b. Water Content

The water content of the samples ranged from 28% (KZP08) to 39% (KZP02).

Table 4.17 Survey Result (Water Content, Unit: %)

Location	Water Content (%)
KZP01	31
KZP02	39
KZP03	35
KZP04	29
KZP05	38
KZP06	33
KZP07	32
KZP08	28
KPZ09	32
KZP10	35
KZP11	30
KZP12	36

c. Particle Size Distribution

The dominant lithological condition of the samples was reported as silty CLAY.
This correlates with data obtained by MSC in 2009, where the dominant lithology was also reported as silty CLAY.

Table 4.18 Survey Result (Particle Size Distribution)

(Unit: %)

Location	Description	Cobbles	Gravel	Sand	Silt	Clay
KZP01	Very soft grey/dark grey silty CLAY with occasional shell fragments.	0	3.5	6	49.3	41.2
KZP02	Brown silty CLAY.	0	0	0.9	66	33.2
KZP03	Soft grey brown silty CLAY	0	0	0.8	55.3	44
KZP04	Soft grey brown silty CLAY with occasional shell fragments.	0	8.3	6.9	48.4	36.4
KZP05	Soft grey brown CLAY with occasional shell fragments.	0	0.4	6.8	49	43.8
KZP06	Soft brown silty CLAY.	0	0	4.2	54.4	41.5
KZP07	Soft grey silty CLAY with occasional shell fragments.	0	1.5	6.8	50.3	41.4
KZP08	Soft brown fine sandy silty CLAY.	0	0.2	44.6	32.9	22.4
KPZ09	Soft grey brown fine sandy clayey SILT.	0	0	14.1	64.5	21.4
KZP10	Soft brown grey silty CLAY.	0	1.2	2.7	51	45.1
KZP11	Soft grey silty CLAY.	0	0.4	3.3	47	49.3
KZP12	Soft brown fine sandy silty CLAY.	0	0	13.5	47.6	38.9

d. Total Organic Carbon (TOC)

TOC content in sediment can be used as an indicator of pollution and eutrophication rate, with high TOC values attributable to either excessive plant debris or anthropogenic loading.

The TOC content varied from <0.1% (KZP12) to 1.1% (KZP09). The low TOC values indicate potentially low nutrient (nitrogen and phosphorus) loadings within the river system.

Table 4.19 Survey Result (TOC)

Location	TOC (%)
KZP01	0.5
KZP02	0.6
KZP03	0.6
KZP04	0.5

Location	TOC (%)
KZP05	0.7
KZP06	0.7
KZP07	0.6
KZP08	0.6
KPZ09	1.1
KZP10	0.6
KZP11	0.6
KZP12	<0.1

e. Oil (Total Petroleum Hydrocarbon)

The concentration of oil was not recorded above the laboratory's limit. This is not indicative of a polluted river bed. This accords with the field observations as no evidence of hydrocarbon contamination was noted. Evidently petroleum hydrocarbons were observed during the MSC 2009 survey, but the levels observed are not a cause for concern.

Table 4.20 Survey Result (TPH, Unit: mg/kg)

Location	TPH	MSC 2009 Survey
KZP01	<50	13.7
KZP02	<50	N/A
KZP03	<50	N/A
KZP04	<50	11.17
KZP05	<50	N/A
KZP06	<50	12.06
KZP07	<50	N/A
KZP08	<50	17.46
KPZ09	<50	N/A
KZP10	<50	14.44
KZP11	<50	N/A
KZP12	<50	11.84

f. Phenol

The concentration of phenol was not recorded above the laboratory's limit. This is indicative of an unpolluted river bed.

Table 4.21 Survey Result (Phenol)

Location	Phenol (mg/kg)
KZP01	<2.0
KZP02	<2.0
KZP03	<2.0
KZP04	<2.0
KZP05	<2.0
KZP06	<2.0
KZP07	<2.0
KZP08	<2.0
KPZ09	<2.0
KZP10	<2.0
KZP11	<2.0
KZP12	<2.0

g. Total Nitrogen

The results for the majority of the samples recorded low (between 0.9 and 1.5 mg/kg). However, two samples, KZP08 and KZP11 were found to have significantly higher results, 280 mg/kg and 190 mg/kg respectively. There is no relevant guideline value for total nitrogen in sediment, however, the two elevated samples are indicative of a potentially polluted environment. High concentrations of total nitrogen are, in conjunction with other factors, often associated with algal blooms, as well as dense aquatic plant growth. Sample point KZ08 is located in the vicinity of the effluent discharge channel from the nearby fertilizer plant and also recorded an elevated concentration of total nitrogen in the high tide water sample.

Table 4.22 Survey Result (Total Nitrogen)

Location	Total Nitrogen (mg/kg)
KZP01	1.1
KZP02	1
KZP03	1.5
KZP04	1.3
KZP05	1.1
KZP06	0.9
KZP07	1.1
KZP08	280
KPZ09	1
KZP10	1.1
KZP11	190
KZP12	1

h. Total Phosphorous

The total phosphorus concentrations recorded were very similar between the sampling points, ranging between 410 – 490 mg/kg. The concentrations of total phosphorus are significantly higher than the total nitrogen concentrations. However, the concentration of phosphate in the 10cm surface layer of sediments can amount to 80 – 90% of the total concentration in the ecosystem[8]. Given this and the low TOC results the overall nutrient loading within the sediment appears to be low and therefore, the concentrations of total phosphorus are not considered to be of concern.

Table 4.23 Survey Result (Total Phosphorus)

Location	Total Phosphorus (mg/kg)
KZP01	450
KZP02	480
KZP03	490
KZP04	430
KZP05	460
KZP06	450
KZP07	420
KZP08	410
KPZ09	460
KZP10	430
KZP11	410
KZP12	450

[8] Phosphorus and its Bioavailable Fractions in the Sediments of Different Trophic States, Wyd. UMK Torun, A Kentzer, 2001

i. Total Surphur

The total sulphur concentration ranged between 2,300 – 4,800 mg/kg. No relevant baseline data has been identified for the project area, nor relevant guideline values with which to evaluate the data. The presence of sulphur will be largely due to natural sources but anthropogenic sources such as wastewater and atmospheric deposition may also be a contributor.

Table 4.24 Survey Result (Total Surphur)

Location	Total Sulphur (mg/kg)
KZP01	2,600
KZP02	2,300
KZP03	2,700
KZP04	3,500
KZP05	2,900
KZP06	2,900
KZP07	3,400
KZP08	3,400
KPZ09	4,800
KZP10	3,700
KZP11	4,300
KZP12	3,400

j. Cyanide

The concentration of cyanide was not recorded above the laboratory's limit of detection. The concentrations recorded in 2009 were also very low. This is indicative of an unpolluted river bed.

Table 4.25 Survey Result (Cyanide, Unit: mg/kg)

Location	Cyanide	MSC 2009 Survey
KZP01	<0.1	0.008
KZP02	<0.1	N/A
KZP03	<0.1	N/A
KZP04	<0.1	0.088
KZP05	<0.1	N/A
KZP06	<0.1	0.073
KZP07	<0.1	N/A
KZP08	<0.1	0.103
KPZ09	<0.1	N/A
KZP10	<0.1	0.008
KZP11	<0.1	N/A
KZP12	<0.1	0.02

k. Arsenic

The concentrations of arsenic recorded ranged between 2.3 and 4.9 mg/kg. These are below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (7.24 mg/kg) and the United States Geological Survey (USGS) Sediment Quality Guideline (17 mg/kg). The concentrations recorded in 2009 were also very low. The survey results for arsenic are indicative of an unpolluted environment.

Table 4.26 Survey Result (Arsenic, Unit: mg/kg)

Location	Arsenic	MSC 2009 Survey
KZP01	3.7	0.118
KZP02	4.1	N/A
KZP03	3.7	N/A
KZP04	3	0.065
KZP05	2.3	N/A
KZP06	3.3	0.087
KZP07	4.2	N/A
KZP08	4.9	0.072
KPZ09	2.7	N/A
KZP10	3.4	0.211
KZP11	3.5	N/A
KZP12	3.5	0.056

l. Tin

The concentration of tin was not recorded above the laboratory's analytical limit of detection. The results are indicative of an unpolluted river bed.

Table 4.27 Survey Result (Tin, Unit: mg/kg)

Location	Tin
KZP01	<1.0
KZP02	<1.0
KZP03	<1.0
KZP04	<1.0
KZP05	<1.0
KZP06	<1.0
KZP07	<1.0
KZP08	<1.0
KPZ09	<1.0
KZP10	<1.0
KZP11	<1.0
KZP12	<1.0

m. Iron

The detected concentrations of iron were very similar between the sampling locations, ranging between 24,000 to 30,000 mg/kg.

Table 4.28 Survey Result (Iron, Unit: mg/kg)

Location	Iron
KZP01	28,000
KZP02	29,000
KZP03	30,000
KZP04	28,000
KZP05	28,000
KZP06	28,000
KZP07	27,000
KZP08	24,000
KPZ09	27,000
KZP10	29,000
KZP11	29,000
KZP12	27,000

n. Manganese

Manganese was detected in all twelve samples with a maximum concentration of 440 mg/kg (KZP11). The concentrations detected were relatively similar, with no outliers noted.

Table 4.29 Survey Result (Manganese, Unit: mg/kg)

Location	Manganese
KZP01	410
KZP02	430
KZP03	420
KZP04	390
KZP05	410
KZP06	410
KZP07	390
KZP08	370
KPZ09	420
KZP10	430
KZP11	440
KZP12	400

o. Cadmium

Cadmium was not recorded above the laboratory's analytical limit of detection.
Comparing the 2009 data with the USGS Sediment Quality Guideline (3.53 mg/kg), all of the samples were below the threshold; however, the majority exceeded the more stringent Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (0.7 mg/kg).

Table 4.30 Survey Result (Cadmium, Unit: mg/kg)

Location	Cadmium	MSC 2009 Value
KZP01	<0.2	1.76
KZP02	<0.2	N/A
KZP03	<0.2	N/A
KZP04	<0.2	2.62
KZP05	<0.2	N/A
KZP06	<0.2	0.98
KZP07	<0.2	N/A
KZP08	<0.2	0.67
KPZ09	<0.2	N/A
KZP10	<0.2	0.92
KZP11	<0.2	N/A
KZP12	<0.2	3.82

p. Hexavalent Chromium

Hexavalent chromium was not recorded above the laboratory's limit of detection. With regards to the 2009 dataset, the concentration of chromium ranged between 12.55 and 26.85 mg/kg. These concentrations are below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life for total chromium (52.3 mg/kg) and the USGS Sediment Quality Guideline (90 mg/kg).

Table 4.31 Survey Result (Hexavalent Chromium, Unit: mg/kg)

Location	Hexavalent Chromium	MSC 2009 Value
KZP01	<5.0	22.61
KZP02	<5.0	N/A
KZP03	<5.0	N/A
KZP04	<5.0	26.85

Location	Hexavalent Chromium	MSC 2009 Value
KZP05	<5.0	N/A
KZP06	<5.0	23.78
KZP07	<5.0	N/A
KZP08	<5.0	14.27
KPZ09	<5.0	N/A
KZP10	<5.0	12.55
KZP11	<5.0	N/A
KZP12	<5.0	19.01

q. Lead

Lead was detected, above the laboratory's analytical detection limit, in all twelve samples submitted for analysis. The maximum concentration detected was noted at KZP10 (21 mg/kg), this was significantly higher than the other samples, which ranged between 2.2 – 4.1 mg/kg. Despite the elevated concentration at KZP10, all samples were noted to be below the USGS Sediment Quality Guideline (35.0 mg/kg) and the more stringent Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (30.2 mg/kg).

Table 4.32 Survey Result (Lead, Unit: mg/kg)

Location	Lead	MSC 2009 Value
KZP01	2.2	28.78
KZP02	3.2	N/A
KZP03	4.1	N/A
KZP04	3.6	32.92
KZP05	3.8	N/A
KZP06	2.6	26.34
KZP07	2.5	N/A
KZP08	3.4	14.45
KPZ09	3.2	N/A
KZP10	21	31.88
KZP11	3.4	N/A
KZP12	3	27.31

r. Mercury

Mercury was not recorded above the laboratory's analytical limit of detection. The results are indicative of an unpolluted river bed.

Table 4.33 Survey Result (Mercury, Unit: mg/kg)

Location	Mercury
KZP01	<0.3
KZP02	<0.3
KZP03	<0.3
KZP04	<0.3
KZP05	<0.3
KZP06	<0.3
KZP07	<0.3
KZP08	<0.3
KPZ09	<0.3
KZP10	<0.3
KZP11	<0.3
KZP12	<0.3

s. Copper

Copper was detected above the laboratory analytical detection limit. The concentrations detected indicated a very small range between the sampling points, 21 – 24 mg/kg, and all samples were noted to be below the USGS Sediment Quality Guideline (197 mg/kg). However, all samples were found to be above the more stringent Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (18.7 mg/kg).

Table 4.34 Survey Result (Copper, Unit: mg/kg)

Location	Copper
KZP01	23
KZP02	23
KZP03	24
KZP04	21
KZP05	22
KZP06	24
KZP07	21
KZP08	21
KPZ09	24
KZP10	23
KZP11	23
KZP12	23

t. Nickel

Nickel was detected in all twelve samples with a small concentration range between the sampling points, 72 – 90 mg/kg. All samples were noted to be above the USGS Sediment Quality Guideline (36 mg/kg), indicating of that a contamination source exists in within the Khor Al-Zubair.

Table 4.35 Survey Result (Nickel, Unit: mg/kg)

Location	Nickel
KZP01	89
KZP02	88
KZP03	90
KZP04	78
KZP05	86
KZP06	86
KZP07	79
KZP08	72
KPZ09	88
KZP10	87
KZP11	89
KZP12	82

u. Zinc

Zinc was also detected, above the laboratory analytical detection limit in all twelve samples. The concentrations detected indicated a small range between the sampling points, 33 – 50 mg/kg, suggesting a relatively even distribution throughout the river system.

All concentrations were below the USGS Sediment Quality Guideline (315 mg/kg) and the more stringent Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (124 mg/kg). These results are indicative of an unpolluted environment.

Table 4.36 Survey Result (Zinc, Unit: mg/kg)

Location	Zinc
KZP01	38
KZP02	42
KZP03	43
KZP04	35
KZP05	50
KZP06	38
KZP07	36
KZP08	33
KPZ09	40
KZP10	39
KZP11	40
KZP12	38

v. Total PCBs

Total PCBs were not found above the laboratory analytical limit of detection in any of the samples.

Table 4.37 Survey Result (Total PCBs, Unit: mg/kg)

Location	Total PCBs
KZP01	<5.0
KZP02	<5.0
KZP03	<5.0
KZP04	<5.0
KZP05	<5.0
KZP06	<5.0
KZP07	<5.0
KZP08	<5.0
KPZ09	<5.0
KZP10	<5.0
KZP11	<5.0
KZP12	<5.0

w. Total DDT

DDT was not found above the laboratory analytical limit of detection in any of the samples.

Table 4.38 Survey Result (Total DDT, Unit: mg/kg)

Location	Total DDT
KZP01	<0.01
KZP02	<0.01
KZP03	<0.01
KZP04	<0.01
KZP05	<0.01
KZP06	<0.01
KZP07	<0.01
KZP08	<0.01
KPZ09	<0.01
KZP10	<0.01
KZP11	<0.01
KZP12	<0.01

x. Total Dioxins and Furans

Total dioxins were detected in seven of the twelve samples. Of the seven dioxin congeners analyzed for only two congeners were detected (1,2,3,4,6,7,8HpCDD and OCDD). In order of toxicological concern these are less toxic (with congener OCDD being the least toxic of all) and reflected by a lower Toxic Equivalent Factor (TEF).

Total Furans were detected in three of the twelve samples. Of the ten specific furan congeners, only two congeners (1,2,3,4,6,7,8-HpCDF and OCDF) were detected in two samples (KSP01 and KZP06). In order of toxicological concern these congeners are less toxic (with congener OCDF being the least toxic of all) and reflected by a lower TEF. Seven furan congeners (2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8HxCDF; 2,3,4,6,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF) were detected in the sample from KZP07, which in order of toxicological concern are more toxic (with congener 2,3,7,8-TCDF being the most toxic of all) and reflected by a higher TEF.

The Toxic Equivalent Upper Bound concentrations (worst case scenario) for both the total dioxins and furans are below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (21.5 ng TEQ/kg for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans) and are therefore not considered to be environmentally significant.

Table 4.39 Survey Result (Total Dioxins and Furans, Unit: ng/kg)

Location	Total Dioxins	Total Furans
KZP01	28.9	3.5
KZP02	<MDL	<MDL
KZP03	2	<MDL
KZP04	<MDL	<MDL
KZP05	2.36	<MDL
KZP06	2.91	1
KZP07	3.56	2.96
KZP08	11.3	<MDL
KPZ09	<MDL	<MDL
KZP10	<MDL	<MDL
KZP11	<MDL	<MDL
KZP12	2.2	<MDL

Note: MDL = Method Detection Limit

y. Tributhyltin (TBT)

Tributyltin was not found above the laboratory analytical limit of detection in any of the samples.

Table 4.40 Survey Result (TBT, Unit: mg/kg)

Location	TBT
KZP01	<0.01
KZP02	<0.01
KZP03	<0.01
KZP04	<0.01
KZP05	<0.01
KZP06	<0.01
KZP07	<0.01
KZP08	<0.01
KPZ09	<0.01
KZP10	<0.01
KZP11	<0.01
KZP12	<0.01

(3) SOIL QUALITY

a. Heavy Metals

Cadmium, chromium, mercury and cyanide were not detected above the laboratory's analytical detection limits.

Tin was recorded just above the laboratory detection limit in only one sample, from the intertidal area of Area A. The concentration 1.0 mg/kg is below the stringent agricultural Canadian Soil Quality Guideline for the Protection of Environmental and Human Health.

Arsenic was found at concentrations of between 1.8 – 6.1 mg/kg, all of which were below the Canadian Soil Quality Guideline for the Protection of Environmental and Human Health (12 mg/kg). None of the samples were found to be above the stringent agricultural Canadian guideline value for copper (63 mg/kg), lead (70 mg/kg) and zinc (200 mg/kg).

The majority of the samples were found to contain a concentration of nickel above the relevant Canadian guideline (50 mg/kg).

Iron was found at a concentration of between 4,400 and 34,000 mg/kg and manganese between 66 – 580 mg/kg.

Table 4.41 Survey Result (Heavy Metals, Unit: mg/kg)

Dumping Area	Location	As	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Sn	Zn
Area A	1	3.7	<0.2	<5.0	20	30,000	3.7	410	<0.3	90	<1.0	45
	2	3.2	<0.2	<5.0	14	18,000	2.7	300	<0.3	61	1	42
	3	4	<0.2	<5.0	25	29,000	3.9	470	<0.3	110	<1.0	51
	4	4.1	<0.2	<5.0	26	29,000	5.6	490	<0.3	110	<1.0	52
	5	4.5	<0.2	<5.0	25	30,000	4.3	580	<0.3	110	<1.0	49
	Mean	3.9	N/A	N/A	22	27,200	4.04	450	N/A	96.2	N/A	47.8
Area B	1	6.1	<0.2	<5.0	20	21,000	4.1	370	<0.354	83	<1.0	36
	2	5	<0.2	<5.0	17	17,000	2	310	<0.3	69	<1.0	29
	3	5.4	<0.2	<5.0	19	24,000	4.2	340	<0.3	75	<1.0	35
	4	4.1	<0.2	<5.0	23	29,000	4.7	450	<0.3	100	<1.0	50
	5	4.7	<0.2	<5.0	25	34,000	5	450	<0.3	110	<1.0	53
	Mean	5.06	N/A	N/A	20.8	25,000	4	384	N/A	87.4	N/A	40.6
Area C	1	4.2	<0.2	<5.0	30	34,000	6.2	480	<0.3	100	<1.0	54
	2	4.5	<0.2	<5.0	23	25,000	4.1	470	<0.3	98	<1.0	47
	3	5.1	<0.2	<5.0	20	30,000	3.3	340	<0.3	93	<1.0	36
	4	4.2	<0.2	<5.0	12	18,000	2.3	270	<0.3	61	<1.0	22
	5	2.9	<0.2	<5.0	7.8	10,000	2.4	190	<0.3	34	<1.0	17
	Mean	4.18	N/A	N/A	18.56	23,400	3.66	350	N/A	77.2	N/A	35.2
Area D	1	1.8	<0.2	<5.0	2.6	4,400	<2.0	66	<0.3	2.7	<1.0	11
	2	4.1	<0.2	<5.0	22	26,000	2.9	420	<0.3	93	<1.0	48
	3	3.5	<0.2	<5.0	14	22,000	2.5	290	<0.3	67	<1.0	27
	4	4.4	<0.2	<5.0	23	26,000	4	460	<0.3	99	<1.0	45
	5	3.2	<0.2	<5.0	8.3	13,000	<2.0	190	<0.3	34	<1.0	15
	Mean	3.4	N/A	N/A	13.98	18,280	2.68	285	N/A	59.14	N/A	29.2

Analysis of the mean concentrations of metals for each area shows a spatial trend with respect to copper, nickel, lead, zinc, iron and manganese. The highest mean concentrations were consistently recorded in Area A, followed by Area B, Area C and then Area D. The only metal to show a different spatial trend in mean concentrations was arsenic. Mean arsenic concentrations were found to be highest in Area B, followed by Areas C, A and D. The maximum arsenic concentration was also recorded in Area B (6.1mg/kg). However, it should be noted that the range of the mean arsenic concentrations is only small (3.4mg/kg in Area D to 5.06mg/kg in Area B).

b. Other Parameters

Total PCBs and total DDT were not detected above the laboratory's analytical detection limits in any of the soil samples.

With regards to TPH, three of the samples were found to contain concentrations above the laboratory detection limit. All three were collected from the intertidal area of Area A, these concentrations, at a maximum of 240 mg/kg, are not wholly unexpected as Area A is directly opposite KZP and will be affected by any spillages or accidents from the port. No field evidence of contamination was noted during the collection of these samples, which suggests that the contamination is engrained in the sediment and not a recent incident.

The presence of dioxins was recorded in fourteen samples from all fours areas. As with the sediment samples, only two out of the seven congeners were detected (1,2,3,4,6,7,8-HpCDD and OCDD). In order of toxicological concern these are less toxic (with congener OCDD being the least toxic of all) and reflected by a lower Toxic Equivalent Factor (TEF). Area A recorded the highest total concentration of dioxins, followed by Areas B, C and D.

Total Furans were detected in fifteen samples from all four areas. Of the ten specific furan congeners, nine were detected (2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HpCDF; 1,2,3,4,6,7,8-HpCDF and OCDF). Furan congeners of lower toxicological concern were detected in nine of the fifteen samples and furan congeners of higher toxicological concern were detected in 6 of the fifteen samples (Area A: 0.1 & 0.4; Area C: 0.1 & 0.5; Area D: 0.1 & 0.5). As with dioxins, the highest concentration of total furans was recorded in Area A.

The Toxic Equivalent Upper Bound concentrations (worst case scenario) for both the total dioxins and furans are below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (21.5 ng TEQ/kg for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans).

Table 4.42 Survey Result (Other Parameters, Unit: mg/kg unless stated)

Dumping Area	Location	TPH (C10-C40)	Cyanide	Total PCBs	Total DDT	Total Dioxins	Total Furans
						(ng/kg)	(ng/kg)
Area A	1	180	<1.0	<5.0	<0.01	16.3	7.2
	2	240	<1.0	<5.0	<0.01	7.13	1.75
	3	240	<1.0	<5.0	<0.01	4.18	<MDL
	4	<5.0	<1.0	<5.0	<0.01	5.3	6.1
	5	<5.0	<1.0	<5.0	<0.01	<MDL	1.89
	Mean	220	N/A	N/A	N/A	8.23	4.24
Area B	1	<5.0	<1.0	<5.0	<0.01	<MDL	3.1
	2	<5.0	<1.0	<5.0	<0.01	<MDL	0.79
	3	<5.0	<1.0	<5.0	<0.01	0.8	0.43
	4	<5.0	<1.0	<5.0	<0.01	0.82	<MDL
	5	<5.0	<1.0	<5.0	<0.01	10.6	1.1
	Mean	N/A	N/A	N/A	N/A	4.07	1.36
Area C	1	<5.0	<1.0	<5.0	<0.01	4.1	6.53
	2	<5.0	<1.0	<5.0	<0.01	<MDL	<MDL
	3	<5.0	<1.0	<5.0	<0.01	0.99	<MDL
	4	<5.0	<1.0	<5.0	<0.01	<MDL	1.39
	5	<5.0	<1.0	<5.0	<0.01	1.9	3.68
	Mean	N/A	N/A	N/A	N/A	2.33	3.87
Area D	1	<5.0	<1.0	<5.0	<0.01	1.21	4.27
	2	<5.0	<1.0	<5.0	<0.01	0.94	0.45
	3	<5.0	<1.0	<5.0	<0.01	<MDL	<MDL
	4	<5.0	<1.0	<5.0	<0.01	1.8	2.38
	5	<5.0	<1.0	<5.0	<0.01	1.6	2.35
	Mean	N/A	N/A	N/A	N/A	1.39	9.45

Note: MDL = Method Detection Limit

(4) ECOLOGICAL SURVEY

An ecological survey was conducted at all four candidate dumping areas. The primary objective of the surveys was to document and characterize the ecological conditions within these four areas including any exposed sediments along the tidal and intertidal zone (i.e. the land between the high and low water marks which is subjected to daily inundation by tides). This survey was primarily concerned with flora and fauna, including insects, mammals, reptiles and birds, and, if applicable, birds' nests.

a. Habitat

Habitat maps of each individual candidate area were produced.

Intertidal Zone

Areas A and B predominantly comprise intertidal areas with large areas of mudflats, regularly inundated during the tidal cycle.

Source: EAME,2012

Photograph 4.1 Area B intertidal zone

Alluvial Plain

Vegetation is mainly limited to the alluvial plain areas, where halophytic perennials belonging to the *Zygophyllaceae*, *Poaceae*, *Borginaceae* and *Chenopodiaceae* families were observed. Alluvial plains also provide suitable habitats for a range of mammal, bird and reptile species found in Iraq.

Source: EAME,2012

Photograph 4.2 Area C alluvial plain

Sabkha

Sabkha habitats are hypersaline environments which provide poor habitats for vegetation.

Vegetation is highly tolerant of saline conditions, such as *Boraginaecae, Chenopdiaceae* and *Zygophyllaceae*. Whilst predominantly void of vegetation, Sabkha habitats are known for supporting various species of fauna.

Areas C and D predominantly comprise alluvial plains and Sabkha environments.

Note the sparse level of vegetation
Source: EAME,2012

Photograph 4.3 Area D Sabkha area

b. Field Survey result

Meteorological Conditions

During the survey, the weather was very sunny and warm with a strong breeze on the 10 March 2012.

Fauna

In summary, the number and diversity of the fauna observed during the survey was generally poor. Across all four sites, the general environment and large human interference appears to have limited the number of species present.

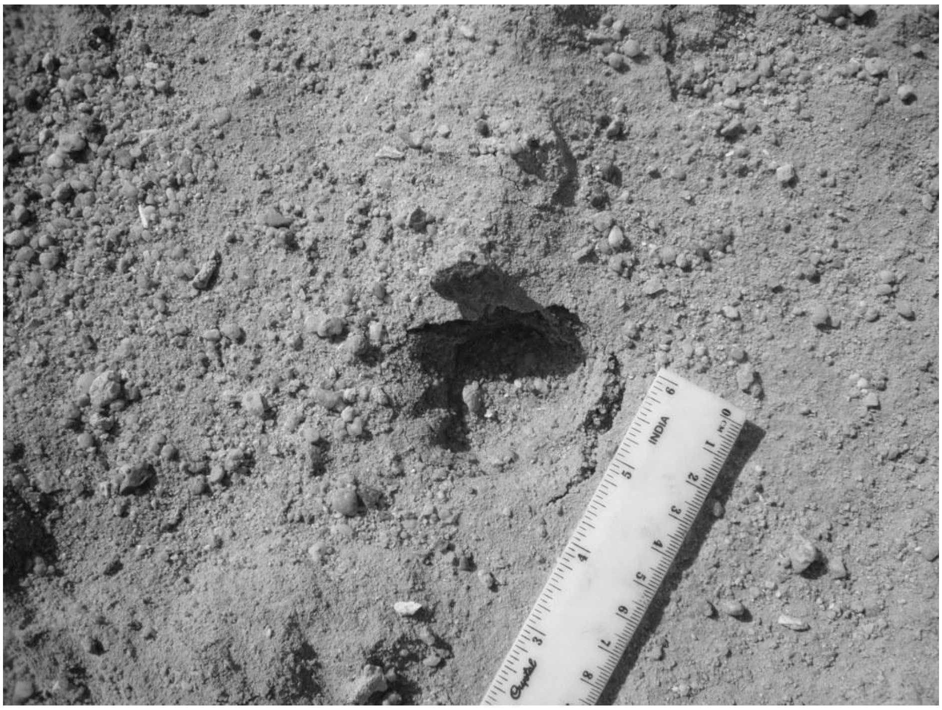
Reptiles

At Area C, a Spiny-tailed lizard (*Uromastyx*) was observed. This is a diurnal species of reptile, clearly identifiable by its spiky tail. *Uromastyx* are burrowing lizards that tend to bask in areas of direct sunlight with high ambient air temperature. No other reptiles were noted during the survey at any of the other locations.

Photograph 4.3 Spiny tailed lizard noted at Area C

Mammals

Several mammal footprints were noted during the surveys, predominantly at Areas C and D.
These appear to be related to the domestic dog (*Canis familiaris*), which due to the human activities nearby, exist in large numbers in this area and also the Arabian Red Fox (*Vulpes vulpes*), a species that is relatively tolerant of human activity.



Photograph 4.5: Arabian Fox footprint within the intertidal zone of Area C

Although no small mammals, or evidence of their presence, were found during the survey, small rodents are likely to present near areas of habitation and activity and although the presence of domestic dogs is not particularly of interest, it may suggest that there are small creatures and ground prey in the area, not observed during this survey, that they can prey on.

At Area B, unidentified mammal faeces were observed (see Photograph 4.6).

Photograph 4.6: Unidentified mammal faeces

Amphibians

Two species of mudskipper, the Gray Mudskipper (*Boleophalmus boddarti*) and the Brown Mudskipper (*Periophalmus koelreuteri*), were noted within the intertidal channels and ditches which flow into the Khor Al-Zubair.

Photograph 4.7: Brown Mudskipper (*Periophalmus koelreuteri*)
at the entrance of its burrow, Area D

Mudskippers are uniquely adapted for intertidal habitats and survive the retreat of the high tide by using their pectoral fins to move effectively on land. However, mudskippers are limited to humid habitats as they must always be moist. As depicted in Photograph 4.7, mudskippers dig deep burrows in order to thermoregulate as well as to avoid marine predators at high tide.

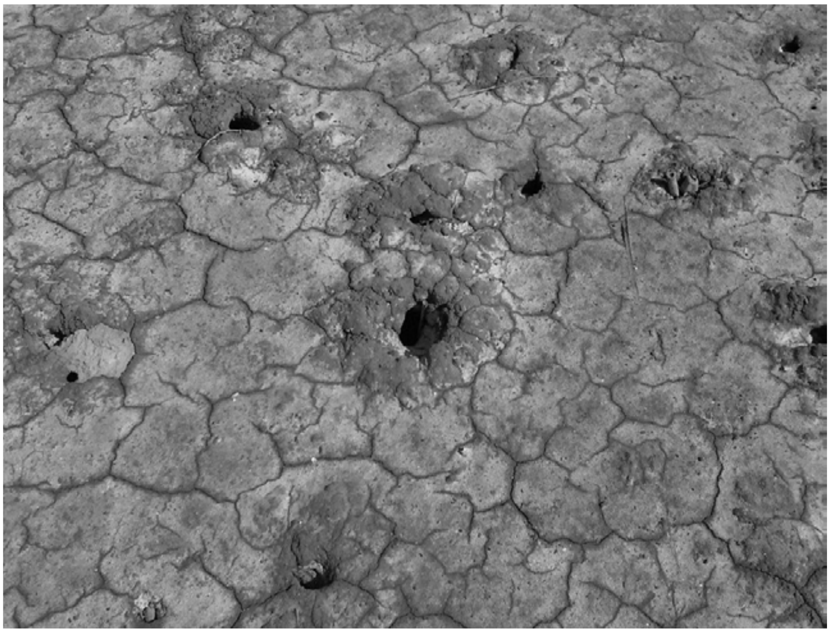
During the survey, a significant number of dead mudskippers were noted at Area A; it has been assumed that with the onset of the warmer weather, the mudskippers were unfortunately marooned as their habitat (ditches and channels) dried up.

Crustaceans

Along the intertidal channel and ditch areas of all candidate areas, several exoskeletons of marine crabs were collected. These have been identified as the Long Eyestalk Crab (*Macrophthalmus depressus*) (see Photograph 4.8), widespread across this part of the world.

Photograph 4.8: Exoskeleton of Long Eyestalk Crab found at Area A

During the survey, a large number of burrows were noted in all four areas within the intertidal area. These burrows are likely to be utilized by the Long Eyestalk Crab, a crab well known for burrowing, however, this could not be confirmed during the survey.



Photograph 4.9: Potential crustacean burrows at the intertidal zone of Area B

<u>Molluscs</u>
At all areas, dead gastropods and bivalves were found washed up along the intertidal zone.
The bivalves were identified in the laboratory as *Circe callipyga*, *Dosina caelata*, *Barbatia plicata* and the gastropod as *Thais mutabilis,* a species of sea snail.

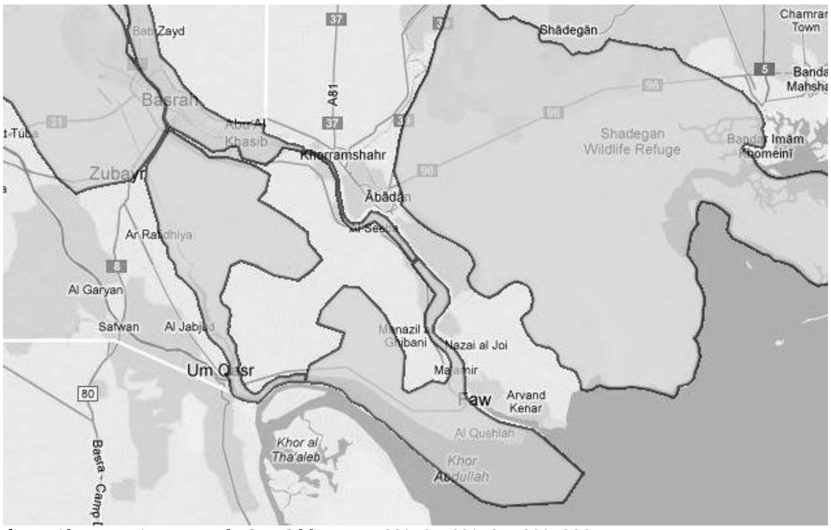
Photograph 4.11: Bivalve and gastropod shells found at Area D

Insects

During the survey, no insects were found during the net sweeping activities.

Birds

According to BirdLife International, there are three ‘Critically Endangered’, four ‘Endangered’, eleven ‘Near Threatened’ and eight ‘Vulnerable’ species of bird in Iraq. Khor Al-Zubair contains an Important Bird Area (IBA), for its importance in providing suitable habitat for approximately 20,000 wintering waterbirds[9] (ref: IQ041, Khawr Al Zubair). The IBA, circa 20,000ha in size, appears to include all of Areas A and B, as well as the intertidal zones of Areas C and D (see Figure 6.1).



Source:http://www.birdlife.org/datazone/geomap.php?r=i&bbox=-150%20-50%20150%2080

Figure 4.1: Khawr Al Zubair IBA, as classified by BirdLife International

Khor Al-Zubair is considered by Scott and Carp (1982)[10] as of possible great importance for wintering waterbirds and was listed as a wetland of international importance by Carp (1980)[11]. However, since the early-1980s, significant human interference has occurred along the Khor Al-Zubair, with the various conflicts as well as the recent influx of freshwater into the previously saline environment. These are all likely to have had a significant effect on the wildlife in the area.

During both the reconnaissance survey and the main ecological survey, many migratory birds were noted within the intertidal zones of Area A and B, attracted to the potential food within this zone. This included Eurasian Curlew (*Numenius arquata*), classified as ‘Near Threatened’ by BirdLife International, Common Gulls (*Larus canus canus*) and potentially Slender-billed Gulls (*Chroicocephalus genei*). Overall, gulls were observed at all locations, although, these were at a distance and the species was not identifiable.

[9] Important Bird Areas Factsheet: Khawr Al Zubair, BirdLife International, 2012

[10] A Midwinter Survey of the Wetlands in Mesopotamia, Iraq, Sandgrouse, 4: 60 – 76, D.A. Scott and E. Carp, 1982

[11] A Directory of Western Palearctic Wetlands, E. Carp, UNEP and IUCN, 187 – 191, 1980

Photograph 4.12: Common Gull at Area B

During the initial reconnaissance survey, a Grey Heron (*Ardea cinerea*) was noted on the Tambur shipwreck, adjacent to Area C (Photograph 4.13) and at Area D. The Grey Heron prefer nest sites in tall emergent trees, however, there are no such trees in the immediate or wider vicinity of the Khor Al-Zubair, therefore, the possibility exists that the heron was migrating.

Photograph 4.13: A Grey Heron photographed on the Tambur wreck
(adjacent to Area C) during the initial reconnaissance survey

The aforementioned crustacean burrows could potentially provide a suitable habitat for the Crab Plover *(Dromas ardeola*), whose bill is specialized in easting crabs. At the time of the survey, no Crab Plovers were observed; however, this species tends to breed in this area between April and July and thus may explain their absence.

Fish
Alongside the dead mudskippers, a dead fish was also noted at the intertidal zone of Area A. This has been identified as *Ilisha megaloptera* (also known as Big Eye Ilisha).

Photograph 6.15: Dead *Ilisha megaloptera* found at Area A

Flora
The vegetation observed across all four areas was very similar; however, the coverage of vegetation differed due to the extent of the intertidal zone. Overall, the condition and total species number was very limited due to the hypersaline environment and human interference.

Halocnemum strobilaceum and *Salicornia herbacea* were the most dominant species at the intertidal zone, both are halophytic perennial plants. *Salicornia herbacea* were predominantly located along ditches and depressions.

Photograph 4.15: *Salicornia herbacea* found at Area D

Slightly inland, the alluvial plains were dominated by *Suaeda aegyptiaca*, *Suaeda vermiculata* and *Anabasis setefera*, which all species are salt-tolerant perennials.
Further inland still, several perennial species were found in the slightly less saline areas including *Calendula aegyptiaca*, *Malva parviflora* and *Hodeum desticum*.

Photograph 4.16: *Calendula aegyptiaca* found at Area C

In summary, none of the species recorded during the site visit are of conservation importance.

B5. DATA SUMMARY

(1) WATER QUALITY

The chemical data shows that pollution indicators like oil (petroleum hydrocarbons), nitrogen, phosphate and BOD are generally low and do not indicate significantly polluted waters.

Overall the marine waters do not seem to be displaying signs of pollution or environmental degradation in relation to the parameters being assessed and the water quality could generally be described as good. It is suggested in some of the literature that the waters within the Persian Gulf undergo a net total replacement every two years. Whilst this cannot be easily verified, it does indicate that water chemistry and, in particular, pollutants may not have long residence times in the Persian Gulf (even if they persist in the water itself for many years).

For all of the parameters where there is comparative data, the results from the 2009 MSC survey were generally higher than the current 2012 dataset. This may be due to a general improvement in water quality (for example due to improvements in sanitary and industrial wastewater treatment and the removal of wrecks from the river), but this is unlikely given the rate of progress in such issues in Iraq and the relatively short time period between the surveys (such improvements can take many years to manifest). The differences are more likely to be attributable to the use of different laboratories and analytical techniques. Furthermore, as discussed, earlier, there is likely to have been wholesale replacement of the water in the region due to general circulation patterns and mass sediment transfer so that in effect, different water bodies are being analysed.

Table 5.1 provides a summary of the water quality data collected during the survey. The international guideline standards (Iraqi 1967 Water Quality Standard, WHO guideline value and Canadian Marine Water Quality Guideline for the Protection of Aquatic Life) stated within the report have also been tabulated to provide an indication of the contamination level. The highlighted text within the table indicates a concentration above the guideline value.

Table 5.1: Summary of Marine Water Chemical Data (µg/l unless stated)

Analyte	High Tide			Low Tide			All Data			International Standard(s)
	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	
pH	7.9	6.5	7.4	7.7	6.7	7.3	7.9	6.5	7.3	Iraqi: 6.5 – 8.5 Canadian: 7.0 – 8.7
Electricity Conductivity (µs/cm)	77,000	59,000	64,541.7	72,000	62,000	66,750.0	77,000	59,000	65,645.8	-
Salinity (ppt)	>42	>42	N/A	>42	>42	N/A	>42	>42	N/A	-
Total Cyanide	N/A	<10	N/A	N/A	<10	N/A	N/A	<10	N/A	-
Total Nitrogen (mg/l)	7.0	0.5	1.7	1.9	0.5	0.8	7.0	0.5	1.3	US EPA: 10 mg/l WHO: 50 mg/l
BOD (mg/l)	6.6	3.2	4.3	6.1	3.1	4.2	6.6	3.1	4.2	40 mg/l
SS (mg/l)	610	140	436.7	890	330	619.2	890	140	527.9	Iraqi: 60 mg/l
DO (mg/l)	8.5	2.4	6.9	6.4	2.9	5.0	8.5	2.4	6.0	-
Arsenic	4.1	1.1	2.5	4.9	1.4	3.2	4.9	1.1	2.9	Iraqi: 50 Canadian: 50 WHO: 10
Cadmium	N/A	<0.1	N/A	N/A	<0.1	N/A	N/A	<0.1	N/A	Iraqi: 10 WHO: 3
Hexavalent Chromium	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	Iraqi: 10 WHO: 50
Lead	2.1	<0.1	1.7	N/A	<0.1	N/A	2.1	<0.1	1.7	Iraqi: 100 WHO: 10
Mercury	N/A	<0.5	N/A	N/A	<0.5	N/A	N/A	<0.5	N/A	WHO: 6
Total Phosphorus	380	39	117.6	300	64	148.4	300	64	148.4	-
TPH (C10 – C40)	N/A	<10	N/A	N/A	<10	N/A	N/A	<10	N/A	-
Total PCBs	N/A	<7.0	N/A	N/A	<7.0	N/A	N/A	<7.0	N/A	-

(2) SEDIMENT QUALITY

The sediment samples collected throughout the survey period at all locations showed no evidence of significant contamination with the target analytes. It should be noted, however, that the river bed is a highly dynamic environment; there are relatively strong currents, frequent sandstorms and large volume sediment rich outflows upstream which all contribute to the deposition and transport of sediment. Consequently, the sediment is in a state of flux at any given sample location and pollution that may have occurred may have been assimilated into the environment by now, or in the case of the shipwrecks, simply buried.

The principal lithology of the seabed stratum is predominantly soft clay and silt, i.e. very fine grained. The Particle Size Distribution (PSD) results from the survey period correlates with the field evidence and indicates that the lithologies are very similar and predominantly comprise silt and clay fractions, with minor sand components. It is reasonable to expect that each of the above lithologies can be encountered anywhere in the project area.

A summary of the chemical data derived from the twelve sediment samples obtained from the river bed of the Khor Al-Zubair is presented in Table 5.2. The international guideline standards (United States Geological Society sediment quality guidelines and the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life) stated within the report have also been tabulated to provide an indication of the contamination level. The highlighted text within the table indicates a concentration above the relevant guideline value.

Table 5.2: Summary of Marine Sediment Chemical Data (mg/kg unless stated)

Analyte	Maximum	Minimum	Mean	International Standard
Total Cyanide	N/A	<1.0	N/A	-
Total Sulphur	4,800	2,3000	3325.0	-
Total Nitrogen	280	0.9	40.1	-
TOC (%)	11	<0.1	0.65	-
Total Phenols (monohydric)	N/A	<2.0	N/A	-
Arsenic	4.9	2.3	3.5	Canadian: 7.24 USGS: 17
Cadmium	N/A	<0.2	N/A	Canadian: 0.7 USGS: 3.52
Chromium	N/A	<5.0	N/A	Canadian: 52.3 USGS: 90
Copper	24	21	22.7	Canadian: 18.7 USGS: 197
Iron	30,000	24,000	27,833.3	-
Lead	4.1	2.1	3.1	Canadian: 30.2 USGS: 35.0
Manganese	440	370	410.0	-
Mercury	N/A	<0.3	N/A	-
Nickel	90	72	84.5	USGS: 36
Phosphorus	490	410	445.0	
Tin	N/A	<1.0	N/A	-
Zinc	43	33	38.5	Canadian: 124 USGS: 315
TPH (C10- C40)	N/A	<50	N/A	
Total PCBs	N/A	<5.0	N/A	-
DDT	N/A	<0.01	N/A	-
TBT	N/A	<0.01	N/A	-
Total Dioxins	28.9	<MDL	44.8	Canadian: 21.5
Total Furans	3.5	<MDL	2.5	Canadian: 21.5

(3) SOIL QUALITY

None of the concentration of analytes tested was significantly elevated, although concentrations of nickel exceed the stringent Canadian Soil Quality Guideline for the Protection of Environmental and Human Health. These exceedances may represent elevated background concentrations rather than a pollutant source. It should be noted that the guidelines utilised are not site-specific values and have been derived from North American Data. With regards to TPH, the elevated concentrations recorded at Area A are likely to be a result of accidental spills at KZP. No field evidence of any hydrocarbon contamination was noted during the collection of these samples.

Analysis of the mean concentrations of metals for each area shows a spatial trend with respect to copper, nickel, lead, zinc, iron and manganese. The highest mean concentrations were consistently recorded in Area A, followed by Area B, Area C and then Area D. The only metal to show a different spatial trend in mean concentrations was arsenic. Mean arsenic concentrations were found to be highest in Area B, followed by Areas C, A and D.

The presence of dioxins and furans was recorded in all areas, with the highest total concentrations being recorded in Area A. The Toxic Equivalent Upper Bound concentrations (worst case scenario) for both the total dioxins and furans are below the Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life (21.5 ng TEQ/kg for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans) and are therefore not considered to be significant.

A summary of the chemical data derived from the twenty soil samples collected from Areas A - D is presented in Table 5.3. The international guideline standards (Agricultural Canadian Soil Quality Guideline for the protection of Environmental and Human Health and Canadian Marine Sediment Quality Guidelines for the Protection of Aquatic Life) stated within the report have also been tabulated to provide an indication of the contamination level. The highlighted text within the table indicates a concentration above the relevant guideline value.

Table 5.3: Summary of Soil Chemical Data (mg/kg unless stated)

Analyte	Area A			Area B			Area C			Area D			All Areas			Inter-national Standard
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	
Total Cyanide	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	-
Arsenic	4.5	3.2	3.9	6.1	4.1	5.06	5.1	2.9	4.2	4.4	1.8	3.4	6.1	1.8	4.1	Canadian: 12
Cadmium	N/A	<0.2	N/A	N/A	<0.2	N/A	N/A	<0.2	N/A	N/A	<0.2	N/A	N/A	<0.2	N/A	-
Chromium	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	-
Copper	26	14	22	25	17	20.8	30	7.8	18.6	23	2.6	14.0	30	2.6	18.8	Canadian:63
Iron	30,000	18,000	27,200	34,000	17,000	25,000	34,000	10,000	23,400	26,000	4,400	18,280	34,000	4,400	23,470	-
Lead	5.6	2.7	4.0	5.0	2.0	4.0	6.2	2.3	18.6	4.0	2.5	3.1	6.2	2.0	3.9	Canadian:70
Manganese	580	300	450	450	310	384	480	190	350	420	66	241.5	580	66	356.4	-
Mercury	N/A	<0.3	N/A	N/A	<0.3	N/A	N/A	<0.3	N/A	N/A	<0.3	N/A	N/A	<0.3	N/A	-
Nickel	110	61	96.2	110	69	87.4	100	34	77.2	99	2.7	59.1	110	2.7	80.0	Canadian:50
Tin	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	Canadian:1.0
Zinc	52	42	47.8	53	29	40.6	54	17	35.2	48	11	29.2	54	11	38.2	Canadian:200
TPH (C10 – C40)	240	<50	220	250	<50	N/A	N/A	<50	N/A	100	<50	N/A	250	<50	220	-
Total PCBs	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	N/A	<1.0	N/A	-
DDT	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	N/A	<5.0	N/A	-
Total Dioxins (ng/kg)	16.3	<MDL	8.23	10.6	<MDL	4.07	4.1	<MDL	2.33	1.8	<MDL	1.39	16.3	<MDL	4.01	Canadian:21.5
Total Furans (ng/kg)	7.2	<MDL	4.24	3.1	<MDL	1.36	6.53	<MDL	3.87	4.27	<MDL	2.36	7.2	<MDL	2.96	Canadian:21.5

(4) ECOLOGICAL DATA

Khor Al-Zubair has been included as one of Iraq's Key Biodiversity Areas and has been classified, by Birdlife International, as an Important Bird Area (IBA). The IBA comprises the all of Areas A and B, as well as the intertidal zones of C and D.

Areas A and B provide important intertidal areas. These provide habitats for amphibians and crustaceans, and thus provide a food source for migratory and permanent residual birds. Areas C and D predominantly comprise alluvial plains and Sabkhas which are only able to support particular vegetation and, thus, have a smaller area to support watering birds. None of the vegetation observed during the site visit is of conservation importance.

Overall, Areas C and D are considered to be the least ecologically sensitivity of the four areas, and would be the most favourable sites for the deposition of the dredged material. The habitat maps produced during desk study have proven to be very accurate and have been slightly updated following the field surveys.

The ecological characteristics of the four candidate areas are summarised in Table 5.4 below.

Table 5.4: Summary of Ecology at Candidate Sites for Deposit of Dredging

	Area A	Area B	Area C	Area D
Habitat	Predominantly intertidal with large areas of mudflats, regularly inundated during the tidal cycle.	Predominantly intertidal with large areas of mudflats, regularly inundated during the tidal cycle.	Predominantly alluvial plains and sparse vegetation tolerant of hypersaline (Sabkha) environments.	Predominantly alluvial plains and sparse vegetation tolerant of hypersaline (Sabkha) environments.
Reptiles	None observed	None observed	Spiny-tailed lizard (Uromastyx) observed.	None observed.
Mammals	None observed	Unidentified mammal faeces observed.	Footprints of domestic dog (Canis familiaris) and the Arabian Red Fox (Vulpes vulpes) observed.	Footprints of domestic dog (Canis familiaris) and the Arabian Red Fox (Vulpes vulpes) observed.
Amphibians	Gray Mudskipper (Boleophalmus boddarti) and Brown Mudskipper (Periophalmus koelreuteri), noted within the intertidal channels.	Gray Mudskipper (Boleophalmus boddarti) and Brown Mudskipper (Periophalmus koelreuteri), noted within the intertidal channels.	Gray Mudskipper (Boleophalmus boddarti) and Brown Mudskipper (Periophalmus koelreuteri), noted within the intertidal channels.	Brown Mudskipper (Periophalmus koelreuteri) noted within the intertidal channels.
Crustaceans & Molluscs	Crab burrows present in intertidal area. Exoskeletons of Long Eyestalk Crab noted. Several species of bivalves and gastropod identified.	Crab burrows present in intertidal area. Exoskeletons of Long Eyestalk Crab noted. Several species of bivalves and gastropod identified.	Crab burrows present in intertidal area. Exoskeletons of Long Eyestalk Crab noted. Several species of bivalves and gastropod identified.	Crab burrows present in intertidal area. Exoskeletons of Long Eyestalk Crab noted. Several species of bivalves and gastropod identified.
Insects	None captured	None captured	None captured	None captured
Birds	Entire area classed as an Important Bird Area (IBA). Many migratory birds observed, including Eurasian Curlew (Numenius arquata).	Entire area classed as an Important Bird Area (IBA). Many migratory birds observed, including Eurasian Curlew (Numenius arquata).	Inter-tidal area classed as an Important Bird Area (IBA). Gulls observed.	Inter-tidal area classed as an Important Bird Area (IBA). Gulls observed.

B6. CONCLUSIONS AND RECOMMENDATIONS

(1) CONCLUSIONS

The survey has involved a reasonably comprehensive assessment of the chemical and physical conditions of the Khor Al-Zubair. The key conclusions can be summarized as follows:

- There is little, if any, evidence of significant pollution of the environment and most notably there is no evidence of significant petroleum hydrocarbon contamination of the water, the benthic sediment or soil samples. Given the large amounts of hydrocarbons that were spilled into the area during the armed conflicts this is encouraging, although, it should be noted that a large proportion of the oil spilled migrated south to the Saudi Arabian and Kuwaiti coasts, so the sediments in the study area may not have been heavily impacted in the first place.

- The results of the survey and the analysis of information gathered during the desk-based study suggest a dynamic and active environment with substantial mixing and movement of water and sediments over across seasons and over longer periods of time. It is suggested in some of the literature that the waters within the Persian Gulf undergo a net total replacement every two years. Whilst this cannot be easily verified, it does indicate that water chemistry and in particular pollutants may not have long residence times in the Persian Gulf (even if they persist in the water itself for many years).

- The principal lithology of the seabed stratum is predominantly soft clay and silt, i.e. very fine grained. The Particle Size Distribution (PSD) results correlate with the field evidence and indicate that the lithologies are very similar and comprise predominantly silt and clay fractions, with minor sand components. It is reasonable to expect that each of the above lithologies can be encountered anywhere in the project area.

- The rehabilitation project clearly has the potential to increase sediment load in the water column during the construction (and especially) dredging phases. Given the dynamic environment, however, and the fact that a large part of the study area is subject to regular high suspended sediment loads from natural processes, the impact of sediment mobilized by the construction activity is likely to be short-lived and of limited significance.

- The measurements and observations made during the surveys show broad correlation and concurrence with other elements of the work and other studies in the area that have been published. However, for parameters where there is comparative data, the results from the 2009 MSC survey were consistently higher than the current 2012 data. This suggests that there may have been an improvement in water quality, possibly due to improvements in sanitary and industrial wastewater treatment and the removal of wrecks from the river but this is unlikely. Other influencing factors could be the use of different laboratories and analytical techniques and the different tidal conditions under which the two sampling events took place, resulting in a different mix of fresh water and salt water.

- Khor Al-Zubair has been included as one of Iraq’s Key Biodiversity Areas and has been classified as an Important Bird Area (IBA). The IBA comprises all of Areas A and B, as well as the intertidal zones of C and D. Areas A and B provide important intertidal habitats for amphibians and crustaceans, and thus provide a food source for migratory and permanent residual birds. Areas C and D predominantly comprise alluvial plains and Sabkhas which are only able to support particular vegetation and, thus, have a smaller area to support watering birds. None of the vegetation observed during the site visit is of conservation importance.

- With regards to the overall ecological sensitivity of the four areas, Areas C and D are the least sensitive, and therefore considered to be the most suitable for the deposition of the dredged material. The habitat maps produced during desk study have proven to be very accurate and have been slightly updated following the field surveys.

- The highest mean concentrations of contaminants were consistently recorded in Areas A and B (copper, nickel, lead, zinc, iron, manganese, TPH and dioxins). For this reason, it may also be preferable to deposit dredging in Areas C and D to reduce the contaminant loading on Areas A and B.

(2) RECOMMENDATIONS

- The desk-based and field surveys has indicated that the Khor Al-Zubair is likely to harbour a number of unique bird and fish species, however, the area has been significantly disturbed by human impacts as such, governmental and local action is required in order to restore the area to its former state and to prevent any further deterioration. Certain areas (especially inter-tidal areas) should ideally be designated as protected zones to prevent future impacts. Of the four candidate dumping areas, this applied most to Areas A and B which have the greatest ecological potential and environmental sensitivity.

- A dredging monitoring plan should be designed and implemented including visual inspections of any turbidity plumes, post dredge and post deposition hydrographic surveys etc. The use of silt screens is not recommended in this environment as these would be extremely difficult to deploy and manage in such an active environment and of limited if any effectiveness.

- An appropriate dredging waste management plan should be developed with clearly set out designated disposal areas, materials management plans and effective physical controls to manage run-off and sediment distribution. These sediments should be disposed of as far from the inter-tidal areas as practicable. Where possible Areas C and D should be used for dredging disposal as these are already degraded to an extent or of much less ecological value than Areas A and B. The ecology of the inter-tidal zones in areas C and D (if used) should be monitored again after the deposition works have been completed to determine if significant impacts have been successfully avoided.

- Given the amount of vessel activity in the area associated with large scale dredging and ongoing wreck removal, an Oil Spill Response Plan should be in place with appropriate counter measures defined and ready for deployment in the event of a major release of oil associated with these works.

APPENDIX C

DRAFT IEE ON KZP DEVELOPMENT

APPENDIX C: DRAFT IEE ON KZP DEVELOPMENT

This report was prepared based on the report by the sub-contractor[1].

Abbreviation

CMP	Construction Management Plan
CONS	Project Consultants
CONT	Contractor
COPA	Conditions of Particular Application
CWMP	Construction Waste Management Plans
DDT’s	Dichloro-diphenyl-trichloroethane
DMP	Dredging Management Plan
DWRC	Draft Wreck Removal Convention
DWT	Deadweight Tonnage
ECOP	Environmental Codes of Practice
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EQMP	Environmental Quality Monitoring Plan
ESSAF	Environmental and Social Screening and Assessment Framework
EU	Environmental Unit
GCPI	General Corporation for the Ports of Iraq
GWR	Groundwater Regulations
Hs	wave height
IAEA	International Atomic Energy Agency
IBA	Important Bird Area
ICDF	Iraqi Coastal Defense Force
I*d*RC	Interdisciplinary Research Consultants
IEE	Initial Environmental Evaluation
IMAD	Iraqi Marine Anti-pollution Department
IMO	International Maritime Organization
IPA	Iraqi Port Authority
ISU	International Salvage Union
IUCN	International Union for Conservation of Nature
JBIC	Japan Bank for International Cooperation
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KA	Khawr Abdallah
KAZ	Khor Al Zubayr
KOC	Kuwait Oil Company
KZC	Khor Al Zubayr Channel
KZP	Khor Al-Zubayr Port
MARPOL	International Convention for the Prevention of Pollution from Ships
MESL	Marine Environmental Services Laboratory
MNA	Mine Danger Areas
MNF	Multinational Force Iraq
MOE	Ministry of Environment
MOO	Ministry of Oil

I*d*RC: Interdisciplinary Research Consultants (I*d*RC), P.O. Box 13304, Amman 11942, Jordan www.idrc-jo.com

MOP	Project Monitoring Plan
MOT	Ministry of Transport
MOU	Memorandum of Understanding
MP	Management Plans
NNW	North-Northwest
ODA	Official Development Assistance
OP	Operational Policy
OSCP	Oil Spill Contingency Plan
PCB	poly-chlorinated bi-phenyl
PMT	Project Management Team
POC	Project Oversight Committee
PSD	Particle Size Distribution
Ppm	Parts per million
PPP	Public-Private Partnership
ROPME	Regional Organization for the Protection of the Marine Environment
SAPROF	Special Assistance for Project Formation
SHSP	Salvage Health and Safety Plan for Salvage Operations
SOW	Scope of Work
SSE	South-Suotheast
TDS	Total Dissolved Soilds
TOC	Total Organic Carbons
TPH	Total Petroleum Hydrocarbons
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UQP	Umm Qasr Port
USAID	United States Agency for International Development
UXO	Unexploded Ordnance
WB	The World Bank
WCMC	World Conservation Monitoring Centre
WRMP	Wreck Management Plan

C1. PROJECT DESCRIPTION

(1) BACKGROUND OF THE STUDY

Iraq has a short coastline of about 48 km lying between the national boundaries of Iran and Kuwait, with all its ports situated within the Al Basra province, which are the key infrastructures necessary for recovering Iraq national economy as a physical distribution base. The port facilities in Iraq have a big drop in efficiency due to a long-term war and suspension of the new investment/maintenance by economic sanctions and more than 70 % of imported commodities rely heavily on inland transportation through neighboring countries. "National Development Plan (Year 2010~2014)" issued in 2010 aims at restoration from the severe situations of the port facilities and to increase its competitiveness through rehabilitation of existing channels and port facilities.

Umm Qasr port (UQP) is the biggest foreign trade port in Iraq and "Iraq Port Sector Rehabilitation Project Phase I" by Japan's ODA Loan, which aims to recover functions and to increase an efficiency of the port, is in progress and as a result handling capacities of cargos will be enhanced. Simultaneously, counterpart trainings for persons concerned in General Company of Iraq Ports (GCPI) have been conducted in order to improve the port operation and management capability.

On the other hand, it is expected that cargo volumes in Iraq will increase greatly and enhancement of the cargo handling capacity at ports is an urgent subject to be solved. Khor Al Zubayr port (KZP), which is the second largest foreign trade port in Iraq, doesn't function well and its handling capacity doesn't meet the cargo demand. In addition there are several issues on the port operation and management system, for example ship dispatch control, customs clearance, an efficient terminal operation system and so on.

Based on the above background, this Data Collection Survey was carried out to collect information for enhancement of the port operation and management capability and arrange them in order aiming at support to the port development plan prepared by the Iraq government. "The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project (Post-Phase I Development Plan) " prepared in "Iraq Port Sector Rehabilitation Project Phase 1" is referred.

(2) PRESENT SITUATION OF PORTS IN IRAQ

There are 5 major cargo ports in Iraq such as Umm Qasr, Khor Al Zubayr, Al Maqil, Abu Flus and Al Faw Ports, which are located along Khor Al Zubayr Channel and Shatt Al Arab Channel in the southern part of Basrah Province. Apart from these cargo ports, two oil terminals for exporting crude oil such as Al Bakr and Al Amaya are located in the Arab Bay of the Gulf.

At independence, Iraq had little port capacity because of the country's traditional overland orientation toward Syria and Turkey rather than toward the Gulf. The Port of Basra was acknowledged as the Gulf port. The government invested to expand the port many times, and a newer port was developed at Umm Qasr to relieve pressure on Basra. A new port was built in tandem with an industrial center at Khor Al Zubayr.

While oil terminals were developed along the Shatt al Arab till the mouth of the river at the Gulf, at one stage up to 70% of imports came through the ports. Available infrastructures for crude oil transport in many respects seem to be sufficient to comply future oil transport scenarios.

Excluding crude oil, container shipping is the most strategic sector for future development of Iraqi international trade.

The present infrastructures for container sea transport are underdeveloped far behind the international standards and level of container terminals of the ports in the Gulf region, particularly terminal operation/management system and connection system with global networks.

Port activities were curtailed severely in the 1980's in the Iraq-Iran war. Before shipping could be resumed, the Shatt al Arab River had to be cleared of explosives and wreckage and sedimentation at the bottom of the river, which will take many years to come.

Iraq ports by its geographic location support the idea that Iraq could function as a gate of land bridge for container flow connecting between Far East Asian countries and Eastern Mediterranean countries.

a. Iraqi Port Management Body

There are 5 major commercial cargo ports in Iraq such as Umm Qasr, Khor Al Zubayr, Maal, Abu Flus and Al Faw Ports, which are located along Khor Al Zubayr Channel and Shatt al-Arab Channel in the southern part of Basrah Province. GCPI owns and operates those ports.

b. Land Transportation

Because of the inadequacy of the handling capability of above commercial cargo ports, fairly large amount of imported cargo were coming by land route from neighboring countries such as Jordan, Syria, Turkey, Iran and Kuwait. In 2010, it was estimated about 70 % of the imported cargo were transported through land line and more than 2,000 trucks were believed to pass the border between Jordan, Kuwait and Iraq. Aqaba port of Jordan, Mersin Port of Turkey, Tartous and Latakia Ports of Syria are used for import cargoes that bring the increase of cost for imported material. In 2010, it was estimated about 40 % (2008) of the imported cargo were transported through land line.

c. New Al Faw Port M/P

Italian consortium leading by TECHNITAL submitted the F/S Report on the Master plan of New New Al Faw port in 2009 using Italian government loan which considered the Public-Private Partnership (PPP) contract options for the implementation of the project. This master plan considered the modernized rail connections and the up-to-date facility could reduce the transit times of cargo moving between Far East and Europe which satisfy the demand of Iraqi domestic cargo transport demand as an inevitable consequence. In Jan. 2012, detailed design of port and cargo transportation infrastructures has been submitted to Iraqi government from Italian consortium. According to the hearing from Japanese company which engaged in the business activities in Iraq, they have received the invitational offer for investing to this gigantic project.

d. Modernization of Port Facilities and Management

In July 2008, the Ministry of Transport selected a US-based specialist consulting company Cornell Group to assist it in restructuring and introducing concession the port of Umm Qasr to appropriate and qualified international investors for port development and operation.

Concessionaire expected to rehabilitate the berth and to procure loading/unloading facility and operate the berth for certain period time (5 years). After completion of the contract Government of Iraq and GCPI will take over the facility and its operation right. These contracts will be deemed to make renewal after completion of original contract period.

Concession of cargo handling yard was also considered and had been made with APL Co. (USA) and Alkamal Comp for Berth No.4 and 5 of UQP South port.

In Feb. 2012, GCPI and Nafith at Jordan made a total of 15MUSD 10 year contract of traffic control and management to the UQP, KZP and Ab Flus port, including to the Kuwaiti border. Nafith have similar traffic control and management system in Aqaba port, Jordan. It aims to shorten the amount of time currently required several days to 8 hours.

e. Phase I Project:

The Government of Japan Provided ODA loan signed in August 2008 for a number of infrastructures restoration projects and engineering study for rehabilitation projects. “Iraq Port Sector Rehabilitation Project (Phase 1)” which is one of the projects consist of dredging the River -1 in the North port of UQP for 200m from the berth face line and depth of -12.5m, removal of wrecks existing at berth no 9-10 of the entrance area of the North Port the following aimed at UQP, procurement of cargo handling equipment and marine equipment, rehabilitation of damaged berthing facilities of the north port and other related engineering consulting services.

The restoration and rehabilitation works for UQP by Japan’s ODA loan is scheduled to complete by the end of 2014. It is expected that cargo handling efficiency of the port will be improved, number of berths will increase for cargo handling operation by removal of the wrecks and channel and basin will be deepened, thus the port capacity will increase and ship size will be enlarged substantially.

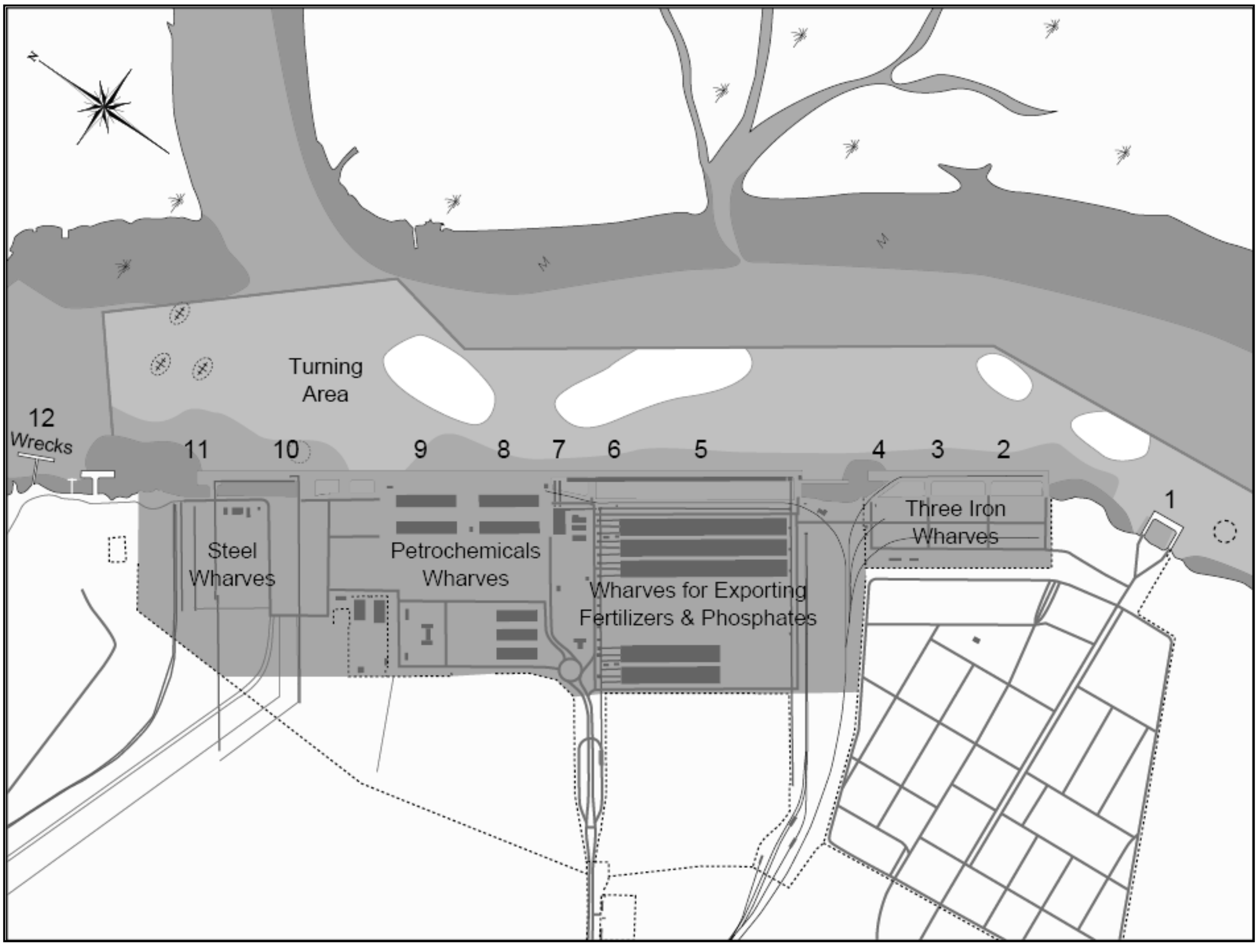
Hopper Suction Dredger (3,500m^3), Grab Dredger and Floating Crane (2,000tons) are now under procurement procedure. It is expected that the originally designed capacity of UQP/KZP in southern region of Iraq will be recovered by the current on-going restoration/rehabilitation projects.

(3) KHOR AL ZUBAYR PORT

The port is located at a distance of 60 kilometers from the center of Basra city, and 105 kilometers from the northern end of the Arabian Gulf and 12 nautical miles from the port of Umm Qasr. KZP was constructed between years 1975 and 1980, operating as a free trade zone and industrial port supporting the industrial developments in Basrah and its vicinity. Soon after the end of the conflict in 2003, the general cargo berths were operated by Maersk Sealand Line for two years, after that the whole of the port was run by the GCPI until the joint-operating contract had made with Marlog of German company on 2010.

The port contains specialists to plant iron and steel, for the purposes of import iron ore and export of sponge iron. There are also five berths specialist along the 250m with accessories includes stores specialized for the storage of urea, phosphate, and equipment necessary to load the chemical fertilizer. There are also three berths for general cargo along the 180m with the number of cranes and yards for storage, and paved streets and rail lines in addition to buildings and services.

Although the planned water depth at berth front is -12m, current water depth is 6m to 8m due to the lack of proper maintenance dredging activities. Latest available bathymetric survey data was the one obtained in 2005, after that no such survey has been conducted. The berth cannot be used due to existence of ship wrecks along the berth.



Source: JICA Study Team

Figure 1: Layout of Existing Khor Al Zubayr Port

Table 1 summarizes the originally designed usage and current berth utilization. In contrast with the Port of Umm Qasr, almost none of the berths at Khor Al Zubayr are currently used for the original plan as intended. For example, the specialized bulk handling berths 5, 6 & 7 at Khor Al Zubayr no longer handle fertilizer (urea and phosphate) but are used for general cargo instead, while the bulk iron berths are used for piped oil products

Berth No 1 is used temporally for anchoring empty cargo ship and placement of sunken ships after lifting temporary. Berth No. 2. 3, 4 are not actively used for cargo handling and used for sip mooring

GCPI uses Berth No.2～8 except No.5. Navigational Department uses Berth No.5. Berth No.6 - 8 were originally constructed as a specialized berth for fertilizer. Because of the temporal termination of the fertilizer factory, these berths are used for general cargo such as rice, bagged cement and tire for cargo ship and Dhow ship. Unloading operation has been done by mobile crane or ship geared crane.

Northern parts of the port such as Berth No.8 to 10 are utilized as oil related berth and are under Ministry of Oil (MOO) operation and management. GCPI have no authority on operation and management activity.

Table 1: Berth Utilization

Berth No.	Designed Usage	Berth Utilization	Remarks
1	General Cargo	Berth no. 1 is being used temporarily for anchoring empty cargo ships and placing sunken ships after lifting. Berth no. 1 will be tendered for concession soon.	Under GCPI's management
2, 3 and 4	General Cargo (break bulk and steel products handling)	Berth no. 2 & 3 have no records of being used by GCPI for cargo handling from 2006 to 2011 After removing the wreckages in front of these berths, cargo ships carrying general cargo such as cement, have been using these berths.	
6 and 7	Fertilizer and Phosphate	These berths were planned to be used for exporting fertilizer products by MTI, however dhows presently use Berth no. 6 for unloading general cargo mainly from India. Cargo ships carrying general cargo such as bagged sugar, rice, cement, and soya beans also use these berths.	
8	Petrochemicals	This berth was planned to be used by MOO for exporting fuel oil and importing petrochemical products. This berth is presently used by cargo ships for container and general cargo handling.	On concession by Marlog of Germany
9	Petrochemicals	This berth was planned to be used by MOO for exporting fuel oil and importing petrochemical products. Presently tankers use this berth for importing petrochemical products and exporting fuel oil.	Under MOO's management
10	Sponge Iron Import	This berth was planned to be used for importing sponge iron. Presently tankers use this berth for importing petrochemical products and exporting fuel oil under MOO's management.	
11	Raw Iron Imports	This berth was planned to be used for importing iron ore. Presently tankers use this berth for importing petrochemical products under MOO's management	
12	General Cargo	A 125 MW capacity Turkish power barge is berthed here.	Under GCPI management

Source: JICA Study Team

a. Berth structure:

The berthing structure was constructed in the detached type of berth as typical type of the river port to obtain the depth of -12m in the river and minimize the maintenance dredging. The berth and land is connected with concrete access bridge. These structures were supported by the steel piles which were driven up to -32 m to accommodate large bulk carrier ships.

Table 2: Berth Dimension of Khor Al Zubayr Port

Berth No.	Current Usage	Current Water Depth (m)	Length x Width (m)	Construction Year
1	Not used	-6~-7	100 x 30	1976
2	Not used (Recently General Cargo handling have been resumed)	-6~-7	180 x 30	1980
3		-6~-7	180 x 30	1980
4	General Cargo Ships	-6~-7	180 x 30	1980
5	Not used (The berth is used for the mooring facility for GCPI working boats)	-5~-6	-	1978
6	General Cargo Ships, Dhow Ships	-5~-6	375 x 35	1978
7	General Cargo Ships	-5~-6	375 x 35	1978
8	Container Ships, General Cargo Ships	-8	250 x 35	1978
9	Tankers	-8	250 x 35	1978
10	Tankers	-8	240 x 24	1976
11	Tankers	-7~-8	320 x 26	1976
12	Power Parge	-7~-8	100 x 20	1975

Source: JICA Study Team

b. Port Operation Concession

Joint-operating contract for Khor Al Zubayr Port Berth No.8 with the German Marlok Company had been made on Aug. 2010. The contract stipulates that the Marlok Company administrates and operates Berth No. 8 which is specified for transferring goods and containers, for 7 years starting from the date of completing the rehabilitating and equipping operations for the wharf within 9 months after receiving the wharf. Marlok Company have priority to moor the arriving ships at this wharf to its account and to except them from waiting according to the terms of the contract. It also stipulates that Marlok must commit to supply the wharf with the required equipment and machinery. According to the hearing from Japanese company, they also have an interest for joint-operation contract as long as the surrounding activity in these are coincide the interest in their company activity.

c. Cargo

Main export materials are oil and dates. They used to export fuel oil but recently they import fuel oil.

d. Port Planning

The ministry also plans to nearly double the current 4 million t/yr capacity of Khor Al Zubayr port with the construction 13 multi-purpose commercial berths including four container berths and a Ro-Ro berth, all furnished with the necessary buildings and services. The proposed capacity of the new facilities will be 3.75 million tons/year. The vacant water front area between Berth No.1 and No.2 are the candidate for the construction of container berth where 400m vacant hinter land space will be allocated as a Free Trade Zone. South-east of Berth No.1 is another possible location of expansion of container berth and necessary yard space.

e. Cargo Handling Equipment

The efficiency of port operation and services are required for improvement up to minimum internationally recognized level in order to cope with increasing traffic of frequent ship calls and cargo volume.

Under the present situation of the worn out and damaged cargo handling equipment, damaged berthing facilities, and lack of communication equipment, lack of and damaged facilities of water supply facility, electric power supply substation, the port would be difficult to provide effective services and efficiency of operation.

The port management office of KZP have also shortage of working vessels like dredgers, tug boats, pilot boats, and suitable cargo handling equipment of bulk cargo and containers, as a result the port management office can not provide efficient service to port users.

f. Present situation of Access Channel

The channel between the Umm Qasr Port and the Khor Al Zubayr port was developed by dredging the depth of -12.0m. Since then the maintenance dredging was not carried out for last 10 years, except the partial maintenance dredging was carried out in this channel by GCPI owned dredgers from 1998-2002. According to the survey of the channel between UQP and KZP as conducted by JETRO study in 2006, the upstream of the channel has got shallow depth around -8.2 to 8.5 m and the ship size of 20,000 DWT can be sailed up to the Khor Al Zubayr port. The port basin of the Khor Al Zubayr port is shallow depth of around -8.2 m. The small and large sunken ships of 15 ships are scattered along the existing berthing area and basin area.

g. PROJECT SCOPE OF WORK AND MAIN COMPONENTS

The following tables show the requested scope of the project to be implemented under the Urgent Rehabilitation Development project.

Table 3: Proposed Project Components for KZP

Project Component	Outline of Scope of Works	Remarks
(Construction Works)		
1. Dredging Works at KZP	Dredging of Port Basin, front of berthing areas, a limited area of Access Channel, Dredging volume: 5,400,000 cu.m, Depth: -12.5m, Width: Access Channel & Berthing areas 300m, and Turning basin 450m wide.	From UQP to KZP (including KZP port area), no maintenance dredging has been done for a long time. Especially the port basin and berth front areas are serious. The Channel (UQP-KZP) is also shallow and narrow in places, and widening and deepening are required, which can be done after the dredging works in the port area by GCPI own dredgers together with the planned rehabilitation and improvement of the LNG plant berth area.
2. Shipwrecks Removal Works	Total 12 wrecks removal located in the Main Channel and KZP basin.	6 wrecks located at KZP port basin area and KZP channel, the other 6 are along the Channel to UQP. Therefore, 6 wrecks located in KZP basin and access channel are the most critical.
3. Rehabilitation of Port Facilities	Damaged Fender Replacement: 60 pcs. (KZP) Repair of Tug berth structure (KZP), Yard pavement rehabilitation (KZP), Corrosion Protection (UQP)	According to the investigation results, total 97 pcs of Fenders were lost or damaged and need replacement. Some fenders are replacing by KZP. Thus 68 pcs of appropriate and suitable fenders will be replaced. Tug berth maintenance and corrosion protection. Yard pavement repair and maintenance including drainage. All North port berths (No.12-No.21), Total Cathode 1,845 pcs.
4. Expansion of Berth at KZP	300m Extension of the existing berth No.2 to South, and utilize as Multi-purpose Berth (KZP), Also connected to Berth No.1, Design depth -12.5m	In order to handle overflowed cargoes from UQP, it is necessary to extend the existing general cargo berth at least 300m. Design ship: 20,000-30,000 DWT max.
5. Navigation Aids Works	Procure and Install 20 Light Buoys along the Channel between UQP and KZP, 2 Leading lights installation at KZP Access Channel, AIS/VTS system installation	At present only 10 light buoys are installed along the channel between UQP and KZP, whilst 25 required as minimum. It is therefore recommended to provide 20 light buoys. At present no leading light is provided for the access to KZP, thus essential for safe navigation to KZP. Necessary to install the system according to the Strategy approved and required for ISPS compliant ports.
6. Utility Works	Rehabilitation/repair works at KZP, (Water supply, electricity cables, etc.)	Water supply system, electrical cables and pits rehabilitation A part of such works cam be done by the Port (GCPI). 40 quay cranes exist at UQP North, of which 24 cranes are not working. The work target is to remove total 14 nrs at Berth No.17,18 & 19 urgently for container cargo handling.
7. Removal of Unused Facilities & Equipment	Unused rail mounted quayside cranes at UQP	
(Procurement of Equipment)		
8. Cargo Handling Equipment	KZP: Container cargo handling equipment (21nrs.) , KZP: Maintenance works equipment (4nrs.) , UQP: RTG (4nrs)	
9. Marine Equipment (UQP/KZP)	Dredger (3), Tug (3), Survey boat(1), Mooring boat (2), Anti-pollution/monitoring vessels(3), Others (7)	

Source: JICA Study Team

It is however necessary to further examine the necessary development, facilities, and equipment based on the updated cargo demand forecast. In the examination of the necessary cargo handling equipment, the updated conditions of the existing equipment will be fully considered.

The figure below shows the dredging area of KZP

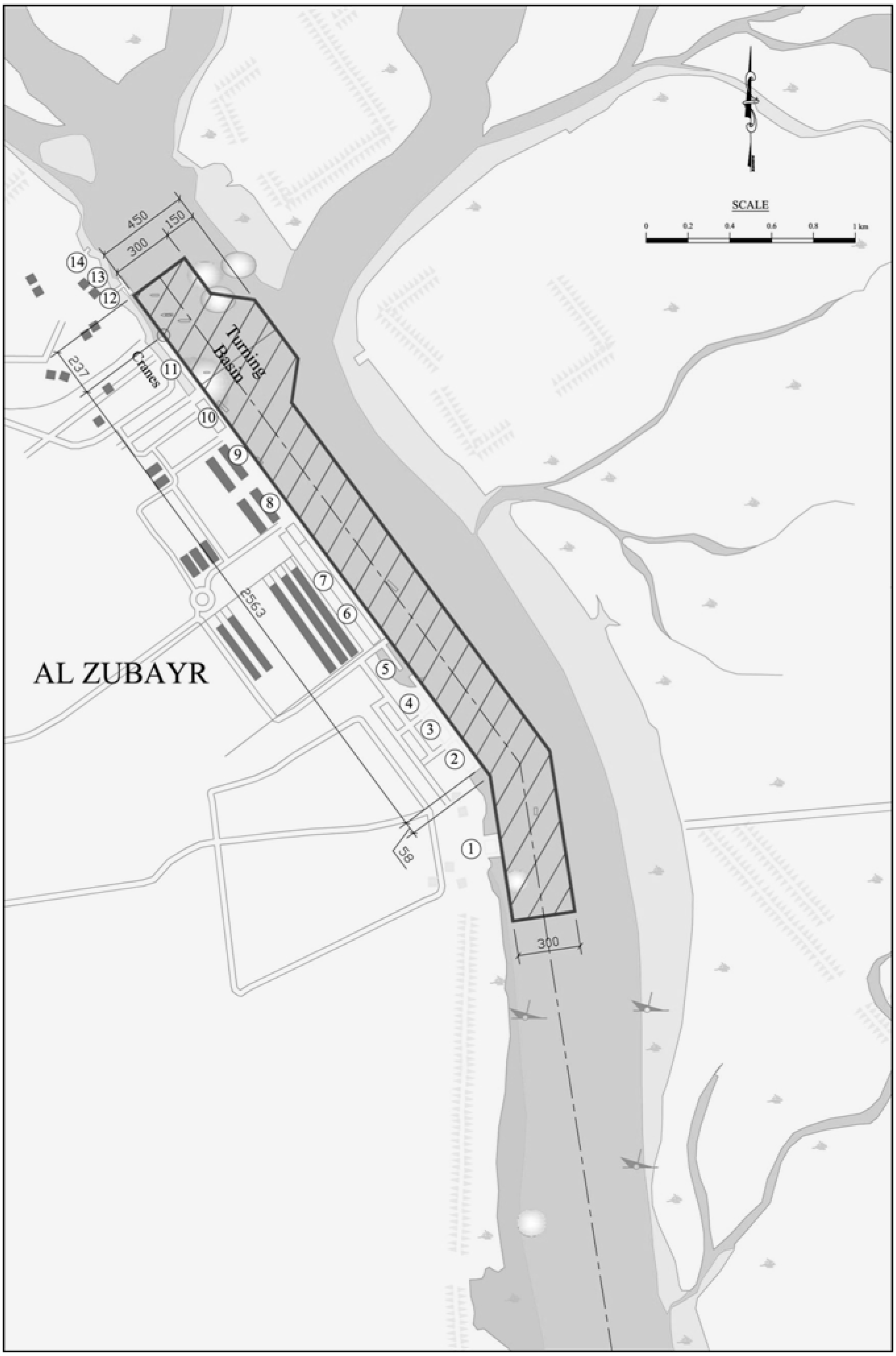
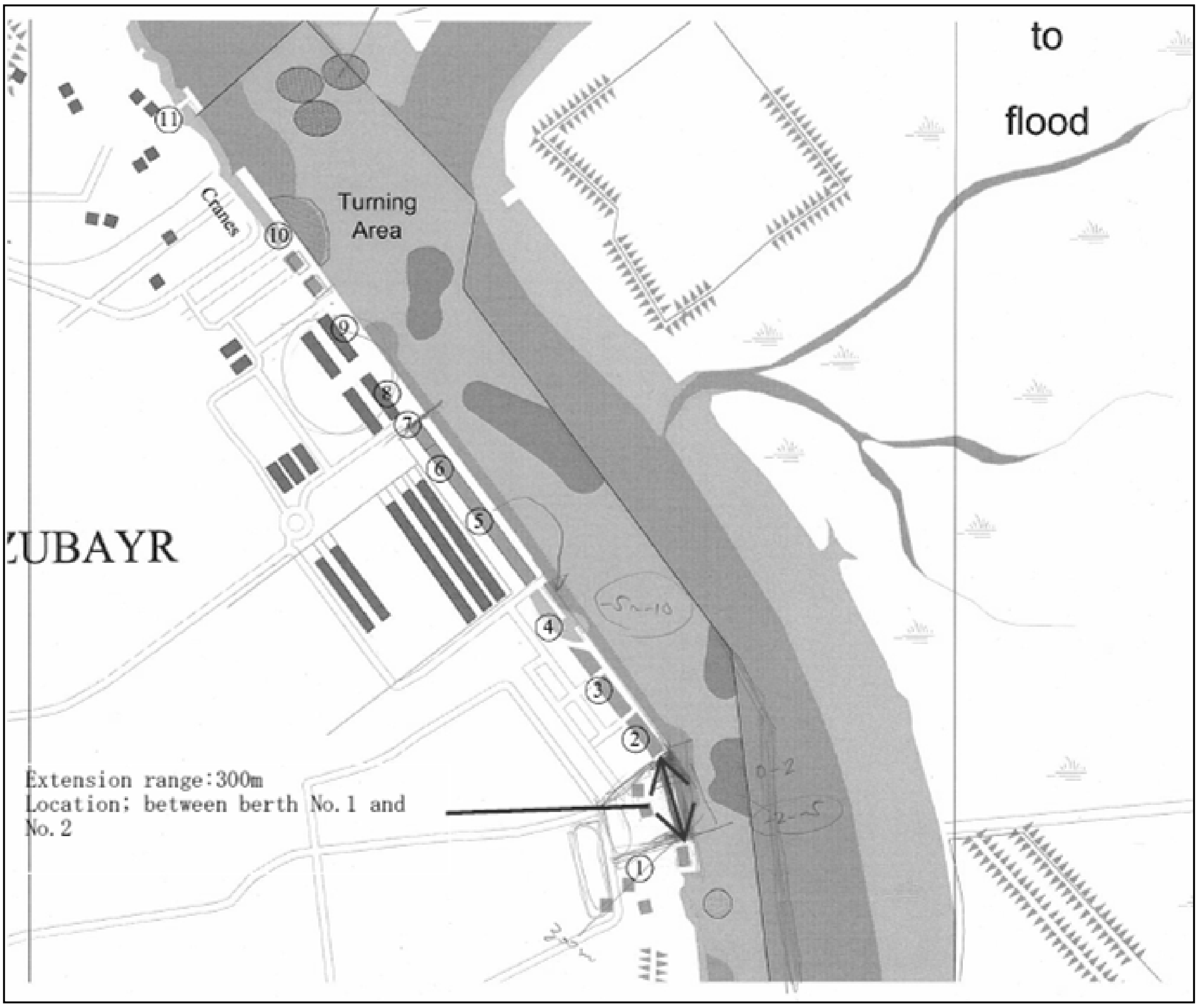


Figure 2: Dredging area of KZP

The extension of a multi-purpose berth is planned as a part of the rehabilitation project phase 2 to supplement a shortage of the public service berth in KZP. The proposed multi-purpose berth will serve to accommodate different types of cargo ships (20,000~30,000 DWT max.) transporting containers, general/bagged cargoes and bulk cargoes for public use.

It is proposed to construct one berth with about 300 m in length and -12.5 m in depth. The berth to be planned will be connected to the existing Berth No. 1 and No. 2 (see Figure 3 for the location).



NOTE: The red line shows the area of the jetty to be extended.

Figure 3: Extension of berth

(4) OBJECTIVES OF THIS STUDY:

The Japan International Cooperation Agency (JICA) Study Team was commissioned to undertake an environmental data collection survey associated with the port sector development plan in Iraq. The project has focused on the Khor Al Zubayr Port (KZP) and the associated navigation channel between Umm Qasr Port and KZP.

According to UNDP, the recovery of function of KZP is expected to have the following benefits:

(i) The increase in throughput capacity would be expected to save the Iraqi economy some $US 200 million per annum by reducing the costs of goods imported to Iraq via the ports of neighboring countries. Table 4 provides an indication of potential annual savings.

Table 4 Potential Cost Savings Based on 2003 Volumes and Rates

	Ave. Kms	Ave. Cost /ton	% total volumes	Daily cost	Annual cost $million per 350 days
Useable Iraqi Ports	351	7.5	32	104,000	
Aqaba Jordan	1172	32.75	28	399,000	
Syrian Ports	1126	18.60	28	227,000	
Turkish Ports	951	55.0	12	287,000	
Weighted Average	870	23.4		1,017,000	
All Iraqi Ports	639	11.1	100	483,000	
Difference	231	12.3		534,000	186.9

Source: UNDP, 2004

(ii) Compliance with IMO and Lloyds requirements for Ship protection and safety will reduce insurance costs for vessels using the Port. This should in turn reduce shipment rates and product costs in the market place.

(iii) The improved operational efficiency expected to result from project investments will reduce vessel stay times in Iraqi waters thereby further reducing shipping rates and product costs.

(iv) Increased throughput will have significant downstream effects, on the transport sector and activities in other sectors. In the transport sector this would include, increased employment in the port service sector, shippers, forwarders etc. Direct employment is however unlikely to increase as GCPI has over 8000 employees at present.

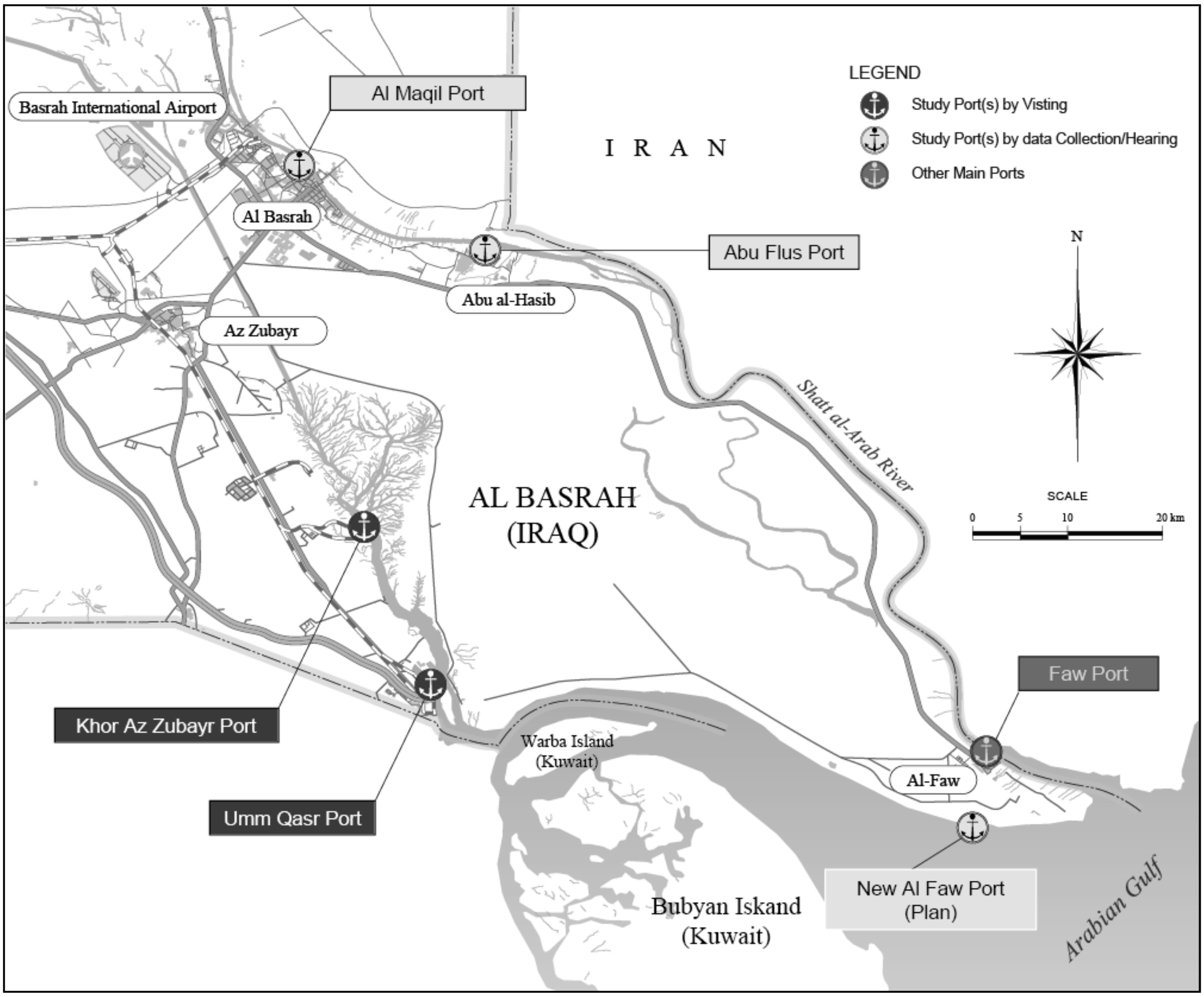
(v) Increased port traffic should allow GCPI to increase its income generating capacity. This should in turn increase Port revenues and significantly enhance the capacity of the Port authorities to undertake necessary, regular and scheduled, programs of maintenance and facility upgrading as required.

(vi) Upgraded pollution management capacity in the Port and in addition significantly reduced pollution threats to project affected waterways.

(vii) Improved Health and Safety during port operations.

The principal objectives of the Survey are to collect information for enhancement of the port operation and management capability and arrange them in order to support the port development plan prepared by the Iraq government. Following points are highlighted:

- To collect information on the present situations of the port sector in Iraq and review them
- To have a clear understanding of the operation and management system in GCPI and examine issues on the system
- To prepare the improvement plan for enhancement of the port operation and management capability and for upgrading of JICA's training curriculum.
- To review the KZP restoration plan proposed in "The Study for Development of Southern Ports in Iraq Post-Phase I Rehabilitation Project (Post-Phase I Development Project)" and conduct supplementary survey for the formation of next restoration step.



Source: JICA Study Team

Figure 4 Survey Area

(5) ENVIRONMENTAL REPORT OBJECTIVES

Reviews undertaken for this project indicate that there is no requirement for the Project to be subject to EIA under Iraqi guidelines. Equally, it is understood there is no requirement to apply for other Iraqi environmental permissions or approvals.

Accordingly, this Initial Environmental Examination (IEE) has been prepared to meet three objectives:

To comply with the SOW of the SAPROF Study,

- To comply with the requirements of Category B project under JICA regulations, and
- To detail for all project stakeholders the environmental management programs necessary to minimize potential Project threats to the environment and to ensure proposed project activities are carried out in compliance with Best International Practice.

Study Approach

The IEE has been prepared on the following basis:

a. Review of available existing data

Primary data sources for the study have included:

- Interim Report
- IEE Report December 2005,
- UNDP Project Reports;
    - Pre Contract Report of Bathymetric and Soil Survey of Approach Channel
    - Final Report of the UXO and Wrecks Detection Survey
    - Final Report of the Environmental Damage (Wrecks) Survey
    - Pre-Salvage Baseline Assessment of Marine Pollution near Shipwrecks in Iraq and Kuwait
    - Oil Spill Contingency Plan
    - Wreck Removal Packages
- USAID Draft Um Qasr Port Assessment, 2003,
- Study on Project Formulation for Reconstruction of Iraq for Iraq Ports Sector, Interdisciplinary Research Consultants Report, September 2005
- IMO (www.imo.org).
- ROPME (www.ropme.com)
- International Salvage Union (ISU) (www.isu.com)

b. Consultations

Considerable assistance has been given to the preparation of this IEE by a number of individuals and authorities, in the latter case most particularly by the efforts of the staff of IdRC.

c. Site Surveys

Reconnaissance surveys of accessible areas were undertaken by the survey team. As with all operations in Iraq security considerations limited the scope for field studies.

On the 19th and 20th January 2012, the survey team undertook a reconnaissance of the general project area, the Khor Al Zubayr and the four potential dumping sites (Areas A – D). The reconnaissance was undertaken with the full permission of the General Company Ports of Iraq (GCPI), Iraqi Port Authority (IPA) and Iraqi Coastal Defense Force (ICDF).

The reconnaissance was intended to determine the location and condition of the wrecks, thereby, aiding the design of the sampling rationale. The boat-based reconnaissance was done at high tide.

d. Impact Assessment

The basic analytical tools utilized in the impact Assessment are the Checklists contained in the JICA document ‘Guidelines for Confirmation of Environmental and Social Considerations’, April 2002. The World Bank (WB) checklist was also utilized.

e. Environmental Management Planning

Draft Environmental Management Plans have been prepared for inclusion in this IEE. It is expected that these will be subject to review and some modification over the period prior to Project Implementation.

(6) REPORT STRUCTURE

This Report contains eight (8) further Sections.

Sect	*Title*	*Content*
2	*Legal and Institutional Framework*	*Description of legal and institutional framework within which Project is set.*
3	*Baseline Conditions*	*Summary description of existing environmental and social condition, including fishermen activities*
4	*Impact Matrix and Mitigation Measures*	*Description of the anticipated project and summary of proposed environmental management measures.*
5	*Alternatives including the zero option*	*Description project alternatives including the "No Project" option.*
6	*Environmental Management Planning*	*Summary of proposed environmental management measures*
7	*Monitoring Plan*	*Summary of monitoring plan*
8	*Stakeholder Meeting*	*Brief about the conduct of the stakeholder meeting*

Seven Annexes are also provided as follows:

Annex 1	*Project Screening Report*
Annex 2	*EIA Checklists for Port Projects JICA Checklist*
Annex 3	*Dredging Environmental Management Plan*
Annex 4	*Wreck Management Plan Salvage Health and Safety Plan Component*
Annex 5	*Wreck Information and Wreck Management Plan*
Annex 6	*Oil Spill Contingency Plan*
Annex 7	*Draft Proposal for the Establishment of Environmental Unit*

C2. LEGAL AND INSTITUTIONAL FRAMEWORK

(1) INTRODUCTION

This Section provides a summary of the legal and institutional framework within which the project is set. This section reviews and addresses:

1. National Iraqi EIA regulations and the status of the Project. It also addresses briefly JICA Environmental and Social Regulations and provides an initial screening assessment of the Project. This concludes that for JICA review and appraisal purposes the project should be classified as a Category B.
2. Addresses the issue of dredging and salvage in Iraqi waters.
3. Provides summary details of other, Iraqi environmental legislation and guidelines that may apply to the project and reviews Iraq's International obligations with regard to the Environment.
4. The key elements of the legal framework for maritime operations in Iraqi ports are summarized, in addition to Salvage Law.
5. The Institutional framework that applies to the project is reviewed.

(2) REGULATIONS GOVERNING THE REQUIREMENT FOR IMPACT ASSESSMENTS

Given the economic and security challenges in Iraq, the environment has not been a priority. There has been some focus on the development and introduction of environmental legislation in more recent years. However, there is still limited enforcement of this regulation and there is still a need for further development of such legislation. The main issues in Iraq with respect to environmental protection can be summarized as follows:

- Lack of effective institutional or administrative infrastructure for management of environmental protection regimes or promotion of sustainable development;
- Lack of participation in regional and global environmental agreements and processes; and
- Lack of adequate legislation or enforcement of this legislation.

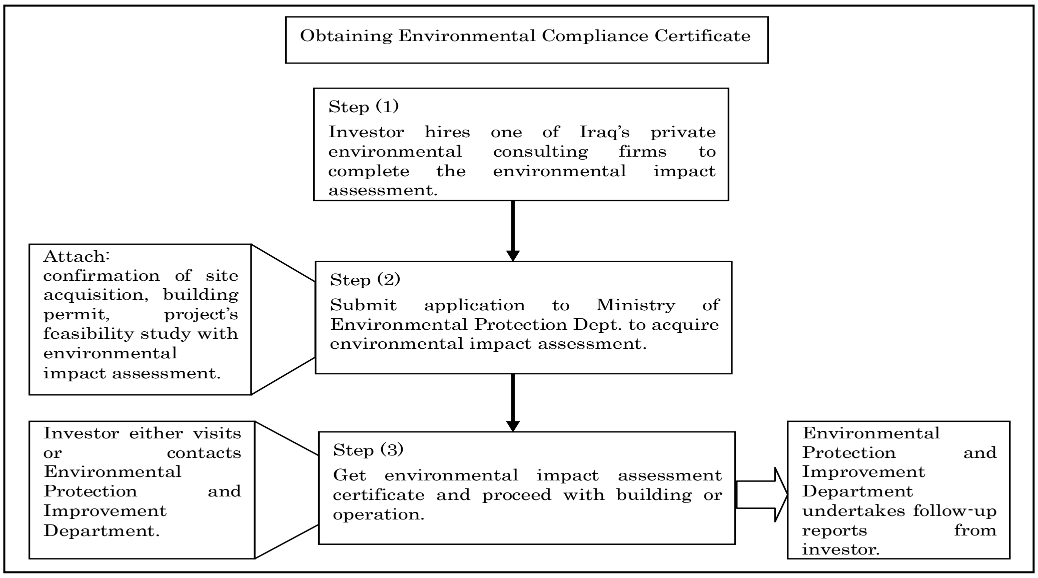


Figure 5: Environmental Procedure

The overall framework is provided by the recently enacted Law No. (27) 2009 for Protection and Improvement of the Environment. Among other things, this law requires development projects to obtain an Environmental Compliance Certificate. In order to obtain such a certificate a pre-project environmental evaluation must be conducted so that protection systems are incorporated. The Figure above summarizes the main steps that project owners shall go through to obtain an Environmental Compliance Certificate.

This law, which replaces and repeals Environment Protection and Improvement: Law No. (3) 1997 (note that regulations and instructions issued pursuant to the 1997 law shall remain in full force in a way not to contradict with the provisions of the 2009 law, until replaced or cancelled), aims to protect and improve the environment and natural resources, preserve public health, biodiversity and cultural and natural heritage, to ensure sustainable development and international and regional cooperation in this area. Specifically this law details the requirements for an EIA for major projects.

The law defines, amongst other things:

- Environmental contaminants as being any solid material, liquid or gas, noise, vibration, radiation, heat or flare, or the like, or ecological factors that lead directly or indirectly to the pollution of the environment.
- Environmental determinants (i.e. the permissible limits of concentration of each pollutant that are allowed to be put to into the environment under national standards). Hazardous waste (waste that causes or is likely to cause as a result of the contents of the material, serious harm to humans or the environment).
- Waste (unusable or non-recyclable solid, liquid or gaseous wastes from various types of activities).
- Dangerous materials (materials that are harmful to human health when abused or adversely affect the environment, such as pathogens, toxic substances, explosive or flammable substances, ionizing radiation, or magnetic materials).
- Land degradation (the loss of some chemical, morphological, physical, fertility or microbiology properties).

The following is a general overview of some of the main relevant articles of this Law.

Article 8 requires planning authorities to introduce considerations for protection of the environment and for pollution control, consumption of natural resources and for sustainable development in applications for development projects.

Article 9 relates to polluting activities, with respect to:

- The use of environmentally clean technology to address pollution, and for efficient operation.
- The monitoring and recording of pollutants.
- Building an information base on environmental protection, to include concentrations and levels of pollutants resulting from polluting activities.
- Work on the use of renewable energy technologies to reduce pollution.

Article 10 of the Law relates to the need for an environmental impact assessment (EIA) prior to the commencement of a project. According to Article 10 of the law, an EIA must include the following:

- Determine the positive and negative impacts of the project on the environment and the impact on the surrounding environment;
- Detail the proposed methods to avoid and treat the causes of pollution in order to achieve compliance with environmental regulations and instructions;
- Propose contingencies for pollution emergencies and potential precautions;
- Detail possible alternative technology that is less harmful to the environment and the rational use of resources;
- Detail provisions to reduce and recycle waste, where possible; and

- Provide an assessment of the environmental feasibility of the project and an estimate of the cost of pollution relative to production.

Article 11 relates to preventing the operation of activities which can adversely affect the environment for which approval of the Ministry has to be obtained.

Article 12 relates to the extension/expansion of existing facilities or the renovation of such facilities with respect to the provisions detailed in Articles (9), (10) and (11) of this Law.

Article 14 relates to the prevention of:

- The discharge of effluents (domestic, industrial, agricultural) to inland water resources, groundwater or surface waters, or Iraqi maritime waters, without treatment to ensure compliance with the specifications set out in national environmental legislation and international conventions.
- With respect to residential dwellings and industry, connecting or discharging of sewage, effluents from industry and other activities, to rain water drainage systems.
- The disposal of solid waste, animal waste and corpses, or scrap material into water resources.
- The use of toxic substances and explosives to catch fish, birds and aquatic animals.
- The discharge from oil tankers of waste oil, wastewaters or fuel to surface water or territorial waters of the Iraqi navy.
- Any act that may lead to the pollution of surface water resources as a result of the exploitation of the river, unless approved by the concerned authorities.
- Any acts that lead to pollution of the marine area as a result of exploration or exploitation of the seabed of the territorial sea and its subsoil and the continental shelf, including pollution emergencies which result in damage to the marine environment, to ensure compliance with national legislation and the principles and provisions of international law.

Article 18 prevents the following:

- Damage to biota in their habitats.
- Fishing, hunting or trafficking of threatened and endangered species.
- The hunting, killing, keeping, or transfer of protected species (birds, wildlife and aquatic species) as identified by the authorities.
- Damage to plants and rare medicinal and aromatic plants used for scientific, medical, industrial, or trade purposes, or it's seeds, in according with the requirements of the authorities.
- Cutting of perennial trees (i.e. trees over 30 years of age) in public areas within the city, unless permitted.
- Logging in the forest unless approved by the regulatory authorities.

Article 22 relates to environmental monitoring for those activities which affect the environment.

Article 23 requires the operator of a facility which is subject to environmental control to maintain records of the releases to the environment in accordance with requirements issued by the Minister.

Article 24 relates to the implementation of this Law by the Ministry of the Environment.
In terms of project classifications as it relates to their environmental impacts, Law No. (27) of 2009 does not provide details on project classifications as it relates to the level of detail of the environmental evaluation needed for obtaining a compliance certificate. However, the regulations and instructions issued pursuant to the 1997 law are in full force in a way not to contradict with the provisions of the 2009 law, until replaced or cancelled, which has not happened to date. Under those regulations, projects are classified into three main categories from an environmental perspective:

- **Environment Polluting Activities Category (A)** – This category is for intensive environmentally polluting activities, including major agricultural or industrial projects that could result in significant impacts on environment quality over large areas. Such activities should be located away from villages, towns, cities, etc., including areas of cities, districts, sub-districts and villages, etc. nominated for development under a rural settlement plan. ***This category of projects requires a detailed EIA Study***
- **Environment Polluting Activities Category (B)** – This category relates to those activities which have less potential to result in pollution than those in Category (A). Such activities include industrial, agricultural, or other activities which can result in site contamination which can be controlled. Such activities can therefore be established within city boundaries and within the development plots allocated for them, provided that pollution control equipment/treatment units are installed in accordance with relevant national regulations and instructions. ***This category of projects requires a less detailed Study (e.g., IEE or EIS)***
- **Environment Polluting Activities Category (C)** – This category relates to activities which cause minor levels of pollution that can be treated i.e. industrial factories that do not result in significant contamination, and small-scale agriculture and residential complexes, hotels, and hospitals, which generate pollution with mainly organic content that can be treated easily using pollution control equipment/treatment units. ***This category of projects does not require a study***

These regulations list various activities, establishing the environmental classification category for that activity, and the various site location restrictions and environmental requirements. The listed activities, however, pertain only to new projects and not rehabilitation projects as is the case at hand.

Furthermore, among all the projects listed, port projects are not mentioned at all. Given that port projects are usually secluded and placed away from communities, there is enough reason to believe that a detailed EIA is not required, especially that this is a rehabilitation project. However, some environmental protection requirements such as disposal into river systems, permissible noise levels, water quality parameters shall still be met even if a detailed EIA is not required.

Discussions were undertaken by members of the study team with the Ministry of Environment, who emphasized that port rehabilitation projects are not stipulated in the law. It was also confirmed that an EIA is most probably not required as the Law does not specify its need for such projects. It was indicated, however, that a proper environmental management plan is needed to be in place during the project implementation. While official correspondence with the Ministry is yet to take place, it is believed that an IEE should suffice. Given the fact the study team plans on conducting a consultative meeting at the end of the study, the scope of the environmental study exceeds that of an IEE and is closer to an EIA where concerns and feedback of stakeholders will be taken into consideration in the consultative meetings to take place.

Given the lack of port project classifications under the Iraqi Law, the study team overviewed the requirements of other international agencies. Those are summarized as follows:

JICA Guidelines

- Projects are screened to one of 3 Categories for Assessment Purposes.
    - Category A: likely to have significant adverse environmental impact on the environment. A project with complicated impact or unprecedented impact which is difficult to assess is also classified as Category A. The impact of Category A may impact broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, (i.e. sectors that are liable to cause adverse environmental impact) or with sensitive characteristics (i.e. characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas.
    - Category B: if its potential adverse environmental impact is less than Category A projects. Typically this is site-specific, few if any are irreversible and in most cases normal

mitigation measures can be designed more readily. Projects funded by Engineering Service Loans for survey and design are classified as Category B, with the exception of those belonging to Category C.

   - Category C: projects with no impact

- Projects comprising only of rehabilitation works on existing sites and do not require a change in land use or any resettlement of populations are classified as Category B. Given the general conditions of the project at hand (i.e., rehabilitation works, isolation from communities, reversible impacts).
- For such category of projects, an IEE report is prepared and monitoring of impacts is required to confirm that necessary environmental measures identified in project reports have been undertaken.

A Screening Form completed by the SAPROF Project Team is included as Annex 1 to this Report. This concludes that the project should be screened as a Category B project primarily because the Project comprises only rehabilitation works on existing sites. It does not require a change in land use or any resettlement of populations.

Further review and assessment of the criteria utilized for assessing project EIA Category provided in Table 5 also suggests the project should be screened as Category B.

Table 5: Review of JICA Category A Criteria

Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impact on the environment. A project with complicated impact or unprecedented impact which is difficult to assess is also classified as Category A. The impact of Category A may impact broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, (i.e. sectors that are liable to cause adverse environmental impact) or with sensitive characteristics (i.e. characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas.

Category B: A proposed project is classified as Category B if its potential adverse environmental impact is less than Category A projects. Typically this is site-specific, few if any are irreversible and in most cases normal mitigation measures can be designed more readily. Projects funded by Engineering Service Loans for survey and design are classified as Category B, with the exception of those belonging to Category C.

Definition	Comment	Conclusion
Category A		
A proposed project is classified as Category A if it is likely to have significant adverse environmental impact on the environment.	Project likely to have overall environmental benefits.	Not applicable
The impact of Category A may impact broader than the sites or facilities subject to physical construction.	Project impacts will extend beyond immediate areas of work but in all cases impacts will be as previously. Dredging has been ongoing since 1970s. International channel part in Kuwait and part in Iraqi waters. Existing disposal sites are in both Kuwaiti and Iraqi waters.	Not applicable
A project with complicated impact or unprecedented impact which is difficult to assess is also classified as Category A.	Only wreck removal program may be considered complicated or unprecedented. However, most wrecks have been subject to survey since 1993 and full data is available. To date 39 wrecks have been removed from project areas since 1993. Experience gained from those projects is available to SAPROF Team.	Not applicable
Sectors that are liable to cause adverse environmental impact or with sensitive characteristics, i.e. characteristics that are liable to cause adverse environmental impact.	Port sector would normally be considered sensitive. However, project works are confined to rehabilitation infrastructure already in place.	Not applicable
Projects located in or near sensitive areas.	No sensitive sites (environmental or man made) have been defined in the vicinity of project works.	Not applicable
Category B		
A proposed project is classified as Category B if its potential adverse environmental impact is less than Category A projects. Typically they are site-specific, few if any are irreversible and in most cases normal mitigation measures can be designed more readily.		Applicable

World Bank Guidelines

World Bank supported Rehabilitation Projects in Iraq have been subject to review using the Environmental and Social Screening and Assessment Framework (ESSAF).

Recognizing the need to balance diligence in managing potential environmental and social risks with urgent reconstruction works ESSAF was developed to assist the Project Implementing Agencies in screening all the subprojects for their likely social and environmental impacts, identifying documentation and preparation requirements and prioritizing the investments. In applying WB OP 4.01, 'Environmental Assessment' it argued that:

- Works focusing on the repair, rehabilitation, reconstruction and upgrading (where necessary) of damaged buildings, roads, railways, bridges and infrastructure of critical importance including power generation and distribution, agricultural infrastructure, irrigation and drainage networks would not trigger other OP, including OP 4.04 on natural habitats.
- The nature and magnitude of potential environmental impacts from reconstruction works was such that they were likely to be classified as Category 'B'.
- The requirement to carry out an Environmental Analysis as part of project preparation can therefore be waived for subprojects with potential adverse impacts. A limited Environmental Analysis was required during project implementation and at the same time, prior to appraisal the implementing agency was required to agree to apply the following minimum standards during implementation:
    - Inclusion of standard Environmental Codes of Practice (ECOP) in the repair and reconstruction bid documents of all subprojects;
    - Review and oversight of any major reconstruction works by specialists;
    - Implementation of environmentally and socially sound options for disposal of debris; and
    - Provisions for adequate budget and satisfactory institutional arrangements for monitoring effective implementation.

All these latter requirements are met by this IEE and the proposed EMP.

(3) OTHER RELEVANT IRAQI ENVIRONMENTAL REGULATIONS

In addition to the aforementioned laws that are directly applicable to EIA and IEE, there are various laws and instructions which will assist in the undertaking of an EIA and IEE, which establish assessment criteria against which environmental baseline conditions should be compared. Those that are considered to be most pertinent to the KZP project are summarized below.

a. Environmental Criteria for Industrial, Agricultural, and Public Service Projects, 1990 (Order number unknown)

These regulations, which were approved by the Council for Protection and Improvement of the Environment in its meeting numbered 14, 1990, establishes environmental criteria with respect to the location and environmental requirements of industrial, agricultural and public service developments. The environmental instructions establish three project categories which have already been presented in the previous section and are re-phrased here

- **Environment Polluting Activities Category (A)** – This category is for intensive environmentally polluting activities, including major agricultural or industrial projects, that could result in significant impacts on environment quality over large areas. Such activities should be located away from villages, towns, cities, etc., including areas of cities, districts, sub - districts and villages, etc. nominated for development under a rural settlement plan. Suitable pollution controls/ abatement equipment should be provided to protect the environment.
- **Environment Polluting Activities Category (B)** – This category relates to those activities which have less potential to result in pollution than those in Category (A). Such activities include industrial, agricultural, or other activities which can result in site contamination which can be

controlled. Such activities can therefore be established within city boundaries and within the development plots allocated for them, provided that pollution control equipment/treatment units are installed in accordance with relevant national regulations and instructions.

In cases where it is not possible to control all pollution (for example odor), the activity should be located outside of the city boundaries, and in accordance with the determinants for that activity as detailed in these instructions.

- **Environment Polluting Activities Category (C)** – This category relates to activities which cause minor levels of pollution that can be treated i.e. industrial factories that do not result in significant contamination, and small - scale agriculture and residential complexes, hotels, and hospitals, which generate pollution with mainly organic content that can be treated easily using pollution control equipment/treatment units. Such activities can thus be established within and outside of city borders, without any limitation, in accordance with these instructions. This also allows farm owners to set up environmentally non - polluting industries within their farms.

The regulations then go on to list various activities, establishing the environmental classification category for that activity, and the various site location restrictions and environmental requirements. For example:
(64) Fuel Depot (*i.e.* places were all kinds of oil products are stored). Environmental Classification: Environment polluting activities of category (C)

Site Restrictions:
- They are to be established within public service areas in a way that ensures they are greater than 250m from the boundaries of residential areas, hospitals, kindergartens and schools;
- They are to be within 250 m of a public road.

Environmental Requirements:
- Establish a fence which is not less than 2m height;
- Provide a collection system to ensure the collection of leaked/spilt fuel, which may occur during the loading process, into special tanks;
- Provide safety requirements with respect to the control of fire and emergencies which could cause environmental pollution of neighboring areas.

b. Law Concerning Ports, 1995 (No. 27 of 1995).

This law applies to all civil ports, the internal waters, and marine areas where ships anchor for a specific purpose such as waiting, loading and unloading or to carry out works (Section 2). The land and sea boundaries of each port shall be demarcated by resolution of the Council of Ministers.
The Director General of the Establishment is vested with powers to regulate navigation and port safety, the prevention of water pollution, the operation of importation and exportation agents, and the registration of ships.

c. Regulation 25 Preservation of Rivers and Public Water from Contamination, 1967

This regulation is composed of 19 Articles and relates to the protection of rivers and public water bodies from contamination. The public water bodies to which the regulations apply (Article 2), include:

- All rivers in Iraq and their tributaries.
- Streams, canals and all their branches.
- Drainage channels and its branches.
- Lakes, marshes, ponds and swamps.
- Springs, wells and other groundwater.
- Ponds and other pools of water.

Article 3 states that no wastewater discharges should be discharged into public waters unless permitted by the Health Authority.

Article 5 states that the Health Authority will determine the volume and the quality of wastewater which may be discharged into a public water body, and will establish discharge consent limits for the wastewater discharge.

The standard consent limits for the discharge of wastewater into public water bodies are detailed in Article 7:

- If oxygen uptake is exceeded, suspended solids or floating rates are to be determined by the health authority's instructions, but at all times should not exceed the upper limit of 60 ppm.
- The discharge must not contain hydrogen sulphide, toxic substances, harmful amounts of bacteria or harmful substances which may produce toxic substances when they interact with chemical agents that may be present in public water.
- The wastewater must not have a hydrogen ion concentration (pH) of less than 6 or more than 10.
- The temperature must not affect the receiving water.
- Any other wastewater discharge parameters may be decided by the Health Authority.

The disposal of carcasses, secretions or faeces, solid and liquid waste of any kind, or any other harmful substance, into any public waterway or on beaches is not permitted (Article 10).

Article 11 prohibits the washing of animals, leather, wool, intestine and contaminated clothing, and any material that may result in harm to public health, in public waters, and prohibits the defecation and urination in such waters or on the shores.

Article 15 contains details of the penalties for breaching these regulations.

d. Wastewater Discharge Quality Requirements Instruction No.(1)

This Instruction provides discharge concentration limits for a number of substances contained in wastewater, in accordance with the provisions of Article (16) of Regulation 25 on the Maintenance of Rivers and Public Water from Contamination, 1967.

e. The New Determinants for the Prevention of Pollution of Rivers No. (25), 1967

These instructions provide physical, chemical and biological guidelines for water quality and wastewater discharges. The regulation defines Water Resources as:

- Rivers and its tributaries and branches.
- Streams, waterways, canals and branches of.
- Lakes and ponds and other pools of water.
- Springs, wells and groundwater.

The regulations apply to wastewater from cities, industry, agriculture and other activities including:

- wastewater discharged to a public water source.
- wastewater discharged to public sewers.
- wastewater discharged to the sewage treatment works.
- wastewater discharged to the marshes.

The regulations define discharge limits for discharges to both natural waters (water resources) and sewers (which generally have a higher permissible discharge limit). These allowable limits are presented in the Environmental Survey – Data Collection Interim Report.

f. Ambient Air Quality Law

This law aims to control emissions to air from a variety of sources (including industrial (factories, power stations, incinerators, oil installations, etc.), non - industrial, and vehicles). It establishes emissions limits for the discharge of certain pollutants to air. The law details certain restrictions on activities in order to minimize harmful emissions to air.

Article 6 details various requirements/restrictions with respect to activities which burn hydrocarbon fuels;

Article 7 prevents the unauthorized disposal, processing and burning of municipal solid waste in or near to residential, agricultural, commercial and industrial areas. It goes on to state such waste can be burnt in incinerators but applies a number of restrictions and limitations with respect to the siting and operation of an incinerator.

Article 8 requires medical facilities to have their own incinerator to incinerate their medical wastes, and goes on to detail a number of conditions which must be met with respect to the operation of that incinerator, including those wastes that cannot be incinerated.

Article 9 relates to the incineration of hazardous wastes.

Article 10 details various conditions for the spraying of pesticides and other chemical compounds for agricultural usage and public health purposes.

Article 11 relates to exploration, excavation, demolition, construction, and waste transfer activities and the control of dust emissions from such activities.

Article 12 details the requirements that should be taken into account in the design of flues/stacks for the discharge of emissions to air, specifically:

- the chemical and physical properties of the substances emitted.
- the height above sea level.
- the height of facilities in the surrounding area.
- the outer diameter of the mouth of the stack.
- the inner diameter of the mouth of the stack.
- building materials used.
- the concentration, volume and velocity of emissions.
- temperature of the emission.
- the direction of prevailing winds.
- the percentage of moisture in the ambient air.

Article 13 requires that all point sources of noise do not exceed national noise standards.

Article 14 requires the monitoring and recording of air emissions and the submission of periodic monitoring reports to the Ministry, competent authorities and stakeholders.

Article 15 requires the owner/operator of a facility to monitor and record emissions to air from the activity; monitoring records should be kept for a minimum of 5 years to enable the

Ministry and designated observers from the competent authorities to access these records during inspections of a facility or activity.

Article 16 states that existing facilities have 4 years to comply with the requirements of this law.

The limits provided in the Annexes of this law are presented in the Environmental Survey – Data Collection Interim Report.

g. Noise Prevention Law No. (21), 1966

These regulations aim to prevent excessive noise in public places. They prevent broadcasting in public places that may disturb the peace but does allow for the use of speakers internally in public and private places if approved by the police, although the speakers cannot be used between the hours of 10pm and 8am. Applications for the use of such equipment should be made to the Police 3 days beforehand, except in urgent situations where a decision may be made on the same day as the application.

Article III details the need for obtaining approval for the use of such equipment. The authorities have the right to supervise and control media broadcasts in public places, and to take legal action in the event of any violations (Article IV). Article V of the regulations details the violations and penalties should the regulations be breached.

h. Instructions No. (2), 1993

This Instruction details the conditions for determining the levels of noise emitted from sound equipment in tourist facilities.

With respect to outdoor concerts, the Instructions state noise levels must not exceed 96db (A) at a distance of five (5) meters from the source of the sound. The power rating of the sound equipment must not exceed 100 watts.

With respect to indoor concerts full of sound insulation of the walls, ceilings and floors are required so noise levels do not exceed 38 db (A). The capacity of a single set of speakers must not exceed 100 watts. The total capacity of the sound equipment must not exceed the limits are as detailed in the Environmental Survey – Data Collection Interim Report.

i. Instructions No. 4, Safe Storage and Handling of Chemicals, 1989

These Instructions detail the requirements for the safe storage and handling of chemicals, being issued in accordance to the provisions of the sixth and seventh paragraph of Article (3) and Article (105) of the Public Health Law No. 89, 1989.

These regulations apply to activities involving the manufacture, use, storage or handling of the following chemical types:

- explosive
- flammable
- oxidizing
- corrosive chemicals, radioactive chemicals and carcinogenic chemicals
- chemical drugs
- toxic chemicals and pesticides
- chemical irritants
- inert chemicals.

Article 2 details the necessary precautions for the handling and storage of chemicals, and the need for suitable signage. The replacement of hazardous chemicals with less hazardous materials is required whenever possible, and the minimum possible quantity of such chemicals should be stored at facilities

Article 3 stipulates for chemical manufacturers the provision of suitable signage and labeling, security and safety, and for the adoption of the international system for the classification and written instructions for chemicals.

Article IV details the factors that should be considered when planning for the storage of chemicals including the properties of the materials to be stored, the systems needed to protect the chemicals from damage or exposure to fire, the transport of the chemical containers to and from the store, etc.

Article V goes on to detail specific requirements when constructing new chemical stores, and Article VI the rules for correct storage.

Articles VII to XIX detail the requirements for the safe storage and use of chemicals, for the disposal of waste chemical containers (Article XVIII), and actions to be taken in the event of the release of a chemical (Article XI); Article XIX details the need for personal protective equipment (PPE) for individuals working with such chemicals.

Environmental legislation is in existence in Iraq, although much of this is dated and spans several political regimes and is divided amongst a number of institutions; it is therefore questionable as to how relevant some of this existing legislation is with respect to current environmental best practice, and environmental conditions within Iraq as a result of decades of conflict and more recent insurgency.

As a result of the establishment of the Ministry of Environment in 2003 there has been a more focused approach to environmental matters and the development of new environmental legislation; additionally Iraq is now signatory to a greater number of international environmental conventions. Most notably with respect to EIA and IEE the development of Law No. (27) of 2009 Protection and Improvement of the Environment provides a framework for environmental management and sustainable development, and a platform for the development of other environmental legislation.

However, it is recognized that currently within the country there remains limited effective institutional or administrative infrastructure to ensure implementation of this legislation. The enforcement of present legislation is weak and is not effective at ensuring those environmental standards that do exist are being adhered to, but such an expectation would probably be unreasonable at this stage in the reconstruction of Iraq.

(4) OTHER REGULATIONS RELEVANT TO THE PROJECT

a. Iraqi Salvage Law

Local consultants have indicated[2] that the Salvage Law of Iraq is typical of that in most countries in that it focuses on the issue of physical wreck removal and contains the following clauses:

- Definition of wrecks;
- Definition of when a wreck constitutes a hazard;
- Confirmation that the onus is on the owner of the wreck to remove it;
- Confirmation that in the event the owner fails to do so, the State can take action to remove the wreck; and
- Confirmation the owner remains liable for the wreck removal expenses and that the State can generally reimburse itself by selling the salved property

The recently adopted Port regulations contain further stipulations as follows:

(i) *If a vessel or a vessel has run aground, fallen into water or sunk in the harbor area, the ship's master or owner shall have the vessel removed immediately.*

(ii) *If a sunken vessel or sunken goods cause danger or inconvenience to traffic, the IPA shall have the place marked with a warning sign, if the owner of the vessel or goods has neglected his duty to do so. The IPA also has the right to take immediate measures to have the vessel or goods removed.*

[2] A copy of the law has not yet been obtained.

b. Treatment of Wrecks under International Law

The treatment of wrecks under International Law is at present governed by the International Convention on Salvage, 1989 which is derived from the original International Law of Salvage of 1910.

A Draft Wreck Removal Convention (DWRC) of 1998 continues to be debated within the IMO and remains a Draft.

The 1989 Convention replaced the original law of 1910 which based payments for salvage solely on the principle of 'no cure, no pay’ under which a Salvor is only rewarded for services if the operation is successful.

This basic philosophy worked well in most cases but it did not take into account pollution. For example, a Salvor who prevented a major pollution incident (for example, by towing a damaged tanker away from an environmentally sensitive area) but did not manage to save the ship or the cargo got no reward. This provided little incentive for Salvors to undertake operations that have only a slim chance of success.

The 1989 Convention remedied this deficiency by making provision for an enhanced salvage award taking into account the skill and efforts of the Salvors in preventing or minimizing damage to the environment.

> *Article 8* **-** *Duties of the salvor and of the owner and master*
>
> ***1.*** *The Salvor shall owe a duty to the owner of the vessel or other property in danger:*
>
> ***(a)*** *to carry out the salvage operations with due care;*
>
> ***(b)*** *in performing the duty specified in subparagraph (a), to exercise due care to prevent or minimize damage to the environment;*
>
> *Article 9* **-** *Rights of coastal States*
>
> *Nothing in this Convention shall affect the right of the coastal State concerned to take measures in accordance with generally recognized principles of international law to protect its coastline or related interests from pollution or the threat of pollution following upon a maritime casualty or acts relating to such a casualty which may reasonably be expected to result in major harmful consequences, including the right of a coastal State to give directions in relation to salvage operations.*
>
> *Article 12* **-** *Conditions for reward*
>
> ***1.*** *Salvage operations which have had a useful result give right to a reward.*
>
> ***2.*** *Except as otherwise provided, no payment is due under this Convention if the salvage operations have had no useful result.*

Given that all the wrecks pose a hazard to shipping, are owned by the Iraqi State and are in Iraqi waters there would appear to be no constraint to their removal under law.

(5) INTERNATIONAL ENVIRONMENTAL OBLIGATIONS

a. General

Iraq is not a signatory to many of the more significant international conventions and agreements on the environment and management of pollution. Its international obligations as specified in international treaties and conventions are therefore quite limited.

Notwithstanding the above, all states (including Iraq under the ROPME Convention have a fundamental responsibility to protect and preserve the marine environment in their own territories and also those elsewhere. Equally, states have an obligation to cooperate and to develop through the competent international organizations (such as IMO, UNEP, etc) international rules and standards and recommended practices and procedures to protect and preserve the marine environment.

The case is similar with regard to marine operations and the protection of the environment. Again, Iraq is not a signatory to many of the most relevant, recent agreements and conventions. However, if IPA is to achieve its objective of reducing insurance and other costs to shipping using UQP and KZP, it must operate the Ports and associated shipping channels to standards approved by agencies such as Lloyds Register and IMO. In many cases, this will require compliance with regulations and conventions to which Iraq is not a signatory.

From the above it is clear that the international regulatory contexts for environmental protection and the operation of the UQP and KZP are not fixed and will evolve over the coming years.

For Project purposes therefore, it will be necessary to develop an implementation framework. The most obvious solution at this stage would be to operate within the ROPME framework.

b. Regional Organization for the Protection of the Marine Environment (ROPME)

The Kuwait Convention of 1978 is the legal instrument binding the eight states of the Gulf region to protect their common marine environment. ROPME was established on July 1st 1979 to implement the Kuwait Action Plan and its subsequent protocols.

Although they are not signatories to all the ROPME protocols, Iran, Iraq and Kuwait, are all signatories of the original ROPME Protocol of 1978.

ROPME has the structures and capacity in place to facilitate cooperation between these various parties and to promote agreement on mechanisms by which their common waterways may be managed. The ROPME secretariat in Kuwait is also sufficiently convenient to Southern Iraq to allow for coordination to take place on a regular basis.

In the case of the SAPROF project, as a minimum, it would be appropriate for Iraqi authorities to contact ROPME to advise them of the expected programme of project works before the works are initiated.

Clearly, the nature and extent of any further cooperation would be a matter for the various parties to agree amongst themselves.

(6) MARITIME OPERATIONS

a. Port Operations Guidelines

The most important elements of the Port Regulations, from an environmental perspective, **Prevention of Shoaling and Pollution of the Harbor**, and are provided below:

> *The ship's master is liable to see to it that neither oil nor any other polluting substances or wastes leak or are jettisoned or pumped from the vessel in the harbor area. Neither is it allowed to release steam, carbon or any other substances that may cause danger or inconvenience to users of the port or port equipment.*
>
> *Ship's master or owner of goods is obliged to inform the IPA without delay of any jettisoned goods or oil released into water or other polluting materials and to take necessary measures to eliminate such materials.*

When handling goods in the port area, the handler of the goods shall see to it that the port is not made unnecessarily dirty. If handling of goods results in dust that makes other goods dirty or causes inconvenience to other operations, handling shall be interrupted, until it can ban continued without any impediment.

Garbage and waste shall be taken by the assignor of the work to places indicated by the IPA, and places that have become dirty during handling of the goods shall be cleaned.

Para 29, of Chapter 7 further notes that prohibitions against the pollution of harbor water, its land areas and air, as well as shoaling of water areas are decreed separately elsewhere.

In the case of the former this is understood to be the regulations contained in the **EPIL, 1997, and Regulation No 25 of 1967, Maintenance of Rivers and Public Waters from Pollution**.

b. International Guidelines

The IPA is seeking to obtain ISPS certification and as has been noted previously a number of proposed project components will assist in achieving this.

(7) INSTITUTIONAL FRAMEWORK

a. Port Operations and Waterway Management

Key organizations in the management and operations of Ports in Iraq are as follows:

b. Ministry of Transport (MOT)

The Iraqi Ministry of Transport is the ministry responsible for the transport infrastructure of Iraq, including rail, air and sea ports and terminals.
The land and facilities are the property of the State of Iraq and it is through one of its government departments, the MOT, that it is engaged in transportation of goods and cargo throughout Iraq.

c. General Company for Ports of Iraq (GCPI)

The GCPI is the state organization responsible for the management of Iraq's ports. It is a nationalized state owned enterprise that requires assistance and exposure to modern logistics firms and organizations, and management systems.

d. Environmental Management and Assessment

e. National

The MOE has responsibility for Environmental Affairs in Iraq. In reality however, under present conditions MOE has little capacity to undertake effective actions. Therefore, the effectiveness of any environmental management program will be dependent on the capacity of operational level agencies, in this case IPA.

f. Iraqi Marine Anti-Pollution Department

The Iraqi Marine Anti-pollution Department (IMAD) is located within the GCPI structure. It is reported to have a staff of 50 persons and was set up specifically to ensure Iraq meets its obligations under MARPOL.

However, lack of equipment and low pay (leading to absenteeism) means that the unit has little or no capacity to respond to environmental spills/ emergencies and no capacity to monitor environmental conditions in port areas or monitor the activities of those working in the Port or using its facilities.

UNDP developed proposals to support IMAD with a combination of:

- Financial Incentives for Staff
- Logistical Support
- Provision of Pollution Control Equipment
- Training
- Construction of a Pollution Treatment Facility
- Chemical Analysis Facility.

The latter three facilities were proposed to be established in partnership with the Marine Environmental Services Laboratory (MESL) of International Atomic Energy Authority (IAEA). Three additional components were proposed.

> *(i) Environmental Forensics and Pollution Abatement Enforcement – provision of the capacity and capability in Iraq to measure oil pollution in the aquatic environment and to characterize (fingerprint) the oil to determine its source.*
>
> *(ii) Marine Environmental Monitoring and Pollution Assessment – Implementation of a survey program to assess the extent of regional contamination.*
>
> *(iii) Contaminant Survey of Marine Biota – to assess extent of contamination in the food chain and the threat to human health.*

However, these support packages were not implemented.

Through the Phase I Project, further technical assistance was provided to the GCPI to help establish the roles and responsibilities of the environmental unit. The detailed report for this unit is included in the Annex.

(8) SUMMARY

- Given that all the project target wrecks pose a hazard to shipping, are owned by the Iraqi State and are in Iraqi waters there would appear to be no constraint to their removal under law.
- Even though Project dredging programs are confined to previously dredged channels and the use of previous dredge disposal sites it is anticipated that environmental approvals based on the IEE will be required. However, further investigation of dredging permitting requirements is required.
- In the absence of an adequate National framework of environmental legislation and guidelines it will be appropriate to apply International Best Practice Guidelines, primarily within IMO and ROPME frameworks, to Project supported activities.
- In an international context, Iraq has an obligation to protect and preserve the marine environment in its own territories and also those elsewhere. Equally, it has to cooperate with its neighbors to protect and preserve the marine environment. Given the proximity to Kuwait of most project activities and the near certainty that some trans boundary movement of materials (albeit benign) will occur, Iraq will need to open channels of communication with its neighbors and in particular Kuwait.

There are two options for this. Iraq and Kuwait can enter into a formal bilateral dialogue on matters arising from the project and the management of the joint use waterways. However, given the recent history of the two nations it is not unlikely that such discussions will be affected by other issues.

The alternative is to operate within the ROPME framework. Iran. Iraq and Kuwait are all signatories of the original ROPME Protocol of 1978.

This would allow issues to be discussed and resolved in a multilateral forum charged with a specific and relevant management objective. This should serve to allow the discussions to remain focused on technical rather than political issues.

In addition, ROPME has the structures and capacity in place to facilitate cooperation between these various parties and to promote agreement on mechanisms by which their common waterways may be managed. The ROPME secretariat in Kuwait is also sufficiently convenient to Southern Iraq to allow for coordination to take place on a regular basis.

C3. BASELINE OF THE ENVIRONMENT

This Section presents a general overview of present environmental and social conditions in project affected areas. This is presented in two main sections. Section C3 (1) and its sub-sections present baseline data and information cited in the literature and previous studies. Section C3 (2) presents the findings of a baseline survey that was undertaken by the study team on ecology, water quality, and sediment and soil analysis in the study area. Socio economic characteristics and prevailing economic activities are also presented

(1) LITERATURE REVIEW OF BASELINE CONDITIONS

a. Coastal Ecosystems

Khor Zubayr (KZ)is a large tidal inlet, over 25 km in length and up to 15 km wide, at the head of the Gulf. The inlet receives freshwater inflow from the Shatt Al Basrah (canal) at its northern end, and opens up into Khor Abdallah in the southeast. Large areas of intertidal mudflat are exposed at low tide. The Khor Abdallah (KA) is bordered by extensive bare dry saline flats.

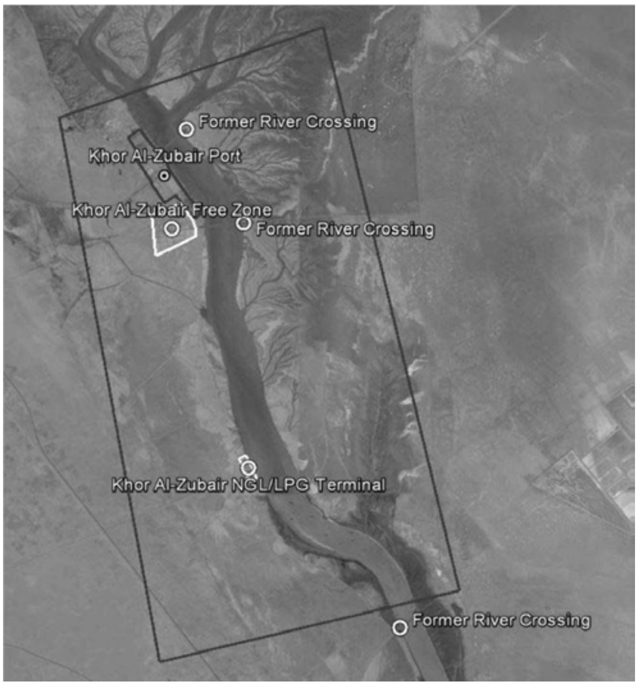


Figure 6: Location of KZP and other key surrounding features

Little or no ecological data has been found relating to coastal sites bordering KZ within Iraq. It is understood that some studies have been carried out in the past by specialists from Basrah University but only some data from these has been located.

KA is bordered on the North by the Fau Peninsula. This comprises a large area of swampy flats (c.90,000 ha) and intertidal mudflats (c.36,000 ha) that extend from the region of Fau at the mouth of the Shatt Al Arab to KA, a distance of at least 50 km.

The mudflats and swampy flats are backed by a belt of date palms and then by extensive bare silt flats. At 3 m or more, tidal amplitude is large throughout the area.

The southern shore of KA is formed by Bubiyan and Warbah Islands which may be regarded as part of the deltaic system of three major rivers, Euphrates Tigris and Karun, which discharge into the Gulf, via the Shatt Al Arab. Combined, the two Islands represent approximately between 5 and 8% of the land area of Kuwait.

While the general form of their coastline appears to have been reasonably stable in recent years it is not well defined except for a small centrally located stretch of beach on the eastern shoreline. Elsewhere, it comprises a broad band of land, covered by the sea at high tide and exposed at low tide.

The maximum dimensions of Bubiyan are around 44km, on the N-S axis, and 31km E-W. However the surface area of both Islands varies significantly. The exposed area of Bubiyan for example varies from around 500km2 to 900 km2 at high and low tide respectively. The highest elevations on Bubiyan do not exceed 4m, approximately 1.0 to 1.5m above high tide level, and are found in the centre of the island. In the north-western corner large tidal inlets occur, some of which hold, permanent water.

The island is linked to the mainland by a bridge across the southern tip of Khor Subiya. At high tide this channel is approximately 1 km wide at the southern end, narrowing to less than 1 km at the northern end. Strong tidal currents regularly occur in this channel. The rate of flow of these currents frequently exceeds 1 m. per sec.

A number of studies of Bubiyan have been undertaken in the past. These include:

- In 1969 and 1970 Japanese experts prepared three papers on the soils, ecology and general development of the island. The papers on soils and ecology refer to only small areas of the island, while the general development paper is concerned only with broad environmental conditions on Bubiyan.
- Kuwait Oil Company (KOC) is understood to have undertaken geophysical and other prospecting surveys on the Island and surrounding waters. Details of such studies are however not available but are known to include, geological mapping in 1979-80 and a geophysical survey carried out in 1983.
- Bubiyan Development Options study prepared in 1983.
- Bubiyan Resort Study, 1989 –90 (never completed).
- ●1990–94 National soil survey – including some survey sites on Bubiyan. In this survey, the soils of Bubiyan were classed as unsuitable for irrigation.

Studies are ongoing at present to identify potential development options for the islands and these are known to include an option for the development of a Port.

Notwithstanding the above, the scientific database for the Islands is generally weak.

Available information indicates that oil pollution remains a constant threat to coastal ecosystems although the area has largely recovered from the huge oil spills of the First Gulf War and from more recent large spills (e.g. bombing of tankers and the Mina al-Bakr offshore oil terminal). It is assumed that the prevailing winds and currents have assisted greatly in this matter by carrying the slicks away from the shore (Evans, 1994).

<u>Protected Areas and Valuable Habitats</u>
No existing protected areas will be affected by the Project. However, three sites may be of significance.

Important Wetlands
Two sites in Iraq are identified as Wetlands of importance in the Directory of Wetlands in the Middle East3. The following text provides a summary of the listing information.

---

[3] Directory of Middle East Wetlands, Wetlands Internationa, (www.wetlands.org).

(i) Khor Zubayr Site; Location: 30^{0}12'N, 47^{0}54'E, Basrah Governorate

Area: 20,000 ha, Altitude: Sea level.

Khor Al Zubayr was listed as a wetland of international importance by Carp (1980) [4], and has been identified as an "Important Bird Area" by BirdLife International (Evans, 1994)[5].
The site area is considered to be a major staging and wintering area for migratory shorebirds, and is listed as such by Summers et al. (1987). However, the site appears never to have been visited by an ornithologist, and no information is available on its fauna.
No information is available on the flora of the region. Information on previous research is not available.

(ii) Khor Abdallah and the Fau Area; Location: 29^{0}55'N, 48^{0}26'-48^{0}34'E; Basrah Governorate

Area: 126,000 ha. Altitude: Sea level.

Khor Abdallah and the mudflats in the Fau area were listed as wetlands of international importance by Carp (1980), and have been identified as an "Important Bird Area" by BirdLife International (Evans, 1994).
The mudflats are believed to be a major staging and wintering area for migratory shorebirds, and have been listed as such but very little additional information is available.
The last known bird survey was undertaken in 1968 by the International Waterfowl and Wetlands Research Bureau (IWRB) in collaboration with the Museum of Natural History in Basrah. This identified:

50 *Egretta gularis*, 30 *Ardea cinerea*, one *Threskiornis aethiopicus*, 10 *Platalea leucorodia*, 200 *Ciconia ciconia*, 35 *Phoenicopterus ruber*, 600 *Anas penelope*, 1,200 *A. platyrhynchos*, 200 *A. acuta*, 60 *Haematopus ostralegus*, 230 *Charadrius alexandrinus*, 10 *C. leschenaultii*, 13 *Pluvialis squatarola*, 510 *Numenius arquata*, 110 *Limosa lapponica*, 100 *Tringa cinerea*, 1,000 *Calidris alpina*, 16 *Limicola falcinellus*, 1,100 *Larus genei*, 700 *L. cachinnans*, 200 *Gelochelidon nilotica* and 30 *Sterna caspia*.

b. Fauna and Flora

Protected Species

Throughout the whole Gulf region, including both land and sea, there are a total of more than 3,650 animal species. Of these, some 50 are recognized as being threatened with extinction at the global level (IUCN Red List of Threatened Animals, 1990, compiled by WCMC).

Within the marine and coastal habitats of the Gulf, 17 animal species occur that are regarded as globally threatened. Of these, ten occur within Kuwait and Iraq. These are listed below in Table 6 by country, together with their world threat category, and where available, their country threat status.

No known specific additional threat is posed by the project to any of these species.

[4] Carp, E. (1980). Directory of wetlands of International Importance in the Western Palearctic. UNEP/IUCN, Gland, Switzerland.
[5] Evans, M.I. (ed.) (1994). Important Bird Areas in the Middle East. BirdLife Conservation Series No.2. BirdLife International, Cambridge, U.K.

Table 6: List of Protected Species: Kuwait and Iraq

Species	Common Name	World Category	Country Status
KUWAIT			
Birds			
Pelecanus crispus	Dalmatian Pelican	E	V
Anser erythropus	Lesser White-fronted Goose	R	V
Numenius tenuirostris	Slender-billed Curlew	K*	V
Mammals			
Sousa chinensis	Indopacific Hump-backed Dolphin	nt*	
Neophocaena phocaenoides	Finless Porpoise	nt*	
Reptiles and amphibians			
Chelonia mvdas	Green Turtle	E	
Eretmocheivs imbricata	Hawksbill Turtle	E	
Species	Common Name	World Category	Country Status
IRAQ			
Birds			
Pelecanus crispus	Dalmatian Pelican	E	W
Anser erythropus	Lesser White-fronted Goose	R	W
Phalacrocorax pygmeus	Pygmy Cormorant K* Res	K*	W
Branta ruficollis	Red-breasted Goose	K*	W
Mamaronetta angustirostris	Marbled Teal	V	Res
Mammals			
Sousa chinensis	Indopacific Hump-backed Dolphin	nt*	
Neophocaena phocaenoides	Finless Porpoise	nt*	

Threat categories are defined by IUCN as follows:
ENDANGERED (E) Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating.
VULNERABLE (V) Taxa believed likely to move into the 'Endangered' category in the near future if the causal factors continue operating.
RARE (R) Taxa with small world populations that are not at present 'Endangered' or 'Vulnerable', but are at risk.
INSUFFICIENTLY KNOWN (K) Taxa that are *suspected* but not definitely known to belong to any of the above categories, because of lack of information.
NOT THREATENED (nt*) Cetacean species that are not threatened with extinction or likely to be, but for which one or more populations are extinct, severely depleted or currently under heavy pressure. (Category assigned by IUCN/SSC Cetacean Specialist Group in Dolphins, Porpoises and
Whales Action Plan: 1988 - 1992).
COUNTRY STATUS OF BIRDS
(Res) Resident **(P)** Passage migrant **(W)** Winter visitor **(Va)** Vagrant

Source: WCMC, 1992

Birds

Other important species such as Phoenicopterus ruber are reported to have nested on Bubiyan Island, (Savage, 1968). Threskiornis aethiopicus was recorded as ‘plentiful’ in the 1910s (Cumming, 1918), and Dromas ardeola was said to be a common breeding bird (Ticehurst et al., 1925[6]) but there is little recent data available.

[6] Ticehurst, C.B., Cox, P.Z. & Cheesman, R.E. (1925). Birds of the Persian Gulf islands. J. Bombay Nat. Hist. Soc. 30: 725-733.

Bird activities are also found at KZP. The table below is a list of the birds species found at KZP:

Table 7: List of the Birds Species Found at KZP

Local Name (Arabic)	Scientific name
القليعي المطوق Ston chat	*Saxicola torquata*
نورس اعتيادي	*Larus canus*
Longling bazel	
غطاس	*Podiceps cristatus*
سمامه	*Apus affinis*
مرزة البطائح	*Circus aeruginosus*
البغيلي (cormrent)	*Phalacrocorax carbo*
ططوة	*Hoplopterus indicus*
جهلول	*Gallinago media*
ام عبية(scoakoheron)	*Ardeola ralloides*
بعيجي	*Sturnus vulgaris*
زركي	*Ardea goliath*
سماك	*Ceryle rudis*
دجاج ماي (مورهن)	*Gallinulua chloropus*
بيوضي صغير	*Egretta garzetta*
وروار	*Merops superciliousus*
ططوة بيضاء الذنب	*Chettusia leucura*
الخضيري	*Anas platyrhynchos*
حذاف شتوي	*Anas crecca*
الوردة الافريقية (African darter)	*Anhinga rufa*
غطاس صغير (lettel grep)	*Tachybaptus ruficollis*
بيوضي كبير	*Egretta garzetta*
Bigme cormerent	
الاسماك الابقع	*Ceryle rudis*
سماك ابيض الصدر	*Halcyon smyrnensis*
اللقلق الابيض	*Ciconia ci conia*
مارش هيرون	
صكير الفار (caestral)	
مالك اللحزين الرصاصي	*Arded cinerea*
ابو الزعر	*Prinia gracilis*
سميجي	*Gallinago media*
رخيوي	*Ardea cinerea cinerea*
مغيرفي	
ابو ملعقة	*Platalea leucorodia*

Source: Basra Environment Directorate-Division of natural ecosystems -2011

Fish

Fish populations in project affected areas are not known to be particularly rich or diverse. Physical conditions in environments directly affected by the project are not conducive to the development of diverse or rich habitats. Light penetration is very poor, the tidal range very significant and currents are strong.

There are no known fish nurseries in directly affected area; however it is possible that there are regionally important environments in relatively close proximity to affected.

The affected channels and port areas are theoretically restricted areas that are not fished. However, fishing of the wider waters of KA and KAZ is an important economic activity to local populations.

Sea Grasses

Sea Grass beds are characterized by high biological productivity. They occur in sub tidal shallows (from 0.5-6 meters) and in the Gulf are commonly represented by the species *Halophila ovalis, H. stipilacea* and *Halodule uninervis*.

Data reported by the World Conservation Monitoring Centre (WCMC)7 suggest that sea grass beds occur along the coasts of Iraq, through Iran and Kuwait and to beyond Bahrain and UAE, though it is noted that the distribution in Kuwait is limited.

No existing survey data indicates the presence, or possibility of presence of sea grasses in project affected areas (i.e. port basins, KZ, KA dredged channel and dredge disposal areas) however it is possible that these important habitats occur in areas that may be in proximity to dredge disposal sites in KA.

Flora

There are no records of surveys of the flora of the area. Surveys of selected on shore disposal and clearing areas may required to ensure that no endangered or rare species will be adversely affected.

Corals and Mangroves

There are no corals and mangroves in project affected areas.

c. Coastal Hydrodynamics

Hydrological System

The natural hydrological system of KA has been significantly modified by man. During the Iran/Iraq war (1980-88), the Shatt Al Basrah canal was constructed as a safer shipping route to Basrah, leading northwards from the Gulf directly through KZ to connect with the extreme eastern end of Haur Al Hammar near its discharge into the Shatt Al Arab. This is likely to have led to a major and permanent flooding of the Khor.

Since December 1992 the "Third River" canal has been discharging saline water into the Shatt Al Basrah and hence into the Khor. The volume of this discharge may increase substantially in future. It is not known what impact all of these developments have had on the hydrology of the Khor and its wildlife (Evans, 1994).

Tides

Tides at the head of the Gulf are termed ‘irregular semi-daily tides’ with two highs and lows per day each with markedly differing height. The Admiralty Chart 1238 lists the following:

CLW:	0m
MHHW:	+ 4.6m
MHW:	+ 4.0m
MLLW:	+ 1.0m
MLW:	+ 1.9m

This implies a maximum tidal range of about 5 meters.

[7] WCMC Environmental Effects of Gulf War, 1992.

Waves

No recorded wave data exists for any study area but observations by GCPI indicate that wave heights in excess of 1m do not generally occur in KZ. Wave heights are more significant at the entrance to KA particularly when tides currents and winds are in opposition. In KA itself, this can lead to short amplitude, but steep waves of 3m or more. Generally however, waves are not large, rarely exceeding 1.5m. For operational purposes, a significant wave height (Hs) of 3m would typically be used.

Currents

No current records are available from GCPI. The Arabian Gulf Pilot states that for this region, currents are variable and tidal streams predominate. The magnitude of the currents/tidal streams is not quantified in the Pilot. However, data from UQ indicates that the tidal currents are set mainly NNW and SSE and can reach 3 knots (1.5m./sec). Data reported by USAID, (2003) reported tidal currents of up to 4 knots (2.1m.s).

Siltation

The project area is a very high sediment environment. Under natural conditions KZ is a winding channel subject to typical patterns of sediment deposition and movement. Further south in KZ, the spoil dumping to the South of Hisham Island is likely to have affected flow and sediment patterns though the nature and extent of this change is not known.

The River 1 cut is particularly prone to sedimentation. Its design and orientation is such that suspended sediments entering on the tide settle out in the quiet water primarily at cut sides. At present the eastern side is extensively shoaled, suggesting additional sediment inflow from surrounding land areas, including dredge disposal areas.

A spit, fed by river channel sediments, grows at the entrance to the River 1 cut and this requires regular dredging. Present depths in this area are between 4 and 6m and are becoming critical to effective port operation.

d. Water Quality

Except for the data collected under this study (presented in a later section) no water quality sampling program is underway for project affected water bodies. However, it is clear from the records of recent visual inspections that water quality is generally not of good quality. There are often visible traces of oil on the water surface, in some cases in quite large slicks. Items of garbage are also seen on the shoreline where they have been washed up at high tide.

e. Sediment Analysis

Grain Size

A number of alternative data sources provide an indication of the nature of sediments and sea floor conditions in project affected areas. These are summarized in Table 8.

This data presents a consistent picture of:

- Very fine materials in the outer KA channel trending towards slightly coarser but still fine, silts and clays at the entrance of KZC.
- Within KZC the trend continues with silts and clays in the south trending to slightly coarser materials further the North. It is also apparent that the volume of material in suspension declines to the north.

Table 8: Sediment Grain Size Analysis

Area	Location	Source	Assessment Purpose	Assessment
KZC				
To River 1		UNDP 2004	Dredging Program	Soft Grey very silty CLAY Soft Grey sandy SILT Hard Grey sandy very clayey SILT Grey slightly clayey, very silty gypsiferous SAND
North of River 1 – KZP	Gaza Wreck	UNDP 2004	Wreck Survey (visual)	Bottom visible and assessed as hard mud
	Palestine Wreck	UNDP 2004	Wreck Survey (visual)	Bottom visible and assessed as hard mud
Khor Az Zubair				
Port Area	n/a	n/a		
Khor Abdallah	Outer Channel	UNDP 2004	Dredging Program	Very soft grey sandy very silty CLAY to Soft grey very silty CLAY
	Mid Channel	UNDP 2004	Dredging Program	Very soft grey very silty CLAY
	Warbah Island	UNDP 2004	Dredging Program	Very soft grey very silty clay to very soft grey sandy clayey SILT

Chemical Analysis

Two survey programs have been undertaken since 2002 to assess contamination in KAZ and KA. Over 200 samples were taken from 40 sites, 35 wreck sites and 5 mid channel sites.

Wreck Samples

Under the UNDP Wreck Removal contract (2004), 198 samples taken from locations in the vicinity of 35 wreck sites and were analyzed for a variety of contaminants including metals and uranium isotopes (235, 238) and total oil content expressed as both chrysene and ROPME oil equivalents.

A subset of 24 samples from different wrecks was subjected to further detailed chemical analyses of petroleum hydrocarbons and chlorinated compounds, including PCBs and several pesticides. All Project target wrecks were included in the 35 wrecks surveyed and also in the subset of 24 samples subject to detailed analysis.

The analysis of the sediments and interpretation of results was undertaken by the IAEA and in the absence of local standards, pollutant concentrations were compared to North American sediment quality criteria. A summary of the findings of the analysis for all project target wrecks is shown in Table 9.

Table 9: Results from UNDP Sediment Samples at Target Wrecks

		Contaminant					
P Ref.	Wreck Name	Heavy Metals	Comment	Total PAHs	Comment	Organo-chlorinated Compounds	Comment
3	Al Waleed	None		Contaminated	Samples exceed NOAA sediment quality Guideline for Effects Low Range. Values not considered noteworthy when considering total oil by as measured by UVF techniques.	None	
4	Barge 03	None		None		None	
5	Barge 04	Arsenic	Assessed as no pollution threat given average metals in sediments around wrecks	None		None	
6	Barge 05	None		None		None	
7	Navy Tug 01	None		None		None	
20	Al Ramady	None		None		None	
22	Dokan	None		None		None	
23	Tadmur	None		None		None	
25	Al Bahith	None		None		None	
26	Torpedo Boat	None		None		None	
31	Gaza	None		None		None	
32	Palestine	Arsenic	Assessed as no pollution threat given average metals in sediments around wrecks	None		None	
33	Dhow	None		None		None	
34	Unknown Contact	Arsenic	Assessed as no pollution threat given average metals in sediments around wrecks	None		None	

Source: UNDP, 2004

The analysis suggests that sediments at only one project site, the Al Waleed are contaminated. In this case as reflected in the Total Polyaromatic Hydrocarbon levels.

Aside from this one sample at the Al Waleed, the findings of the IAEA analysis in so far as the project sites are affected can be summarized as follows:

- The sediments collected around the shipwrecks comprise calcium carbonate and aluminosilicates, with unknown contributions of quartz. The sediments in this estuarine zone are predominantly derived from the river systems which contain high levels of suspended particulate material.
- Cadmium and mercury concentrations are generally low. This is also true for lead, except for one sample collected inside a wreck. For arsenic, copper and zinc, sporadic samples exceed the

sediment quality guideline values, but represent no pollution threat when considering the average metal content in the sediments around these wreck sites.

- Both chromium and nickel exhibit consistently high concentrations, interpreted to be due to the mineralogy of the suspended sediment in the river.
- The uranium concentrations are consistent with the crustal abundance and 235U:238U ratios also reflect a natural source for this element.
- As can be seen from Table 10 it is clear that there is oil pollution at a number of (non project target) wreck sites distributed throughout project affected waters. Further contamination may be expected at other sites not yet surveyed.

Table 10: Oil Contaminated Sediment Sites

Vessel	Location	Comment
Ardar	KZP	
Dredger	KZC opposite River 2	
Navy Tug	River 1 near entrance	Most contaminated site
Fuel barge 1,2,3	Not defined	
Small Tug 01	Not defined	
Channel Site	KZ near Hisham Island	

Source: UNDP, 2004

- Results from a subset of 24 sediment samples indicate that the distribution for Total PAHs[8] differed to that of total oil. Only two samples had concentrations that exceeded North American guideline value and these sites were not remarkable in terms of total oil contamination. The situation with regard to petroleum contamination is therefore not completely clear.
- There is no evidence of pollution from organochlorinated compounds. None of the 24 samples tested for a range of chlorinated pesticides and several PCB congeners gave results that exceeded North American Guideline values.

In reviewing the above survey, it should be noted that the samples were taken from surface sediments and that these were almost certainly deposited some time after the sinking of the individual vessels. For UXO related reasons, no samples from deeper sediments that may represent the seafloor at the time of sinking were taken for analysis.

Mid Channel Sites

All mid channel samples were screened for Total Petroleum Hydrocarbon, (TPH) content, expressed as both chrysene and ROPME oil equivalents, and subjected to detailed chemical analyses of individual petroleum hydrocarbons and chlorinated compounds, including PCBs and several pesticides. The results of the analysis can be summarized as follows:

- Compared to North American sediment quality criteria, cadmium, copper, lead, mercury and zinc concentrations are generally low. For arsenic, one sample exceeded the sediment quality guideline values, but represented no pollution threat when considering the average metal content in the sediments from the vicinity. Both chromium and nickel exhibit consistently high concentrations, interpreted to be due to the mineralogy of the suspended sediment in the river.

[8] Total Polyaromatic Hydrocarbons are the best indicator of the potential toxicity of oil spilled to water-column organisms. There are three major types of PAH, which differ by their genesis: Petrogenic, Biogenic and pyrogenic. PAHs of petrogenic origin are related to petroleum, including crude oil and its refined products. The presence of naphthalene in sediments is characteristic of unweathered petroleum (Robertson, 1998). PAHs of biogenic origin are generated by biological processes or by the early stages of diagenesis in marine sediments (e.g. perylene) (Venkatesan, 1988). PAHs with four- to six-ring hydrocarbons are generally of pyrogenic origin and generated by the combustion of fossil fuels and of recent organic material.

- The uranium concentrations are consistent with the crustal abundance and 235U:238U ratios also reflect a natural source for this element.
- TPH content at one mid channel site, near the entrance to KA, was high and suggests there is contamination to the site though the concentration of Σ PAHs at all locations did not exceed the North American guideline value (Long et al. 1995).
- There is no evidence of organochlorinated compound pollution. The concentrations were generally low for both a wide range of chlorinated pesticides and several PCB congeners. Total levels of DDTs and PCBs, including the Aroclor 1254 mixture, did not surpass North American sediment quality guideline values.

Other Objects

Magnetometer surveys carried out by UNDP as part of the dredging project of 2005 produced an extremely large number of magnetometer hits of size greater than 5 kilograms within dredge areas. However, with the survey equipment utilized it was not possible to differentiate accurately between pieces of scrap metal, exploded ordnance, inactive UXO or active UXO.

Clearly, the greater majority of the 'hits' will be scrap pieces of metal. However, it is equally clear that some will be UXO. A summary of the available knowledge on UXO is as follows:

1. It is recognized that a substantial quantity of ordnance is in place in the sediments of River 1, KZ and KA. The greater majority of this will be small arms munitions or inactive ordnance. Nevertheless, it is not possible at this time to conclude that there is no UXO risk.
2. Notwithstanding the above, the main shipping channels have been repeatedly swept by MNF units and are considered to be free of floating mines and UXO. As a consequence the MNF place no UXO related constraints to shipping movement in these areas on their own vessels.
3. Consultations with UK Admiralty[9] have confirmed that the Mine Danger Areas (MDA) shown on the Admiralty Chart No. 1235 (Edition 9, May 2004) were originally placed there by the UK and US forces in 2003 as a precautionary measure to ensure that all merchant vessels sailing to Iraq kept to the channel. The MDA designation is under review and it is anticipated that it will be removed in the near future.
4. It is understood that a significant quantity of UXO was dumped in UQP in the north east corner of the cut although no further details are available at this time.

f. Atmospheric Conditions

There is no data on existing air quality or odor at the port sites or from other areas in the region. Similarly, there is no data on ambient noise levels within port facilities or elsewhere.

g. Socio Economic Characteristics

Affected Populations

There are no residential areas in the immediate vicinity of project activities. The town of Umm Qasr lies some 4kms from the port area and has a population of around 50,000. There is no settlement in proximity to KZP.

All project affected facilities are secure and physically separated from the public.

Although original designs intended that the Ports utilize the facilities available in adjacent settlements these are not functional and will not be made functional during the project.

The Terminals will be permanently manned.

Recreational Uses

There are no recreation sites within project areas or which might be affected by project works. Harbor activities and security restrictions indicate project areas have no potential for recreational use.

[9] SAPROF meetting with Officials of UK Admiralty, 14th October 2005.

Architectural and Historical Heritage

There are no known sites of architectural or historical heritage in project areas or their immediate vicinity.

Archaeological Sites

There are no known archaeological sites reported in the region nor is there the potential for such within the vicinity of the site.

Status of Project Locations

All project sites lie within Iraqi waters. However, a number of wreck sites and the proposed marine dredge disposal site are located in close proximity to Kuwaiti National Waters.
The main shipping channel to be dredged under Phase 2 Project Works lies within both Iraqi and Kuwaiti Waters. Possible marine dredge dump sites for the Phase 2 works may also lie within Kuwaiti Waters.

h. Data Summary

Coastal Ecosystems and Fauna and Flora

No recent data on the ecology or flora and fauna, of coastal ecosystems of the study areas was identified.

It is understood that historical information may be available from individuals, especially those from the University at Basrah but only some of this research was located. Similarly, it is known that a number of projects and programs are now being initiated with external support to establish the status of ecological sites areas of interest, particularly in respect of the marshlands.

An example of the latter would be the Biodiversity Survey proposed as a partnership between the Iraq Foundation (Baghdad), Nature Iraq, the Iraq Nature Conservation Society, and Birdlife International offices in the United Kingdom and Jordan.

Two MOUs have been implemented to facilitate project engagement. These will initiate marsh bird, wildlife and habitat condition surveys last undertaken in 1978 with the objectives to: (a) assess biodiversity and the current state of the marshes as a basis for a National Biodiversity Assessment; and (b) to provide information and data for management decisions, options and restoration planning of over 40 marshlands in southern Iraq.

It will be undertaken as a partnership with the Iraq MOE. An estimated 15 sites will be assessed in 2005. Iraqi specialists in NGOs, universities, and government agencies trained in international techniques, protocols and methods will undertake the works.

In conclusion:

(i) It is not possible at this time to define Baseline ecological conditions for any environment in Iraq. However, given that project works will be confined to existing sites that have been previously modified by frequent and repeated human activity it is unlikely that significant further damage to ecosystems at these sites can occur.

(ii) The Fau Peninsula wetland site is considered unlikely to be affected by project works. The Khor Zubayr site is believed to be located just north (and possibly east) of the Port and although it is unlikely to be affected by project works further information on the status and location of the site and possible threats from Port activity may be required.

Substantially more data is available on the ecosystems of inter-tidal areas and islands in Kuwaiti waters. The situation in Iran is unclear.

Coastal Hydrodynamics

The hydrodynamics of the study area are naturally complex and have been further complicated by man over the last 30 years. However, they appear not to have been fully studied. The majority of available data is historical and apparently based on past observation rather than measurement and analysis. The University of Basrah is reported to have undertaken some analytical modeling but the scope and date of this work is unknown.

The principal issues here are:

- There is no model or other analytical tool available to assist IPA in making key port management decisions. In particular, when and where to dredge most effectively.
- There is no basis on which to determine the fate and trajectory of any spill and therefore to quantify assessments of sediment and potential water quality contamination.

Sediments and Water Quality

There is virtually no data available on water quality in the river systems, past or present. Similarly, while the UNDP survey program provides information on a range of sediment physical parameters this represents only a snapshot of the conditions prevailing at the time of survey. The time series data necessary to provide a comprehensive picture of environmental conditions is not available.

Conclusion

It is apparent that there are significant data weaknesses in a number of areas, in particular with respect to the natural environment, water quality and river systems hydrodynamics.

However, given that project activities are confined to existing activity sites these are not assessed as being sufficient to bring into question the credibility of any project environmental review and its findings, or to justify delays in the implementation of these vital rehabilitation works in order that additional data be collected.

The project will afford numerous opportunities to improve the Baseline Data base for affected environments and these should be taken.

(2) BASELINE SURVEY

As part of the study activity, a baseline survey was conducted to better understand and document the conditions of the project area. The objective of this survey was to supplement the information provided by the Initial Environmental Evaluation (IEE) for the Data Collection Survey on Port Sector Development Plan. The project is intended to provide information with regards to the rehabilitation of KZP to accept vessels with deeper draughts than those presently capable of navigating the channel. In order to dredge the channel it is necessary to understand the pollution levels in the sediment that has accumulated around the many wrecks that may need to be cleared.

The field survey proportion of the project involved the following primary tasks:

- Water quality sampling (twelve sample locations, two depths undertaken at high and low tide);
- Sediment sampling (twelve locations);
- Soil sampling of the four potential areas of deposition for dredged material (known as areas a – d); and
- Ecological surveys of the four candidate dredge dumping areas (areas A – D).

On the 19th and 20th of January 2012, a study undertook a reconnaissance of the general project area, the Khor Al Zubayr and the four potential dumping sites (Areas A – D). The reconnaissance was undertaken with the full permission of the General Company Ports of Iraq (GCPI) and the Iraqi Coastal Defense Force (ICDF). The reconnaissance was intended to determine the location and condition of the wrecks, thereby, aiding the design of the sampling rationale. The boat-based reconnaissance was done at high tide.

During the reconnaissance, evidence of previous deposition of dredged material was noted; including at the potential deposition Areas A and B. Whilst the study team were undertaking the reconnaissance of the Khor Al Zubayr, routine dredging was being undertaken to the south of the KZP. This is predominately undertaken as a general maintenance measure on behalf of the Marine Affairs Department.

The findings of the survey are presented in the following sub-sections. The detailed description of the results of the survey are presented in the report entitled ***Environmental Survey – Data Collection Port Sector Development Plan, Iraq Field Survey Report*** prepared in March 2012.

a. Shipwreck Locations

The boat-based reconnaissance indicated that are no major or large wrecks within the main channel. Anecdotal evidence provided by the team indicates that a number of these wrecks have recently been removed from the channel and during the reconnaissance a number of 'broken-up' wrecks were noted on the western riverbank.

In total, seven wrecks (in various pieces) were noted during the reconnaissance, all but one were located on the western riverbank. The exception to this was located in the main channel near to Area A. The location of the observed wrecks is depicted in Figure 7 below.

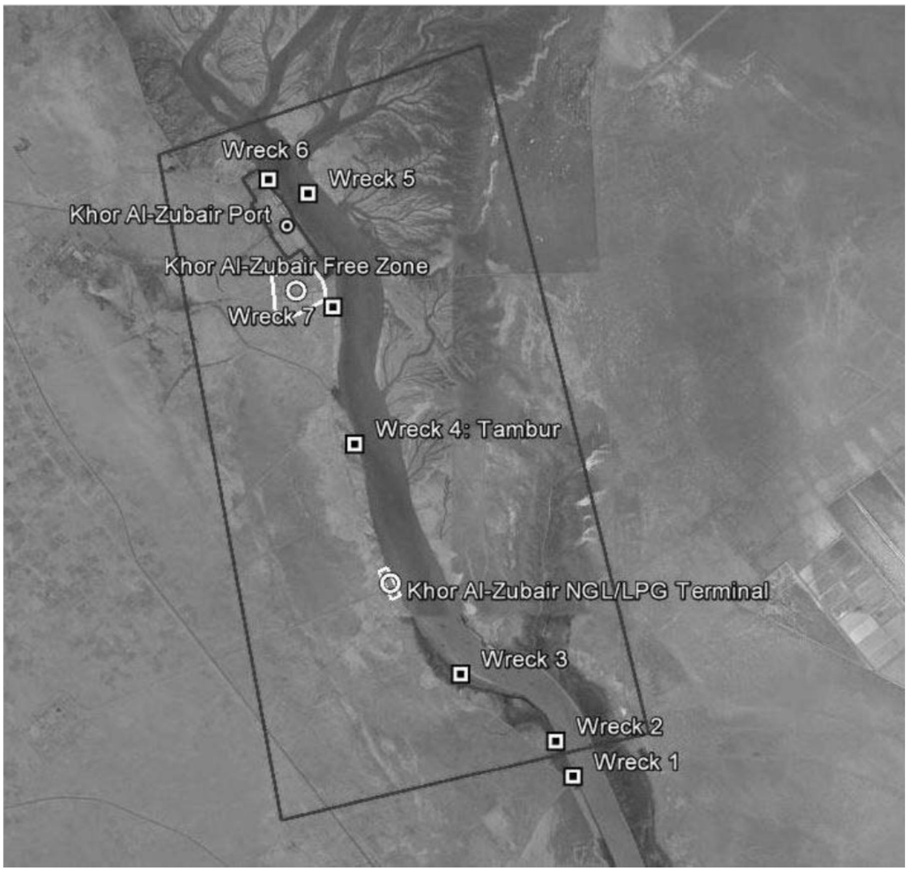


Figure 7: Location of the Observed Wrecks within the Survey Area

b. Potential Areas of Deposition

Reconnaissance of the four potential areas of deposition was undertaken by boat and car. On the basis of this initial reconnaissance survey, none of the proposed areas of deposition appeared to be ecologically diverse or sensitive. However, the potential exists for the intertidal (foreshore areas) to be sensitive.

Areas A and B were observed to have significant areas of tidal interaction and thus the potential to support birds (both migratory and resident), mudskippers, invertebrates and crustaceans. If deposition of dredging was to occur at these two areas, any ecological receptors could be smothered. Areas C and D appeared to have limited intertidal zones as they support minimal coastal vegetation. In this situation, the ecological receptors likely to be affected are birds and invertebrates; however the bird species would find similar alternative habitat on adjacent land parcels. Area D is under South Gas Company jurisdiction and as such its ability to be used as a dumping area may be limited.

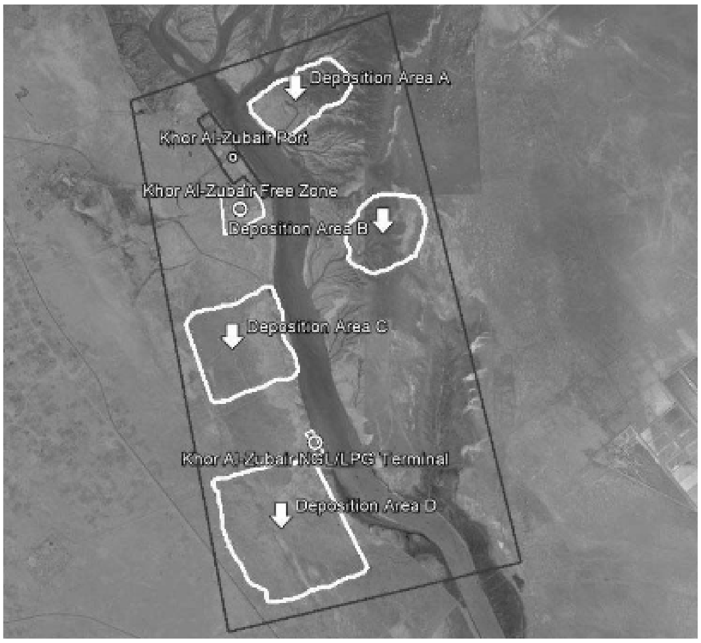


Figure 8: Four Candidate Sites for Dumping

c. Marine Water and Sediment Field Measurements and Observations

Various field observations and physico-chemical measurements were undertaken during the sampling of the water and sediment. The details of the results are presented in the report ***Environmental Survey – Data Collection Port Sector Development Plan, Iraq Field Survey Report*** prepared in March 2012. Only a summary of the findings are presented in this section of the IEE report.

Table 11 Summary of the Data from the Field Survey

Data Summary		
Marine Water	**Marine Sediment**	**Soil**
The chemical data shows that pollution indicators like oil (petroleum hydrocarbons), nitrogen, phosphate and BOD are generally low and do not indicate significantly polluted waters. Overall the marine waters do not seem to be displaying signs of pollution or environmental degradation in relation to the parameters being assessed and the water quality could generally be described as good. It is suggested in some of the literature that the waters within the Persian Gulf undergo a net total replacement every two years. Whilst this cannot be easily verified, it does indicate that water chemistry and, in particular, pollutants may not have long residence times in the Persian Gulf (even if they persist in the water itself for many years. For all of the parameters where there is comparative data, the results from the 2009 MSC survey were generally higher than the current 2012 dataset. This may be due to a general improvement in water quality (for example due to improvements in sanitary and industrial wastewater treatment and the removal of wrecks from the river), but this is unlikely given the rate of progress in such issues in Iraq and the relatively short time period between the surveys (such improvements can take many years to manifest). The differences are more likely to be attributable to the use of different laboratories and analytical techniques. Furthermore, as discussed, earlier, there is likely to have been whole scale replacement of the water in the region due to general circulation patterns and mass sediment transfer so that in effect, different water bodies are being analyzed.	The sediment samples collected throughout the survey period at all locations showed no evidence of significant contamination with the target analytes. It should be noted, however, that the river bed is a highly dynamic environment; there are relatively strong currents, frequent sandstorms and large volume sediment rich outflows upstream which all contribute to the deposition and transport of sediment. Consequently, the sediment is in a state of flux at any given sample location and pollution that may have occurred may have been assimilated into the environment by now, or in the case of the shipwrecks, simply buried. The principal lithology of the seabed stratum is predominantly soft clay and silt, i.e. very fine grained. Occasional samples recorded sand and sandier elements to the lithology, although given the relatively shallow coastal zone and proximity to the Shatt al-Arab and Khor Al Zubayr it is to be expected. The Particle Size Distribution (PSD) results from the survey period correlates with the field evidence and indicates that the lithologies are very similar and predominantly comprise silt and clay fractions, with minor sand components. It is reasonable to expect that each of the above lithologies can be encountered anywhere in the project area. (Awaiting confirmation from PSD results.)	None of the concentration of analytes tested was significantly elevated, although concentrations of nickel exceed the stringent Canadian Soil Quality Guideline for the Protection of Environmental and Human Health. These exceedance may represent elevated background concentrations rather than a pollutant source. It should be noted that the guidelines utilized are not site-specific values and have been derived from North American Data. With regards to TPH, the elevated concentrations recorded at Area A are likely to be a result of accidental spills at KZP. No field evidence of any hydrocarbon contamination was noted during the collection of these samples. Analysis of the mean concentrations of metals for each area shows a spatial trend with respect to copper, nickel, lead, zinc, iron and manganese. The highest mean concentrations were consistently recorded in Area A, followed by Area B, Area C and then Area D. The only metal to show a different spatial trend in mean concentrations was arsenic. Mean arsenic concentrations were found to be highest in Area B, followed by Areas C, A and D.

The survey has involved a reasonably comprehensive assessment of the chemical and physical conditions of the Khor Al Zubayr. The key conclusions can be summarized as follows:

- There is little, if any, evidence of significant pollution of the environment and most notably there is no evidence of significant petroleum hydrocarbon contamination of the water, the benthic sediment or soil samples. Given the large amounts of hydrocarbons that were spilled into the area during the armed conflicts this is encouraging, although, it should be noted that a large proportion of the oil spilled migrated south to the Saudi Arabian and Kuwaiti coasts, so the sediments in the study area may not have been heavily impacted in the first place.
- The results of the survey and the analysis of information gathered during the desk-based study suggest a dynamic and active environment with substantial mixing and movement of water and sediments over across seasons and over longer periods of time. It is suggested in some of the

literature that the waters within the Persian Gulf undergo a net total replacement every two years. Whilst this cannot be easily verified, it does indicate that water chemistry and in particular pollutants may not have long residence times in the Persian Gulf (even if they persist in the water itself for many years).

- The principal lithology of the seabed stratum is predominantly soft clay and silt, i.e. very fine grained. Occasional samples recorded sand and sandier elements to the lithology, although given the relatively shallow coastal zone and proximity to the Shatt al-Arab and Khor Al Zubayr it is to be expected. The Particle Size Distribution (PSD) results correlate with the field evidence and indicate that the lithologies are very similar and comprise predominantly silt and clay fractions, with minor sand components. It is reasonable to expect that each of the above lithologies can be encountered anywhere in the project area. (Awaiting confirmation from PSD results.)
- The rehabilitation project clearly has the potential to increase sediment load in the water column during the construction (and especially) dredging phases. Given the dynamic environment, however, and the fact that a large part of the study area is subject to regular high suspended sediment loads from natural processes, the impact of sediment mobilized by the construction activity is likely to be short-lived and of limited significance.
- The measurements and observations made during the surveys show broad correlation and concurrence with other elements of the work and other studies in the area that have been published. However, for parameters where there is comparative data, the results from the 2009 MSC survey were consistently higher than the current 2012 data. This suggests that there may have been an improvement in water quality, possibly due to improvements in sanitary and industrial wastewater treatment and the removal of wrecks from the river but this is unlikely. Other influencing factors could be the use of different laboratories and analytical techniques and the different tidal conditions under which the two sampling events took place, resulting in a different mix of fresh water and salt water.
- Khor Al Zubayr has been included as one of Iraq’s Key Biodiversity Areas and has been classified as an Important Bird Area (IBA). The IBA comprises all of Areas A and B, as well as the intertidal zones of C and D. Areas A and B provide important intertidal habitats for amphibians and crustaceans, and thus provide a food source for migratory and permanent residual birds. Areas C and D predominantly comprise alluvial plains and Sabkhas which are only able to support particular vegetation and, thus, have a smaller area to support watering birds. None of the vegetation observed during the site visit is of conservation importance.
- With regards to the overall ecological sensitivity of the four areas, Areas C and D are the least sensitive, and therefore considered to be the most suitable for the deposition of the dredged material. The habitat maps produced during desk study have proven to be very accurate and have been slightly updated following the field surveys.
- The highest mean concentrations of contaminants were consistently recorded in Areas A and B (copper, nickel, lead, zinc, iron, manganese and TPH). For this reason, it may also be preferable to deposit dredging in Areas C and D to reduce the contaminant loading on Areas A and B.

(3) ECOLOGICAL FIELD SURVEY AT CANDIDATE SITES

An ecological survey was undertaken at all four candidate dumping areas. The primary objective of the surveys was to document and characterize the ecological conditions within these four areas including any exposed sediments along the tidal and intertidal zone (i.e. the land between the high and low water marks which is subjected to daily inundation by tides). This survey was primarily concerned with flora and fauna, including insects, mammals, reptiles and birds, and, if applicable, birds’ nests.

Khor Al Zubayr has been included as one of Iraq’s Key Biodiversity Areas13and has been classified, by Birdlife International, as an Important Bird Area (IBA). The IBA comprises the all of Areas A and B, as well as the intertidal zones of C and D.

Areas A and B provide important intertidal areas. These provide habitats for amphibians and crustaceans, and thus provide a food source for migratory and permanent residual birds. Areas C and D predominantly comprise alluvial plains and Sabkhas which are only able to support particular vegetation and, thus, have a smaller area to support watering birds. None of the vegetation observed during the site visit is of conservation importance

Overall, Areas C and D are considered to be the least ecologically sensitivity of the four areas, and would be the most favorable sites for the deposition of the dredged material. The habitat maps produced during desk study have proven to be very accurate and have been slightly updated following the field surveys. The following summarizes the key findings of the survey as it relates to environmental baseline conditions:

- Habitat maps of each individual candidate area were produced in the desk-based report. These have been updated and included in the survey report. Areas A and B predominantly comprise intertidal areas with large areas of mudflats, regularly inundated during the tidal cycle.
- Vegetation is mainly limited to the alluvial plain areas, where halophytic perennials belonging to the *Zygophyllaceae*, *Poaceae*, *Borginaceae* and *Chenopodiaceae* families were observed. Alluvial plains also provide suitable habitats for a range of mammal, bird and reptile species found in Iraq.
- Sabkha habitats are hypersaline environments which provide poor habitats for vegetation. Vegetation is highly tolerant of saline conditions, such as *Boraginaecae*, *Chenopdiaceae* and *Zygophyllaceae*. Whilst predominantly void of vegetation, Sabkha habitats are known for supporting various species of fauna.
- Areas C and D predominantly comprise alluvial plains and Sabkha environments
- In summary, the number and diversity of the fauna observed during the survey was generally poor. Across all four sites, the general environment and large human interference appears to have limited the number of species present.
- At Area C, a Spiny-tailed lizard (*Uromastyx*) was observed. This is a diurnal species of reptile, clearly identifiable by its spiky tail. *Uromastyx* are burrowing lizards that tend to bask in areas of direct sunlight with high ambient air temperature.
- Several mammal footprints were noted during the surveys, predominantly at Areas C and D. These appear to be related to the domestic dog (*Canis familiaris),* which due to the human activities nearby, exist in large numbers in this area and also the Arabian Red Fox (*Vulpes vulpes*), a species that is relatively tolerant of human activity.
- Although no small mammals, or evidence of their presence, were found during the survey, small rodents are likely to present near areas of habitation and activity and although the presence of domestic dogs is not particularly of interest, it may suggest that there are small creatures and ground prey in the area, not observed during this survey, that they can prey on.
- At Area B, unidentified mammal faeces were observed
- Furthermore, in addition to this ecological survey, a caravan of camels on the western boundary of Area D during the initial reconnaissance survey was noted.
- Two species of mudskipper, the Gray Mudskipper (*Boleophalmus boddarti*) and the Brown Mudskipper (*Periophalmus koelreuteri*), were noted within the intertidal channels and ditches which flow into the Khor Al Zubayr.
- Mudskippers are uniquely adapted for intertidal habitats and survive the retreat of the high tide by using their pectoral fins to move effectively on land. However, mudskippers are limited to humid habitats as they must always be moist. Mudskippers dig deep burrows in order to thermoregulate as well as to avoid marine predators at high tide.
- During the survey, a significant number of dead mudskippers were noted at Area A; it has been assumed that with the onset of the warmer weather, the mudskippers were unfortunately marooned as their habitat (ditches and channels) dried up.

- Along the intertidal channel and ditch areas of all candidate areas, several exoskeletons of marine crabs were collected. These have been identified as the Long Eyestalk Crab (*Macrophthalmus depressus),* widespread across this part of the world.
- During the survey, a large number of burrows were noted in all four areas within the intertidal area. These burrows are likely to be utilised by the Long Eyestalk Crab, a crab well-known for burrowing, however, this could not be confirmed during the survey.
- At all areas, dead gastropods and bivalves were found washed up along the intertidal zone. The bivalves were identified in the laboratory as *Circe callipyga, Dosina caelata, Barbatia plicata* and the gastropod as *Thais mutabilis,* a species of sea snail.
- During the survey, no insects were found during the net sweeping activities.
- According to BirdLife International, there are three 'Critically Endangered', four 'Endangered', eleven 'Near Threatened' and eight 'Vulnerable' species of bird in Iraq. Khor Al Zubayr contains an Important Bird Area (IBA), for its importance in providing suitable habitat for approximately 20,000 wintering waterbirds10 (*ref:* IQ041, Khor Al Zubayr). The IBA, circa 20,000ha in size, appears to include all of Areas A and B, as well as the intertidal zones of Areas C and D.
- Khor Al Zubayr is considered by Scott and Carp (1982) as of possible great importance for wintering waterbirds and was listed as a wetland of international importance by Carp (1980)12. However, since the early-1980s, significant human interference has occurred along the Khor Al Zubayr, with the various conflicts as well as the recent influx of freshwater into the previously saline environment. These are all likely to have had a significant effect on the wildlife in the area.
- During both the reconnaissance survey and the main ecological survey, many migratory birds were noted within the intertidal zones of Area A and B, attracted to the potential food within this zone. This included Eurasian Curlew (*Numenius arquata*), classified as 'Near Threatened' by BirdLife International, Common Gulls (*Larus canus canus*) and potentially Slender-billed Gulls (*Chroicocephalus genei*). Overall, gulls were observed at all locations, although, these were at a distance and the species was not identifiable
- During the initial reconnaissance survey, a Grey Heron (*Ardea cinerea*) was noted on the Tambur shipwreck, adjacent to Area C (*Photograph 6.14*) and at Area D. The Grey Heron prefer nest sites in tall emergent trees, however, there are no such trees in the immediate or wider vicinity of the Khor Al Zubayr, therefore, the possibility exists that the heron was migrating
- The aforementioned crustacean burrows could potentially provide a suitable habitat for the Crab Plover (*Dromas ardeola*), whose bill is specialised in easting crabs. At the time of the survey, no Crab Plovers were observed; however, this species tends to breed in this area between April and July and thus may explain their absence.
- Alongside the dead mudskippers, a dead fish was also noted at the intertidal zone of Area A. This has been identified as *Ilisha megaloptera* (also known as Big Eye Ilisha).
- The vegetation observed across all four areas was very similar; however, the coverage of vegetation differed due to the extent of the intertidal zone. Overall, the condition and total species number was very limited due to the hypersaline environment and human interference.
- *Halocnemum strobilaceum* and *Salicornia herbacea* were the most dominant species at the intertidal zone, both are halophytic perennial plants. *Salicornia herbacea* were predominantly located along ditches and depressions.
- Slightly inland, the alluvial plains were dominated by *Suaeda aegyptiaca*, S*uaeda vermiculata* and *Anabasis setefera*. Again, all species are salt-tolerant perennials.
- Further inland still, several perennial species were found in the slightly less saline areas including *Calendula aegyptiaca, Malva parviflora and Hodeum desticum.*

(4) FISHERMEN ACTIVITIES:

At KZP, fishermen activities are seasonal, their efforts increase from April to August. Whereas the rest of the months, activities are very limited and are no more than 10 – 12 fishermen a day. Most of them conduct their works using small boats.

Fishermen families' sizes range from 5 – 8 members, with a fluctuating income over the seasons. They make no more than 200 dollars in winter periods where activities are extremely limited due to weather and safety conditions and the available fish species. This value raises to an average of 800 – 1000 dollars in high seasons. Minimal information is found regarding this as there are no studies about the fish activities in KZP.

The area is a large water navigation canal, with deep and running water. The area is highly under the influence of tides phenomenon, surrounded by large tracts of barren land, and is also close to Um Qaser Port.

The table below is a list of the fish species found at KZP:

Table 12: List of the fish species found at KZP

Family	Species	Local Name (Arabic)
Mugilidae	Liza spp.	Byah
Sparidae	Acanthopagrus latus	Shanak
Stromateidae	Pompus argenteus	Zbady
Scinedae	Otolithes ruber	Nuaby
Scinedae	Johnius belengerii	Tataoo
Clupeidae	Tenualosa ilisha	Sobor
Clupeidae	Ilisha elongata	Abo Uena
Serranidae	Epinephelus tuvina (Forskal)	Hamur zaetony
Siliagonidae	Siliago sihama	hasum

C4. IMPACT MATRIX

(1) NECESSARY INPUTS FOR THE RECOVERY OF THE KHOR AL ZUBAYR

The most serious issue/ bottleneck of the Khor Al Zubayr Port are deepening of the berth front areas and the access channel including shipwrecks removal for safe navigation and berthing. To this end the following rehabilitation works are necessary

1) Shipwrecks removal (Total 12 wrecks)
2) Dredging of berth front and basin to the originally designed (-10.0 ~ -12.5 m CD)
3) Repair and purchasing of Navigation Aids
4) Purchasing of cargo handling equipment
5) Purchasing of floating marine equipment
6) Berth fittings repair
7) Port utilities rehabilitation such as electricity and water supply

The above inputs details are summarized in Table 13.

Table 13: Necessary Inputs for Khor Al Zubayr Port

No.	Project Component	Scope of Works (Full Scale)	Work Categories
1	Dredging Works at KZP	Dredging of port basin, front of berthing areas, a limited area of access channel, dredging volume: 5,400,000 m^3, depth: -12.5 m, width: access channel and berthing areas 300 m, and turning basin 450 m wide	Dredging,
2	Shipwrecks Removal	Total 12 wrecks removal located in the main channel and KZP basin	Shipwreck salvage
3	Rehabilitation of Port Facilities	Damaged fender replacement: 68 pcs (KZP) Repair of tug berth structure (KZP), yard pavement rehabilitation (KZP), corrosion protection (UQP).	Onshore facilities
4	Extension of Berth at KZP	Extension of the existing berth No.2 to south, and utilize as multi-purpose berth (KZP), also connected to surrounding berth, design depth -12.5 m	Onshore facilities
5	Navigation Aids Works	Procure and install 20 light buoys along the channel between UQP and KZP, 25 buoys required. Of which, 10 buoys installed. For UQP/KZP channels, two leading lights installation at KZP access channel, AIS/VTS system installation	Navigation Aids
6	Utility Works	Rehabilitation/repair works at KZP (water supply, electricity cables, etc.)	Onshore facilities
7	Removal of Unused Facilities and Equipment	Removal of unused rail mounted quay side cranes at UQP	Onshore facilities
8	Cargo Handling Equipment	KZP: container cargo handling equipment (21 nrs), KZP: maintenance works equipment (4 nrs), UQP: RTG (4 nrs)	Onshore Equipment
9	Marine Equipment (UQP/KZP)	Dredger (3), tug (3), survey boat(1), mooring boat (2), anti-pollution/monitoring vessels(3), and others (7)	Offshore Equipment

Source: JICA Study Team

(2) EFFECTS ON THE COASTAL AND MARINE ENVIRONMENT

a. Habitat Loss

Offshore Habitats

Khor Zubayr

As with other dredged channels KZC has been repeatedly dredged and it must be assumed it contains no undisturbed habitats.
Proposed offshore dredge disposal areas in KZ have been used since the 1970s and any original affected habitats will now have been entirely destroyed. Therefore provided the dredge spoil is confined to the disposal site new sediment deposition will not modify the present environment and no habitat loss would be expected.

Inter-tidal Areas

It is not expected that project activities will directly affect any inter-tidal areas beyond port perimeters and all sites within port perimeters have already been heavily modified.
Nevertheless, there are potentially important inter tidal habitats areas north of KZP and on the eastern bank of KZ opposite the port. These areas are considered to be valuable habitats for migratory birds and will support reasonably diverse ecosystems.
Accordingly, IPA should not undertake any works in these areas, or dispose any materials to these areas.

b. Hydrodynamics

Project proposals do not call for any direct modification to coastlines in project areas or to the design width of dredged channels. Nevertheless, proposed dredging will change present conditions, and some of the material removed will be deposited in marine environments.

River 1 is a man made channel originally constructed in the 1970s and 1980s and any changes that were to occur from its construction will have already have taken place or will be underway. Similarly, while the proposed capital dredging works will undoubtedly cause short term modification to the hydrodynamics of the KZ river system, only slightly different patterns of sediment deposition and erosion would be expected. Moreover, in a strongly tidal river system such as the KZ it very unlikely that any localized dredging impacts will lead to long term change.

The dredging works are therefore not a cause of concern.
Over the short term, there is no available evidence to suggest that continued use of existing dredge disposal site at Hisham Island will be problematic but some monitoring would be desirable to ensure that the southern mouth of the eastern channel does not shoal further or in a worst case actually silt up.

Given the above, a dispose of a minimum of 2-3million m3 of spoil each year, over the medium and long term makes it desirable for disposal to be undertaken on the basis of a scientific determination of the most appropriate disposal sites and their capacity.

This should include, in so far as is possible:

- a hydrodynamic study of the KZ River system and Northern Gulf,
- an assessment of options for on-land disposal within Iraq.

c. Cross Contamination of sediment

General

Given the data available on bottom sediments (derived from samples taken during wreck surveys) it would not be expected that uncontrolled dredging would activate (re-suspend) sediments containing potentially harmful levels of contaminant in the water column.
There are caveats to this assessment.

(i) The relatively few samples taken are insufficient to provide a comprehensive data base.
(ii) No samples were taken from dump sites. It would be desirable for a comparative assessment to be available of materials at both the dredge site and the disposal site to indicate the degree of homogeneity between the two.
(iii) More importantly, the samples taken were restricted to surface samples (i.e. most recently deposited sediments) and thus do not provide information on deeper sediments that will be dredged and moved to dump sites.

Contamination from Wrecks

'Contaminated' sediments were identified at only one project target wreck, the Al Waleed, which had levels of total PAH in excedance of US guideline values.
Al Waleed is located in UQP adjacent to berth Number 9 which in turn is immediately adjacent to the proposed wreck cleaning site. In these circumstances it will relatively straightforward to confine sediment to present locations duration the wreck removal process, even until disturbed sediments have resettled. There is also little scope for cross contamination during transport.

EFFECTS ON LAND AND MARINE ANIMALS AND BIRDS

The project is not expected to have an adverse impact on land and marine animals and birds.
Some temporary effects, from noise, dust and even site occupation, may be experienced at various localities but these will be short term and temporary. In this regard it is particularly important that the project does not engage in activities that will directly affect the KZ wetland area.

IMPACTS ON PROTECTED AREAS

There are no Protected Areas in the vicinity of project sites. However, it is appropriate that the project do not engage in activities that will directly affect the KZ wetland area. Similarly, while it is not yet accorded protected status it is appropriate the project seek to ensure that it does not adversely affect Bubiyan Island directly.

SOCIO CULTURAL IMPACTS

a. Resettlement

No involuntary resettlement will be caused by onshore project activities.

b. Livelihoods

Fisheries

Fishing in port areas and access channels is not permitted. Therefore project dredging operations in channels and port areas should not directly affect fishing activities.
Nevertheless, some temporary dislocation of fishing activities in offshore disposal areas may occur but this should not have significant adverse effects on fishing communities.

The productivity of the fishery will not be affected by project activities. No known nursery or important breeding area is directly affected. Conversely contamination of project waters is expected to be reduced. On project completion, no modification to fishing activity is expected. Some very limited benefit to the fishery may be achieved from wreck removal and the associated reduction in net snagging.

Dhows

A number of smaller vessels (typically Dhows) use waters outside the main shipping channels and facilities at KZP. The trading activities of these vessels are important to economy of Iraq at the present time.

Project activities should not significantly affect these vessels. Some temporary impacts, such as the temporary closure of marine areas are possible, but these can be easily managed.

Other

The project will not adversely affect the livelihoods of any households. Given existing levels of employment at Iraqi Ports (>8000) it would be expected that any employment benefit generated by project activities would be very limited, and confined to specialist operators and tradesmen.

Some temporary employment benefit may accrue from construction and Installation activities but this will be short term.

c. Heritage

No heritage sites will be affected by project related construction/installation operations.

d. Landscape

No landscape or related amenity values will be affected by project related construction/installation operations.

e. Ethnic Minorities and Indigenous Peoples

Construction / installation activities will not adversely affect the economic, political or social status of ethnic minorities or indigenous peoples.

f. Infrastructure

The power, water and wastewater systems of UQP and KZP port are no longer connected to external systems. Under project proposals none of these links will be restored. Therefore, the project will not adversely affect the provision of such resources to local populations. Equally, local communities will not benefit directly from the upgraded port facilities.

g. Impacts on Tourist or Recreational Areas

No tourist and recreational areas will be affected by Port operations.

h. Hazards

General

The ports are subject to access restrictions typical of that elsewhere in the world and it is expected that they will be subject to increased security in the future. If such improvements are undertaken it should prove possible to restrict site access to authorized personnel only.

UXO

A number of UXO areas pose a potential hazard to safety. Although the majority of these are offshore and are not directly affected by project works they remain a threat to port operations and staff taking part in project related works. In these circumstances it is recommended that Project Exclusion zones are demarcated as indicated in Table 14. These should remain in place for as long the UXO threat remains.

Table 14: Known UXO Hazard

Location	Nature of Threat	Comment
UQP North East Corner Basin Naval Base	Substantial quantity (tonnage unknown) of a variety of non sensitive conventional ordnance	Exclusion zone of 500m from outer edge. One third of turning circle of north end of port
UQP Onshore Dredge Disposal Area	Unknown - Substantial quantity (tonnage unknown) of a variety of non sensitive conventional ordnance	Refer to Dredging Plan
Main Naval Base – KUQ	Unknown. Main naval base during 1990-91 conflict. Expected to contain substantial quantities of ordnance of varying type	Exclusion zone of 500m from edge of outer berth.

Source: SAPROF Study, December 2005.

Other

It is known that some buildings contain asbestos. It is also probable that other hazardous materials commonly used in construction and infrastructure engineering (such as PCBs,) in the 1970s will be found in the Ports.

In broad terms the project does not require demolition or even rehabilitation of buildings and as such should not be directly responsible for creation of hazardous wastes, for changing the condition of waste at present inert but potentially hazardous or for bringing the work force into contact with hazardous materials.

It is also clear that a substantial volume of work will take place at the ports over the next few years and that much of that work will affect the status of hazardous materials and the risks they pose.

i. National Benefits

The project will generate benefits at a National level. It will:

(i) Save in excess of $200m per annum in transport costs;
(ii) Reduce the costs of goods imported to Iraq;
(iii) Facilitate increased export of key foreign exchange earning goods;
(iv) Promote economic activity;
(v) Increase revenue from port activities thereby increasing the capacity of IPA to fund its own activities and also provide foreign exchange for the Central Government
(vi) Significantly reduce pollution in national waterways and reduce the threat of contamination of international waterways

(3) IMPACT SUMMARY

OVERVIEW OF PROJECT IMPACTS

A summary of expected project impacts is provided in Table 15.

As shown in table, the majority of project impacts are expected to be positive though in many cases the realization of these benefits will be dependent on expected improvements in IPA’s ability to manage the Ports and in particular support to an effective environmental unit.

Table 15 Impacts and Issues Identified in the Project IEE and to be Addressed in the Management Plan

Activity/Issue/Impact	Signific.	Risk	Comment
Dredging			
Habitat disturbance to areas adjacent to dredge area.	Minimal	L	Natural habitats have very high volume of material in suspension and are unlikely to be affected by dredge effects.
Dispersal and settlement of re-suspended sediments. Release of toxic, harmful substances in water column. Reduced available oxygen, sunlight penetration. Smothering of bottom biota.	Uncertain	U	Available data from UNDP surveys does not indicate excessive contaminant levels. However survey results represent a snapshot of sediment deposition in 2004. No samples taken below surface. Sediments are very fine and a Plume inevitable.
Impact from altered bathymetry.	Minimal	L	River 1 man made channel established in 1979-1984. Any effects such as modifications to tidal and river flows, altered salt wedge intrusion will already be established. Renewed dredging is unlikely to have any additional impact. Effect on rate and location of sediment deposition unknown.
UXO	Uncertain	U	UXO threat presists. Risk is increased if option of dredging of entire River 1 basin is selected.
Dredge Disposal			
On Land	Signficant	H	Impacts include: (i) Non containment of disposal materials. Will create dispersal plume. Cross contamination of land and marine sediments Economic costs of returning sediment to waterways (ii) Site preparation costs and possible project delays from non availability of site. This will lead to increased risk of uncontrolled disposal. (iii) UXO threat in site preparation (iii) Security
In Water Loss of bottom biota. Habitat damage in plume areas - vulnerability to recolonization.	Minimal	L	Proposed offshore dredge disposal areas have been used since the 1970s and any original affected habitats will now have been entirely destroyed. Therefore provided dredge spoil is confined to the disposal site new sediment deposition will not modify the present environment and no habitat loss would be expected. Habitats adjacent to dump site are believed to be generally homogenous (soft sea floor) and unlikely to be affected by temporary, short lasting plumes. Natural water column has very high sediment load in suspension and plume effects unlikely to be important. Significant additional or cumulative effect on important fishery related habitats or the recovery of fishery habitats are not anticipated.
Alteration of current patterns Accelerated shoaling	Uncertain	U	Proposed dump lies to south of Hisham Island an area that is believed to have shoaled as a result of previous dredge spoil disposal and possibly modified current patterns. Further uncontrolled dumping may accelerate shoaling and promote modification of current patterns with unknown effects.
Cross Contamination	Uncertain		To be determined. Disposal of contaminants (toxins) and other hazardous materials.
International Waters	Uncertain	H	Disposal site is adjacent to Kuwait Waters and even with effective management some sediments will enter Kuwait Waters.
Safety			
Alteration of harbor/port ship traffic patterns	Minimal	L	Some threat to shipping in channels Minor threat to local shipping not permitted to use channels.
Security	U	H	Threat from pirates and insurgents remains.

Source: Project IEE, NK October 2005

Risk Legend:

L: Low

U: Uncertain

H: High

C5. MITIGATION MEASURES

Table 16 below summarizes the impacts and mitigation measures;

Table 16: Impacts and Mitigation Measures;

Impact	Impact Signific.	Impact	Mitigation
1.0 WATER-RELATED IMPACTS			
1.1 Dredging			
Dispersal and settlement of re-suspended sediments Release of toxic, harmful substances to water column. Reduced available oxygen, sunlight penetration. Smothering bottom biota.	Low/Nil	**KZ** Lower levels of material in suspension in the natural system but still sufficient to suggest temporary changes to environmental conditions during the actual dredge and the settlement period immediately thereafter will not affect existing systems. Existing data indicate dredge material is unlikely to be toxic/harmful however survey data limited to surface sediments and provides incomplete picture for deeper sediments to be dredged. Channel repeatedly dredged since 1970s. Existing bottom biota will re-establish as previously. **River 1** Sufficient levels of natural material in suspension to suggest temporary changes to environmental conditions during the actual dredge and the settlement period immediately thereafter will not affect existing systems. Existing data indicate dredge material is unlikely to be toxic/harmful however survey data limited to surface sediments and provides incomplete picture for deeper sediments to be dredged. Channel repeatedly dredged since 1970s. Existing bottom biota will re-establish as previously.	1) Dredge Management Plan required for each contract to: Continually assess contamination risk from Sediments. Ensure dredging is confined to defined channels and disposal confined to existing sites. Ensure use of internationally accepted dredging techniques. Confirm disposal capacity and desired post project Bathymetry of disposal sites. Undertake monitoring surveys to establish contaminant profile of sediments at dredge and disposal sites. 2) Dredge companies to be contracted using JICA procurement guidelines and following pre-qualification process. This should ensure only Internationally reputed companies undertake works. Application of Project EMP should further minimize risks. 3) Long Term Management Plan. Preparation of Dredge Management Plan based on the scientific determination of the most appropriate dredge regime and selection of disposal sites. Study to include: a hydrodynamic study of the KZ River system and Northern Gulf, a baseline habitat survey; an assessment of options for on-land disposal within Iraq.
Altered bathymetry Influence on tidal and river flows. Altered salt wedge intrusion. Accelerated natural sediment deposition. Attraction of desirable or undesirable fisheries. Altered bottom biota.	Low/Nil	**KZ** Continued indefinite use of Hisham Island dump site for maintenance dredge disposal may be problematic. **River 1** River 1 is man made channel established between 1979 and 1984 and hydrological systems have evolved over that period. Channel repeatedly dredged since 1970s. Any cumulative impact from proposed works is considered minimal. Existing bottom biota will re-establish as previously	
Shoreline configuration Change in current patterns. Shore zone and beach erosion. Accelerated sediment deposition-shoaling	Low/Nil	**KZ** Shorelines have stabilised since original port construction in KZ and UQ South. There is no evidence of erosive activity. Sediment patterns will be modified by dredging and spoil disposal but this will not affect system dynamics. **River 1** River 1 is man made channel established between 1979 and 1984 and hydrological systems will have evolved over that period. All shorelines are artificial and will remain unaltered.	
Loss of bottom habitat, Shellfisheries, fishery food resources.	Low/nil	KZ Channel has been subject to repeated capital and maintenance dredging. It contains no significant undisturbed habitats.	

Impact	Impact Signific.	Impact	Mitigation
Exposure of subsurface materials not conducive to decolonization. Lost attachment potential for aquatic biota. Current pattern changes.		Existing biota will re-establish as previously **River 1** River 1 has been subject to repeated capital and maintenance dredging. It contains no significant undisturbed habitats. Existing biota will re-establish as previously	
Altered groundwater flows Salt water intrusion. Accelerated groundwater flow to estuary. Undermining of land-edge sediments. Saltwater intrusion to potable water supplies	Nil	All Sites are long established dredge sites. No new additional impacts can be expected.	
1.2 Dredge disposal			
All Sites	Nil	Re-use of existing sites is required to ensure that EIA is not required. All existing sites in use since 1970s. Any pre-existing values will have been destroyed. Any existing biota will re-establish as they have previously done.	
Disposal on land	Medium	(i) Some habitats of ecological value are believed to remain within the wetland systems that surround project areas. These would be irrevocably damaged by their use for dredge spoil disposal. (ii) There is a considerable risk of sediment recirculation if spoil is not confined to disposal site.	(i) All potential disposal sites must be subject to ecological survey prior to use. (ii) All sites must be adequately engineered. This will require Site Preparatory Works including: Surveys to delimit the proposed site and provide basis for site engineering. Design and construction of site. (iii) All sites to be subject to monitoring according to project EMP requirements.
Disposal in water	Low	**KZ** Lower levels of material in suspension in the natural system but still sufficient to suggest temporary changes to environmental conditions during the actual disposal processes, and the settlement period immediately thereafter will not an effect on present systems. Possible long term impacts of continued maintenance dredging in channel and possible threats to other habitats – on Bubiyan and Warbah islands may need to be assessed. Phase 1 dredge disposal is unlikely to have any affect sedimentation and current patterns. However continued indefinite use of Hisham Island dump site for maintenance dredge disposal may cause permanent modification. **River 1** No disposal is proposed in River 1	**KZ and River 1** Development and application of Dredging Management Plan required. Management Plan to be approved by MOE.

Impact	Impact Signific.	Impact	Mitigation
Characteristics of Dredged Material	Low	Little data available on sediment in disposal areas. Existing data indicates dredged spoil is unlikely to be toxic/harmful but continued assessment required.	Monitoring of dredge material within framework of Dredge Management Plan.
Disposal Methods	Low	Inappropriate disposal of waste materials has the potential to generate significant adverse ecological impacts and also economic costs if material recirculates to dredged site.	Will be dependent on quality of contractor and contract management. Application of international procurement guidelines and pre-qualification of contractors should minimize risks. Application of Dredging Management Plan.
1.3 Alteration of harbor/port ship traffic patterns			
Relocation of navigation markers, moorings. Assurance of location precision. Designation of channels for arrival/departure traffic.	Positive	Project includes substantial component to improve Port navaids and marine support capacity.	None
Improved procedures for vessel traffic control. Shore based radar reflectors. Improved pilotage, etc.	Positive	Project includes substantial component to improve vessel control within IPA waters.	None
Increased provision for vessel handling and servicing	Positive	Project includes substantial component to improve marine support capacity and improve maritime safety. Project will not include vessel repair facilities, dry-docks or graving docks.	None
1.4 Ship discharges - oily ballast; bilge water; sewage			
Implementation of regulations controlling cleaning procedures.	Positive	Regulations are in place. Issue is one of enforcement and management. Present widespread non-compliance with regulations will not be tolerated. Project proposals call for improved management of port and control of illegal discharge.	Preparation of Port Waste Management Plan to be approved by MOE. Support for Proposed Environmental Unit
Environmental sensitivity to discharges from ships.	Positive	Low environmental risk – habitats already damaged and not diverse. Existing water quality is poor. Project aims to improve water quality by improved port management.	Support for Proposed Environmental Unit
Development of shore facilities for receiving ship generated sewage and garbage waste.	Nil	Project proposals do not call for port to accept solid waste, sewage or other liquid wastes from ships.	None
1.5 Spills detection and clean-up of spills			
Type of Spills. Oils. Lubricants. Hydraulic oils. Fuels.	Nil	No change in type of spills anticipated.	Support for Proposed Environmental Unit

Impact	Impact Signific.	Impact	Mitigation
Liquid and solid chemicals.			
Spill clean-up measures.	Positive	Project includes component to improved emergency planning and spill response capability.	Establishment of spill response capability within EU.
Dry cargo releases	Low / Nil	Project will permit increased dry cargo throughput but few dry bulk cargos would be expected and even then loading and unloading will not be a continuous activity. No habitats within vicinity of operations are sensitive to either impacts on water clarity or contamination of water column.	None
Hazardous cargoes	Nil positive	Port regulations Chapter 5 para 19, Chapter 6 paras 25-25 etc deal with hazardous cargoes. Any issues will relate to implementation of regulations.	Support to EU in application of Port Guidelines.
1.6 Waterfront activity discharges - sanitary and non-sanitary			
Sanitary wastes	Positive	Project will not increase threat from sanitary wastes however extent of existing threat unknown.	Waste Management Plan to include risk assessment.
Sanitary treatment facilities.	Positive	Project proposals do not include not sanitary treatment facilities. Therefore some risk will remain from potential continued disruption of disposal systems beyond port perimeter.	Waste Management Plan to address this issue
Discharges/spills reaching harbor/ river waters.	Positive	All potentially affected habitats will have been subject to contaminated discharge for 15 or more years and repeated dredging. No environmental values remain. Project construction and installation activities will not modify present storm drainage patterns nor will they increase the risk of contamination of storm water. Project will not increase threat to receiving waters by increased discharge volume, increased level of contaminant or increased toxicity of contaminant. Some reduction in contaminant load is anticipated from a reduction in leakages and spills resulting from improved management of port activities and the use of new equipments, and also from an improved spill management and clean up capacity. Project offers opportunity to clean up known existing sources of discharge notably loading and unloading of oil and oil products at Khor Al Zubayr.	Provision of support for Proposed Environmental Unit. Engineered solution to KZ oil export and import to be operational before start of Phase 2.
1.7 Wreck Removal			
Spill	Low	Even a worst case wreck clearance spill event will be relatively easily handled by a basic spill management plan and associated spill clean up capability.	Wreck Management Plan to contain OSCP.
Contamination	Low	‘Contaminated’ sediments were identified at only one project target wreck, the Al Waleed, which had levels of total PAH in excedance of US guideline values. Al Waleed is located in UQP adjacent to berth Number 9 which in turn is immediately adjacent to the proposed wreck cleaning site giving little scope for contaminant transfer.	Wreck Management Plan - good management of operations will limit extent of possible contamination transfer.

Impact	Impact Signific.	Impact	Mitigation
2.0 LAND-RELATED IMPACTS			
2.1 Natural Values			
Ecological value of wetlands Waterfowl use. Use by domestic animals. Use by other fauna. Unique vegetation. Food source for aquatic or non-aquatic biota. Irrigation water source.	Nil	(i) Project will not directly affect any inter-tidal areas beyond port perimeters and all sites within port perimeters have already been heavily modified. (ii) There are potentially important inter tidal habitats areas north of KZP and on the eastern bank of KZ opposite the port. These areas are considered to be valuable habitats for migratory birds and will support reasonably diverse ecosystems. (iii) Other land based sites, River 1 dredge disposal area and Wreck Clean up site heavily modified. Any existing colonisers or users will continue to do so after Project use.	(i) and (ii) Within framework of Dredge Management Plan undertake surveys of wetlands areas to delineate ecological values. Once site values are defined ensure no port activities take place in defined areas of value or elsewhere in such a manner as to affect sites of value. Clean up of KZP oil exporting facility to reduce contamination of KZ. (iii) None
Floodplain functions	Nil	Not directly affected by project works.	None
Watershed/groundwater source quality	Nil positive	Not directly affected by project works. Possible clean up of port areas may reduce contamination threat.	None
2.2 Land Uses	Nil	No change	None
2.3 Noise from ports and harbor side industry	Nil	Ports are existing facilities. Project does not propose significant change in land use or increase number of noise sources.	None
2.4 Effects of dust and other airborne emissions			
Dust and other non-combustion particulates.	Low	Project does not propose increase in number of emission sources. Very limited emissions increase from construction activities and land side receivers distant (>2kms) from site. Project will permit increase in dry cargo throughput but nevertheless relatively few bulk dry cargoes will be expected. Principal source will be grain. In all cases loading and unloading will be intermittent. During project period bulk dry handling expected to be confined to berths that are relatively isolated from port boundaries and potential receivers	None
Smoke and other combustion products	Low	General No addition in number of industrial sources. Some increase in road traffic and low probability that regulatory limits will be applied strictly but overall increase in vehicle numbers will be marginal. Some increase in number of vessels using facilities and low probability that regulatory limits will be applied strictly However, threat remains low as land side receivers are distant from site and no increase in 'toxicity' of emissions is anticipated. KZP KZP will continue to operate as an oil exporting and refined product importing facility with a number of potential sources of vapor or liquefied gas emission such	IPA to create interim operational guidelines for storage and handling of hydrocarbons in import and export operations. EU to monitor implementation of guidelines.

Impact	Impact Signific.	Impact	Mitigation
		as storage facilities and holding tanks. With Crude Oil it is also possible that there will be gases within ship holding tanks that will be displaced during filling operations.	
Odor	Nil	No additional sources of odor nuisance are proposed.	None
2.5 Traffic Impact	Low	Ports are existing facilities with supporting land side road infrastructure in place. Increase in traffic volume will be relatively slight. Principal issue is need for improved security.	None
2.6 Handling and disposal of shore generated solid			
Ships/Waterfront activities	Low	Some increased goods throughput of waste.	Implementation of Waste Management Plan Plan must include measures to improve classification, handling and storage of wastes.
Disposal methods	Low	Although Waste Management Plan should improve classification, handling and storage of wastes risk remains from potential continued disruption of disposal systems beyond port perimeter.	Waste Management Plan to address issue of disposal of wastes and risks from potential continued disruption of disposal systems beyond port perimeter.
Runoff from raw material storage	Low /nil	Aside from possible temporary storage of materials during construction project will not promote increase in open storage of materials.	None
Exposure effects	Positive	Existing storage conditions are very variable but generally poor. Project would be expected to improve port management and condition and management of storage facilities.	Support for proposed EU
2.7 Waterfront drainage			
Drainage components Contaminants (toxins). Volumes, oils (hydraulic, etc.).	Positive	No expected increase in volume of contaminants or hazardous materials from project activities. Project would be expected to improve port management and reduce risk of cross contamination with surface drainage.	Assessment required of existing liquid storage facilities. Support for proposed EU
Drainage collection systems	Nil ? Positive	Although existing drainage systems are considered to be in reasonable condition some maintenance and rehabilitation is required. Project does not include specific component to upgrade/rehabilitate collection systems. No expected increase in threat from project activities. Project would be expected to improve port management and reduce risk of contamination of surface drainage and will improve spill management and clean up capacity.	None
Biological effects of disposal.	Positive	All existing biological resources heavily damaged by dredging and possibly by contaminant load. Existing impacts on local fishery not known. No expected increase in threat from project activities and reduction in contaminant load expected from improved port management, (reduced risk of contamination of	None

Impact	Impact Signific.	Impact	Mitigation
		surface drainage) and improved spill management and clean up capacity.	
3.0 AIR-RELATED IMPACTS			
Construction	Low	During construction project may increase number of dust sources and dust emissions on a temporary basis. Simple management measures and relative distance to sensitive receivers should minimize threat	Application good construction management via CMP.
Port Operations	Nil	Project will not directly increase industrial contributions. Vehicle emissions may increase as a result of increased truck traffic and regulatory limits may not be applied. However any traffic increase will have a marginal effect. UQ Port has few operational point sources of air pollution. KZ Port has oil terminal and grain receiving berth. These affect only very limited area around each facility and there are no sensitive receivers within possible impact areas.	None
4.0 HAZARDOUS MATERIALS / CARGOES			
Hazardous cargoes	Low – Nil	No anticipated increase in threat from cargos even with increased overall throughput. Improved equipment and port management should reduce existing threats.	Support to EU in application of Port Guidelines. Port regulations Chapter 5 para 19, Chapter 6 paras 25-25 etc deal with handling hazardous cargoes
Unexploded ordnance	Nil – positive	Project will require rationalization of UXO hazard including stipulation of known hazard areas, an operational policy and ERP.	Development of UXO Management Plan
KZ oil exporting facility.	Significant	Present oil import and export operations at KZ pose significant hazard. Project will promote increased product throughput.	Project proposals should provide interim engineered solution to reduce contamination and Health and Safety risks from hydrocarbon export and import. IPA to create operational guidelines for crude oil export operations.
Navigation Hazards	Positive	Wreck clearance in channel will reduce hazards to shipping operations.	None
Hazardous Waste (Asbestos and other hazardous materials commonly used in construction and infrastructure engineering (such as PCBs,) in the 1970s)	Low	Project will not require demolition or refurbishment of port buildings. However, some work can not be ruled out at this stage.	Proposed Waste Management Plan to include component to deal with Hazardous Wastes.
5.0 SOCIO-CULTURAL IMPACTS			
5.1 Involuntary resettlement.	Nil	Project requires no resettlement	None
5.2 Livelihoods			None
Fisheries	Low – nil	The productivity of the fishery will not be affected by project activities. No known nursery or important breeding area is directly affected.	None

Impact	Impact Signific.	Impact	Mitigation
		No long term effect on fishing activity expected. Some temporary dislocation of fishing activities in offshore disposal areas may occur during project works but this should not have adverse effects on fishing communities.	
Dhow Traders	Nil	Trading activities of these vessels are important to economy of Iraq at the present time. Project activities should not significantly affect these vessels. Some temporary impacts, such as the temporary closure of marine areas are possible, but these can be easily managed.	None
5.3 Heritage	Nil	No heritage sites will be affected by project related construction/installation operations.	None
5.4 Landscape	Nil	No landscape or related amenity values will be affected by project related construction/installation operations.	None
5.5 Ethnic Minorities and Indigenous Peoples	Nil	Construction / installation activities will not adversely affect the economic, political or social status of ethnic minorities or indigenous peoples.	None
5.6 Utilities	Nil	Project proposals not affect the provision of utilities such resources to local populations.	None
5.7 Impacts on Tourist or Recreational Areas	Nil	No tourist and recreational areas will be affected by Port operations.	None
5.8 Economic Benefits			
National	Positive	The project will generate benefits at a National level. It will: Save in excess of $200m per annum in transport costs; Reduce the costs of goods imported to Iraq; Facilitate increased export of key foreign exchange earning goods; Promote economic activity; Increase revenue from port activities thereby increasing the capacity of IPA to fund its own activities and also provide foreign exchange for the Central Government Significantly reduce pollution in national waterways and reduce the threat of contamination of international waterways	None
Local	Positive	Promote economic activity in sectors servicing the Ports Promote downstream activity in the transport and freight forwarding sector	None

Dumping Site

Since volume of dumping at land site is great, following impact and measures was separately studied.

Table 17 Impacts, Measures and Monitoring Plan on Dumping at Land Site

Interventions (substance)	Impacts	Measure	Monitoring Plan
Water	The quality of the groundwater was highly deteriorated due to chemical discharges. Seepage may be defined as any liquid percolating through the deposited waste and emitted from or contained within a landfill. This seepage picks up suspended and soluble materials that originate from or are products of the degradation of the waste. If this seepage is allowed to migrate from the site it may pose a severe threat to the surrounding environment and in particular to the groundwater and surface water regimes.	Corrective measures including treatment technologies should be undertaken in discharging the harmful wastes directly from the ports. Effective environmental protection requires an understanding of the composition and volumes of seepage being generated and the implementation of control measures. The composition of seepage within a landfill is unique as the characteristics of the seepage will vary depending on the wastes deposited. The main factors that influence the generation of seepage include: • meteorological conditions at the site, • waste composition, • waste density, • waste age, • depth of landfill, • moisture content, • rate of water movement, and • lining system (if any). • Confirmation of groundwater artery • Installment of impermeable sheet if necessary • Regular monitoring of groundwater and discharged water from outlet • Treatment of discharged water from outlet	Develop a long-term institutional framework covering the identification of leakage areas. The purposes of a seepage monitoring programme are: • to confirm that the seepage management systems are operating as designed; • to provide information on the progress of decomposition of the waste; and • to provide information for the potential revision of groundwater and surface water monitoring parameters. The Landfill Directive requires that sampling and measurement of seepage (both volume and composition) must be performed separately at each point at which seepage is discharged from the site. Each cell in a landfill should be treated as a separate unit for the purpose of determining the number and location of seepage monitoring points. The frequency of seepage monitoring at a landfill site will be site specific and governed by the waste license. It should be reviewed on a regular basis to reflect changes in: • quantity and types of waste deposited, • operational practice, • size of operational cell, and • the effectiveness of the seepage drainage and collection system.
Dredged material	Due to pollution in the port, the aesthetic value of the site is highly affected.	Develop a comprehensive solid waste removal plan focusing on the high-risk spots. It is also required to identify and procure plan and establish transfer station for the solid waste. (see below for the Solid Waste Management Regulation)	Elaborate security arrangements to ensure application of waste management plan on the sites. It is essential to monitor routinely. Variations may occur due to the aging of the waste, inconsistencies within the waste composition itself as well as changing meteorological conditions. Monitoring plan should take into consideration the compounds present at the landfills, type and design of the equipment used and operation of the equipment.
Fisheries Assessment		An assessment of the fisheries status of a river may be necessary in some cases. This may be of particular importance where treated leachate is discharged directly into a river or to provide baseline data of the status of a river affected by close landfills. The Ministry of Agriculture, through the General Authority for Animal Resources Development, Fisheries Department should be contacted to ascertain if there is any current information on the fish species or fish populations present in the river or if any surveys have been undertaken. The Fisheries Board should also be able to provide information on whether the river is a designated area for fishermen activities.	Monitoring plan must include regular follow-up from the concerned party (MoE) and ensure all fishermen activities are authorized within the protected areas. This includes setting an emission toxicity limit, and ensure that it is important to consider the effluent mixing conditions within the receiving waterbody or otherwise toxicity limits may not give adequate protection to aquatic life. Information is therefore needed on the receiving waters (e.g. the minimum flow of a river) and the number of dilutions of the discharge available.

Ground water

The prevention of groundwater pollution is applied by controls over the release of substances considered harmful (nitrates and pesticides). All deliberate discharges and disposals must be subject to prior authorization, whilst other potential releases of harmful substances must be controlled by other appropriate measures, the form of which is at government's discretion. All permits under these regimes must comply with the Groundwater Regulations (GWR). The GWR place a duty on stakeholders to protect groundwater by preventing discharges of certain substances to groundwater and pollution of groundwater.

These duties, including prior investigation, apply to all discharges and disposals of listed substances to groundwater. The GWR also may prohibit or impose conditions on activities other than disposals which could result in discharges to groundwater. However, the practical application of the GWR is less clear for other pollution sources such as historic land contamination and pollution from product use (for example fertilizers and pesticides).

The storage of pollutants is generic to many of the activities considered in the project. Key issues are:

- • Whilst working according to risk-based principle, where appropriate, the precautionary principle[10] must be followed.
- • Information supporting developments/activities is often inadequate to assess the risk to groundwater. Developers are responsible for providing these data which should include an assessment of any pollutant sources, any receptors that may be harmed (including groundwater itself) and the pathway to receptors.
- • Site owners and operators need to be aware of, and take responsibility for, the groundwater pollution risk from their operations.
- • Storage and handling of pollutants has an on-going risk of groundwater pollution through accidents, vandalism, poor practice and deterioration.
- • Underground and sub-water table storage represents a particular risk to groundwater due to the difficulty of detecting and dealing with any leaks.

Site owners and operators need to be aware of, and take responsibility for the groundwater pollution risk from their operation.

General Groundwater Protection Policies:

Regulatory:

[10] Precautionary principle is defined as "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." Defra 2000.

- • Wherever legislation allows, a tiered, risk-based approach to the regulation of activities that may impact groundwater resources and to the prevention of pollution shall be used.
- • Where the potential consequences of a development or activity are serious or irreversible, precautionary approach shall be taken to the management and protection of groundwater, particularly in the absence of adequate information with which to conduct an assessment.
- • Prevent or limit unacceptable releases to groundwater arising from an activity that is not subject to a permit. In the event of actual pollution, it shall be taken into consideration whether the operator is complying with a statutory code of good practice before taking further action.

Planning:

- • It is expected that developers and operators shall assess the area of influence of their activities and to take account of groundwater uses and dependent ecosystems within this area during planning, construction and operation.
- • Developers and operators are anticipated to provide adequate information to statutory bodies such as the Ministry of Environment when submitting their proposals so that the potential impact on groundwater resources and quality can be adequately assessed. In particular, where new techniques, operations, products or substances are involved, developers or operators should be prepared to supply specific relevant data where groundwater is at risk.
- • Site owners, developers and operators are expected to comply with any relevant statutory codes of good practice. This applies particularly to the handling, use, storage and treatment of substances that can potentially result in an unacceptable release to groundwater. Codes of good practice (agricultural, pesticides, groundwater) are useful tools in preventing pollution from a range of activities where there is no deliberate disposal (and therefore no permit).

Solid Waste Management Regulation

The purpose of setting regulations is to reduce the impact on the environment due to volumes of hazardous and non-hazardous waste being generated during the construction activities performed within the project. The primary aim of this plan is to:

- Define the different types of waste as defined by local regulation and their segregation methods.
- Set out general criteria for managing, monitoring and avoiding or effectively minimizing any possible form of environmental damage or pollution during construction activities.
- Define recording, monitoring and tracking of waste.
- Estimate and evaluate potential sources of polluting substances, spills etc. during operations and provide adequate arrangements for safe control and contingencies.
- Define responsibility for the handling of waste management to safe disposal.
- Defining responsibilities and actions for the environmental emergencies during operation.
- Waste materials shall only be deposited in approved locations.

- Any noxious, toxic or other hazardous waste materials, or containers of such materials, shall be disposed of by methods of approved locations.
- Handling of all litter and waste packaging materials during construction shall comply with the relevant legislation. Disposal shall be separated in hazardous and non-hazardous waste.
- Incorrect disposal of waste material shall be reported as an incident.

Source: Project Environmental Plan for Port Sector Rehabilitation Project, Lot A: river-1 dredging at Umm Qasr Port, May 2010

C6. ENVIRONMENTAL MANAGEMENT PLAN

(1) INTRODUCTION

The IEE to be prepared for approval by the MOE will contain a detailed Environmental Management Plan (EMP). This EMP has been developed solely for project planning and development purposes.

In that context it provides an indication of the types of activities that may be contained in the EMP, based on the findings of this preliminary Impact Assessment.

In total, seven management plans are identified:

1) Construction Management Plan
2) Waste Management Plan
3) Dredging Management Plan
4) Wreck Management Plan
5) Salvage Health and Safety Plan
6) Oil Spill Contingency Plan

A Monitoring Plan is also required. This plan should:

- formalize exclusion zones around each area and if deemed appropriate include such zones as an annex to port regulations.
- physically demarcate the exclusion zones; onshore by a fence or line and offshore by buoys or other appropriate means.
- Contain a full ERP for an incident related to each area.

(2) CONSTRUCTION MANAGEMENT PLAN (CMP)

a. General

The Construction Management Plan will address general construction issues that are not directly addressed by other specific MPs. The CMP will be prepared by the Contractor in response to project contract requirements. Typically, Standard Construction Contracts will contain requirements for:

- proper management of construction waste;
- control measures for waste fuel; oil and lubricants;
- rehabilitation of sites used to temporarily store construction materials.
- use and proper maintenance of equipment with appropriate noise and smoke abatement controls;
- effective control of noise and dust levels.

Specific provisions will also be included to mandate the use of formal health and safety measures to minimize accidents and avoid injury during the construction process.

Advisory, non-standard contract clauses will also be needed to highlight specific issues or specific non typical practices IPA wish to enforce. These will be included in Contract documentation in Part II, Conditions of Particular Application (COPA).

b. Preparation of the CMP

A two-part process is envisaged.

Tender Phase

During the tender process, each potential contractor shall be required to prepare an outline CMP for submission as part of their tender. This requirement will demonstrate how the contractor will meet the environmental, health and safety requirements laid out in the contract documentation.

To ensure full understanding of the implications of the Project CMP, all pre-qualified contractors will be expected to attend a Pre-Tender Conference, where they will be briefed on their responsibilities with regard to environmental, social and health and safety issues. These briefings will review specific provisions of the construction tender documents and contracts, as laid out in the COPA.

It is probable that these briefings will take place either in Amman or Kuwait.

Negotiations Phase

Upon contract award, the successful Contractor shall be required to submit a Detailed CMP for the approval of IPA-EU, with the final version to be submitted prior to the commencement of the works.

In this Plan, the Contractor should define the significant environmental aspects for each construction activity, identify the legal requirements to be complied with, and establish an objective and target in order to achieve the requirements. The structure and responsibilities of each site management team shall be identified and training needs, if any, must also be defined.

Channels of communication, document control, operational control and emergency procedures should also be detailed. The checking and corrective action procedures, together with the Contractor's management review procedure shall be elaborated.

c. CMP Monitoring

The IPA-EU will monitor contractor performance with respect to the CMP. The principal mechanism by which this will be achieved will be a program of site inspections. These will be supported by a capacity to conduct measurements and analysis as required.

To facilitate inspections a checklist of items to be considered under each contract shall be drawn up. This checklist would be distributed to all parties concerned during the tender process and reviewed during the pre-bid meeting.

For the inspection process to function access to all sites related to the project must be guaranteed. Site inspections should be carried out on a regular basis but not necessarily to a structured pattern. However, as a minimum each site should be inspected at least weekly during its operation.

(3) WASTE MANAGEMENT PLAN

The following wastes are excluded from this Plan.

Construction waste	At this time the project does not include any large scale construction works. Therefore large quantities of construction wastes are not expected and Construction Waste Management Plans (CWMP) not required.
Chemical Wastes	At this time the project does not include any works that are expected to require the storage, use or removal of significant quantities of chemicals. Therefore little or no chemical waste is expected and there is no requirement for a Chemical Waste Management Plan.
Ship to shore waste	The project will not facilitate the acceptance of any waste from vessels.
Ship maintenance and repair	The project will not facilitate vessel maintenance and repair at KZP.
Dredge Spoil	Addressed within the framework of the Dredging Management Plan.

The proposed Waste Management Plan has three components.

a. Pre-Existing Wastes (excluding UXO) Management

It is possible that sites proposed for use under the project contain materials that will need to be removed and disposed of prior to the start of contract works. In this case an inventory of all materials on the affected sites should be undertaken. This would be the responsibility of by IPA.

Under present and likely continuing circumstances over the next few years most waste materials in Iraq will have some re-use or salvage value. Therefore where local markets exist (or as in the case of scrap metal a capacity to receive scrap is being rehabilitated) the IPA should ensure all wastes are sorted and stored securely for possible later sale or use.

In undertaking these works IPA must

- prepare waste receiving areas; designed and secured to meet the needs of the various waste types;

- specify the handling and storage procedures to be adopted to minimize loss or leakage, and for clean up of small spills and general hazards to public health;
- provide appropriate clothing and equipment;
- define measures for the cleaning and maintenance of waste storage and handling areas;
- establish a Management Information System to monitor receipt of wastes and waste disposal.
- establish a database on the quantities of wastes generated, recycled and disposed.
- license waste collectors for each kind of waste and monitor their activities to ensure that wastes are disposed of appropriately.
- Establish a list of defined and approved disposal areas for different waste types.

This program may be used as a pilot program for the eventual clearance of all wastes within Port Areas.

b. Wreck Decontamination Wastes

Wreck salvage material and waste shall be delivered to a defined decontamination site. The location of this site has not been finalized at this time although a provisional location has been identified.

Whichever site is chosen it must be prepared to receive the wastes. Site preparation works will include:

- Provision of all weather sealed road access to hard stand sites within the decontamination area.
- Provision of secure hard stand sites for waste storage.
- Provision of utilities as required.
- Preparation of a wash area: including hard stand area and containment areas.
- Provision of offshore access for marine protection vessels.
- Provision of offshore access for the scrap barge.

At this time it is probably appropriate for IPA to be made responsible for the preparation of the receiving site, the decontamination program and the storage and disposal of salvage and waste materials.

In this case, Wreck Removal Contract documents must define the location of the decontamination, site and IPA and Contractor responsibilities and liabilities.

This would require IPA:

(i) Put in place a plan for the transfer, storage and eventual disposal of salvage and waste materials once cleaned. This requires that a waste separation, storage and disposal program similar to that outlined above.

(ii) To have in place throughout all decontamination operations a spill clean up capacity and a tiered ERP.

This would require IPA-EU undertake the following works.

(i) Supervision of decontamination works (staff to be adequately trained for such supervision).
(ii) Prepare monthly reports on the nature and quantities of material received and the decontamination process undertaken.

On completion of wreck decontamination works the site will have to be decommissioned and signed off land as 'clean' by a defined observer. Ideally this would be ROPME who could also be permitted to observe site operations if they so desire. Alternatively IPA–EU should be required to sign the site off.

A possible program of works for the Wreck Decontamination works is shown in Table 18.

Table 18: Wreck Decontamination Program - Schedule of Works

Activity	Responsibility
Site Identification	IPA – with TA support
Design SOW	IPA – with TA support
Site Preparation Design	IPA – with TA support
LCB procurement	IPA
Site Preparation Works	Contractor
Site Inspected and Approved	IPA - with TA support
Staff Training	IPA – TA support
Possible first receipt of wreck materials	
Decontamination etc	IPA – ROPME monitor
Site decommissioning	IPA – ROPME sign off

Source: SAPROF Study, December 2005.

c. Future Operational Waste

Future operational wastes may be divided into three main sources;

(i) Waste from commercial cargo activities and spillage;
(ii) Wastes generated from Port maintenance and rehabilitation activities;
(iii) Domestic (office) waste generated by port and harbor employees and users.

In broad terms, none of these wastes would be expected to pose particular concerns and could therefore be dealt with by standard waste storage and disposal practices. However, as vessel numbers and throughput increases and as the scope of the rehabilitation works onshore widens to include extensive works on utility systems and perhaps major structures it will be for IPA to put in place a comprehensive waste management plan.

This would be built on the Pre-existing waste disposal plan and would require formalization of a number of programs, notably

- Waste audits: to be undertaken prior to work starts at any rehabilitation or reconstruction site. IPA-EU to be required to authorize work starts only after the audit is completed.
- Preparation of permanent (or site specific temporary) waste receiving areas; designed and secured to meet the needs of the various identified waste types;
- Definition of protocols for the cleaning and maintenance of waste storage and handling areas;
- Management Information System to monitor receipt of wastes and waste disposal and quantities of wastes generated, recycled and disposed of.
- Licensing of waste collectors for each kind of waste and monitor their activities to ensure that wastes are disposed of appropriately.
- Establishment of a list of defined and approved disposal areas for different waste types.

However, the Plan must also contain two additional elements:

(i) A spill response plan.
(ii) A Hazardous Waste Management Plan. Hazardous wastes that may be encountered during onshore rehabilitation and reconstruction works would include: Lead-based paints, toxic-based material insulation, caulking, transformers (may contain poly-chlorinated bi-phenyl (PCB)), oil-containing space heaters, Freon-containing refrigerators, discarded neon lamps (may contain mercury).

(4) DREDGING MANAGEMENT PLAN

It is intended that a Draft Dredging MP is attached to the Dredge Contract Tender Documentation and thus made available to potential contractors. This will inform contractors of the nature and scope of environmental management proposed to be adopted and of their responsibilities in that regard.

A Final Dredging Management Plan (DMP) will be attached to the Contractors Operational Management Plan. Compliance with the DMP will be contractually binding.

The Final DMP will comprise:

1. *Introduction*
2. *Objectives*
3. *Identified Concerns*
4. *Legislative Framework*
5. *Baseline Report*
6. *Management Plan*

7. *Method Statement*
8. *Allocation of Responsibilities*

An outline DMP, for use in the management of the dredging program proposed for Phase 1 of the Project, i.e. the dredging of River 1, is provided in Annex 3.

(5) WRECK MANAGEMENT PLAN

A Wreck Management Plan (WRMP) should be prepared for each individual Salvage operation.
It is intended that a Draft WRMP is attached to the Wreck Contract Tender Documentation and thus made available to potential contractors. This will inform contractors of the nature and scope of environmental management proposed to be adopted for the contracts and of their responsibilities in that regard.

The final contract documents will require that a WRMP is prepared and submitted to IPA for approval prior to commencement of any wreck removal contract. The final WRMPs will be prepared by the Contractor and will be based on the Draft provided during the tender process. Compliance with the approved WRMP will be contractually binding.

The Final WRMP will comprise two elements.
Part 1 shall comprise a detailed Salvage Health and Safety Plan for Salvage Operations (SHSP). An example of an appropriate SHSP, derived primarily from ISU documentation, is provided as Annex 4.
Part 2 shall comprise an Oil Spill Contingency Plan (OSCP) for each Wreck. A generic OSCP has been prepared for the Project Wreck Removal program by the Salvage specialist. This is provided in Annex 6 together with a summary table that indicates specific concerns associated with each wreck.

(6) SALVAGE HEALTH AND SAFETY PLAN:

This plan is intended to: help prevent accidents, illnesses and injuries; increase safety awareness; meet requirements of environmental, occupational health, and safety laws and regulations; reduce institutional liability; and establish safety responsibilities for individuals within the area.

This plan outlines safety responsibilities and training requirements to ensure individual and institutional compliance with relevant environmental health and safety laws, regulations, policies, and guidelines. Please refer to Annex 4.

(7) OIL SPILL CONTINGENCY PLAN:

The overall objective of the plan is to prevent and to limit as far as practicable the adverse consequences of any spill that might arise from the wreck recovery operations.

All the Salvage operations will come under International health, Safety and Environmental Policy regulations, which is covered under International Maritime Organization (IMO United Nations). Please refer to Annex 6.

Ideally, this study should be prepared under the auspices of ROPME and would be further developed to provide a spill fate model that may be utilized for spill response planning.

C7. MONITORING PLAN

(1) PROJECT DESCRIPTION

PROJECT OBJECTIVES

The overall project for Iraqi major ports rehabilitation/ reconstruction aims at recovering the function of the two (2) major ports in Iraq, namely Umm Qasr Port and Khor Al Zubayr Port, to the operational level originally designed. The overall project involves quite comprehensive and a long-term based rehabilitation, reconstruction and replacement of the existing ports facilities such as access channels, port basin, berths, cargo handling equipments, various port services floating equipments and onshore utilities, by which a phased implementation program are required.

To this end, the most essential and urgent needs of the implementation among all the necessary inputs for the full recovery of the both ports have been identified as Phase-1 Project (the Project).

The Project aims at functional recovery to the level around 10 million tonnes cargo handling capacity annually, that was ever performed in the year 2001 by both ports, providing safe navigation and berthing, necessary equipment for cargo handling and maintenance, wrecks salvaging equipment for IPA use and associated utilities.

NECESSITY AND PRIORITY OF THE PROJECT

The current operational efficiency of Umm Qasr and Khor Al Zubayr Ports is estimated around 30% of the originally planned (rated) capacity because the channel and berths front depths are very shallow. As a result, major cargoes required for the northern part of Iraq and Baghdad capital region have to be imported from Jordan through Aqaba Port, and cargoes for the southern part of Iraq, in the case of large vessels, from Kuwait. Therefore, transportation distances for imported cargoes are long and considering the time taken for inspection and customs clearance of trucks at the border, the total transportation time of imported cargo, particularly from Aqaba Port in Jordan is significantly longer than if cargoes were imported directly through Iraqi ports. This results in total transportation costs being very high, which is passed on to the Iraqi people with higher prices for imported goods.

If by restoring the existing channel and port facilities and large vessels gain access to Iraqi ports, the commodities necessary for the Iraqi people and goods and materials for reconstruction of Iraq should be purchased at reasonable prices, even considering sea and land transportation costs. As a result, Iraqi port development will contribute to the overall improvement of the national economy. From the national economic point of view, the restoration of the access channel to Umm Qasr and Khor Al Zubayr Ports need to be implemented urgently so these ports can function at their original capacity.

Furthermore, the National Development Strategy announced by the Government of Iraq in October 2004 also has given the highest priority in the port sector to the Umm Qasr Port rehabilitation.

RATIONALE OF THE PROJECT DESIGN

According to the UNJLC report, Iraq will be able to save more than half a million dollars per day if most of the seaborne cargo are routed through Iraqi ports, as currently only a third of such cargo is handled at Iraqi ports. It will therefore a great saving of national economy once the restoration of the major ports have been implemented through the Project. In order to accommodate all such cargoes at the Iraqi ports, the restoration of two major ports should be achieved. As the first step among all Umm Qasr Port functional recovery will be utmost importance as the leading port to handle most of general cargoes together with a proper equipment/facility to continue to maintain/improve its function by Iraqi people.

a. General

The proposed Project Monitoring Plan (MOP) comprises two elements.

b. Environmental Quality Monitoring Plan (EQMP)

Recent projects have contained significant environmental assessment components that provide a partial assessment of present environmental conditions. Partial in that they are restricted only to the specific needs of the project in question.

The SAPROF project will further add to this partial database by providing additional data on sediment characteristics, water quality, etc. However, none of the projects has left IPA or any other agency with either, the capacity to continue monitoring previously assessed parameters or to compile a comprehensive baseline of key parameters.

Therefore, while there are relatively few significant negative residual impacts identified in the Project Impact Assessment, there are sufficient environmental monitoring and other needs to justify the creation of an environmental unit trained in environmental monitoring.

With such a unit in place it is appropriate for the project to further support environmental activities by proposing the establishment of an EQMP. This would include the program outlined in Table 19. This program is seen as the minimum required. Other elements may be added as required.

Table 19: Draft Monitoring Plan (excluding Dredging Works)

Sub – Plan	Activity	Location	When / frequency	Parameter	Baseline Status
Environmental Quality Monitoring	Monitoring of surface water quality	7 sites in Iraqi waters KZP (2 sites) KZ Channel UQP (2 sites) River 1 Entrance KZ downstream River 1 confluence.	Monthly throughout project operations.	pH, conductivity, temperature, ammonia & ammonium, TOC, TDS, and TPH.	
	Groundwater Quality and Depth	2 wells UQP 2 wells KZP	Quarterly	Water Level, pH, conductivity, temperature, ammonia & ammonium, TOC, TDS, heavy metals and TPH.	
Wreck Management Plan	Post removal hydrographic surveys of site.			Channel bathymetry. Bathymetry of dump sites	
	Sediment contaminants.	Each wreck	Every 50 cms of sediment removal, including sample from vessel bottom layer	As per UNDP study	UNDP 2004 survey provides snapshot assessment.
Dumping Site	Discharge of water from outlet	outlet form dumping area	Monthly	pH, conductivity, temperature, ammonia & ammonium, TOC, TDS, heavy metals, dioxins and TPH.	
Coastal area	Ecosystem	Both sides of the channel	Occasionally	Visual inspection of change at intertidal zone	

c. Dredging Monitoring Plan

Good practice requires that Dredging Management Plans include a program for monitoring of affected sites. This is required to ensure that the environmental integrity of the disposal site and the areas surrounding a site is maintained and to verify compliance with site designation criteria, defined special management conditions, permitting requirements and other elements of the DMP as required.

The DMP provided in Annex 3 contains a Draft Monitoring Plan. This contains proposals for the following

- Sediment (sieve analysis) at sites in River 1 and KZC at different dredge depths;
- Analysis of sediment contamination at sites in River 1 and KZC at different dredge depths;
- Sediment (sieve analysis) at the Hisham Island dump site;
- Analysis of sediment contamination at the Hisham Island dump site;
- Water Quality (pH, temperature, ammonia & ammonium, TOC, TDS, heavy metals and TPH) in River 1, KZC and the Hisham Island dump site;
- Visual inspections of any turbidity plumes at operational sites.
- Assessments of characteristics of any in waters plume (e.g. effects of currents, tides and wind on horizontal transport and vertical mixing).

- Post dredge and post deposition hydrographic surveys at the completion of dredging activities.

In addition to ensuring compliance with the DMP this data will be utilized to:

- Determine levels of present and past contamination in KZ and River 1;
- Establish the characteristics of materials already being dredged and the characteristics of materials that may potentially be dredged in the future;
- Assist in determining the requirement for post dredge monitoring programs.
- Assist in the determination of likely future dredging

It may also serve as a basis for future management actions (e.g., in determining the capacity of dredge disposal sites, the planning of corrective actions).

(2) PROJECT IMPLEMENTATION

PROJECT SCOPE

The Project Components are as shown in Table 20 (1).

Table 20 (1) : Project Scope

Project Component	Outline of Scope of Works	Remarks
(Construction Works)		
1. Dredging Works at KZP	Dredging of Port Basin, front of berthing areas, a limited area of Access Channel, Dredging volume: 5,400,000 cu.m, Depth: -12.5m, Width: Access Channel & Berthing areas 300m, and Turning basin 450m wide.	From UQP to KZP (including KZP port area), no maintenance dredging has been done for a long time. Especially the port basin and berth front areas are serious. The Channel (UQP-KZP) is also shallow and narrow in places, and widening and deepening are required, which can be done after the dredging works in the port area by GCPI own dredgers together with the planned rehabilitation and improvement of the LNG plant berth area.
2. Shipwrecks Removal Works	Total 12 wrecks removal located in the Main Channel and KZP basin.	6 wrecks located at KZP port basin area and KZP channel, the other 6 are along the Channel to UQP. Therefore, 6 wrecks located in KZP basin and access channel are the most critical.
3. Rehabilitation of Port Facilities	Damaged Fender Replacement: 60 pcs. (KZP) Repair of Tug berth structure (KZP), Yard pavement rehabilitation (KZP), Corrosion Protection (UQP)	According to the investigation results, total 97 pcs of Fenders were lost or damaged and need replacement. Some fenders are replacing by KZP. Thus 68 pcs of appropriate and suitable fenders will be replaced. Tug berth maintenance and corrosion protection. Yard pavement repair and maintenance including drainage. All North port berths (No.12-No.21), Total Cathode 1,845 pcs.
4. Expansion of Berth at KZP	300m Extension of the existing berth No.2 to South, and utilize as Multi-purpose Berth (KZP), Also connected to Berth No.1, Design depth -12.5m	In order to handle overflowed cargoes from UQP, it is necessary to extend the existing general cargo berth at least 300m. Design ship: 20,000-30,000 DWT max.
5. Navigation Aids Works	Procure and Install 20 Light Buoys along the Channel between UQP and KZP, 2 Leading lights installation at KZP Access Channel, AIS/VTS system installation	At present only 10 light buoys are installed along the channel between UQP and KZP, whilst 25 required as minimum. It is therefore recommended to provide 20 light buoys. At present no leading light is provided for the access to KZP, thus essential for safe navigation to KZP. Necessary to install the system according to the Strategy approved and required for ISPS compliant ports.
6. Utility Works	Rehabilitation/repair works at KZP,	Water supply system, electrical cables and pits rehabilitation

	(Water supply, electricity cables, etc.)	A part of such works cam be done by the Port (GCPI). 40 quay cranes exist at UQP North, of which 24 cranes are not working. The work target is to remove total 14 nrs at Berth No.17,18 & 19 urgently for container cargo handling.
7. Removal of Unused Facilities & Equipment	Unused rail mounted quayside cranes at UQP	
(Procurement of Equipment)		
8. Cargo Handling Equipment	KZP: Container cargo handling equipment (21nrs.) , KZP: Maintenance works equipment (4nrs.) , UQP: RTG (4nrs)	**Refer Table 20 (2)**
9. Marine Equipment (UQP/KZP)	Dredger (3), Tug (3), Survey boat(1), Mooring boat (2), Anti-pollution/monitoring vessels(3), Others (7)	**Refer Table 20 (3)**

Source: JICA Study Team

Table 20 (2) List of Cargo Handling Equipment Proposed for the Phase II Project

Port	Equipment	Spec.	Quantity	Remarks
KZP	Reach stacker	42 t	2 units	For handling container (1 for quay & 1 for yard)
	Straddle Carrier	42 t	2 units	For handling container
	Forklift	15 t	2 units	For handling general cargo
	Trailer		3 units	For handling container
	Chassis	20'~45'	6 units	For handling container
	Mobile cranes	50 t	1 unit	For handling container & general cargo Tire-mounted type
		15 t	1 unit	
	Workshop vehicle		1 unit	For maintenance & cleaning
	Sweeping vehicle		1 unit	
	Back Hoe		1 unit	
	Dumping Lorry	20 t	1 unit	
UQP	RTG		4 unit	UQP North Container Berth

Source: JICA Study Team

Table 20 (3) Marine Equipment List

Port	Equipment	Spec.	Quantity	Remarks
UQP/KZP	Mooring boat	< 10 m long	4 units	
	Service boat	< 10 m long	2 units	
	Pilot boat	< 10 m long	1 unit	
	Cutter dredger (CSD)	1,500 m^3/hr	1 unit	
	Grab dredger	1,500 m^3	1 unit	
	Trailing suction H. dredger (TSHD)	3,500 m^3	1 unit	
	Lightning vessel		1 unit	
	Survey boat	> 12 m long	1 unit	With suitable lifting crane
	Service pontoon for salvage dep't	2,000 t class	2 units	20 m (W) x 60 m (L) x 3 m (D) equipped with 80 t crane
	Firefighting boat	2,000 HP	2 units	
	Anti pollution boat		1 unit	Standard type with treatment plant
	Anti pollution monitoring boat	High speed boat	2 units	
	Tug boat	3,000~4,000 HP	3 units	

Source: JICA Study Team

PACKAGING OF PROJECT COMPONENTS

The following categorization together with the packaging of the work component is suggested:

Table 20(4) Project Packages

Package	Project Component	ODA Loan Type
PACKAGE-1	DREDGING & WRECK REMOVAL	Un-tied loan
1.1	Dredging Work	
1.2	Shipwrecks Removal	
PACKAGE-2	MARINE/CIVIL WORKS	Tied (STEP)
2.1	Rehabilitation of Port Facilities	
2.2	Berth Extension	
2.3	Navigation Aids	
PACKAGE-3	EQUIPMENT	Tied (STEP)
3-1	Cargo Handling Equipment	
3-2	Marine Equipment	
PACKAGE-4	UTILITY & REMOVAL	Un-tied loan (by local competitive bidding)
4.1	Removal of Un-used Facilities and Equipment	
4.2	Utility Works	

Source: JICA Study Team

IMPLEMENTATION SCHEDULE

The detailed Implementation Schedule for the Project is also shown in the figure.

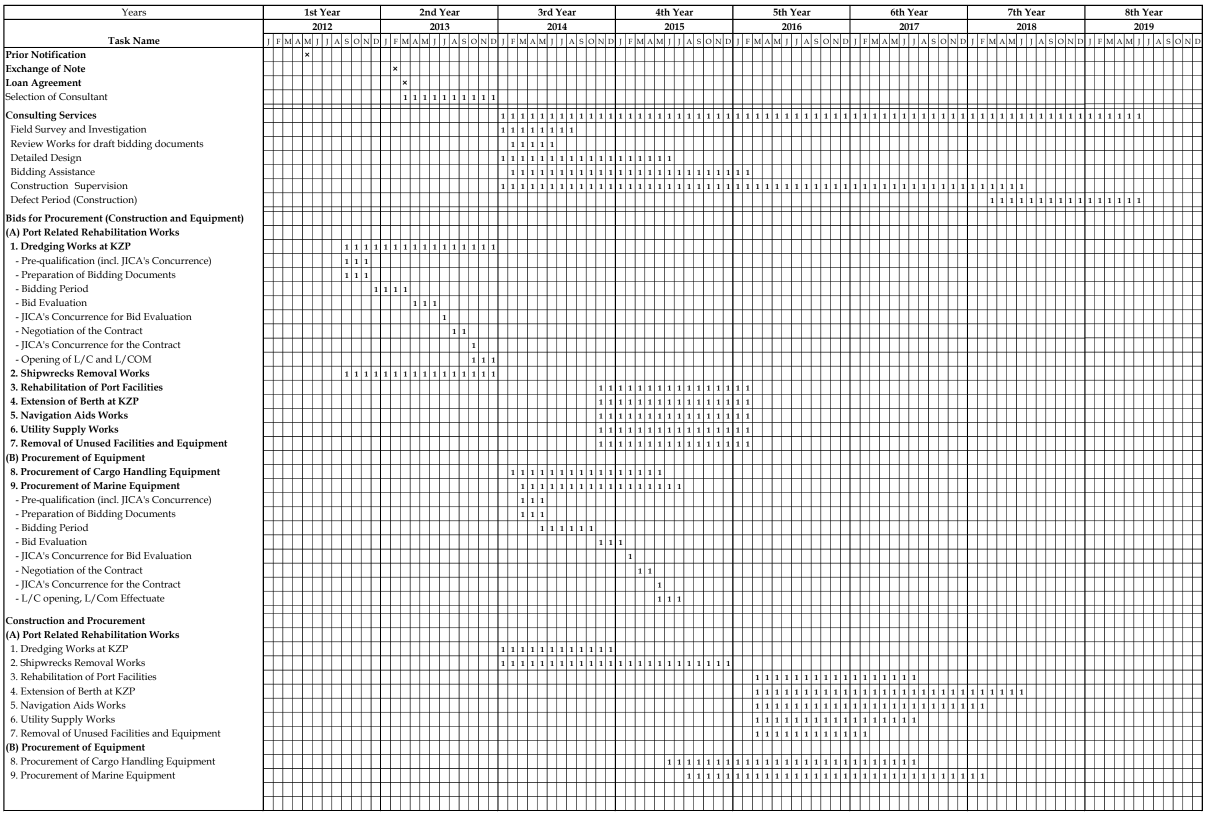


Figure 9: Required Process and Duration

(3) INSTITUTIONAL RESPONSIBILITY

A summary of the primary activities of each agency is provided below in Table 21.

Table 21 Proposed Allocation of Responsibility for Implementation of Environmental Management Plan

Action No.	Task	Responsible Agency							
		MOT	IPA-EU	PMT	CONST	POC	ROPME	CONT	MOE
Pre-Construction									
1	Establish EU within IPA; identify and train relevant staff	R		E	S	N			N
2	Define and demarcate all UXO exclusion zones and develop UXO ERP; Confirm all affected land areas are within the port boundaries		N	E	N			N	N
3	Confirm the requirement for any additional survey and management planning; finalize details of additional requirement			E	S				
4	Finalize the communication strategy	R		E	S				
5	Implement the external communications strategy			E	S		N		
6	Finalize the EMP for inclusion in the tender documents for dredging, wreck removal, and general construction works	R	R	E	E		S		
7	Undertake the preparatory surveys			E	S				
Wreck Removal (each wreck)									
8	Undertake the familiarity training with contractor	R	R	E	E			S	
9	Supervise the construction of on shore cleaning area		E	R	S				
10	Undertake the ERP exercise training for land sites		E	R	S				
11	Prepare the monitoring program: shore and offshore		E	R	S				
12	Undertake the monitoring		E	R	S				
13	Prepare the final report for each wreck		E	R	S		N		
14	Prepare the progress reports for the PMT, POC, and JBIC	N	E	R	S		N		N
Dredging									
15	Undertake familiarity training with contractor		R	E	E			S	
16	Monitor the preparation of on shore dump area		E	R	S				
17	Undertake the ERP exercise training								
18	Prepare the monitoring program: shore and offshore		E	R					
19	Undertake the monitoring		E	R					
20	Prepare the final report		E	R			N		
21	Prepare the progress reports for the PMT, POC, and JBIC	N	E	R			N		N
Construction Management Plan									
22	Prepare the monitoring program		E		S			N	
23	Undertake the monitoring		E						
24	Prepare the final report		E	R					
25	Prepare the progress reports for the PMT, POC, and JBIC		E	R					N
Waste Management Plan									
26	Inventory of existing sites		E						
27	Prepare waste receiving areas and define operating criteria		R	E					
28	Specify the handling and storage procedures to be adopted to minimize loss or leakage, and for clean up of small spills and general hazards to public health		E	R					
29	Provide appropriate clothing and equipment			E					
30	Develop plan for the transfer, storage, and eventual disposal of salvage and waste materials from wreck.		E	R					

Action No.	Task	Responsible Agency							
		MOT	IPA-EU	PMT	CONST	POC	ROPME	CONT	MOE
31	Supervise the decontamination plan		E						
32	Prepare the progress reports for the PMT, POC and JBIC	N	E	R					N
33	Sign-off the decontamination site		E	R					N
34	Prepare the hazardous waste management plan		E	R					
Khawr Abdullah Management Plan									
35	Prepare the scope of work for management plan		R	R	E		R		R
36	Prepare the tender		R	R	E		R		R
37	Award the contract-dependent on agreed executing body and agreed client								
38	Prepare the report		S				S	E	
39	Review the management plan		R	R			R		R
40	Implement the management plan		S	E			N		n

Key: R= Review/clear, E= Execute, S= Support, N= Notified

Legend:

PMT: Project Management Team
MOT: Ministry of Transport Safeguard Focal Point
IPA-EU: Environmental Unit IPA
CONS: Project Consultants
JICA: Japan International Cooperation Agency
POC: Project Oversight Committee at the Ministry of Planning and Development Cooperation
CONT: Contractor
ROPME: Regional Organization for the Protection of the Marine Environment

C8. STAKEHOLDER MEETING

To date, the team has completed the following activities:

- Review of the legislative requirements of environmental protection in Iraq;
- Recruitment of a consultant to conduct the baseline survey for water and sediment in the project area;
- Completion of the selection of data collection points and scheduling of the sampling activities;
- Review of the general environmental conditions of the project area; and
- Examination of the proposed disposal sites for the dredging activities proposed in the project.

Once all documents are circulated and the IEE report is confirmed, a meeting is planned to be held in Basra.

- To inform the result of study
- To inform the environmental and social consideration
- To obtain agreement to the project
- To inform the project schedule

Annex 1

Project Screening Report

A. Screening Procedure

1. <u>Environmental Classification</u>

1.1 Required EIA procedure and Environmental Classification

The environmental institution in Iraq consists of two steps; one is environmental screening (or called site study) based on the Environmental Instructions for Industrial, Agricultural and Services Projects and the other one is environmental examination (or called EIA) conducted during the techno-economic feasibility study of the project.

In the environmental screening, the regional office of the MoE divides the projects into categories 'Class A, B, C' and unclassified depending on the severity of predicted environmental impacts. However, there is no clear definition for the term "unclassified" in the Environmental Instructions for Industrial, Agricultural and Services Projects, for year 1990. The three main environmental categories of projects and those considered as unclassified are:

<u>Class A:</u> All activities, including industrial and large agricultural projects, that have severe environmental impacts on large scale and huge area, therefore, should be sited far enough from urban districts and/or other areas proposed for future development. Such projects are conditional to providing all necessary mitigation measures in order to prevent and control pollution.

<u>Class B:</u> Activities with a lesser pollution extent than those classified as "Category A" schemes and include industrial and agricultural activities that would have a controllable environmental effect, therefore, these could be located within developed areas provided that all necessary mitigation measures are implemented, and in case impacts such as odor, cannot be controlled then the proposed project should be located outside boundaries of developed areas taking into account the specific environmental conditions for such projects according to Environmental Instructions for Industrial, Agricultural and Service Projects for year 1990.

<u>Class C:</u> Other activities that have simple impacts that can be controlled such as small industrial and agricultural projects where the waste is mainly organic which could be easily controlled and can be established within developed districts.

<u>Unclassified:</u> Other activities that have no or minor impacts on the environment and can be controlled easily without need for advanced controls or employing after-treatment technologies.

In case of being rated as 'Class A' or 'Class B', the project executing agent shall prepare the Terms of Reference (TOR) for an environmental examination in compliance with the Environmental Law and to submit comprehensive EIA report. Where 'Class C' projects will not need an EIA, and then the environmental examination process would continue to the next stage without preparation of an EIA report. In case of 'Class A' or 'Class B' projects, a construction permit will be issued by the ministry in charge of the project implementation after the MoE reviews and approves the EIA report. For unclassified projects there is no need to prepare an EIA report: only make sure to comply with the general conditions listed in the Environmental Instructions for Industrial, Agricultural and Services Projects for year 1990.

1.2 Related Past Environmental and Social Considerations

As stated previously, according to pertinent Iraqi environmental laws and regulations, the project executer is required to conduct an environmental and social impact assessment if the proposed project is classified among Class A or B. The executing agency is required to apply to the regional or local environmental department, which is part of the MoE, for official environmental screening and EIA approval. However, there are no records of reporting to the MoE regarding the three past feasibility studies which are considered as Pre-F/Ss of the project for Japanese ODA loan. But a thorough review of related past reports and the utilization of already available information are important for the environmental review of the proposed three projects because information gathering activities by the team within Iraq is limited due to the security issues in Iraq, time constraints, etc.

2. REQUIREMENT OF EIA PROCEDURE ACCORDING TO JBIC ENVIRONMENTAL GUIDELINES

2.1 Procedure for Confirmation of Environmental and Social Considerations by JBIC Environmental Guidelines

In light of the JBIC Environmental Guidelines and taking into account general characteristics of the proposed project, the particular circumstances of the country and its location, JICA confirms in its environmental reviews whether appropriate and sufficient considerations is given to environmental and social issues before the implementation of the project or appropriate environmental and social considerations can be expected after JICA makes decisions on project funding in light of such factors as the state of preparation by the project proponent and host government, their experience, operational capacity, and the state of securing funds, as well as external factors such as instability. According to the Guidelines, the following procedures are necessary to the confirmation of environmental and social consideration:

1. Screening
2. Review of results (categorization and environmental check list)
3. Monitoring

Such procedures are based principally on information provided by borrower's and the project proponent's, although information from governments and organizations of host countries, stakeholders, etc., are also necessary and important for final evaluation.

(1) Environmental screening

a) Screening by using screening format

Using the JBIC instructions and format, the first step is to collect necessary information from borrower's and project's proponent. These would include situation of environmental permits and approvals, project details, expected environmental impact and relation to sensitive sectors/areas as shown in Tables 1 and 2. The above information is generally obtained with screening format of JBIC Guidelines, in which the borrowers and the project proponent reply in writing to each point/question. The borrowers and the project proponent are requested to submit the necessary information promptly so that it may perform the screening process at an early stage.

Table1: Items of Environmental Screening

Items	Remarks
1. Permits and approvals	Need for permits and approvals for EIA
	Status of acquisition of permits and approval for EIA
	Date of issue of permits and approvals for final EIA
	Names of organizations issuing permits and approvals for EIA
	Status of acquisition of other environmental permits and approvals
2. Project Details	Location/site
	Project description
	Relevant sector
	Scale, size, etc., of proposed project
3. Environmental Impact	Degree of environmental impact
	Existence of sensitive area
	Existence of sensitive characteristics
	Scale of sensitive characteristics

Note: When necessary, additional data may be required regarding nature of the project and peripheral circumstances, etc.
Source: Edited from JBIC Environmental Guidelines

Table 2: Illustrative List of Sensitive Sectors, Characteristics and Areas

1. Sensitive Sectors
Large-scale projects in the following sectors:
(1) Mining, (2) Oil and natural gas development, (3) Oil and gas pipelines, (4) Iron and steel (projects that include large furnaces), (5) Non-ferrous metals smelting and refining, (6) Petrochemicals)manufacture of raw materials; including complexes), Petroleum refining, (8) Oil, gas and chemical terminals, (9) Paper and pulp, (10) Manufacture and transport of toxic or poisonous substances regulated by international treaties, etc., (11) Thermal power, (12) Hydropower, dams and reservoirs, (13) Power transmission and distribution lines involving large-scale involuntary resettlement, large-scale logging or submarine electrical cables, (14) Roads, railways and bridges, (15) Airports, (16) Sewage and wastewater treatment having sensitive characteristics or located in sensitive areas or their vicinity, (18) Waste management and disposal, (19) Agriculture involving large-scale land-clearing or irrigation, (20) Forestry, (21) Tourism (construction of hotels, etc.)
2. Sensitive Characteristics
(1) Large-scale involuntary resettlement, (2) Large-scale groundwater pumping, (3) Large-scale land reclamation, land development and land-clearing, (4) Large-scale logging
3. Sensitive Areas
Projects in the following areas or their vicinity
(1) National parks, nationally-designated protected areas (coastal areas, wetlands, areas for ethnic minorities or indigenous peoples and cultural heritage, etc., designated by national governments)
(2) Areas considered to require careful consideration by the country or locality:
(2-1) Natural Environment- a) Primary forests or natural forests in tropical areas, b) Habitats with important ecological value (coral reefs, mangrove wetlands and tidal flats, etc.), c) Habitats of rare species requiring protection under domestic legislation, international treaties, etc., d) Areas in danger of large-scale salt accumulation or soil erosion, e) Areas with a remarkable tendency towards desertification
(2-2) Social Environment- a) Areas with unique archaeological, historical or cultural value, b) Areas inhabited by ethnic minorities, indigenous people or nomadic people with traditional ways of life and other areas with special social value.

Source: Japan Bank for International Cooperation"JBIC Guidelines for Confirmation of Environmental and Social Considerations" (April 2002)

b) EIA Categorization of the proposed project

During the screening process, JICA classifies each project in terms of its potential environmental impact, taking into account other factors such as sector and scale of the project, substance, uncertainty of impacts and environmental and social context of the proposed project site and surrounding areas.

Category A: The proposed project is classified as “Category A” if it is likely to have significant adverse impacts on the environment. A project with sever and/or complex or unprecedented impacts which are difficult to assess is also classified among this category. Impacts of a “Category A” project may affect an area broader than the sites’ or facilities subject to physical construction. “Category A”, in principle, includes projects in sensitive sectors (i.e. sectors that are liable to cause adverse environmental impacts) or with sensitive characteristics (i.e. characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas as indicated in Table 7.5.

Category B: A proposed project is classified as “Category B” if its potential adverse environmental impacts are lesser than those of “Category A” projects. Typically, this is site-specific, but has some irreversible impacts. In most cases normal mitigation measures could be applied using readily available designs. Projects funded by Engineering Service Loans that are considered as Yen Loans for survey and design, are classified as “Category B”, with the exception of those belonging to “Category C”.

Category C: A project is classified among “Category C” if it is likely to have minimal or no adverse environmental impacts. Projects that correspond to one of the following are, in principle, classified as “Category C”, with the exception of projects with sensitive characteristics and projects located in sensitive areas as indicated in Table 5

1) Projects for which the JBIC’s share is not above SDR 10 million;

2) Sectors or projects in which no particular environmental impacts would be normally expected (e.g. human resources development, support for international balance of payments, maintenance of existing facilities, acquisition of rights and interests without additional capital investment); or

3) Case in which there is only minor involvement of the project by the borrower or JBIC, such as the export/import or lease of items of machinery or equipment that is not connected with a particular project, and where there would be little reasonable significance in JBIC’s conducting and environmental review.

Category F1: A project is classified as “Category F1” when satisfies all of the following:

1. JICA’s funding of the project is provided to a financial intermediary etc.

2. The selection and assessment of the actual sub-projects is substantially undertaken by such an institution only after JICA’s approval of the funding and therefore the sub-projects cannot be specified prior to JICA’s approval of funding (or assessment of the project); and those sub-projects are expected to have potential impacts on the environment.

(2) Environmental Review

Reviews of environmental and social considerations “environmental reviews” is conducted to confirm all of the requirements are duly satisfied.

a) Environmental Review for Each Category

After the completion of screening process, environmental reviews are conducted according to the following procedures for each category.

Category A: examine the potential negative and positive environmental impacts of projects. It is required to evaluate measures necessary to prevent, minimize, mitigate or compensate for potential negative impacts, and measures to promote positive impacts if any such measures are available. Borrower’s and the project proponents’ should conduct and submit a detailed Environmental Impact Assessment (EIA) report for the proposed project. In case the project will result in a large-scale involuntary resettlement, basic resettlement plans must be prepared and submitted within the EIA report. Environmental reviews should be carried out based on the findings of the submitted EIA and other reports prepared by the project proponents’.

Category B: The scope of environmental reviews for “Category B” projects may vary from one project to another, but for sure it is not as those categorized among “Category A” projects. The environmental reviews for “Category B” are similar to those for “Category A” in which potential negative and positive environmental impacts should be examined. Also necessary mitigation measures to control or minimize as well as compensate for potential negative impacts should be evaluated thoroughly, and measures that would have positive impacts should be promoted.

Category C: Projects fall within this category; environmental reviews will not proceed beyond screening.

Category F1: Proper checks must be undertaken through the financial intermediary etc., to observe whether appropriate environmental and social considerations as stated in the Guidelines are considered for the proposed project.

b) Environmental review and environmental checklist

Usually, an environmental review is conducted by comparing items of corresponding environmental checklist for the specific project, with the situation of EIA approval and results of examination of potential positive and negative impacts, and measures for prevention, minimization and mitigation of predicted adverse impacts as well as necessary further baseline survey and environmental monitoring. The checklist includes categories and environmental items as shown in Table 3. Appropriate items should be checked based on sector and nature of the project.

Table 3: Categories and items of Environmental Checklist (Edited from JBIC Environmental Guidelines)

Category	Item
1. Permits and approvals, explanations	EIA (approval) and environmental permits
	Explanation and public hearing
2. Anti-pollution measures	Air quality
	Water quality
	Waste
	Soil contamination
	Noise and vibration
	Subsidence
	Odor
	Sediments
3. Natural Environment	Protected areas
	Ecosystem
	Hydrology
	Topography and geology
	Management of abandoned sites
4. Social Environment	Resettlement
	Living and livelihood
	Heritage
	Landscape
	Ethnic minorities and indigenous peoples
5. Others	Impact during construction
	Accident prevention measures

(3) Monitoring

a) Establish Environmental Management Plan (EMP)

After the environmental reviewing process is completed, environmental management plan (EMP) should be developed and prepared according to JBIC Guidelines. EMP includes mitigation and monitoring measures as well as institutional strengthening to be taken during construction, operation and decommissioning of the project in order to eliminate adverse impacts, offset them, or reduce them to acceptable levels. In the EMP, items requiring monitoring are listed in Table 4 below.

Table 4: Items Requiring Monitoring

Items	Remarks
1. Permits and approvals, explanations	Response to matters indicated by authorities
2. Anti-pollution measures	Air quality (SO_2, NO_2, soot and dust, suspended particulate matter, coarse particulate, etc.)
	Water quality (pH, suspended solids (SS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved oxygen (DO), total nitrogen, total phosphorus, heavy metals, hydrocarbons, phenols, carcinogen compounds, mineral oils, water temperature, etc.)
	Waste
	Noise and vibration
	Odors
3. Natural Environment	Ecosystem (impact on valuable species, countermeasures, etc.)
4. Social Environment	Resettlement
	Lifestyle and livelihood
5. Others	Impact during construction
	Accident prevention measures
Note: For air and water quality, specify whether you are monitoring emission levels or environmental levels. Also, it should be noted that the items which require monitoring will differ depending on whether the impact in question will occur during construction or during the operation of the project. Source: Edited from JBIC Environmental Guidelines	

b) To confirm results of monitoring

In order to ensure execution of environmental management plan after the implementation of the proposed project, it is necessary to make sure, over a certain period of time, all results of monitoring of targeted items, which have significant environmental impacts, are recorded and analyzed.

The necessary information for monitoring as demanded by JICA Guidelines should be provided by the borrower and/or the project proponents' using appropriate means. When necessary, JICA may also conduct its own investigations.

If a third party pointed out, in concrete terms, that environmental and social considerations are not being fully undertaken, JICA forwards such claims to the borrowers' and, if necessary, encourages them to make an official request to the project proponents' in order to take appropriate action and correct the situation. In the project proponents' response to the claim, JICA confirms that they carry out the required investigation for the specific claim, examination of countermeasures, and their incorporation into project plan's through transparent and accountable processes. Also, when necessary, JICA may request cooperation between borrowers and project proponents' in conducting its own investigations to confirm the level of undertaking desired environmental and social considerations. If JICA judges that there is still a need for further improvement, with respect to environmental and social considerations, it may ask proponents' of the project, through the borrower, to take appropriate actions in accordance with the loan agreement. If the response of the project proponent's is inappropriate, JICA may consider taking its own action in accordance with the loan agreement, including the suspension of the disbursement.

B. JICA Screening Form

Name of Project： **PORT SECTOR REHABILITATION PROJECT (Phase-2)**

Name of Project Execution Organisation: General Company Ports of Iraq (GCPI)

Name of Borrower

Please provide the name, department, job title and contact details for the person who is responsible for filling out this form.

Name: (To be filled by GCPI)

Department and Title:

Name and Company or Organisation:

Telephone number:

Fax number:

E-mail address:

Date:

Signature:

Questions

Q1 Please provide the address of the Project Site

Khor Al-Zubayr Port, Iraq.

Q2 Please provide a brief explanation of the Project.

Khor Al-Zubayr port (KZP), which is the second largest foreign trade port in Iraq, doesn't function well and its handling capacity doesn't meet the cargo demand. In addition there are several issues on the port operation and management system, for example ship dispatch control, customs clearance, an efficient terminal operation system and so on.

Presently KZP has following problems on the port facilities:

Worn-out and damaged cargo handling equipment,
Damaged berthing facilities,
Lack of communication equipment,
Damaged water supply facilities
Lack of the electric power supply substation

As a result the port is unable to provide the effective services and the efficient operation to the port users.
The port management office of KZP has also a shortage of working vessels like dredgers, tug boats, pilot boats, and suitable cargo handling equipment for bulk and container cargoes. This is also the reason why the port management office can not provide the efficient services to the port users.

At present 60 % or up of the total imported cargo to Iraq has been brought from major ports in the neighboring countries (Jordan, Syria, Turkey, Kuwait) with high port dues and a expensive on-land transportation cost due to its long distance. The above cost on the imported cargo has been laid on the Iraqi people.

Considering the recovery of the Iraqi economy, there is a quite strong demand to utilize the existing port facilities in KZP as supporting port for industrial activities and a logistic terminal of the export/import trade business together with UQP.

In order to meet with such needs, the fallowing measures are urgently required;

KZP should be restored and rehabilitated to utilize the existing berthing facilities according to the increasing traffic together with UQP. The multi-purpose berthing facilities for public services at the port are strongly needed to cope with the demand of increasing cargoes.

Navigability of the 50,000DWT class fuel oil tankers should be ensured in the access channel from UQP to KZP, so that the large volume of urgent goods for the Iraq reconstruction can be also transported by large ships.

The port should improve the cargo handling efficiency through repair /rehabilitation of the existing equipment and procurement of the additional equipment.

Q3 Will JBIC loan be applied to a new project or an executing project? In the case of an executing project please inform the presence of strong local claims by local residents.

☐	New Project	☐	Executing Project (with claim)
☒	Executing Project (without claim)	☐	Other (Please Speciify)

Q4 In case of this project, is it necessary to execute Environmental Impact Assessment (EIA) based on laws or regulations? If necessary, please inform of progress of EIA.

☐ Required (Completed) ☒ Required (Under execution or under planning)

☐ Not required ☐ Other (Please Speciify)

Q5 In case that the EIA is already completed, please inform whether the EIA report is already approved based on the EIA system or not. If EIA report is approved, please provide the date and name of authorities of the approval.

☐ Approved (without condition) ☐ Approved (conditional)

☐ Under approval process ☒ Other (Please Speciify)
Need to confirm as to the Scope of EIA

Date of Approval ____

Name of Authorities ____

Q6 If environmental permits(s) other than EIA is required, please provide the name of the required permit(s). Have you obtained required permit(s).

☐ Obtained (without condition) ☐ Required, but not obtained yet.

☒ Not required ☐ Other (Please Speciify)

Name of Required Permits ____

This data is still being researched by the borrower. It will be available before project appraisal.

Q7 Will the loan be used for the undertaking that cannot specify the project at this stage (e.g. export or lease of machinery that has no relation with the project or Two Step Loan that cannot specify the project at the time of the loan agreement)?

(Yes/No)

If answered Yes it is not necessary to reply to the following questions
If answered No please reply to the following questions

Q8 Are there any environmentally sensitive area shown below in and around project site?

(Yes/No)

If answered Yes please select applicable items by marking and reply to the following questions
If answered No please reply to Questions 9 and after.

- [ ] (1) National Parks, protected areas designated by government (coastal areas, wetlands, habitats of minorities or indigenous peoples, heritage sites etc)
- [ ] (2) Primeval forests, tropical natural forests
- [ ] (3) Ecologically important habitats (coral reefs, mangrove, tidal flats, etc)
- [ ] (4) Habitats of endangered species of which protection is required under local laws and international agreements.
- [ ] (5) Areas that have risks of large scale increase in soil salinity or soil erosion
- [ ] (6) Desertification Areas
- [ ] (7) Areas with special values from archaeological, historical and or cultural viewpoints
- [ ] (8) Habitats of minorities, indigenous populations, nomadic people with traditional life style, or areas with special social value.

Q9 Does the project involve following elements?

(Yes/No)

If answered Yes please describe the scale of the applicable elements and reply to Questions 10 and after.

If answered No please reply to Questions 11 and after.

- [ ] (1) Involuntary Resettlement (Number of resettlers:)
- [ ] (2) Pumping of groundwater (Scale:)
- [x] (3) Land reclamation and/ or development (Scale 1.23 ha)
- [ ] (4) Deforestation: (Scale: ha)

Q10 Please reply to this question only in case that the project involves some of the above (1) to (4) elements. In the country where the project is planned are there any regulations on the scale of the elements asked in Question 9?. If the country has such regulation, please answer whether the project satisfies the regulation or not.

- [ ] Regulation is applicable ([ ] satisfied [ ] not satisfied) [x] No regulation
- [ ] Other (Please Speciify)

Please reply to Questions 11 and after.

Q11 Will JBIC share in the project be equal or less than 5% of the total project costs, or the total amount of JBIC loan equal or less than SDR 10 million?

(Yes/No)

If answered Yes it is not necessary to reply to the folllowing questions.
If you answered No please reply to Questions 12 and after.

Q12 Does the project belong to either of the sectors that impact on the environment is deemed immaterial or is not anticipated under normal conditions (e.g. maintenance of the existing facilities, non-expansionary renovation project, acquisition of rights or interest without additional plant investment)
(Yes/No)

If answered Yes it is not necessary to reply to the folllowing questions.
If you answered No please reply to Questions 13 and after.

Q13 Does the project belong to the following Sections
(Yes/No)

If answered Yes please specify the sector by marking and reply to questions 14 and after.
If you answered No it is not necessary to reply to the following Questions 13.

- [ ] (1) Hydro power plant, dam or water reservoir.
- [ ] (2) Thermal power plant
- [ ] (3) Mines
- [ ] (4) Development of oil and gas
- [ ] (5) Pipeline
- [ ] (6) Steel industry (with large scale furnace)
- [ ] (7) Non ferrous refining
- [ ] (8) Petrochemical (including manufacturing of raw materials and petrochemical complex)
- [ ] (9) Terminal of oil, gas and chemicals
- [ ] (10) Petroleum refining
- [ ] (11) Paper and pulp
- [ ] (12) Manufacturing and /or transportation of hazardous substances (specified by international agreement).
- [ ] (13) Road, railway or bride
- [ ] (14) Airport
- [x] (15) Port
- [ ] (16) Waste material processing or treatment
- [ ] (17) Treatment of sewage and/or waste water that includes hazardous substances or executed at environmentally sensitive area
- [ ] (18)Power transmission and/or distribution lines (including large scale involuntary resettlement, large scale deforestation or submarine cable)
- [ ] (19) Tourism (Construction of hotel etc)
- [ ] (20) Forestry or tree planting
- [ ] (21) Agriculture (large scale project and/or project including irrigation)

Q14 Please provide information on the scale of the project (project area, area of plants and buildings, production capacity, amounts of power generation, etc). Further, pleased explain whether an execution of EIA is required on account of large scale of project in the country where the project is implemented.

(See the Project Description; Section C1 and Legal and Institutional Framework; Section C2)

Annex 2

EIA CHECKLIST FOR PORT PROJECT
JICA CHECKLIST

Ports and Harbour Component

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	1) Have EIA reports been officially completed? 2) Have EIA reports been approved by the authorities of the host country's government? 3) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports are the conditions satisfied? 4) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	1) Project is to rehabilitate existing channels and port facilities. National EIA regulations do not require EIA for rehabilitation project provided rehabilitation works do not extend beyond existing boundaries or result in major change in land use. 2) Not applicable 3) Not applicable 4) Not required. Letter should be sent to Ministry of Environment by project proponent advising of intent to proceed with rehabilitation works.
	(2) Explanation to the Public	1) Are the contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? 2) Are proper responses made to comments from the public and regulatory authorities?	1) Public consultation is planned. 2) No comments anticipated.
2 Mitigation Measures	(1) Air Quality	1) Do air pollutants, such as sulphur oxides (SOx), nitrogen oxides (NOx), and soot and dust emitted from various sources, such as ships vehicles and the ancillary facilities comply with the country's emission standards and ambient air quality standards?	1) Prohibitions against the pollution of harbour water, its land areas and air, are decreed but not enforceable in present circumstances. Present negligible enforcement capacity and elderly vehicle and vessel fleet mitigate against management. Project expected to improve management capacity and over medium term have beneficial impacts.
	(2) Water Quality	1) Do general effluents from the related facilities comply with the country's effluent standards and ambient water quality standards? 2) Do effluents from ships and ancillary facilities (e.g. dock) comply with the country's effluent standards and ambient water quality standards? 3) Are adequate measures taken to prevent spills and discharges of materials such as oils and hazardous materials to the surrounding water area? 4) Is there a possibility that oceanographic change, such as alteration of ocean current and reduction in seawater exchange rates (deterioration of seawater circulation) due to the modification of water areas, such as shoreline modifications, reduction in water areas and creation of new water areas will cause changes in water temperature and water quality? 5) In the case of the projects including land	1) Effluent will be complied with any standards by the undergoing project. Project is expected to improve waste collection and disposal capability. 2) No waste is accepted from ships. Illegal disposal is considered common. Project proposals will improve port capacity to monitor vessels. 3) Port has no capacity to monitor or manage oil or other spills. Project will contain proposals for establishment of spill management capacity. 4) Project contains no proposals for additional port facilities. Dredging and wreck removal proposals will restore previous operational conditions. All project components have been functional since 1980. No changes in hydrological conditions anticipated. 5) Measures and monitoring to leachates will be considered.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
		reclamation are adequate measures taken to prevent contamination of surface water, seawater and groundwater by leachates from the reclamation areas?	
	(3) Wastes	1) Are wastes from ships and related facilities properly treated and disposed of in accordance with the country's standard? 2) Is offshore dumping of dredged materials and soils properly performed in accordance with the country's standards to prevent impacts on the surrounding waters? 3) Are adequate measures taken to prevent discharge or dumping of hazardous materials to surrounding water areas?	1) No waste is accepted from ships. Improved facilities at port will improve capacity to accept solid waste. Illegal disposal is considered common. Project proposals will improve port capacity to monitor vessels 2) All disposal sites proposed for use in the project have been extensively utilised in the past. No new sites are proposed for use. Project proposals likely to include development of detailed dredging plan, possibly developed in coordination with Kuwait. 3) No controls are in place. Project proposals will increase Port authority capacity to monitor and control discharge and dumping of hazardous materials in surrounding waters.
	(4) Noise and Vibration	1) Do noise and vibrations comply with the country's standards?	1) Noise regulations are in place. No existing monitoring or management capacity. Project will increase port capacity to manage operations.
	(5) Odour	1) Are there any odour sources? Are adequate odour control measures taken?	1) There are numerous odour sources (especially at KZP) that are not at present managed. Port proposals will need directly address these facilities.
	(6) Sediment	1) Are adequate measures taken to prevent contamination of sediments by discharges or dumping of materials such as hazardous materials from ships and related facilities	1) Port has no capacity to monitor or manage disposal of materials. Project will contain proposals for establishment of spill management capacity and for improved management of land and offhore operations.
Natural Environment	(1) Protected Areas	1) Is project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	1) No – Not applicable.
	(2) Ecosystem	1) Does the project site encompass primeval forest, tropical rainforest, ecologically valuable habitats (e.g. coral reefs, mangroves or tidal flats)? 2) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? 3) If significant ecological impacts are anticipated are adequate protection measures taken to reduce the impacts on the ecosystem? 4) Is there a possibility the project will adversely affect aquatic organisms? If significant impacts are anticipated are adequate protection measures taken to reduce the impacts on the aquatic organisms? 5) Is there a possibility the project will adversely affect vegetation and wildlife of coastal zones? If significant impacts are	1) Port access channels are in tidal waters and large expanses of mud flats line waterways. Port related and channel development and maintenance activities have been ongoing since 1970. 2) No – Not applicable 3) Significant impacts not anticipated. 4) Project activities not anticipated to cause any additional or cumulative impacts. Significant impacts not anticipated. 5) All project sites have been previously utilised and natural assets previously destroyed. Significant additional impacts not anticipated.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
		anticipated are adequate protection measures taken to reduce the impacts on vegetation and wildlife?	
	(3) Hydrology	1) Is there a possibility that installation of port and harbour facilities will cause oceanographic changes? Is there a possibility that installation of the facilities will adversely affect oceanographic conditions such as induced currents, waves and tidal currents?	1) Project confined to rehabilitation of existing facilities to previous status. No further modification to oceanographic conditions anticipated.
	(4) Topography and Geology	1) Is there a possibility that installation of port and harbour facilities will cause a large scale alteration of topographic and geologic features in the surrounding areas or elimination of natural beaches?	1) Project confined to rehabilitation of facilities to previous status. No significant modification to local topography or natural conditions anticipated.
Social Environment	(1) Resettlement	1) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimise the impact's caused by resettlement? 2) Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? 3) Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? 4) Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line ethnic minorities and indigenous peoples? 5) Are agreements with the affected persons obtained prior to resettlement? 6) Is the organisational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? 7) Is a plan developed to monitor the impacts of resettlement?	1 - 7) Not applicable
	(2) Living and Livelihood	1) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts if necessary? 2) Is there a possibility that changes in water uses (including fisheries and recreational uses) in the surrounding areas due to the project will adversely affect the livelihoods of inhabitants? 3) Is there a possibility that port and harbour facilities will adversely affect existing water traffic and road traffic in the surrounding areas? 4) Is there a possibility that diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project? Are considerations given to public health, if necessary?	1) Not applicable. 2) Some temporary exclusions will be put in place during wreck removal and dredging works. Alternative 'safe' fishing areas can be utilised. Significant impacts on livelihoods not anticipated. No other uses affected. 3) A number of smaller vessels use waters outside main shipping channels. The trading activities of these vessels is important to economy of Iraq at present time. Activities of these vessels should not be affected by project works. 4) No impact anticipated.
	(3) Heritage	1) Is there a possibility that the project will damage the local archaeological, historical, cultural and religious heritage sites? Are adequate measures considered to protect these	1) Not applicable

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
		sites in accordance with the country's laws?	
	(4) Landscape	1) Is there a possibility that the project will damage the local landscape? Are necessary measures taken?	1) No landscape values remain.
	(5) Ethnic Minorities and Indigenous Peoples	1) Does the project comply with the countries laws for rights of ethnic minorities and indigenous peoples? 2) Are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples?	1) Not applicable
Others	(1) Impacts during Construction	1) Are adequate measures considered to reduce impacts during construction (e.g. noise, vibrations, turbid water, dust, exhaust gases and wastes)? 2) If construction activities adversely affect the natural environment (ecosystem) are adequate measures considered to reduce impacts? 3) If construction activities adversely affect the social environment are adequate measures considered to reduce impacts? 4) If necessary, is health and safety education (e.g. traffic safety, public health) provided for the project personnel, including workers?	1) Construction management plan will be developed. Environmental management and monitoring capability of Port authorities will be enhanced by the Project. 2) As for 1 above 3) As for 1 above 4) As for 1 above
	(2) Monitoring	1) Does the project proponent develop and implement monitoring programmes for the environmental items that are considered to have potential impacts? 2) Are the items, methods and frequencies included in the monitoring programme judged to be appropriate? 3) Does the proponent establish an adequate monitoring framework (organisation, personnel, equipment and adequate budget to sustain the monitoring framework)? 4) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to regulatory authorities?	1) No existing monitoring plan in place. Project will contain comprehensive monitoring plan. Environmental management and monitoring capability of Port authorities will be enhanced by the Project. 2) See 1 above 3) See 1 above 4) See 1 above
Note	Note on using environmental checklist	1) Where necessary, impacts on groundwater hydrology, (groundwater level drawdown and salinisation that may be caused by alteration of topography, such as land reclamation and canal excavation should be considered, and impacts, such as land subsidence that may be caused by groundwater uses should be considered. If significant impacts are anticipated, adequate mitigation measures should be taken. 2) If necessary the impacts to transboundary or global issues should be confirmed (e.g. the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer or global warming)	1) Not applicable. Project is concerned only with rehabilitation of existing facilities. 2) Dredging and wreck removal will take place in areas adjacent to Kuwaiti waters. Consultations with Kuwait will need to be undertaken prior to project implementation.

River and Channel Related Components

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	1) Have EIA reports been officially completed? 2) Have EIA reports been approved by the authorities of the host country's government? 3) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports are the conditions satisfied? 4) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	1) Project is to rehabilitate existing channels and port facilities. National EIA regulations do not require EIA for rehabilitation project provided rehabilitation works do not extend beyond existing boundaries or result in major change in land use. 2) Not applicable 3) Not applicable 4) Not required. Letter should be sent to Ministry of Environment by project proponent advising of intent to proceed with rehabilitation works.
	(2) Explanation to the Public	1) Are the contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? 2) Are proper responses made to comments from the public and regulatory authorities?	1) Public consultation is planned. 2) No comments anticipated.
2 Mitigation Measures	(1) Water Quality	1) Is there a possibility that changes in river flow downstream (mainly water level drawdown) due to project will cause areas that do not comply with the country's ambient water quality standards?	1) Project confined to rehabilitation of facilities to previous status. No change to water conditions is expected.
	(2) Wastes	1) In the case that large volumes of excavated/dredged materials are generated are the excavated / dredged materials properly treated and disposed of in accordance with country's standards?	1) Regulations for disposal of waste are in place but there is limited or no existing capacity to monitor works. All proposed spoil disposal sites have been extensively utilised on previous occasions. Project will include dredge disposal management plan based on these sites. Project will require development of extensive dredging management plan prior to implementation of Phase 2 works.
	(3) Subsidence	Is there a possibility that the excavation of waterways will cause groundwater level drawdown or subsidence? Are adequate measures taken, if necessary?	1) Project confined to rehabilitation of facilities to previous status. No changes to groundwater conditions anticipated.
3) Natural Environment	(1) Protected Areas	1) Is project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	1) No – Not applicable.
	(2) Ecosystem	1) Does the project site encompass primeval forest, tropical rainforest, ecologically valuable habitats (e.g. coral reefs, mangroves or tidal flats)? 2) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? 3) If significant ecological impacts are anticipated are adequate protection measures taken to reduce the impacts on the ecosystem? 4) Is there a possibility that hydrologic changes, such as the reduction of river flow, and seawater intrusion up river will adversely affect downstream aquatic organisms,	1) Port access channels are in tidal waters and large expanses of mud flats line waterways. Port related and channel development and maintenance activities have been ongoing since 1970. 2) No – Not applicable 3) Significant impacts not anticipated 4) Project activities not anticipated to cause any additional or cumulative impacts. Significant impacts not anticipated. 5) All project sites have been previously utilised. No data available on present status of resources/ resource recovery but significant impacts not anticipated.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
		vegetation and ecosystems? 5) Is there a possibility that the changes in water flows due to the project will adversely affect aquatic environments in the river? Are adequate measures taken to reduce the impacts on aquatic environments such as aquatic organisms?	
	(3) Hydrology	1) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	1) Project confined to rehabilitation of facilities to previous status. No further modification to hydrology anticipated.
	(4) Topography and Geology	1) Is there a possibility that the excavation of rivers and channels will cause a large scale alteration of topographic and geologic features in the surrounding areas?	1) Not applicable
4) Social Environment	(1) Resettlement	1) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimise the impact's caused by resettlement? 2) Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? 3) Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? 4) Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line ethnic minorities and indigenous peoples? 5) Are agreements with the affected persons obtained prior to resettlement? 6) Is the organisational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? 7) Is a plan developed to monitor the impacts of resettlement?	1) – 7) Not applicable
	(2) Living and Livelihood	1) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts if necessary? 2) Is there a possibility that the amount of water (e.g. surface water and groundwater) used by the project will adversely the downstream fisheries and other water uses? 3) Is there a possibility that water borne or water related diseases (e.g. schistosomiasis, malaria, filiarisis) will be introduced?	1) Significant impacts on livelihoods not anticipated. No other uses affected. 2) Adverse impacts on fishing and other water users not anticipated. 3) No impact anticipated.
	(3) Heritage	1) Is there a possibility that the project will damage the local archaeological, historical, cultural and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	1) Not applicable
	(4) Landscape	1) Is there a possibility that the project will damage the local landscape? Are necessary measures taken?	1) No landscape values remain.
	(5) Ethnic Minorities and	1) Does the project comply with the countries laws for rights of ethnic minorities and	1) Not applicable

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
	Indigenous Peoples	indigenous peoples? 2) Are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples?	
Others	(1) Impacts during Construction	1) Are adequate measures considered to reduce impacts during construction (e.g. noise, vibrations, turbid water, dust, exhaust gases and wastes)? 2) If construction activities adversely affect the natural environment (ecosystem) are adequate measures considered to reduce impacts? 3) If construction activities adversely affect the social environment are adequate measures considered to reduce impacts? 4) If necessary, is health and safety education (e.g. traffic safety, public health) provided for the project personnel, including workers?	1) Construction management plan will be developed. Environmental management and monitoring capability of Port authorities will be enhanced by the Project. 2) As for 1 above 3) As for 1 above 4) As for 1 above
	(2) Monitoring	1) Does the project proponent develop and implement monitoring programmes for the environmental items that are considered to have potential impacts? 2) Are the items, methods and frequencies included in the monitoring programme judged to be appropriate? 3) Does the proponent establish an adequate monitoring framework (organisation, personnel, equipment and adequate budget to sustain the monitoring framework)? 4) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to regulatory authorities?	1) No existing monitoring plan in place. Project will contain comprehensive monitoring plan. Environmental management and monitoring capability of Port authorities will be enhanced by the Project. 2) See 1 above 3) See 1 above 4) See 1 above
Note	Note on using environmental checklist	If necessary the impacts to transboundary or global issues should be confirmed (e.g. the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer or global warming)	Dredging and wreck removal will take place in areas adjacent to Kuwaiti waters. Consultations with Kuwait will be undertaken prior to project implementation.

World Bank Checklist

Impact	**Risk**	**Comment**
1.0 WATER-RELATED IMPACTS		
1.1 Impacts caused by dredging		
1.1.1 Dispersal and settlement of re-suspended sediments. Release of toxic, harmful substances to water column. Reduced available oxygen, sunlight penetration. Smothering bottom biota.	Medium	Management Plan Required. Existing data indicate dredged spoil is unlikely to be toxic,/harmful but monitoring will be required. Sediments are very fine and plumes are inevitable at all operational sites. Use of standard management techniques should reduce threat. Project areas have been subject to repeated dredging since 1970s and remaining habitats considered to have few ecological values
1.1.2 Effects of blasting. Compression effects. Indirect effects on fisheries. Damage to shore zone and bulkhead structures	n/a	
1.1.3 Results of altered bathymetry. Influence on	Low/Nil	River 1 man made channel established between

Impact	Risk	Comment
tidal and river flows. Altered salt wedge intrusion. Accelerated natural sediment deposition. Attraction of desirable or undesirable fisheries. Altered bottom biota		1979 and 1984 and hydrological systems will have evolved over that period. Any cumulative impact from proposed works is considered minimal.
1.1.4 Effects of changing shoreline configuration. Change in current patterns. Shore zone and beach erosion. Accelerated sediment deposition-shoaling	Low/Nill	Shorelines stabilised since original port construction. Project is not considered likely to have any affect sedimentation and current patterns but effective management of offshore disposal sites is proposed to minimise threats.
1.1.5 Loss of bottom habitat, shellfisheries, fishery food resources. Exposure of subsurface materials not conducive to recolonization. Lost attachment potential for aquatic biota. Current pattern changes.	Low/nil	As 1.1.3
1.1.6 Altered groundwater flows. Salt water intrusion. Accelerated groundwater flow to estuary. Undermining of land-edge sediments. Saltwater intrusion to potable water supplies	Nil	As 1.1.3
1.2 Impacts of dredged material disposal		
1.2.1 Selection of appropriate disposal site.		
1.2.1.1 Disposal on land.	Medium	The candidate sites predominantly comprise alluvial plains and Sabkhas which are only able to support particular vegetation. Site to be engineered for purpose and its use monitored according to project EMP requirements.
1.2.1.2 Disposal in water.	Low	Based on the fact that a large part of the study area is subject to regular high suspended sediment loads from natural processes, the impact of sediment mobilized by the construction activity is likely to be short-lived and of limited significance. Disposal to be monitored according to Project EMP requirements.
1.2.2 Characteristics of Dredged Material	Low	Low concentration of dioxins were detected from the planned dredging area.
1.2.3 Disposal Methods	Low	Dredge companies to be contracted using JBIC procurement guidelines and following pre-qualification process. This should ensure only Internationally reputed companies undertake works. Application of Project EMP should further minimize risks.
1.3 Construction of piers, breakwaters and other waterside structures (new or extension/replacement of existing structures)	n/a	Not applicable
1.4 Alteration of harbor/port ship traffic patterns		
1.4.1 Changes in channel, anchorage and turning basin locations. Dredging and dredge material disposal, Increased frequency of maintenance dredging. (See Section 1.1)	n/a	Not applicable
1.4.2 Relocation of navigation markers, moorings. Assurance of location precision. Designation of channels for arrival/departure traffic.	Positive	Project includes substantial component to improve Port navaids and marine support capacity.
1.4.3 Addition of new channels. anchorages, turning basins requiring improvement dredging.	n/a	Rehabilitation only
1.4.4 Improved procedures for vessel traffic control.	Positive	Project includes substantial component to

Impact	Risk	Comment
Shore based radar reflectors. Improved pilotage.		improve Port navaids and marine support capacity.
1.4.5 Increased provision for vessel handling and servicing.	Positive	Project includes substantial component to improve marine support capacity and improve maritime safety. Project will not include vessel repair facilities, dry-docks or graving docks.
1.5 Ship discharges - oily ballast; bilge water; sewage		
1.5.1 Promulgation of regulations controlling cleaning procedures.	Positive	Regulations are in place. Issue is one of enforcement and management. Present widespread non-compliance with regulations will not be tolerated. Project proposals call for improved management of port and control of illegal discharge.
1.5.2 Environmental sensitivity to discharges from ships.	Positive	Low environmental risk – habitats already damaged and not diverse. Existing water quality is poor. Project aims to improve water quality by improved port management.
1.5.3 Development of shore facilities for receiving ship generated sewage and garbage waste.	Positive	Project proposals call for improved infrastructure provision and provision of basic services to ships. Proposed Waste Management Plan should improve classification, handling, storage and disposal of all wastes. However, some risk remains from potential continued disruption of disposal systems beyond port perimeter.
1.5.4 Effects *of* antifouling paints. Relation to ships in dock. Ships in repair. Vessels sunk in shallow water.	n/a	No provision of repair facilities anticipated. Repair and maintenance practices to be prohibited. Ongoing effects on biota in water, fisheries. types of antifoulants - tributyl-tin, copper based from wrecks not fully established despite wreck surveys.
1.6 Spills detection and clean-up of spills		
1.6.1 Type of Spills. Oils. Lubricants. Hydraulic oils. Fuels. Liquid and solid chemicals.	Positive	Negligible increase in threat from increased from increased traffic volume. Specific identified existing threats, e.g. KZP oilf facility, to be addressed. Project will provide significant spills clean up capability.
1.6.2 Resources at risk. Identify areas subject to spills.	Nil	Data available indicates no resources at risk.
1.6.3 Spill clean-up measures.	Positive	Regulations are in place. Project will provide for port with improved planning and response capability. This will include, retention and clean-up equipment, development of emergency procedures, staff training and drills.
1.6.4 Dry cargo releases.	Low	Relatively few bulk dry cargoes will be expected durign project period. Principal source will be grain. In all cases loading and unloading will be intermittent. During project period bulk dry handling expected to be confined to berths that are relatively isolated from port boundaries and potential receivers.
1.6.5 See also hazardous cargoes	Uncertain	

Impact	Risk	Comment
1.7 **Waterfront industry discharges - sanitary and non-sanitary**		
1.7.1 Sanitary wastes.	Uncertain	Project will not increase threat from sanitary wastes however extent of existing threat unknown. Project Waste Management Plan will provide risk assessment.
1.7.1.1 Sanitary treatment facilities.	Uncertain	Project proposals do not include not sanitary treatment facilities. Therefore some risk will remain from potential continued disruption of disposal systems beyond port perimeter. Proposed Waste Management Plan will address this.
1.7.2 Non-sanitary wastes.	Uncertain	Project will not increase threat from non-sanitary wastes however extent of existing threat unknown. Improvements to port equipment should reduce threat from faulty equipment and reduce leakage from storage facilities. Project Waste Management Plan will provide risk assessment.
1.7.2.1 Discharge/treatment procedures.	Low	Project will increase volume of waste to be treated and present disposal systems will be improved by the undergoing project.
1.7.2.2 Discharges reaching harbor/river waters.	Positive	All potentially affected habitats will have been subject to contaminated discharge for 15 or more years. Project will not increase threat to receiving waters by increased discharge volume, increased level of contaminant nor increased toxicity of contaminant. Improved spill response capability and probable improvement in port management will result in improved water quality.
1.7.2.3 Possible needed retention and treatment systems	n/a	Project proposals will not increase threat. Environmental risk assessment may be required to determine need for additional (beyond those include in Project proposals) retention and treatment systems.
1.7.2.4 Non-sanitary spillage from non-ship related activities	Positive	Improved spill response capability and probable improvement in port management will result in improved water quality. Improved port management and equipment should reduce frequency and volumes of spills.
1.7.2.5 Non-sanitary discharges/releases from ship repair. Paints. Paint compounds. Other chemicals - hydraulic fluids, etc. Antifoulants.	Nil	Ports will not have ship repair facilities.
1.7.3 Heated process water discharges. Electricity generation. Industrial processes. LNG condensation.	n/a	None present.
1.7.4 Brine from desalinization plants.	n/a	None present
2.0 LAND-RELATED IMPACTS		
2.1 Excavation for fill (rock or aggregate)		
2.1.1 Loss of upland-vegetation, cropland. Windbreaks. Degradation of Upland appearance. Soil cover. Prevention of erosion. Mudslide potential. Flooding potential	n/a	Not applicable

Impact	Risk	Comment
2.1.2 Damage from shore sand/gravel excavation.	n/a	Not applicable
2.1.3 Coastal dunes. Destabilization of shore zone. Acceleration of inland dune migration. Increased sandstorm frequency and increase in dust (fugitive emissions):	n/a	Not applicable
2.1.4 From drilling. Truck traffic and construction equipment. Wind velocity, direction. Blasting and Its Effects	n/a	Not applicable
2.1.5 Control of debris	n/a	Not applicable
2.2 Pre-construction assessment of land appearance		
2.2.1 Ecological value of wetlands: Agricultural use. Waterfowl use. Use by domestic animals. Use by other fauna. Unique vegetation. Food source for aquatic or non-aquatic biota. Irrigation water source.	Nil	Negligible change
2.2.2 Flood plain functions: River flooding retention capacity. Tidal flooding capacity. Water retention intervals. Flooding related to irrigation source capacity.	Nil	Negligible change
2.2.3 Watershed/groundwater source quality Groundwater recharge function. Groundwater discharge function. Relation to used aquifer(s). Source of surface streams. Flow rates. Runoff (long-term) from developed areas (including ports and harbor facilities)	Nil	No change
2.2.4 Receiving function for natural surface runoff. Receiving area for developed area runoff -- municipal, industrial. Existing contamination input. Contaminant buildup rates. Present background contaminant levels.	Positive	Project will seek to reduce contaminant and spill threat through improved port management and provision of new equipment. Enhanced spill management capacity.
2.2.5 Loss of usable uplands to expanding waterfront/industrial areas.	n/a	Not applicable
2.3 Land Uses		
2.3.1 Types of land areas likely lost to industrial or waterfront use.	n/a	Not applicable
2.3.2 Residential areas. Market centers. Commercial areas. Extent to which relocation compensates for lost land use.	n/a	Not applicable
2.3.3 Extent of involuntary re-settlement. Residential relocation. Replacement farmlands. Other replacement/relocation needs. Requirements for associated needs-water, sewer, electricity, roads. fuel, etc.	n/a	Not applicable
2.4 Noise from ports and harbor side industry		
2.4.1 Planning for possible strategic location of noise sources.	Nil	Existing facility. Project does not propose significant change in land use.
2.5 Effects of dust and other airborne emissions		
2.5.1 Dust and other non-combustion particulates.	Low	Project does not propose addition of emission

Impact	Risk	Comment
		sources. Some emissions increase from construction activities but land side receivers distant from site. Increased cargo throughput but few dry bulk cargos and even then loading and loading will not be a continuous activity. No sensitive habitats will be affected.
2.5.2 Smoke and other combustion products.	Low	No addition of industrial sources. Some increase in road traffic and low probability that regulatory limits will be applied strictly but overall increase in vehicle numbers marginal. Some increase in number of vessels using facilities and low probability that regulatory limits will be applied strictly However, threat remains low as land side receivers are distant from site and no increase in ‘toxicity’ of emissions is anticipated.
2.6 Traffic burden projections		
2.6.1 Existing traffic load. Road network, traffic load, accident risk, weight loading and pavement damage.	Low	Minimal Impact. Ports are existing facilities with supporting land side road infrastructure in place. Increase in input will be relative slight.
2.6.2 Projected traffic increases. Required roadway additions/improvements. Important routes. Traffic loads - commercial, construction. Destinations. Needs for traffic control.	Low	Minimal Impact. Ports are existing facilities with supporting land side road infrastructire in place. Principal issue is need for improved security.
2.7 Handling and disposal of solid shore generated wastes		
2.7.1 Ships. Waterfront industrial areas.	Positive	Some increased goods throughput. Proposed Waste Management Plan should improve classification, handling, storage and disposal of wastes but risk remains from potential continued disruption of disposal systems beyond port perimeter.
2.7.2 Means of transport/transfer. Ship-to-shore. Onshore - Vehicle types (Compactors. Intermediate collecting sites).	Positive	Some increased goods throughput. Proposed Waste Management Plan should improve classification, handling and storage of wastes on site.
2.7.3 Disposal methods	Moderate	Proposed Waste Management Plan should improve classification, handling and storage of wastes on site but risk remains from potential continued disruption of disposal systems beyond port perimeter. Management Plan will need to address the issue of waste disposal.
2.7.3.1 Incineration	n/a	No pre-existing facility. Unlikely to be built.
2.7.3.2 Landfills	n/a	See 2.7.3.
2.8 Runoff from raw material storage		
2.8.1 Nature of materials Salt. Sulfur. Metal ores. Refined concentrates. Potential for toxic releases.	Low /nil	Project will not increase run off contamination risk from toxic materials and metals.
2.8.2 Exposure effects	Positive	Existing storage conditions are very variable but generally poor. Project would be expected to improve port management and condition and management of storage facilities.
2.9 Waterfront drainage		
2.9.1 Drainage components	? Positive	Project would be expected to improve port

Impact	Risk	Comment
Contaminants (toxins). Volumes, Oils (hydraulic, etc.).		management and reduce risk of cross contamination with surface drainage.
2.9.2 Drainage collection systems	Positive	Project would be expected to improve port management and reduce risk of contamination of surface drainage and will improve spill management and clean up capacity. However, project does not include speciifc component to upgrade/rehabilitate collection systems.
2.9.3 Biological effects of disposal.	Positive	Impacts on local fishery will be limited. No expected increase in threat from project activities and reduction in contaminant load expected from improved port management, reduced risk of contamination of surface drainage and improved spill management and clean up capacity.
2.10 Industrial liquid wastes not discharged to harbor: Possible hazardous/toxic		
2.10.1. Storage and handling methods.	Positive	Proposed Waste Management Plan should improve classification, handling, storage and disposal of wastes.
2.11 Visual impacts – location. Aesthetics. Structure. Painting. Attempts to blend with surroundings	n/a	Not applicable
3.0 AIR-RELATED IMPACTS		
3.1 Important background information		
3.1.1 Background data.		No data on ambient air quality but anecdotal evidence suggests it is poor. Background dust level is high due to natural condition. Port has few operational point sources of air pollution. KZ oil terminal and grain receiving berth. These affect only very limited area around facility.
3.1.2 Identify sensitive areas		No sensitive receivers in immediate proximity of port activities
3.2 Fugitive emissions see also Section 2.5)		
3.2.1 Sources of Dust	Low	During construction project may increase number of dust sources and dust emissions on a temporary basis. Simple management measures should and relative distance to sensitive receivers should minimize threat During port operations enclosure of conveyor loading systems for ships loading dry cargo would be sufficient.
3.3 Gases, smoke, and fumes		
3.3.1 Sources, components, controls:	Low	Project will not directly increase industrial contributions. Vehicle emissions may increase as a result of increased truck traffic and regulatory limits may not apply during project period. Minimal threat to agriculture and fisheries
4.0 HAZARDOUS MATERIALS / CARGOES		
4.1 Categories, gases, liquids, solids		Unknown quantities - required for industrial processes, waste products, finished products.
4.1.1 Key Considerations (i) Low probability that KZP will handle hazardous material. However,	Positive	(i) No anticipated increase in threat from cargos even with increased throughput. Improved equipment and port management should reduce

Impact	Risk	Comment
- existing storage facilities rudimentary and do not include hazardous materials storage. - handling and other containment measures associated with bulk storage and tank farms heavily damaged and need replacement. - existing storage and handling procedures rudimentary. (ii) Unexploded ordnance remains within basin area. (iii) KZP is an industrial port with an oil exporting facility. Present oil import and export operations at KZ pose significant hazard.		existing threats. (ii) Project will require application of exclusion zone. (iii) Project will promote increased product throughput. Project proposals will provide improved interim solution and reduce hazards in loading areas. Wreck clearance in channel will reduce hazards to tanker operations.
5.0 SOCIO-CULTURAL IMPACTS Tribal cultural, ethnic, historical, religious aspects.	n/a	No development on sites beyond existing port perimeter.
6.0 REVIEW OF EXISTING AND PROPOSED REGULATIONS AFFECTING THE PROPOSED PORT OR HARBOR DEVELOPMENT AND ITS CONSTRUCTION		Ongoing.
7.0 NEED FOR CONSTRUCTION OR FACILITY OPERATION ENVIRONMENTAL MONITORING		Project proposals call for Environmental Management Plan to be prepared.

Annex 3

Dredging Environmental Management Plan

A. Context

It is intended that a Draft Dredging EMP is attached to the Tender Documentation made available to contractors. That document will contain:

1. *Introduction*
2. *Objectives*
3. *Identified Concerns*
4. *Legislative Framework*
5. *Baseline Report*
6. *Draft Management Plan*
7. *UXO Plan*

At this time further works are required to complete item 3 to 5. Accordingly this Outline Dredging EMP details only the required contents of these Sections. A summary of the preparatory works to be undertaken to complete the Draft EMP is provided as Annex 1.

The Final Dredging EMP will be attached to the Contractors Operational Management Plan. Compliance with the Dredging EMP will be contractually binding.

The Final Dredging EMP will comprise:

1. *Introduction*
2. *Objectives*
3. *Identified Concerns*
4. *Legislative Framework*
5. *Baseline Report*
6. *Method Statement*
7. *Management Plan*
8. *UXO Plan*

A dredging management plan must be prepared for inclusion in all project contract documents. This management plan must include:

Outline of Dredging Environmental Management Plan

1. Introduction

This Environmental Management Plan (EMP) has been prepared for use in the management of dredging programmes proposed to be undertaken under the UQP and KAP rehabilitation Project. Therefore it is concerned only with the dredging of River 1, i.e.

This EMP refers only to the dredging and disposal of sediments from River 1. It does not apply to other wastes or other materials (e.g. sewage sludge) that may also be considered for disposal at potential disposal sites.

All dredging areas and identified possible disposal sites, (on land or offshore) are within Iraqi National Territory and Waters.

2. Objectives

The objective of the Dredging Management Plan is to avoid, or minimise potential adverse environmental impacts that may arise from proposed Phase 1 dredging operations. The completed EMP will be attached to the Contractors approved Dredge Management Plan.

3. Identified Concerns

Impacts and issues identified in the Project IEE and to be addressed in the Management Plan are shown in Table 1.

4. Legislative Framework

At this time it is understood that a permit is required to undertake dredging but no details of the nature of the required permission are available.

Given that all project works are associated with existing dredged facilities and will use only existing spoil sites no specific EIA is required.

These details are to be confirmed.

Table 1 Impacts and Issues Identified in the Project IEE and to be Addressed in the Management Plan

Activity/Issue/Impact	Signific.	Risk	Comment
Dredging			
Habitat disturbance to areas adjacent to dredge area.	Minimal	Low	Natural habitats have very high volume of material in suspension and are unlikely to be affected by dredge effects.
Dispersal and settlement of re-suspended sediments. Release of toxic, harmful substances in water column. Reduced available oxygen, sunlight penetration. Smothering of bottom biota.	Uncertain	U	Available data from UNDP surveys does not indicate excessive contaminant levels – Table 1. However survey results represent a snapshot of sediment deposition in 2004. No samples taken below surface. Sediments are very fine and a Plume inevitable.
Impact from altered bathymetry.	Minimal	L	River 1 man made channel established in 1979-1984. Any effects such as modifications to tidal and river flows, altered salt wedge intrusion will already be established. Renewed dredging is unlikely to have any additional impact. Effect on rate and location of sediment deposition unknown.
UXO	Uncertain	U	UXO threat presists. Risk is increased if option of dredging of entire River 1 basin is selected.
Dredge Disposal			
On Land	Signficant	H	Impacts include: (i) Non containment of disposal materials. Will create dispersal plume. Cross contamination of land and marine sediments Economic costs of returning sediment to waterways (ii) Site preparation costs and possible project delays from non availability of site. This will lead to increased risk of uncontrolled disposal. (iii) UXO threat in site preparation (iii) Security
In Water Loss of bottom biota. Habitat damage in plume areas - vulnerability to recolonization.	Minimal	L	Proposed offshore dredge disposal areas have been used since the 1970s and any original affected habitats will now have been entirely destroyed. Therefore provided dredge spoil is confined to the disposal site new sediment deposition will not modify the present environment and no habitat loss would be expected. Habitats adjacent to dump site are believed to be generally homogenous (soft sea floor) and unlikely to be affected by temporary, short lasting plumes. Natural water column has very high sediment load in suspension and plume effects unlikely to be important. Significant additional or cumulative effect on important fishery related habitats or the recovery of fishery habitats are not anticiapted.
Alteration of current patterns Accelerated shoaling	Uncertain	U	Proposed dump lies to south of Hisham Island an area that is believed to have shoaled as a result of previous dredge spoil disposal and possibly modified current patterns. Further uncontrolled dumping may accelarate shoaling and promote modification of current patterns with unknown effects.
Cross Contamination	Uncertain		To be determined. Disposal of contaminants (toxins) and other hazardous materials.
International Waters	Uncertain	H	Disposal site is adjacent to Kuwait Waters and even with effective management some sediments will enter Kuwait Waters.
Safety			
Alteration of harbor/port ship traffic patterns	Minimal	L	Some threat to shipping in channels Minor threat to local shipping not permitted to use channels.
Security	U	H	Threat from pirates and insurgents remains.

Source: Project IEE, NK October 2005

5. Baseline Report

The Baseline report should provide a summary of environmental conditions in project affected areas. Data to be provided will include:

(1) Disposal Site Capacities
(2) Ecological Values Survey
(3) Sediment Characteristics at Dump Site and removal sites
(4) Available hydrological data; tidal and current data
(5) Meteorological Data

6. Draft Management Plan (DMP)

The Draft Management Plan will comprise:

(1) Location of Project Sites

Specification of the location of disposal sites and conditions of use. It is desirable that the documentation delimit the the boundary of the dump areas and, in the case of marine sites, a preferred disposal regime based on a desired post disposal bathymetry. This will be set as minimum desired water depths.

The MP will specify that dumping of any dredge spoil waste except at the defined spoil sites is prohibited.

(2) Statement of Special Management Conditions or Practices.

The DMP should define any special management conditions or practices to be implemented at project sites that are necessary for the protection of the environment. However, as indicated in the review below there is expected to be only limited need for such conditions.

Area of Special Provision	Comment
Disposal methods	No restriction
Capping provisions	Not appropriate
Quantity restrictions	Except as define by capacity statement
Weather restrictions	Except as defined by Contractor operating specifications
Sediment grain size restrictions	No restriction
Seasonal restrictions	No restriction
Equipment requirements (equipment for dredging, transportation and disposal, navigation and positioning, etc.);	No restriction
Discharge point and allowable tolerances in position	To be defined
Debris removal provisions	Except UXO, no specific provision
Provisions to address spillage, and leakage of dredged material	Application of standard best practice

(3) IPA will be responsible for the management of the onshore disposal area. Therefore it will be required to prepare a Management Plan for the operation of the site. This plan would be made available to the Contractor prior to mobilisation.

(4) Method Statement

The Tender documentation should specify that the contractor is required to prepare a method statement based on the pre-defined ‘dredging and spoil disposal profile’.

The contractor should be advised that the Method Statement will be reviewed and considered in the bid process. They should be further advised that their method statement should give consideration to:

- Hydrodynamic conditions at the excavation and disposal locations.
- Ensuring dreging proposals minimise, as far as practically possible, the disturbance and dispersion of sediments from the dredger and barges, during dredging operations.
- The provisions that will be made to reduce spillage, and leakage of dredged material during transfer operations.
- Assessment as to whether any activities can be timed to avoid or minimise environmental risks.
- Ensuring that the most suitable dredging equipment (BATNEEC) for purpose is proposed for use in order to minimise the suspension of any fine sediments and contaminants at the dredge site.
- Ensuring that discharge occurs only within permitted discharge zones.
- Measures that will be taken to minimise UXO risks.

(5) Health and Safety Plan

As part of his bid the Contractor will be required to provide details of his company's Health, safety and security management plan. This will be reviewed for compliance with International Best Practice by IPA.

IPA will prepare the HS plan for the land based disposal site. This will be included in the site management plan referred to under item (3) above. This plan will be made available to the Contractor prior to mobilisation.

(6) Monitoring programme

The MP will specify the nature and extent of the Monitoring Program that will be undertaken as part of the Dredge Management Plan. A Draft Monitoring Plan is provided in Annex 3.

(7) Statement of Responsibilities/obligations of IPA/contractor/others as Identified

The MP will detail the obligations of all parties in respect of ensuring compliance with the Project Environmental Management Plan. In doing so it must also provide for coordination of management activities.

A draft table of obligations is provided as Table 2.

Table 2 Draft Allocation of Responsibilities – Dredging Management Plan

Activity	Responsibility
Project Preparation and Tender	
Issuance of a permit giving authority to dispose of dredge material at approved sites subject to the approval of the site manager. All necessary licenses approvals and consents required to undertake dredging and spoil disposal are to be attached.	IPA - Available at negotiations prior to contractor mobilisation.
Confirm Dredge Spoil Disposal Sites	IPA – Available in Tender Documentation
Preparation of Baseline Report	IPA – Available in Tender Documentation
Preparation of Draft Environmental Management Plan	IPA – Available in Tender Documentation
Preparation of Method Statement	Contractor
Preparation of Final Dredge Management Plan	Contractor
Land Site Preparation	IPA – Site to be available for use by Contractor, no later than 1 month after notification to IPA by Contractor of mobilisation start.
Preparation of Management Plan for onsite disposal site	
Operations	
(i) Compliance with - Dredging EMP - HSE Plan (ii) Monitor Compliance	(i) Contractor (ii) IPA – EU Site Management Team
Environmental Quality Monitoring	IPA – EU Site Management Team Identifying and evaluating any impacts outside the designated sites will be the responsibility of the MOE and others as appropriate.
Maintain records of the nature and quantities of all material dumped and the location, time and method of dumping	Contractor
Provide access for designated officials to their vessels throughout the dredge operations.	Contractor
Post dredge bathymetric survey	Contractor

Actual operations on site will be managed by staff from the IPA. A site manager and 4 assistants should be available throughout the dredge disposal period to provide a 24 hour presence at the disposal site.

The site manager will prepare weekly work programmes for review by the IPA-EU Manager and Manager of the IPA – PMU.

(8) Capacity Building

A manager and 4 assistants should be appointed as to control the use of the land based disposal site. These should be trained in the following:

- Dredging Management Plan Obligations;
- Site operations and site Health and Safety;
- Environmental quality monitoring (EQM)
- Reporting;
- Record keeping.

Training would take place on site and at an appropriate regional location.

To undertake the EQM the unit will require access to appropriate sampling equipment.

(9) Management Plan Review and Revision

Over the short duration of the proposed project it is unlikely that significant revision of the MP will be required. Nevertheless the Plan must detail how modifications or updates may be made in response to specific needs identified during project monitoring activities.

Annex 1 **<u>Required Preparatory Works</u>**

1 Legal Documentation

The legislative framework provided in the Outline MP (Section 4) is provisional and must be confirmed. Therefore:

(1) IPA should establish the requirement for all licenses, consents and agreements that may be applicable to Project Dredging Works.

(2) IPA must obtain all necessary licenses, consents and agreements and provide copies of such to JBIC. A further copy should be attached to tender documentation.

2 Confirmation Dredge Spoil Disposal Sites

Given the need to minimise delays in project implementation it is considered appropriate at this stage to consider only pre-existing dredge spoil sites.

(1) IPA are to undertake a review of available existing disposal sites and confirm to JBIC the location of those proposed to be used for Phase 1 works. At this time it is assumed that these will include 1 offshore and 1 onshore site. However, this may be subject to change.

3 Preparation of Baseline Report

IPA are to arrange for the following surveys/assessments to be undertaken. The findings of these surveys are to be compiled into a Baseline Report.

(1) Disposal Site Capacities

Disposal Sites should be surveyed to determine nominal disposal capacities in order to:

a) Confirm sufficient total combined capacity is available at selected sites;

b) Define any constraints on the capacity of each site indicating, if appropriate, a maximum capacity.

In the case of marine sites this will comprise:

- Large grid Bathymetric survey;
- Delimiting the boundary of the dump area;
- Analysis of survey data and hydrological conditions to determine a preferred disposal regime based on a desired post disposal bathymetry. This will be set as minimum desired water depths.

Onshore sites should be subject to topographical survey to initially delimit the site and thereafter estimate its capacity. The slumping risk should also be determined.

(2) Ecological Values Survey

The ecological values of any affected onshore sites should be confirmed by a walkover survey carried out by a specialist ecologist.

(3) Sediment Sampling and Analysis

Sea bed sediment samples should be taken from sites defined in Table 1.

Table 1 Sea Bed Sediment Sample Locations

Sample	Location[1]
Sediment Grain Size	6 sites. 3 in River 1, 3 Hisham Island dump site
Sediment contaminants	6 sites. 3 in River 1, 3 Hisham Island dump site

The contaminants survey should include analysis for the parameters shown in Table 2.

Table 2 Baseline Sediment Sample - Analytical Programme

Contaminant	No. Samples	Comment
Arsenic	All Samples	
Cadmium	All Samples	
Chromium	All Samples	Plus additional in-stream sampling[1]
Copper	All Samples	
Lead	All Samples	
Mercury	All Samples	
Nickel	All Samples	Plus additional in-stream sampling
Uranium and Uranium Isotopes	All Samples	
Zinc	All Samples	
Total Oil	All Samples	
Petroleum Hydrocarbons	30% of samples - random basis	
Chlorinated Pesticides	All samples	Reduced sampling in response to recommendations of UNDP Report
PCBs	All samples	Reduced sampling in response to recommendations of UNDP Report

Note 1) The Pre-Salvage Baseline Assessment of Marine Pollution near Shipwrecks in Iraq and Kuwait, prepared by IAEA for UNDP recommended that in stream sampling be undertaken to confirm the level of natural Lead and Nickel in the river system. This monitoring plan provides the opportunity to comply with these recommendations.

(4) Tidal and Current Measurements
It is desirable that current measurements are taken over marine spoil areas. A minimum of three days continuous monitoring would be required. Existing tidal data from Umm Qasr is to be collated and made available as required.

(5) At this time comprehensive meteorological data is available only for Kuwait. IPA should be requested to provide any data for UQP or KZP.

(6) Assessment of Constraints to Use
IPA should report on any constraints to site use determined on the basis of site surveys. This analysis is to be refined into a dredging and spoil disposal profile that defines:

- Required dredge depths by location;
- Estimated total volume of dredge material per 100m dredge length;
- Dredge disposal options based on defined maximum capacity limits for disposal sites. If no limits are defined contractor may utilise any defined dredge site at his discretion.

4 Land Site Design, Tender Preparation and Contract Procurement

Once the survey assessments are complete a design for any onshore disposal sites will need to be put in place.

This design will be strictly limited in scope. ***It will be required only to permit efficient disposal of dredge spoil and to ensure its effective retention.*** Issues associated with the potential long term use of a site for dredge disposal in subsequent maintenance dredging programs will not be addressed by the design.
If a September 1 operational deadline is to be met the following program will need to be adhered to:

Baseline Survey	*Complete end Jan 2006*
Facility Design and Tender	*Complete 15th March 2006*
Procurement	*31 March – 30th April*
Construction	*15 May –15 August 2006*
Operations	*September 1 2006 onwards*

The DG of IPA and IPA–EU will jointly approve the design of the facility. Copies of the approved design should be provided to MOE and JBIC as necessary.

5 Management Plan
The following items must be confirmed by IPA for inclusion in the Draft MP.

(1) Statement of legal responsibilities of contractor under regulations
(2) Locations of disposal site and conditions of use. The documentation must clearly specify that dumping of any dredge spoil waste except at the defined spoil sites is prohibited.
(3) Statement of Special Management Conditions or Practices.
Review and revise content of program in Outline MP.
(4) Monitoring programme.
Review and revise comments in programme in Outline MP.
(6) Statement of responsibilities/obligations of IPA/contractor/others as identified.
Review and revise content of program in Outline MP.

6 Pre-Bid Conference
Any further available information that may be of possible use to contractors in preparing their bid will be compiled into a briefing document by IPA. This will be made available to Contractors at the Pre-Bid Meeting. IPA will be prepared to respond to questions at the Pre-bid meeting and by email subject to compliance with JBIC procurement regulations.

7 Land Site Preparation Works

7.7.1 Construction

A local contractor (or possibly IPA) must prepare the land based disposal site based on the approved design. The schedule of works in (see Item 4) has an earliest construction start date of mid May 2006.

7.7.2 Site Inspection and Approval

The constructed site should be inspected and approved by IPA – EU staff prior to its use by the dredging Contractor. The approval should be provided in writing to the IPA DG. Copies of the approval should be made available to MOT, MOE, JBIC and other stakeholders as necessary.

8 Staff Training

A manager and 4 assistants should be appointed as to control the use of the land based disposal site. These should be trained in the following:

- Dredging Management Plan Obligations;
- Site operations and site Health and Safety;
- Environmental quality monitoring;
- Reporting;

- Record keeping.

Training would need to take place between June and September 2006.

9 Allocation of Responsibilities

Table 3 provides a summary of responsibilities for undertaking the preparatory activities listed above.

Table 3 Responsibility for Preparatory Works

Activity	Date	Responsibility
Identify and review the requirements of all licenses, consents and agreements applicable.	End Nov 2005	IPA
Confirm Dredge Spoil Disposal Sites	End Nov 2005	IPA
Survey Dredge spoil sites (i) Bathymetry (ii) Ecological values	End Dec 2005	 (i) IPA (ii) Local specialist
Inform regional authorities (ROPME) of the intent to dump spoil at defined locations.	End Dec 2005	IPA
Land Site Design	End Jan 2006	IPA with TA assistance
Land Site Tender Preparation	End Jan 2006	IPA with TA assistance
LCB procurement	End March 2006	IPA
Preparation of Draft Environmental Management Plan (i) Locations of disposal site and conditions of use (ii) Statement of legal responsibilities of contractor under regulations. (iii) Requirement for Method Statement (iv) Issues to be addressed in Method Statement (v) Monitoring programme (vi) Statement of responsibilities/obligations of IPA/ contractor / others as identified. (vii) Expected monitoring requirements (viii) Attendance at pre-bid conference	End March 2006	IPA with TA assistance
Pre-Bid Conference	Mid April 2006	IPA
Site Preparation Works	Initiate April 2006	Contractor
Site Inspected and Approved	End July 2006	IPA - with TA support
Staff Training	March - July 2006	IPA – TA support

Annex 2 Dredging Management Plan Cost Estimates $US

Item	No Units	Unit Cost	Cost
Legislative Review	-	-	**0**
Confirmation Dredge Sites	-	-	**0**
Preparation Baseline Report			
Sampling Equipment procurement (1)			
Offshore Site Survey and assessment (2)			
Onshore Site Surveys and assessment (3)	LS		
Baseline Sample Sieve Analysis (4)			
Baseline Sample Chemical Analysis (5)			
Dredge Material Sampling and analysis (6)	40	100	**4000**[3]
Procurement			
TA (7)	-	-	**0**
Pre-Bid Meeting (8)	-	-	**0**
Land Site Preparation			
Design of facility			
Implementation onshore Site UXO clearance contract			
Onshore Site Preparation Contract			
Onshore Site Inspection			
Operations			
Inspection Visits – Offshore			
Monitoring Sample Sieve Analysis			
Monitoring sample Chemical Analysis			
Post Dredge surveys			

Notes

Annex 3 Draft Monitoring Plan – Dredging Environmental Management Plan

1. Sampling Programme

A proposed sampling program is shown in Tables 1 and 2.

For consistency with previous studies, survey results should be compared with NOAA and Environment Canada Environmental Quality Guidelines, Table 3.

Table 3 Sediment Quality Guidelines from NOAA and Environment Canada

		NOAA Marine Sediment Quality Guideline		Environment Canada Interim Marine Sediment Quality Guideline	
Chemical	Units	Effects Range Low	Effects Range Medium	ISQG	Probable Effects Level
Arsenic	$ug\text{-}g^{-1}$	8.2	70	7.24	41.6
Cadmium	$g\text{-}g^{-1}$	1.2	9.6	0.7	4.2
Chromium	$ug\text{-}g^{-1}$	81	370	52.3	160
Copper	$ug\text{-}g^{-1}$	34	270	18.7	108
Lead	$ug\text{-}g^{-1}$	47	220	30.2	112
Mercury	$ug\text{-}g^{-1}$	0.15	0.71	0.13	0.7
Nickel	$ug\text{-}g^{-1}$	21	52		
Zinc	$ug\text{-}g^{-1}$			124	271
Total DDT	$ng\text{-}g^{-1}$	1.6	46		
Total PCB	$ng\text{-}g^{-1}$	23	180	21.5	189
Aroclor 1254	$ng\text{-}g^{-1}$			63.3	709
Total PAH	$ng\text{-}g^{-1}$	4000	45000		

Note: 1) Concentration on a dry weight basis.
Source: NOAA and Environment Canada
(spo.nos.noaa.gov/projects/nsandt/sedimentquality.html; www.ec.gc.can)

2. Allocation of Responsibilities

The allocation of responsibilities for carrying out the Monitoring Programme is shown in Table 4.

Table 4 Allocation of Responsibility for Monitoring Programme.

Activity	**Date**	**Responsibility**
Confirm Sampling sites	End Nov 2005	IPA
Confirm Dredge Spoil Disposal Sites	End Nov 2005	IPA
Survey Dredge spoil sites (i) Bathymetry (ii) Ecological values	End Dec 2005	(i) IPA (ii) Local specialist
Inform regional authorities (ROPME) of the intent to dump spoil at defined locations.	End Dec 2005	IPA
Confirm Survey Program, Associated survey Protocols and Required Equipment.	End March 2006	IPA – EU
Acquire necessary equipment	End June 2006	IPA – EU
Staff Training	End July 2006	IPA – EU
Contractor HS Briefing	Pre – Operation	Contractor
Sample Collection and transfer to Lab.	Operations	IPA – EU
Sample Analysis	Operations	Independent Laboratory
Periodic Reporting	Operations	IPA – EU
Post Completion Report	Post Operation	IPA – EU

3. Reporting

3.1 IPA – EU

(i) Record-keeping and reporting requirements

Standard reporting procedures should be followed. The content of a typical monitoring report would be as follows. These should be completed each month.

Report Content

1. *Introduction*
2. *Objectives and Scope of Work*
3. *Work Progress*
4. *Description of Monitoring Operations Undertaken and Operating Conditions*
5. *Contractor Compliance with EMP and Related Obligations*
6. *Issues Arising*
7. *Results of Environmental Monitoring*
8. *Environmental Issues Arising*
9. *Proposed Mitigation Measures*
10. *Proposed Monitoring Program for Next Review Period*
11. *Notes*

3.2 Contractor

The Contractor will prepared progress reports for review by IPA. For the purposes of the EMP these should contain the following details:

(i) Characteristics and composition of the dredged material

1. Total amount and average composition of matter dredged (per week of operation).
2. Physical properties of material and location of source.

(ii) Characteristics of dumping site and method of deposit

1. Location within dump site (e.g. Depth and distance from the shoreline)
2. Rate of disposal per specific period (e.g. quantity per day, per week, per month).

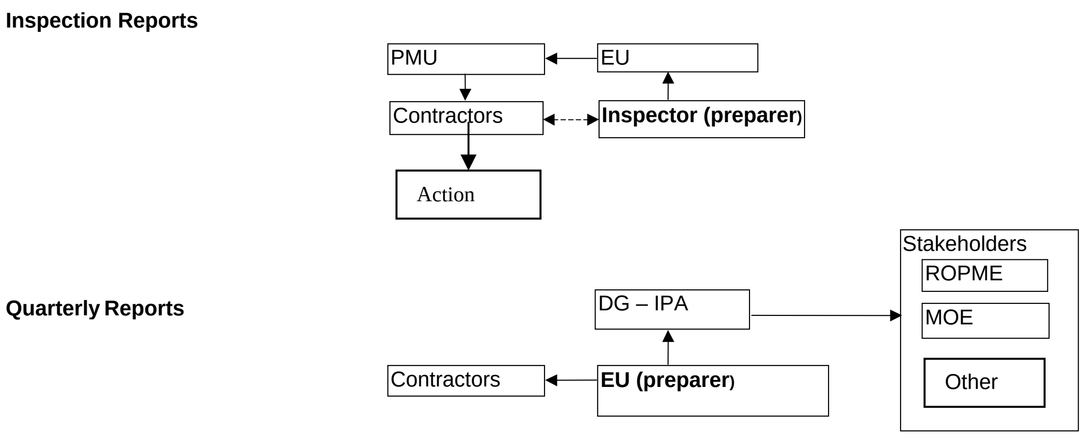


Figure 1 Summary of MP Reporting Structure

Table 1 Phase 1 Dredging Management Plan - Draft Monitoring Program

Activity	Location[1]	When / frequency	Parameter
Nature of Sediment (sieve analysis)	6 sites. 3 River 1, 3 Hisham Island dump site	In-situ grab samples after every 50 cms of cut.	Sediment size
Sediment contamination	6 sites. 3 River 1, 3 Hisham Island dump site	In-situ grab samples after every 50 cms of cut.	pH, temperature, ammonia & ammonium, TOC, TDS, heavy metals and TPH.
Visual inspections of any turbidity plume when discharging at Hisham Island site	Hisham Island dump site	Daily when site in operation.	discolouration
Visual inspections of any turbidity plume in vicinity of onshore dump site.	KZ channel upstream of River 1 opposite dump site	Daily when site in operation.	discolouration
Visual inspections of any turbidity plume at dredge sites	Dredge site	Daily when site in operation.	discolouration
Water quality (i.e. turbidity, suspended solids, and grease/oils) in the plume at the time of waste disposal.	In plume Hisham Island Dump Site	3 x samples (High Tide, Ebb Tide, Slack Water) each 1m of water column 1 day per fortnight during disposal activities.	pH, temperature, ammonia & ammonium, TOC, TDS, and TPH.
Characteristics of any in waters plume (e.g. effects of currents, tides and wind on horizontal transport and vertical mixing).			
Post dredge and post deposition hydrographic surveys at the completion of any dredging activities.	River 1, and Hisham Island Dump site.	Within one month of completion of **all** dredging works	Bathymetry

1) Note: Assumes use of Hisham Island and UQP Land Disposal Sites

4. Water characteristics (e.g. temperature, pH, salinity, stratification, oxygen indices of pollution -- dissolved oxygen demand (BOO) -- nitrogen present in organic and mineral form including ammonia, suspended matter, other nutrients and productivity).

Table 2 Monitoring Survey - Sediment Sample Analytical Programme

Chemical	No. Samples	Comment
Arsenic	All Samples	
Cadmium	All Samples	
Chromium	All Samples	Additional in-stream sampling
Copper	All Samples	
Lead	All Samples	
Mercury	All Samples	
Nickel	All Samples	Additional in-stream sampling
Uranium and Uranium Isotopes	All Samples	
Zinc	All Samples	
Total Oil	All Samples	
Petroleum Hydrocarbons	30% of samples random basis	
Chlorinated Pesticides	Each 1m below present sediment surface	Reduced sampling in response to recommendations of UNDP [1]Report
PCBs	Each 1m below present sediment surface	Reduced sampling in response to recommendations of UNDP Report

Note 1: Pre-Salvage Baseline Assessment of Marine Pollution near Shipwrecks in Iraq and Kuwait, 2004, IAEA for UNDP.

Annex 4

Wreck Management Plan
Salvage Health and Safety Plan Component

A Wreck Management Plan (WRMP) must be prepared for each individual Salvage operation.

It is intended that a Draft WRMP is attached to the Wreck Contract Tender Documentation and thus made available to potential contractors. This will inform contractors of the nature and scope of environmental management proposed to be adopted for the contracts and of their responsibilities in that regard.

The final contract documents will require that a WRMP is prepared and submitted to IPA for approval prior to commencement of any wreck removal contract. The final WRMPs will be prepared by the Contractor and will be based on the Draft provided during the tender process. Compliance with the approved WRMP will be contractually binding.

The final WRMP will comprise two elements.

Part 1 shall comprise a detailed Salvage Health and Safety Plan for Salvage Operations (SHSP).

Part 2 shall comprise an Oil Spill Contingency Plan (OSCP) for each Wreck. A generic OSCP has been prepared for the Project Wreck Removal program by the Salvage specialist.

SALVAGE HEALTH AND SAFETY MANAGEMENT PLAN

1.0 General

The ISU has developed a specific set of procedures to ensure the priority of safety during a salvage/wreck removal operation.

These procedures have been reviewed and in some parts adjusted to reflect Project Conditions.

1.1 Site Safety and Health Plan

Care must be taken to ensure that safety, including the prevention of human injury or loss of life and the occurrence of damage to the marine environment and to the preservation of property, is a primary obligation of the Salvor during the entire salvage/wreck removal operation. As a result, a site specific safety plan must be incorporated into the overall Salvage Plan and must include:

- health and safety analysis for each site task or operation;
- comprehensive operations work plan;
- personnel training requirements;
- PPE selection criteria;
- site specific occupational monitoring requirements;
- air monitoring plan, if needed;
- site control measures;
- confined space entry procedures (if needed);
- pre entry briefings, (tailgate meetings) initial and as needed;
- pre-operations commencement health and safety briefings for all incident participants; and
- quality assurance of SSHP effectiveness.

A sample Site Safety and Health Plan is provided in Annex “A”.

1.2 Daily Briefings and Reporting

A safety briefing shall be held at the commencement of each work day. All elements of casualty response shall be discussed, including

- a review of diving operations;
- an update on vessel operations;
- status of all heavy lift operations;
- status of all rigging;
- status of all refloating operations;
- weather conditions;
- a review of safety hazards and dangerous situations encountered, corrective actions taken, effectiveness of these actions and any other additional recommendations;
- status of unmet safety requirements and procedures;
- new hazards or safety requirements and procedures;
- employee comments and feedback; and
- any other issue/activity to be conducted during the day.

1.3 Vessel/Equipment Inspections

Equipment should be subject to inspection upon arrival at the site of the wreck. Any salvage work should have safety standards for equipment, including inspections before delivery to the work site. Those organizations which follow AWORP, ISM Code or other safety programs should ensure adherence to these programs and/or codes.

Vessels should, where appropriate, be classified by a recognized classification society. If appropriate, the ISM should be identified, approved and current. Inspections should be made on each vessel to ensure safety is being maintained as well as all licensing requirements for navigating crew. Appropriate insurance on all vessels and equipment must be confirmed.

1.4 Subcontractors

To the maximum extent possible, subcontractors should be chosen on the basis of their safety record and demonstration of a safety program in their operations. In addition, the subcontractor's safety program should be reviewed carefully to ensure that it can be incorporated into salvor's safety program. If changes are required to ensure an integrated safety program, these changes should be made to subcontractor's safety program before the subcontractor begins work at the salvage site. Adequate and appropriate insurance must be provided and reviewed as necessary.

1.5 Salvage Master's Log

The Salvage Master must keep an independent log of daily salvage activities. This log is to be completed and maintained according to industry standards and in accordance with any applicable regulatory requirements. Sufficient entries are to be made to ensure that the salvage operation can be understood from the log itself.

Specifically, entries in the Salvage Master's log as they relate to safety shall include, but not be limited to the following:

- acknowledgement of safety program;
- acknowledgement that inspections have been carried out;
- deficiencies have been corrected;
- times and details of accidents and deaths at the salvage site;
- notation of damage to or loss of any important articles or fixtures;
- any occasion of touching ground, colliding with ship or any other fixed or floating object, including the time of accident, the names of deck and engineering officers and other bridge personnel. The name and port of registry of any other ship involved shall also be recorded;
- description of the weather, wind, sea and corrected barometer and any unusual phenomenon;
- full particulars of any contravention or suspected contravention of Oil Pollution Prevention Regulations and actions taken;
- Names and descriptions of any vessels, lighters, barges or small craft alongside including time of arrival and departure;
- any damage caused by vessels alongside;
- times of commencing and ceasing to load or discharge;
- times of departure and return of ships;
- any other entry that is required by regulation;
- copies of reports required by regulation or submitted to any agency.

The Salvage Project Manager should have copies and overall control of the salvage logs.

2.0 Roles and Responsibilities

An outline of the roles and responsibilities for each member of a Salvage Team is attached as Annex B.

ANNEX A SITE SAFETY AND HEALTH PLAN

TABLE OF CONTENTS

G. Monitoring Equipment and Procedures
H. Decontamination
I. Medical Surveillance

VII EMERGENCY PROCEDURES AND FACILITIES

VIII ACCIDENT REPORTING AND RECORD KEEPING

IX SIGNALS, WARNING SIGNS, AND SIGNALING

A. Site Plan
B. Work Plan
C. Safety Plan Acceptance Sheet
D. Initial Safety Briefing
E. Daily Safety Briefing
F. Hospital Route Map
G. Hospital Route Map

SITE SAFETY AND HEALTH PLAN (SSHP) FOR SALVAGE OR WRECK REMOVAL

I INTRODUCTORY MATERIAL

Contractor:
Customer:
Contract Number:
Task Order Number:

Site Name:
Site Location:
Purpose of Work: (Contains a brief description of the purpose of the work to be conducted on the site)

Prepared By: _______________________, Safety Officer

Office / Address:
Telephone: ( ) ____________
Facsimile: ( ) ____________
Email ________________
Date Prepared: _________________
Signature: _____________________ **Date:** ______________________

Reviewed By (Title and Signature):
Date

Salvage Project Manager:
Salvage Master:
Diving Superintendent:

All site safety procedures will be in accordance with this Site Safety and Health Plan. All personnel involved in handling oil and hazardous materials will have the appropriate level of OSHA HAZWOPER training as delineated in 29 CFR 1910.120 with current certification.

This Salvage Site Safety and Health Plan will include the Diving Operations Health and Safety Plan and may be integrated in a single Site Safety Plan for the entire casualty response. All safety procedures will be in compliance with or exceed the regulations of the United States Coast Guard, OSHA, the Safety Standards of the American Salvage Association, the International Salvage Union and the Safety Manuals and Safe Practices Manuals of the Salvage Contractor and his subcontractors. This Site Safety Plan will be maintained by the Salvage Master and the Safety Officer.

Visitors to a field location or aboard the casualty will be held to a minimum. Everyone visiting field locations or aboard the casualty will wear appropriate PPE and will be escorted at all times by a representative of the Salvage Company. Visitors will not touch, move, or excavate any materials without express permission of the Salvage Manager or Salvage Master.

The Safety Officer may modify this plan with risk to human safety and health if site conditions warrant.

All modifications will be coordinated with the Salvage Project Officer and Salvage Master

II SITE DESCRIPTION

Contains a brief description of the location, size and make up of the casualty and the shore site obtained from the Wreck Survey.

A. The Casualty

1. The Ship or Vessel

A brief description of the casualty and its current condition.

2. Cargo

A brief description of the cargo and its stowage with identification of any cargo covered by the IMDG Code or which is potentially polluting.

3. Bunkers

A brief description of the type, quantity and location of bunkers and other oils aboard the casualty.

B. Weather

A brief description of the weather that may be expected at the site during the expected period of the operation and the sources of weather information.

C. The Shore Site

1. Site Map and Chart:

A site map and nautical chart of the casualty area are provided as Attachment 1 to this Plan. (A site map is required and can be hand drawn; the chart should be a replica of the appropriate section largest scale chart covering the casualty location and operations area)**.** Site work zones are marked on the site map and chart.

2. Present Use: (Check all that apply)

[ ] Military [ ] Recreational [ ] Other (specify) [ ] Residential [ ] Commercial [ ] Unknown [ ] Natural Area
[ ] Industrial [ ] Agricultural [ ] Landfill [ ] Secured [ ] Active [ ] Unsecured
[ ] Inactive

3. Known past Uses:
Contains a brief description of known past uses of the site.

4. Surrounding Population:
Contains a brief physical description of the site, its flora. fauna and human population. Known dangerous, threatened, or endangered species at the site should be noted.

[ ] Rural [ ] Residential [ ] Other (Specify) [ ] Urban [ ] Industrial [ ] Remote location
[ ] Commercial

5. Previous Sampling /Investigation Results:
Contains a listing of the air, water, soil, and vegetation samples known to have been taken at the site and the results of the analyses.

Type of Sample Date Sampling Method Analysis Results
Air, Water, Soil, Vegetation

III WORK PLAN AND OBJECTIVES

A. Overall Objectives

All work shall be conducted in accordance with procedures established during pre-salvage or entry briefings and the attached work plans.

Overall objectives include:

1. accomplishment of the purposes of the work;
2. preservation of property;
3. protection of the environment;
4. protection of personnel from death or injury;
5. a plan to be implemented in the event of personal injury.

B. Daily or Shift Objectives

1. accomplishment of specific work aboard the casualty, ashore, afloat or underwater for the day or shift;
2. safety issues particularly relevant to the day's or shift's work;
3. daily or shift objectives shall be developed daily and shall be described during the daily or shift change presalvage/entry briefing.

Complete salvage (or wreck removal) and diving operations work plans are provided as Attachment 2 to the Site Safety and Health Plan. Brief descriptions of the work are in the paragraphs below.

C. Activities/Tasks to be Performed:

1. Ashore: A brief description of tasks to be formed ashore.
2. Afloat: A brief description of tasks to be performed afloat.
3. Diving Operations: A brief description of diving operations to be conducted.

IV SITE SAFETY ORGANIZATION

A. Salvage Project Manager: _________________
Office: ___________________________________
Address: ____________________________________
Phone: ( ) ________________________

B. Salvage Master: _________________
Office: ___________________________________
Address: ____________________________________
Phone: ( ) ________________________

C. Safety Officer: ________________________
Office: ____________________________
Address: _____________________________
Phone: ( ) ______________

D. First Aid/CPR Certified Personnel:
The personnel listed below are CPR/first aid trained.

Name Position Vessel or Group Qualification
E. Key Personnel
The following key personnel involved in this salvage operation are:

National On-Scene Coordinator (NOSC)
____

Incident Commander (IC)
____

National On-Scene Coordinator's Representative (NOSC Rep)
____

Salvage Project Manager
____

Salvage Master
____

Operations Supervisor
____

Diving Supervisor
____

Logistics Supervisor
____

Site Safety & Health Officer (SSHO)
____

Site Safety & Health Supervisor (SSHP)
____

Public Affairs Officer (PAO)
____

Scientific Support Coordinator (SSC)
____

ROPME Case Officer (RCO)
____

Coastguard Contract Supervisor
____
____
____

V HAZARD ANALYSIS

A. Anticipated Health Hazards

1. General Hazards Ashore:

[ ] Heat Stress [ ] Overhead Hazard [ ] Tripping Hazard [ ] Cold Stress [ ] Electrical [ ] Water Hazard [ ] Noise [ ] Biological [ ] Dangerous Plants [ ] Foot Hazard [ ] Confined Space [ ] Dangerous Animals [ ] Radiological [ ] Climbing Hazard [ ] Storm [ ] Explosive [ ] Huntavirus [ ] Other (Specify) [ ] Flammable [..]Falling Objects

2. General Hazards Afloat and aboard the casualty:

[ ] Heat Stress [ ] Marine Operations [ ] Tripping Hazard [ ] Cold Stress
[ ] Shallow Water Operations [ ] Falling Objects [ ] Noise [ ] Ship to Ship Transfers
[ ] Overhead Hazard [ ] Foot Hazard [ ] Helicopter to Ship Transfers [ ] Water Hazard
[ ] Radiological [ ] Electrical [ ] Helicopter Operations [ ] Explosive [ ] Biological
[ ] Diving Operations [ ] Flammable [ ] Confined Space { } Storm [ ] Heavy Rigging
[ ] Climbing Hazard [ ] Heavy Lifting [ ] Unknown Chemicals [} Oxygen Deficiency
[ ] Dangerous Surfaces [ ] Other (Specify)

B. Overall Hazard Evaluation

An evaluation of the overall hazard for each segment of the operation (low, medium, or high), with notes as to any particular hazards that are unique or are unusually prevalent.

Overall Hazard Evaluation

Operation Overall Hazard Level Comment
Shore Operation High, Medium, or Low
Afloat/ Aboard Casualty
Diving

VI ACCIDENT PREVENTION

Prior to the start of work, all hands are required to read this plan and to sign the form acknowledging they have read and will comply with it. In addition, the Safety Officer and supervisors will hold a daily safety briefing in which specific topics regarding the day's work will be discussed. A copy of the Site Safety plan will be available at the job site for reference by all hands.

A. Site Control

1. Anyone entering or departing a work area shall report to the site supervisor or designated representative.

2. No person shall enter a site without subscribing to this or another appropriate Site Safety Plan.

3. The buddy system is mandatory for everyone on the site.

4. In general, all personnel on the site shall be trained adequately to perform their assigned tasks safely.

5. All personnel entering the site shall be fully informed about the applicable hazards and procedures on site.

6. Heavy equipment operators will receive instructions and shall demonstrate proficiency in the operation of the equipment. Training and qualification will be documented.

7. All divers will be trained on basic emergency pollution response operations with emphasis on the safety requirements and procedures. Training will be documented.

8. While on duty, employees may not use or be under the influence of alcohol, narcotics, intoxicants, or similar mind-altering substances. Employees found to be under the influence of or consuming such substances will be immediately removed from the job site.

B. General Safe Work Practices

1. Unanticipated Hazardous Conditions: At any sign of unanticipated hazardous conditions, stop tasks, leave the immediate area, and notify the Safety Officer.

2. Electrical Storms: When lightning could occur, all operations shall cease.

3. High Seas or Surf*:* Work shall be halted in seas or surf high enough to prevent safe work.

4. Eating and Drinking: Smoking, chewing, eating, drinking, and applying lip balm, sun block, etc. is allowed only in designated areas.

5. Material Handling Procedures: In compliance with the Work Plan and the Company Safety Manual.

6. Drum Handling Procedures: In compliance with the Work Plan and the Company Safety Manual.

7. Confined Space Entry: A permit, air monitoring, and rescue plan is required.

8. Ignition Source and Electrical Protection: Smoke in designated areas only. Only intrinsically safe equipment is allowed in areas where explosive or flammable liquids of vapors are present.

9. Spill Containment: Required for refueling operations and other areas where pollutants or hazardous materials are handled or stored.

10. Excavation Safety: Do not enter trenches and/or excavations, until approved by competent

person

11. Illumination: Work during daylight hours or with illumination per OSHA requirements.

12. Sanitation: Sanitary facilities will be provided in work areas. The following apply:

a. An adequate supply of drinking water shall be available at all times.
b. Adequate toilet and washing facilities shall be available at all times.
c. Use of common cup (a cup shared by more than one worker) is prohibited. Unused disposable cups shall be kept in sanitary containers and waste receptacles shall be provided for used cups.
d. Outlets dispensing non-potable water will be conspicuously posted CAUTION - WATER UNFIT FOR DRINKING, WASHING OR COOKING.

13. Buddy System: At all times two persons on-site shall maintain constant contact with one another.

14. Clear Access: All stairways and accesses shall be kept free of materials and obstructions at all times.

15. Heat Stress/Cold Stress: Dress appropriately. Take sufficient breaks and drink plenty of fluids. Watch for signs/symptoms of heat or cold stress. Monitoring may be applicable depending on site weather conditions and type of PPE worn.

C. General Safety Precautions

1. Fire Protection
a. Fire-fighting equipment shall be provided and installed in accordance with recommendations of he National Fire Protection Association and U.S. Coast Guard Regulations.
b. When an unusual fire hazard exists or emergencies develop, additional fire protection shall be provided as required by the Safety Officer.

2. Poisonous and Harmful Substances Material Handling, Storage and Disposal
a. When any hazardous substance is procured, used, stored, disposed of, or discovered aboard the casualty or elsewhere on the site, material safety data sheets (MSDS) for the substances shall be available at the work site.
b. All employees shall use protective equipment for protection from poisonous and hazardous substances.
c. Containers of hazardous chemicals will be labeled, tagged or marked in accordance with 29 CFR 1910.1200.
d. All incompatible materials will be segregated and stored properly.
e. All chemicals, to including oils and fuels, will be labeled. This includes any pipelines, hoses and storage containers, including drums.
f. Non-hazardous wastes will be stored separately from hazardous wastes. Containers for both wastes will be marked accordingly and will include a warning not to mix them.

3. Electrical Wiring and Apparatus
a. All electrical equipment shall conform to Underwriters Laboratory Standards.
b. Electrical tools shall have ground fault protection when appropriate.
c. Temporary wiring shall be guarded, buried or elevated to prevent accidental contact by workers or equipment.

4. Hand and Power Tools
a. As required by the Safety Manual caution shall be exercised in the use of all tools.
b. Power tools shall be inspected, tested, and determined to be in safe operating condition prior to use.
c. Safety lashing shall be provided at connections between tool and hose and at all quick makeup connections on hydraulic and pneumatic tools.

5. Rigging and Lifting
a. All rigging, rigging appliances, tension members, and fittings shall be used within the safety recommendations and safe working load limits of the manufacturer.

b. Wire and fiber rope, hooks, shackles, rings, and other fittings that show excessive wear shall be taken out of service.
c. All hands shall stand clear of wire and fiber ropes that are being hauled or tensioned or that are under tension.
d. Personnel shall not work or pass under the buckets or booms of operating cranes or loaders, except as necessary.
e. Cranes will not be loaded in excess of the certified load.
f. Braking equipment capable of stopping, lowering and holding a load shall be provided.
g. A standard signal system shall be used on all hoisting equipment.
h. Crane operators shall not do anything which will divert their attention while operating cranes.
i. There shall be at least three full wraps (not layers) of cable on the drums of hoisting equipment at all times.

6. Machinery and Mechanized Equipment
a. All machinery shall be operated in accordance with the appropriate Safety Manual and Operating Instructions.
b. Preventive maintenance procedures recommended by the manufacturer shall be followed.

D. Job- and Site-Specific Safety Precautions

This section provides specific safety precautions for the particular job and job site as developed by the Safety Officer and the Salvage Master.

1. Special Safety Precautions
In addition to the above, the Salvage Master is responsible for any special safety precautions that are to be taken aboard the casualty and for compliance with good salvage safety practice as addressed in the Company Safety Manual.

In like manner, the Diving Superintendent is responsible for special safety precautions in diving operations as for compliance with the appropriate OSHA and US Coast Guard Regulations and for compliance with his company's Safe Practices Manual.

The Vessel Operations Manager is responsible for any special maritime safety precautions suited to the operation and its particular conditions and for compliance with good maritime safety practice and with the Safety Manuals of the company or company's involved in the operation.

E. Safety Briefings
1. All employees should be made aware of the Accident Prevention Program. They will attend daily safety meetings and should be encouraged to report any dangerous conditions to their supervisors. All personnel shall receive an initial orientation/briefing on the Site Safety Plan which will be documented by means of a signature sheet. A typical Safety Plan Acceptance Sheet is provided as Attachment 3.

2. Field supervisors will conduct safety meetings each day for all workers. A brief of the meeting giving date, time, attendance and subjects discussed shall be retained on site and a copy given to the Safety Officer. As a minimum, the subjects covered shall include:

- a review of safety hazards and dangerous situations encountered, corrective actions taken, effectiveness of these actions, and any additional recommendations.
- status of unmet safety recommendations.
- new hazards or safety requirements and procedures.
- employee comments/feedback.

3. All visitors to the site, including subcontractors, will receive an orientation/briefing on the Site Safety Plan as applicable to the purpose of the visit or subcontractor work. Subcontractors will be responsible for the safety of their employees and will have a subcontractor safety plan that meets the applicable requirements of this Site Safety Plan. The subcontractor safety plan will be reviewed and approved by the Safety Officer as well as by operational managers before the subcontractor begins work.

4. Copies of forms for acknowledgement of initial briefings and for daily safety briefing records are provided as Attachments 4 and 5.

F. Personal Protective Equipment and Safety Equipment.

1. Employees shall wear clothing suitable for the weather and work conditions; the minimum for field work shall be short sleeve shirt, long trousers, and leather or other protective work steeltoed shoes or boots and hard hats. Foul weather gear appropriate to existing conditions may be worn.
2. Persons involved in activities with potential exposures to hazardous materials will use PPE as prescribed in work plans.
3. Site visitors should be appropriately attired for their visit and if required trained in and equipped with the proper PPE.
4. Life rings shall be provided on each safety skiff and the casualty.
5. All employees working over or adjacent to water shall wear life vests.
6. All floating plant shall be equipped in compliance with applicable Coast Guard regulations.

G. Monitoring Equipment and Procedures

If monitoring of the presence or concentrations of hazardous materials is required by the salvage operator, the monitoring equipment and procedures should be described in this paragraph. A statement that monitoring is required in accordance with procedures and with equipment provided In an attachment is acceptable. If no monitoring is required, a statement should be made to that effect.

H. Decontamination

If decontamination of people and equipment is required by the salvage operation, the equipment and procedures should be described in this paragraph. A statement that decontamination is required in accordance with procedures and with equipment provided in an attachment is acceptable. If no decontamination is required, a statement should be made to that effect.

I. Medical Surveillance

If most on-site personnel in the salvage operation are on the Medical Surveillance Program meeting the requirements of 29 CFR 1910.120, and ANSI Z-88.2, depending on the PPE and site-specific tasks, it should be stated here. It should also be stated if, based on the risk assessment, not all personnel are required to have current OSHA or a medical exam. If, at any time, the risk exceeds the assessment, the Safety Officer will direct personnel to avoid the affected areas.

VII EMERGENCY PROCEDURES AND FACILITIES

1. Workers and supervisors shall be alert to the dangers associated with the site and the operations at all times. If an unanticipated hazardous condition arises, stop work, evacuate the immediate area and notify the Safety Officer.

2. Telephone numbers or other means of quick communication to the police, Coast Guard and emergency medical treatment shall be posted at the site. Emergency numbers are:

Coast Guard
Fire /Police/Ambulance
Poison Control Center
Helicopter Services
Safety Officer
Salvage Project Manager
Salvage Master
Diving Superintendent

3. Hospitals:
Closest Hospital: ___________________________________
Distance: ______________miles
Name:
Address:
Telephone:

Driving Directions:
Level of Trauma Care
Lifeflight Helicopter YES/NO
Helicopter Landing Facilities YES/NO, Day/Night

Second Closest Hospital: _______________________________________
Distance ________________miles
Name:
Address:
Telephone:

Driving Directions:
Level of Trauma Care
Lifeflight Helicopter YES/NO
Helicopter Landing Facilities YES/NO, Day/Night

Maps of the routes to each hospital are provided as Attachments 6 and 7.

4. A copy of the Accident Prevention and Response Plan will be available at the job site for ready reference by all employees. The plan will be maintained by the Salvage Master and Safety Officer.

5. The Salvage Master ________________________ will be responsible for communications at the site. The emergency radio channel is ________. This channel is reserved for all emergency communications at the site. The site dispatcher will be responsible for requesting all outside emergency support, including air evacuations.

6. Emergency signals:
a) Fire/Explosion - 3 short blasts on air horn
b) Stop work at site and evacuate - Continuous blast on air horn
c) All clear - Verbal clearance from supervisor
d) Test - 1 short blast on air horn

7. Supervisors will instruct employees on their work site-specific evacuation plan.

8. First aid kits are provided at all work sites, aboard all vessels and in the Safety Officer's vehicle. The first aid kit at the diving station and recompression chamber shall be appropriately equipped for dealing with diving accidents.

VIII ACCIDENT REPORTING AND RECORDKEEPING

1. Employers and immediate supervisors are responsible for reporting all injuries and illnesses to the Safety Officer and their operational manager within 24 hours.

2. Injured or ill persons are responsible for reporting all injuries and illnesses as soon as possible.

3. A daily record of all accidents and first-aid treatments shall be maintained on prescribed forms on site by the supervisor for review by the Safety Officer.

4. The Salvage Master will prepare a "First Report of Accident" on all employee injuries and send it to the home office where it will be reviewed and forwarded to the insurance carrier, other appropriate agencies and the contracting officer in a timely manner.

5. Third Party Accidents should be reported to the supervisor immediately. Any aid necessary should be rendered and any operation which might be causing the dangerous condition would cease until it is determined how and why the accident occurred. The accident should be reported to the home office in writing along with sketches, if possible. The home office will notify the proper agencies.

6. All personal injuries and property damage in excess of $250.00 will be immediately reported to the supervisor.

7. All of the job accidents should be recorded on OSHA Form No. 300 which is maintained/posted at the job site.

8. Any follow-up material received at the job site will be sent to the home office for proper handling.

IX SIGNALS, WARNING SIGNS, AND SIGNALING

1. Only persons who are dependable and qualified by experience with the operations being directed shall be used as signal persons.

2. Warning signs shall be placed to provide adequate warning of hazards to workers and the public. They shall be removed when the hazards no longer exist.

3. Signs, tags, and labels shall be provided to give adequate warning and caution of hazards and instruction and directions to workers and the public.

4. Emergency signals:
a) Fire/Explosion - 3 short blasts on air horn
b) Stop work at site and evacuate - Continuous blast on air horn
c) All clear - Verbal clearance from supervisor
d) Test - 1 short blast on air horn

5. Verbal communications will be used among team members to communicate with one another on-site. If this communication is not possible, the hand signals listed below will be used.
a) Hand gripping nose - Unusual smell detected.
b) Thumbs up - Okay: I am all right or I understand.
c) Thumbs Down - No, Negative
d) Grip partner's wrist or both hands around waist. Leave the area immediately.

6. Off-site communications available on site include cellular telephones and radios.

SITE SAFETY AND HEALTH PLAN (SSHP) ATTACHMENTS

Number Title

1 **Site Plan ---** Job Specific Not attached

2 **Work Plan ---** Job Specific Not attached

3 **Safety Plan Acceptance ---** Sheet Sample attached

4 **Initial Safety Briefing ---** Sample attached

5 **Daily Safety Briefing ---** Sample attached

6 **Hospital Route Map ---** Job Specific Not attached

7 **Hospital Route Map ---** Job Specific Not attached

SITE SAFETY AND HEALTH PLAN ATTACHMENT 3 - Safety Plan Acceptance Sheet

For

Salvage of M/V _____________ at________________________________

I have read and agree to abide by the contents of the Site Safety and Health Plan and I have attended the Safety Briefing for the aforementioned site.

NAME

OFFICE

SIGNATURE

DATE

Person Presenting the Safety Briefing:

ATTACHMENT 4—Initial Safety Briefing Checklist (Check Subjects Discussed)

Site Name: Salvage of M/V at Date/Time:________

General Information

__________________ Purpose of Job/Visit
__________________ Identify Key Site Personnel
__________________ Training and Medical Requirements

Specific Information

__________________ Site Description / Past Uses

__________________ Results of Previous Studies

__________________ Potential Site Hazards

__________________ Safety Procedures

__________________ Site SOPs

__________________ Site Control and Communications

[ ] Emergency Hand Signals

__________________ Emergency Response

[ ] Location of First Aid Kits

[ ] Emergency Phone Numbers and Location

[ ] Location of Nearest Medical Facility and Location of Map to Facility

__________________ PPE and Decontamination

Stress the following during the briefing: ***If an unanticipated hazardous condition arises, stopwork, evacuate the immediate area, and notify the Safety Officer.***

ATTACHMENT 5—Daily Safety Briefing Checklist

Salvage of M/V at Date/Time:________

Subjects Covered

Attendees:
____

Briefer

ANNEX B ROLES AND RESPONSIBILITES OF A SALVAGE TEAM

B1 Typical Organizational Matrix

Given that each salvage operation is unique no one standard organizational structure or matrix may apply for salvage/wreck removal projects. An example of a possible organizational matrix is provided here.

B2 Responsibilities

It is a high priority in any salvage/wreck removal operation that working conditions are favorable to the safety and health of employees and any persons at the site of the casualty. All members of the salvage team are committed to protecting all persons at the site of the casualty and all property from accidental loss or damage.

To fulfill this commitment, the salvage team will provide support and maintain a safe and healthy work environment that complies with and at times exceeds regulatory requirements as the team strives to eliminate any foreseeable hazards which could cause personal injury or illness, loss or damage to property or loss to the environment. The role and responsibilities of each key member of the salvage team are discussed in the following sections.

B2.1 Salvage Master

The Salvage Master has overall accountability in all respects for the salvage/wreck removal operation. He is responsible for the formulation, development, implementation and monitoring of the salvage plan to ensure an effective and efficient salvage operation. He is ultimately responsible for its success or failure.

Above all others, the Salvage Master is responsible for accomplishing the goals of the salvage operation, the safety of the salvage personnel, the equipment used during the salvage operation, preservation of property, and the protection of the environment. All other positions described below report to the Salvage Master and provide him with advice and assistance in the particular area of expertise.

The Salvage Master's specific responsibilities with regard to safety are:

- review and execute the Site Safety Plan for the operational area.
- ensure that personnel safety and health receive top priority in all phases and areas of operations.
- coordinate safety and health issues and requirements pertaining to both pollution response and salvage operations.
- serve as the final safety and health authority for the salvage operations.
- review and approve accident reports.
- review and approve supervisory safety meeting minutes/reports.
- order work to stop if there is an immediate danger to life and health (IDLH) and consult with supervisor and managers to determine and carry out corrective
- actions before allowing work to resume.
- report safety deficiencies and provide recommendations to correct deficiencies to ICS Command; monitor implementation of recommendations.
- review work plans to identify safety deficiencies and requirements and coordinate with supervisor and manager to resolve deficiencies and meet requirements.

B2.2 Logistics Manager

The Logistics Manager is directly responsible to the Salvage Master for planning, organizing, directing and controlling all support services, both materiel and administrative, during the entire salvage operation. He assists the Salvage Master and the Safety Officer in the interface with regulatory and other interested parties and is tasked with making these individuals aware of the safety program for the particular salvage/wreck removal operation. The Logistics Manager must ensure that all safety equipment is available to suit the tasks for which the equipment will be used.

B2.3 Diving Superintendent

The Diving Superintendent reports to the Salvage Master and is responsible for all diving operations deployed during the salvage/wreck removal operation, including:

- the preparation of all diving plans to ensure that procedures issued by the regulatory authority responsible for the enforcement of the regulation for the safety and protection of divers are identified, are incorporated into the salvage plan and will be observed by the diver conducting the dive;
- the provision of safe working conditions to the highest standards;
- emergency and contingency planning;
- maintenance and verification that all diver logbooks are up to date;
- verification and inspection of all diving equipment;
- verification of fitness to dive certifications, as applicable.

B2.4 Vessel Operations Officer

The Vessel Operations Officer is accountable for managing and directing the cost effective operation and deployment of all vessels and other delivery platforms used to fulfill the salvage plan requirements during the salvage/wreck removal operation.

He is responsible for the management of the acquisition and in-service support for all vessels and other delivery platforms and their installed equipment identified in the salvage plan and to ensure that the vessels and other delivery platforms and their installed equipment and systems are maintained in accordance with the relevant standards and regulations throughout their in-service operation in support of the salvage/wreck removal operation.

An inspection of all vessels employed in the salvage/wreck removal operation should be made when possible and practicable.

Safety Responsibilities of the Logistics Manager, Diving Superintendent and Vessel Operations Officer

The Logistics Manager, Diving Superintendent and Vessel Operations Officer are specifically responsible to:

- assist in the development, review and execution of the Site Safety Plan for their operational area;
- assist in the coordination of safety and health issues and requirements impacting other operational areas;
- assist in monitoring the effectiveness and implementation of the Site Safety Plan through their supervisors the Safety Officer;
- review and approve all accident reports for their operational area;
- Review and approve work plans.

B2.5 Safety Officer

The Safety Officer reports directly to the Salvage Master on a day-to day basis and is accountable to him for all matters concerning safety, including safety of personnel, equipment and protection of the environment. Specifically the Safety Officer is responsible to:

- create a site specific safety plan;
- implement the salvage safety plan;
- immediately correct action of any noted deficiency;
- create and implement other safety documentation, when necessary;
- brief visitors and subcontractors on Site Safety Plan;
- conduct investigations of accidents, prepare reports, and review reports and results with operational managers;
- oversee Safety meetings and briefing, conduct periodic safety inspections and report findings and results to the Salvage Master;

- review and approve requirements for personal protection equipment (PPE), oversee use of PPE, monitor PPE use;
- review and maintain MSDSs if necessary;
- monitor reported adverse physical conditions of personnel and determine if the individual is capable of participating in an activity.

Safety Responsibilities of Supervisors

- Review, monitor and implement Site Safety Plan.
- Enforce the wearing and proper use of all required PPE, and established safety
- and health procedures.
- Monitor employee condition during work.
- Inspect the work site for safety deficiencies, safety violations, and unsafe situations.
- Make on-the-spot corrections of safety hazards whenever possible, or if not possible, contact Safety Officer.
- Stop work if there is an Immediate Danger to Life and Health situation, notify the Safety Officer and the Salvage Master, evacuate if necessary, and do not resume work until cleared by Safety Officer and Salvage Master.
- Assist the Safety Officer in the investigation of accidents.
- Revise and resubmit work plans when there are changes in procedures, as required.
- Report all injuries and illnesses and physical conditions that may impact performance and safety (blisters on feet, weak knees, twisted ankle, colds, fever, etc.) to the Safety Officer within 24 hours.

B2.6 Safety Responsibilities of All Hands

- Work safely.
- Review and comply with the Site Safety Plan.
- Comply with established safety procedures and work plans.
- Use PPE as trained/instructed; do not modify PPE without consulting with the assigned supervisor and the Safety Officer.
- Report all dangerous situations or safety hazards to supervisor.
- Stop work if an Immediate Danger to Life and Health situation exists and stopping work will not endanger other workers/operations; in all events, report situation immediately to supervisor.
- Monitor the condition of other employees, especially work partners at hazardous work sites.
- Report all injuries, illnesses and physical conditions that may impact performance and safety to supervisor.

ANNEX C DIVING OPERATIONS

1.0 Basic Requirements

1.1 Diving operations shall be conducted in accordance with the requirements, standards and regulations of the Occupational Safety and Health Administration (OSHA), the Hazardous Waste Operations and Emergency Response (HAZWOPER) standards and the U.S. Coast Guard (USCG) as appropriate and applicable to the location and mode of dive planned.

1.2 The number of divers has been selected to assure operations can be safely conducted within diving time/depths limits. The diving crew will be required to mobilize all diving safety equipment, including appropriate decompression chambers. All diving tasks will be carefully planned and tested. Tools and fixtures will be developed to assist divers and reduce inherent safety risks as much as possible.

1.3 The Salvage Master shall ask and shall receive assurances form the Diving Superintendent that the diving operation will be conducted in accordance with all applicable regulatory requirements including verification of diver logbooks, proper equipment and fitness to dive.

1.4 The Salvage Master shall develop a site specific checklist to ensure that procedures are followed in the conduct of diving operations.

2.0 Planning of Diving Operations

2.1 A detailed plan of diving operations including the contingency plan will be presented by the Diving Superintendent and will be discussed between the Diving Superintendent and the Salvage Master and agreed upon by all partied prior to the commencement of diving operations. The plan should include:

- a description of the underwater work to be done;
- the location of the work;
- the number and time of the dive or dives;
- the number of divers that will be in the water at any one time;
- the number of dive attendants that will be on duty while divers are down;
- the signal system that will be used to communicate with the divers;
- a list of requirements to be met by the dive vessel (shutdowns, lockouts, lookouts, boats, energy sources, tools, lines etc.);
- a set of contingency plans to deal with foreseeable emergencies;
- this plan will include the location and phone number of the nearest hyperbaric chamber.

2.2 A copy of the plan shall remain on board the dive vessel.

3.0 Conduct of Diving Operations

3.1 In accordance with appropriate regulations, applicable signals and shapes will be displayed during the diving operations. Where required, appropriate warning devices such as buoys, flags, lights, etc. shall be displayed to define the restricted access limits of the diving operations. Where appropriate a NOTICE TO SHIPPING will be issued.

3.2 The Salvage Master, in consultation with and approval of the Diving Supervisor, will ensure that the propulsion machinery, sea-suction and underwater discharge mechanisms, cathodic protection system or any other mechanism that could pose a threat to the safety of the divers are secured in such a manner as to render the work site safe for diving operations.

3.3 A general announcement is to be made informing all personnel that diving operations are taking place, and a notice to this effect posted in a suitable location in the engine room. The appropriate machinery lockout procedures must be taken and logged.

3.4 A Diving Operations Checklist (see sample checklist below) will be completed prior to the commencement of the actual dive and the return of divers and the completion of diving operations shall be logged immediately upon completion. The checklist is divided into three components – personnel, equipment and operations. This checklist is intended to provide a basic compliance indication consistent with the minimum health and safety requirements for commercial divers.

SAMPLE DIVING OPERATIONS CHECKLIST

PART ONE – PERSONNEL

1.0 Designated On scene person-in charge Name ___________________________

Signature________________________

2.0 Diving Supervisor Name ___________________________

Signature________________________

3.0 Dive Team is qualified to conduct assigned tasks and consists of the person in charge, dive tender and line-tended diver

4.0 All Dive Team members have required certification:

- Current CPR and First Aid Certification

PART TWO – EQUIPMENT

1. Air compressors must be equipped with a volume tank with a check valve, a pressure gauge, a relief valve and a drain valve.

2. Air tanks for air compressors are located away form areas containing exhaust fumes or other hazardous materials.

3. An air purity analysis certificate is available for review at the dive location.

4. Surface-supplied helmets have a non-return valve, an exhaust valve and a two-way communications system.

5. Breathing gas supply hoses have a working pressure equal to or greater than the working pressure of the total breathing system, have a bursting pressure four times or more the working pressure, and evidence of annual testing to 1.5 times their working pressure has been supplied.

6. Each diver has a depth gauge.

7. A diving ladder or stage is available to assist entry and exit.
8. A diving bell is available for use for divers with an in-water decompression time greater than 120 minutes.
9. A diver's safety harness, with a positive buckling device capable of distributing the pulling force of the umbilical is available for use in surface-supplied dives.
10. Weights are equipped with a quick release system.
11. Decompression chambers are properly equipped, maintained and approved for use by appropriate authorities.
12. The decompression chamber has:
    - pressure relief device;
    - two-way communications between compartments and outside;
    - a pressure gauge in each compartment;
    - view ports;
    - sufficient illumination to allow gauges to be read;
    - an interior fire extinguishing system;
    - a system to override interior breathing and pressure supply controls.

PART THREE – DIVING OPERATIONS

1. Detailed Diving Operations Plan is available on site.

2. Contingency Plan in the event of an emergency is available on site.

3. First aid equipment, including hand held resuscitator is available on site.

4. A pre-dive safety briefing and equipment inspection has been conducted.

5. Appropriate warning devices (buoys, flags, lights, etc.) are displayed to define the restricted access limits of the diving operations.

6. The designated on-scene person in charge maintains a dive log.

SCUBA DIVING

7. Scuba diving must be conducted in depths less than 130 fsw, within the nodecompression limits an din currents less than 1 knot.

8. A standby diver is available while the scuba diver is in the water.

9. The scuba diver is either line-tended or accompanied by another diver with continuous visual contact.

10. In physically confining space, scuba diver must be line tended by another diver from the underwater point of entry.

11. Scuba diver is carrying a reserve breathing gas supply.

SURFACE -SUPPIED AIR DIVING

12. Surface-supplied air diving must be conducted at a depth of 190 fsw or less.

13. Each diver must be continuously tended.

CONTAMINATED WATER DIVING SAFETY CHECKLIST

1. Conduct a Hazard Evaluation which will include:
- a sampling study before diving if contaminant is unknown to establish 3 zones of contamination – support or cold zone, contamination reduction zone, exclusion or hot zone;
- determination of degree and extent of contamination;
- determination of duration of potential exposure to contaminant;
- determination of environmental exposure due to geographic location (i.e. thermal conditions, depth, current speed, weather forecast, etc.).

2. Approved Medical Monitoring Program for divers and personnel potentially
exposed to contamination.

3. Preparation of site specific safety plan and assignment of safety officer.

4. Testing of diving equipment to ensure:
- each piece of equipment including umbilical and connectors are compatible with contaminants;
- diving system materials matches durability;
- diving system leak test is conducted prior to dive

Review diving equipment durability, material permeation rate, potential breakthrough time.

5. Ensure that divers and topside personnel are trained to conduct contaminated water diving, including:
- decontamination procedures;
- dry suit diving (donning, doffing and emergency procedures);
- leak testing procedures;
- maintenance, repair and proper use of contaminated water diving systems;
- sampling procedures;
- emergency procedures;
- HAZWOPER training plus annual refresher).

6. Backup team or standby divers are equipped and trained to the same standards as the entry team.

7. Decontamination system is set up and manned by trained responders.

8. An evaluation process is in place to measure the effectiveness of the decontamination system.

9. The disposal plan for contaminated equipment and contaminated wastes is approved by the Salvage Master.

10. Comprehensive records are maintained, including:
- medical surveillance records;
- a detailed description of exposures to hazardous substances;
- complaints following exposures to hazardous substances;
- a complete log of response actions;
- equipment maintenance records.

Annex 5

Wreck information and Wreck Management Plan

1. Introduction

This Annex provides a summary of the known characteristics of the target wrecks and utilises that information to provide a Risk Assessment.

Four categories of the risk are included in the assessment.

1) Risk A: risks for the implementation
   - Data Risk
   - Site Assessment Risk

2) Risk B: risks if not removed
   - Environmental Risk
   - Economic Risk

In all cases three categories of risk, High, Medium and Low are defined. A summary risk assessment is then provided according to Table 1.

Table 1 Wreck Risk Assessment Criteria

	Category	Risk Assessment		
		Low	Medium	High
Risk A	Risk from Data Quality	No constraint to removal	Conditions applied to removal	Not suitable for immediate removal
	Site Assessment	Low	Medium	High
	Action	No requirement for removal	Cost / Benefit Assessment required	Further Evaluation
Risk B	Environmental	Low	Medium	High
	Action	No requirement for removal	Monitor wreck	Remove Wreck
	Economic	Low	Medium	High
	Action	No requirement for removal	Cost / Benefit Assessment required	Remove Wreck

Overall Project Risk Assessment

The overall risk assessment for each wreck is shown below.

		Risk A: risks for the Implementation		Risk B: risks if not removed	
Ref	Wreck	Data	Site	Environmental	Economic
1	Al-Nasr	Low	Low	Low	High
2	Navy boat/B07	Low	Low	Low	High
3	Navy boat/B08	Low	Low	Low	High
4	Unknown	Low	Low	Low	Low
5	Fuel/B 07	Low	Low	Low	Medium
6	Nigakie Karam	Medium	Low	Low	Low
7	Hilla	Low	Medium	Low	Low
8	Hakmony	Low	Medium	Low	Low
9	Noor Tug	Low	Low	Low	Low
10	Partrol/B 02	Low	Low	Low	High
11	Dhow	Low	Medium	Low	Medium
12	BFC II	Low	High	Medium	High

Wrecks

The wrecks assessed under this project are shown in Table 2. And the locations of the wrecks are shown in Figure 1.

Comments

Spill trajectory modelling and fate modelling are not available for evaluation purposes. The likely probability of impact is assumed based on past movement of oils and dredged material.

Table 2 Wreck Details

No.	Name	Length (m)	Breadth (m)	Depth (m)	Weight (tones)	Type	Location	Position		Condition	Remarks	Risk Summary	Priority
								North	East				
1	Al-Nasr	57	12	5	990	Bunker/B	KZP	30 12.234	47 52.586	Upright	50% buried	P ,X	1
2	Navy boat/B07	30	6.5	3.5	250	Iraqi Navy	KZP B11	30 12.240	47 52.640	Upright	50mtr out from shore	D, P ,X, B	1
3	Navy boat/B08	30	6.5	3.5	250	Iraqi Navy	KZP B11	30 12.240	47 52.640	Upright	50mtr from shore	D, P, X, B	1
4	Unknown	40	12	3	550	Fuel Barge	KZP B. No. 9-10	30 12.084	47 52.754	Up-right	Iraqi	2003	1
5	Fuel/B 07	55	15	3.5	550	Fuel barge	KZP B5	30 11.530	47 53.310	Upright	Sunk 1995	D, P, X, B	1
6	Nigakie Karam	25	5	3	N/A	Dhow	Khawr KZP	-	-	-	-	N, P	1
7	Hilla	110	18	14	2,737	Dredger	Khawr U/Q	29 59.994	47 59.994	Upright	Debris both sides	P	2
8	Hakmony	135	17	12.2	2,900	Cargo	Khawr U/Q	30 00.068	47 59.689	On STBD	90% buried	N, P, X, D	2
9	Noor Tug	25	8	3	250	Supply/V	Khawr U/Q	30 00.068	47 59.689	N/A	Under the Hakmony	P	2
10	Partrol/B 02	30	6.5	3.5	250	Iraqi Navy	Khawr U/Q	30 00.068	47 59.689	Upright	Port side/ Hakmony	X	2
11	Dhow	25	5	5	Unknown	Dhow	Buoy 7	29 48.846	48 28 890	Buried	100%buried	N	2
12	BFC II	110	16.33	9.93	4093	Tanker	Khawr U/Q	30 10.070	47 59.700	Capsized	7000 ton Crude Oil	N, P	2

Summary key: D:Dredging, P: Pollution, X: UXO, N:Navigation, B: Berths

Figure 1 Locations of the Wrecks

2. Data Risk

Three categories of data risk are defined as follows:

Evaluated – Low Risk	Sunken wreck site has been accurately located and wreck has been inspected and fully evaluated by divers and/or remotely operated vehicles.
Known – Medium Risk	Wreck site has been accurately located but not physically inspected.
Suspecte **-** *High Risk*	Sunken wreck site location is suspected based upon documented information but actual location is not known nor inspected.

The conditions imposed by the categories of assessment are:

Low Risk Constraints to removal can be adequately defined and appropriate management plans prepared.

Medium Risk Wreck removal may be undertaken provided all three criteria below are met:

(i) There is high economic risk from wreck remaining on site.

(ii) An environmental management plan is in place. This must include: a) Spill containment plan b) UXO assessment and removal capacity; c) dive capacity to assess wreck conditions as exposed.

(iii) If the wreck is fully covered, or covered to the point that it must be largely exposed to allow full assessment, the wreck removal contract must require the wreck is removed once it is exposed.

High Risk No wreck removal should be undertaken until site is confirmed and status assessed.

3. Site Risk

Site risk assessment criteria are listed below in Table 2.

Table 2 Site Wreck Risk Assessment Criteria and Ratings

Risk Assessment Criteria and Questions	High Risk	Medium Risk	Low Risk
1) What is the size, type, and construction of the sunken vessel?	>10000 tonnes	1000-10000 tonnes	<1000 tonnes
2) What is the likely quantity of oil on board?	High >1000 tonnes	Moderate 100-1000 tonnes	Low <100 tonnes
3) How accessible is the wreck to shore?	Nearshore or lagoonal	Offshore but accessible	Open sea
4) How deep is the water where the wreck rests?	Access by conventional SCUBA	At limit of diving capability	Deep water submersible access only
5) Has the wreck a history of previous oil releases?	Documented history of oil leaks	Occasional oil leaks or not known	None
6) What oil types are contained in the wreck? Are they persistent oils once spilt at sea?	Very persistent oil	Medium grade oils	Non-persistent oil
7) Is the wreck subject to severe weather events, such as storms, monsoons, hurricanes, typhoons?	High degree of severe weather possible	Moderate degree of severe weather possible	Low degree of severe weather possible
8) What is the stability of the seabed and what are the sediment effects on the wreck movement and integrity?	Unstable and/or high degree of movement.	Relatively stable or not known	Known to be a stable seabed
9) What is condition of the wreck, degree of deterioration, and its fragility to natural disturbance effects?	Significant deterioration	Moderate deterioration	Mostly intact
10) Is the wreck subject to high level of hydrodynamic forces on the seabed?	High level of sub-sea current.	Medium level of hydrodynamic forces	Low level of currents and driving forces

For this project the following ranking system is adopted.

Risk Score	Risk Assessment
7 or more	High
3-6	Medium
< 3	Low

Risk Assessment Criteria and Questions	High Risk	Medium Risk	Low Risk
1) What is the size, type, and construction of the sunken vessel?	3	1	0
2) What is the likely quantity of oil on board?	4	2	0
3) How accessible is the wreck to shore?	0*	1	0
4) How deep is the water where the wreck rests?	0*	1	0
5) Has the wreck a history of previous oil releases?	3	1	0
6) What oil types are contained in the wreck? Are they persistent oils once spilt at sea?	3	2	0
7) Is the wreck subject to severe weather events, such as storms, monsoons, hurricanes, typhoons?	4	2	0
8) What is the stability of the seabed and what are the sediment effects on the wreck movement and integrity?	3	1	0
9) What is condition of the wreck, degree of deterioration, and its fragility to natural disturbance effects?	3	1	0
10) Is the wreck subject to high level of hydrodynamic forces on the seabed?	3	2	0

* These risk categories would normally be a reflection of:
(i) the public health an open shore context / public beach or shopreline
(ii) likelihood of rapid and immediate contamination of shoreline / inter-tidal area.
(iii) high energy environment of a open sea shoreline context.
These would not apply to the estuarine quay side context of project target wrecks. In these circumstances low values for the high risk assessment have been applied.

High Site location and characteristics are such that:

(i) there is significant risk that wreck condition will deteriorate rapidly and the wreck contains quantities of persistent pollutants that pose a threat to the environment;

(ii) the wreck is easily accessible to the public and poses a signficant health and safety risk.

(iii) the wreck is located close to shore and will cause immediate damage to intertidal systems if it leaks.

A high risk site should be subject to a cost / benefit assessment to determine the requirement for wreck removal. The decision to remove the wreck remains the decision of the relevant authorities.

Medium Site location and conditions are such that:

(i) there is some risk that wreck condition will deteriorate over the medium and long term;

(ii) the wreck contains quantities of moderately persistent pollutants;

(iii) the wreck is moderately accessible to the public and poses some health and safety risk.

A medium risk site would be subject to a cost / benefit assessment to determine the requirement for its removal and ranked accordingly. The wreck should be monitored to establish how conditions change over time and how these changes may affect its ranking.

Low Site location and conditions are such that:

(i) there is a low risk that wreck condition will deteriorate, even over an extended period;

(ii) the wreck contains no persistent oils;

(iii) the wreck is moderately accessible to the public and poses some health and safety risk.

(iv) the wreck is remote from shore.

A low category wreck would not normally be subject to further evaluation or removal unless a requirement for removal is established by other criteria.

4. Environmental Risk

The environmental risk assessment criteria are listed below in Table 3.

Table 3 Environmental Assessment Criteria and Ratings for Sunken Wrecks

Risk Assessment Criteria and Questions	High Risk	Medium Risk	Low Risk
1) Are there areas of high environmental sensitivity in the region? Consider distribution of sensitive habitats such as marshes, mangroves, seagrasses, coral reefs, mud flats, and kelp beds.	High level of environmental sensitivity	Medium level of environmental sensitivity	Low level of environmental sensitivity
2) Does spill trajectory modeling indicates significant environmental resources at risk from oil releases?	High probability of impact	Moderate probability of impact	Low probability of impact
3) How unique, rare or diverse is the ecology of the area likely to be affected?	High	Medium	Low
4) Are rare or endangered wildlife located within the region or potential spill impact zones?	High level of protected species in region	Low level of protected species in impact zone	No protected species in zone
5) What sensitive wildlife species are at risk? Consider the diversity, number, locations, and seasonality.	High number and diversity	Medium number and diversity	Low number and diversity
6) Are there routes for transitory species, such as migratory birds and marine mammals?	High abundance	Occasional	None
7) What is the preservation or protection status of the area at risk? Considerations include: marine park, wilderness, world heritage, and conservation status?	High level of protection and preservation.	Moderate level of protection and preservation	Low or no level of protection and preservation
8) Are there any historical, cultural or archaeological resources in the area at risk, including war graves?	Significant resources and high value	Moderate level of resources	Low level or not present
9) Does the area at risk have subsistence fishing, traditional hunting /gathering or fish traps in the wreck area?	High degree of subsistence living in region	Medium level of dependency on subsistence	Low level or no dependency on subsistence
10) What is the extent of scientific, educational, or research interest in the area at risk?	High degree of interest	Occasional interest	Low or no interest

Three categories of environmental risk are defined:

High A wreck would be classified as High Risk under the following circumstances:

- Any categorisation as a high risk in the above Table.
- Five or more medium rankings in the Table above.
- Any combination of moderate Category 2 and one of Category 1,3,4, and 5.

Any wreck given a High Risk Ranking should be removed at the earliest possible time and a full environmental management plan must be prepared and implemented as part of the Wreck Management Plan.

Medium A wreck would be classified as Medium Category under the following circumstances

- Three or more medium rankings in the Table above and not classified as High Risk.

A medium risk site would need to be subject to further monitoring and if possible detailed assessment including a spill fate model and assessment of habitats at risk.

Low Any other classification.

A low risk assessed wreck should be subject to occasional non-specific. monitoring

5. Economic Risk

The economic risk assessment criteria are listed below in Table 4.

Table 4 Economic Assessment Criteria and Ratings for Sunken Wrecks

Risk Assessment Criteria and Questions	**High Risk**	**Medium Risk**	**Low Risk**
Are licensed commercial fisheries, fish farms, aquaculture, pearl farming etc in the area at risk?	High level of economic value	Moderate level of economic value	Low level of economic value
What other significant industrial uses, economic resources or important uses of the sea are present in the area at risk (e.g. water intakes, aquaria, salt-pans)?	High level of economic use and dependency	Medium level of economic use and dependency	Low level of economic use and dependency
What important recreational or tourism activities are carried out in the area at risk (e.g., sport fishing, diving, snorkeling, boating, sightseeing, surfing, coastal recreational use)?	High level and/or high degree of economic value	Medium level and /or moderate degree of economic value	Low level and /or low degree of economic value
What level of marine use occurs within the area of the wreck?	High degree and range of marine uses	Medium degree and range of marine uses	Low degree and range of marine uses
Is the region used as a marine transport corridor?	High Level of Use	Moderate Level of use	Low Level of use
Does the wreck contain quantities of unexploded ordnances (UXOs) or other dangerous goods (DGs) that would pose a safety hazard or require exclusions zones near the wreck?	High quantities of UXOs and/or DGs known on wreck	Moderate or unknown quantities of UXOs and/or DGs on wreck	Low or no UXOs/DGs on wreck

Three categories of economic risk are defined:

High A high risk classification would be as follows:

- Any classification of a high risk in the above Table.
- Three or more medium rankings.

Any wreck given a High Risk Ranking should be removed at the earliest possible time.

Medium A wreck would be classified as Medium Category under the following circumstances

- Three or more medium rankings in the Table above and not classified as High Risk.

A medium risk site would need to be subject to a cost / benefit study to determine whether removal is judtified. This would include further assessment of environmental risks.

Low Any other classification.

A low risk assessed wreck should be subject to occasional non-specific. monitoring

Annex 6

Oil Spill Contingency Plan

A Wreck Management Plan (WRMP) must be prepared for each individual Salvage operation.

It is intended that a Draft WRMP is attached to the Wreck Contract Tender Documentation and thus made available to potential contractors. This will inform contractors of the nature and scope of environmental management proposed to be adopted for the contracts and of their responsibilities in that regard.

The final contract documents will require that a WRMP is prepared and submitted to IPA for approval prior to commencement of any wreck removal contract. The final WRMPs will be prepared by the Contractor and will be based on the Draft provided during the tender process. Compliance with the approved WRMP will be contractually binding.

The final WRMP will comprise two elements.

Part 1 shall comprise a detailed Salvage Health and Safety Plan for Salvage Operations (SHSP). This is provided in Annex 8.

Part 2 shall comprise an Oil Spill Contingency Plan (OSCP) for each Wreck. A generic OSCP has been prepared for the Project Wreck Removal program by the Salvage specialist.

This Annex contains a Draft Oil Spill Contingency Plan.

1. ALERT AND NOTIFICATION

1.1 Internal Alerting system
1.2 Notification requirements
1.3 Standard message of alert

2. SPILL RESPONSE ORGANIZATION CHARTS

2.1 Minor spill - Tier 1
2.2 Moderate or Major spill - Tier 2 and Tier 3

3. EMERGENCY CASES

3.1 Crisis management cell (CMC)
3.2 Pollution fighting units
3.3 Personnel on duty (recovery barges)

4. SPILL ASSESSMENT AND GLOBAL MANAGEMENT

4.1 General flowchart
4.2 Immediate action
4.3 Pollution interim report
4.4 Spill drift modelling and forecast

5. SPILL CONTROL AND CLEAN UP ACTION PLAN

5.1 Response selected options
5.2 Typical decision-making flowcharts
5.3 Logistics support
5.4 Storage drift modelling and forecast

6. HEALTH AND SAFETY POLICY DURING CLEAN-UP OPERATIONS

7. WRECK SPECIFIC ANTI-POLLUTION PROPOSALS

1. ALERT AND NOTIFICATION

1.1 Internal Alerting Systems

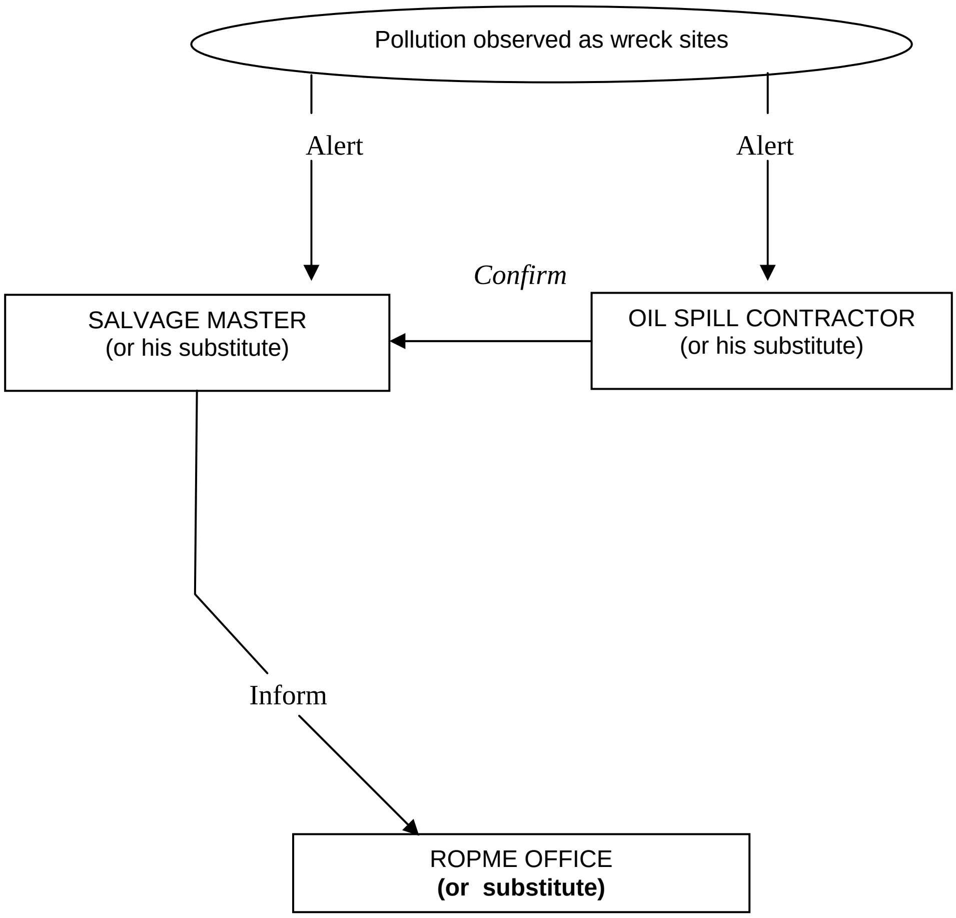


Figure 1 Internal Alerting Systems

1.2 Notification Requirements

Iraqi regulations do not contain any specific provisions for the notification of spills (form and notice). Therefore the notification structure outlined below has been developed specifically for project purposes.

Oil Spill Contingency Plan – Likely Cause of Spill and Response Tiers

No.	Cause	Type of spill	Tier classification (Likely Spill Size)
1	Operational spills during transfers between wrecks and supply-boat. Leak or rupture of flexible hose. Leak from a lubricant drum.	Crude oil Bunker oil Diesel Oil Lub oil	**Tier 1** (1 m^3)
2	Cutting through un-cleaned tank	Crude oil Bunker oil (FO N°6) Diesel oil	**Tier 1** (1 to 50m^3)
3	Structural failure/tank rupture during raising operations	Crude oil Bunker oil (FO N°6) Diesel oil,	**Tier 2** (50 to 300m^3)
4	Explosion of an UXO	Crude oil Bunker Oil (FO N°6)	**Tier 3** (300 to 2000m^3 over 3 hrs)

Oil Spill Notification Structure

TO BE ALERTED	TYPE OF INCIDENT	NOTIFICATION	FROM
Governor	Any threat for coastline	Immediately	SM
	Minor/moderate spill Mjor spill	Through reporting procedures Immediately by phone & fax	SM
State Police Force Officer	Any threat to coastline	Yes, immediately	SM
Harbour Master	Any threat to coastline	Yes, immediately	SM
ROPME	Minor spill < 50m^3 50m^3 to 500 m^3 > 500 m^3	Yes, in weekly report Immediate (phone & fax) Immediate (phone & fax)	SM
ROPME	Minor Spill < 50 m3 50< Spill< 500 m3 Spill> 500 m3	Yes, in DAILY report + weekly Immediate (phone & fax) Immediate (phone & fax)	SM
ROPME	* Spill > 500 m3	Yes, (fax)	SM

SM = Salvage Master

1.3 Standard message of alert

For internal reporting, the following standard message of alert will be used (see next page). This Message is to be considered as the preliminary. Detailed pollution statements (Interim report) will be issue as soon as possible (see section 5) and at regular intervals.

STANDARD MESSAGE OF ALERT

CORRESPONDENCE #

DATE AND TIME:

TO: Tel. No: Fax no:

WITNESS: Company: Function:

Place where the witness can be contacted (address):

Tel. No#1: Tel. No#2:
Fax no: other communication resources:

INCIDENT:

Source of spillage:
Date and time of the beginning of the incident:
Reason of spillage:

SPILL:

Type of products spilled:
Continuous flow: ☐ yes ☐ no Flow-rate (approx.): m3/h

Spill surface area: mx m

Spill vectors (tick the appropriate box and circle the direction):

☐ Main axe (to) ☐ Wind direction (from) ☐ Current direction (to)
N, NE, E, SE, S, SW, W, NW N, NE, E, SE, S, SW, W, NW N, NE, E, SE, S, SW, W, NW

Assess risk of further spillage:

LOCAL CONDITIONS:

Weather:

Wind speed:

Sea conditions:

Visibility:

All data must be completed as far as possible (delete if no answer)

2. SPILL RESPONSE ORGANIZATION CHARTS

2.1 Minor Spill: Tier 1 (< $50m^3$)

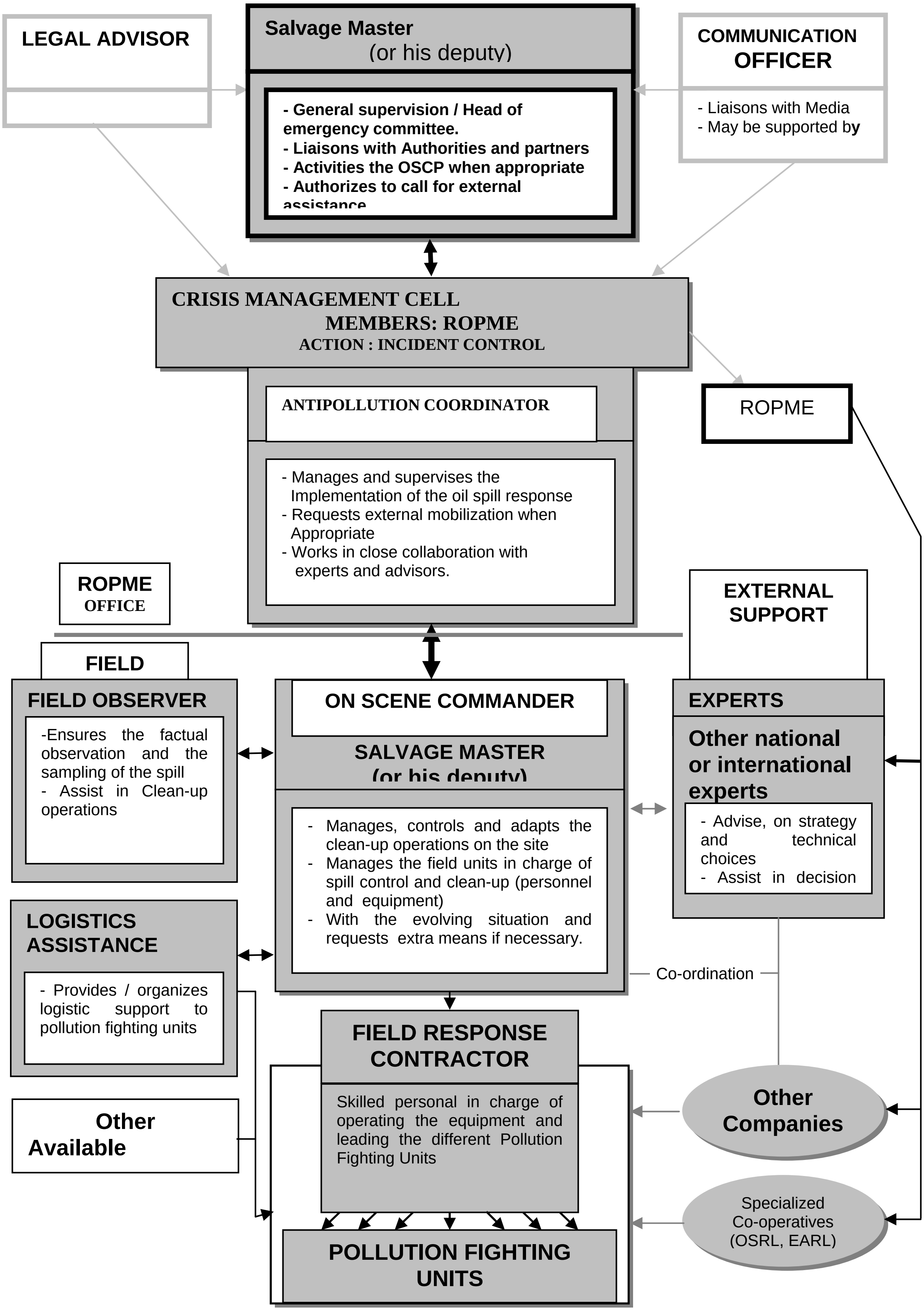
- NOT NECESSARY TO IMPLEMENT THE OSCP

- NOTIFICATION AS PRESCRIBED ABOVE (section 4-1-2).

- ACTION BY CONTRACTOR AND PERSONNEL WITH THE EQUIPMENT AVAILABLE ON BOARD.

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE ADEQUATE RESPONSE TO ANY MINOR SPILL PROBLEM

2.2 Moderate or Major Spill: Tier 2 and Tier 3 (- 50 m^3 to – 2000m^3)



3. EMERGENCY CASES

3.1 Crisis Management Cell (CMC)

In case of significant oil spill (over 50 m3), the Operation Manager (or his deputy) will ASAP Convene in the designated Crisis Room the first meeting of the CMC.

The composition of CMC may be variable according to the spillage circumstances. As a minimum, it will include :

- Salvage Master or any other emergency Leader, the administrative & finance manager of the crisis (Extra personnel, customs clearance…) and Responsible for Communication with assistance of DirCom.
- Antipollution contractor
- ROPME observers if required

Planning of the response and activation of additional support personnel and equipment will be managed By Salvage Master.

3.2 Pollution Fighting Units

As shown in the Spill Response Organisation Chart, UNDP will set up Pollution fighting Units in Charge of implementing the spill response (control and clean-up). These are elementary units for carrying out one specific task with one type of equipment or ancillary support (boom deployment, oil recovery, dispersant application, transport….).

These teams. Whose number and importance will depend on the seriousness of the incident? Will be assembled with the contractors' available personnel (rig and vessels) not involved in Emergency operations related to the safety of personnel and/or installations (safety first). Extra personnel or contractors' will be hired outside, if necessary. They will be instructed and Supervised by Contractor staff.

Upon requisitioning by the Co-ordinator, all the supply boats and crews on charter with the relevant Equipment, all the contractors' not active shifts, and if required by the situation, the shift on duty (Except above mentioned case) will be included in the pollution fighting units. External agents Coming from other affiliates may also be mobilized.

The teams will have access to the antipollution equipment stockpile available on the site and, As circumstance require, to other site stockpiles (Logistics base). In case of the insufficient means, External contribution will be requested through the CMC Kuwait: extra boats and manpower, Other oil companies, OSRL, etc.

In any case, the pollution fighting units shall be kept under the authority of the On Scene Commander. (SALVAGE Master)

3.3 Personnel on duty (oil spill response ship)

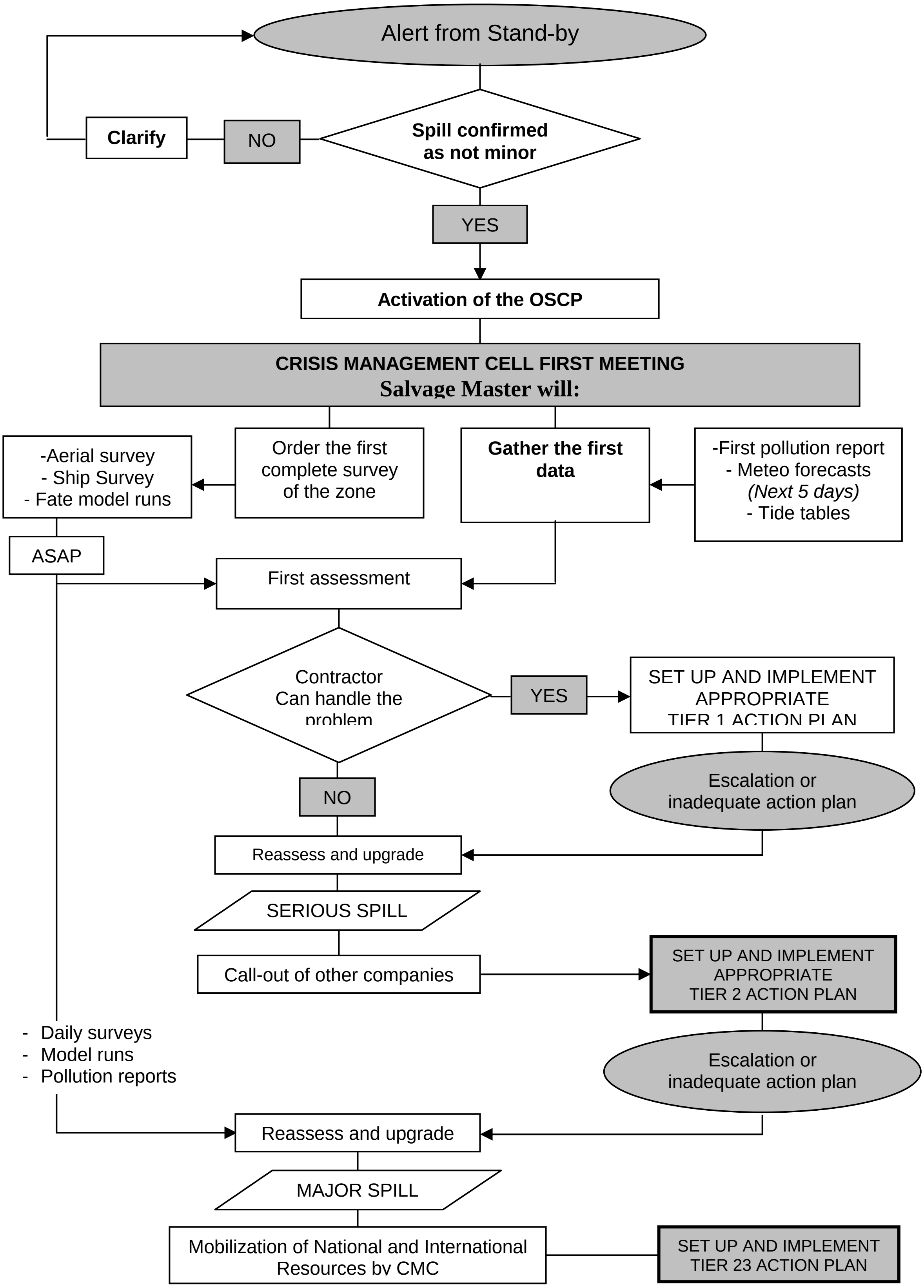
In the event of an incident, the personnel on duty on the ship will be in charge of implementing the first Response Procedures, i.e.:

- Launch the alert and handle the safety problems
- Stop or/and control the spill sources ASAP,
- And then start the clean up of the facilities.

Depending on the situation of things, some of the other personnel may be requested to join the Pollution Fighting Units.

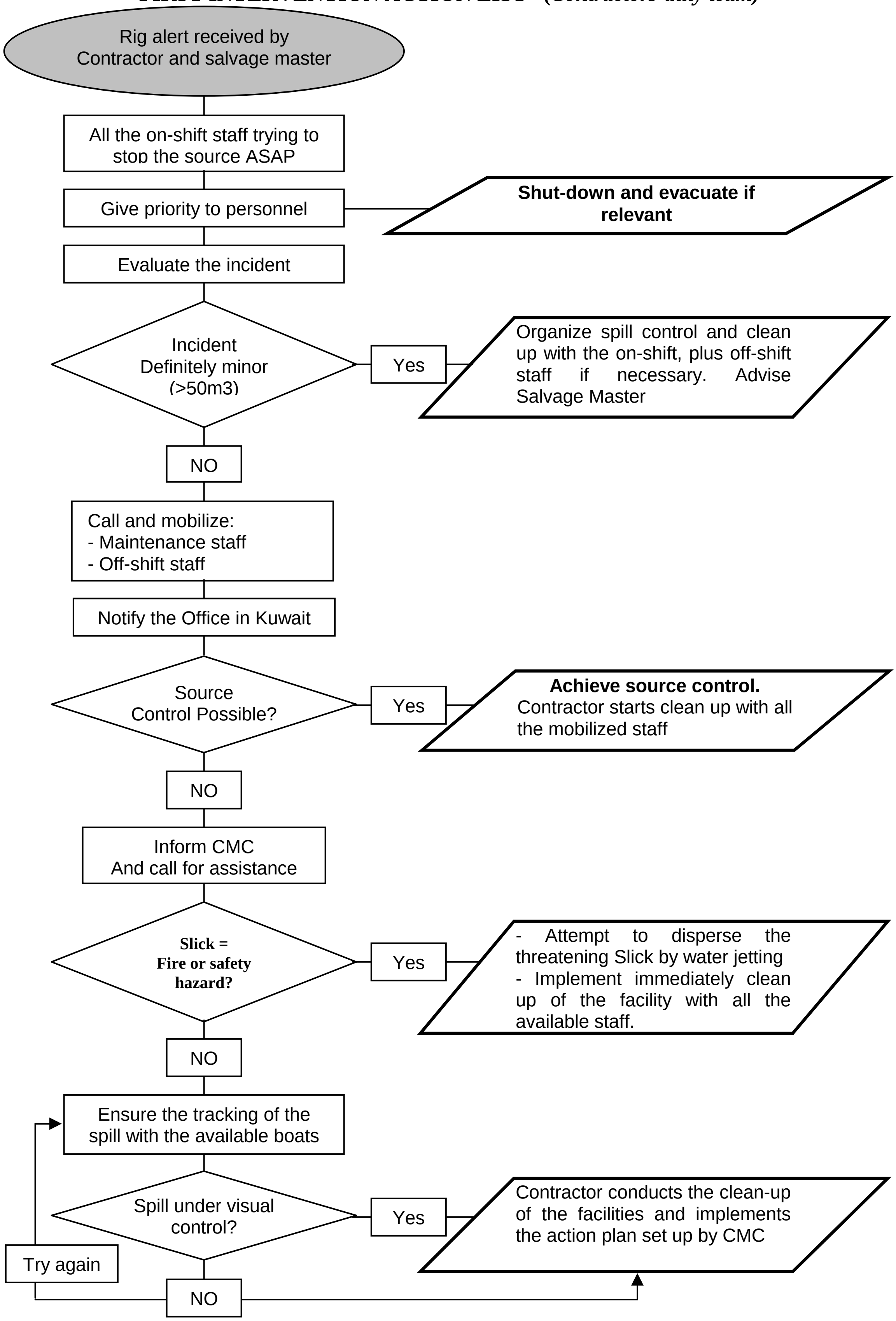
4. SPILL ASSESSMENT AND GLOBAL MANAGEMENT

4.1 General flowchart (Crisis Management Cell)



4.2 Immediate action

FIRST INTERVENTION ACTION LIST (*Contractors-duty team)*



4.3 Pollution interim report

In order to prepare the response and to choose the best strategy, the Salvage Master of Contractor and the Crisis Management Cell need the most accurate information and data regarding. The actual situation at the beginning of the incident and later, the form should be filled in as completely as possible by the Contractor and checked by the Salvage Master.

5. SPILL CONTROL AND CLEAN-UP ACTION PLAN

5.1 Response selected options (strategy reminder)

- **Minor incident:** **TIER 1 (<50 m^3)**

• Monitor and leave to disperse naturally unless may possible safety risk to the Facilities and in case of light product (FOD). Otherwise, treat with mechanical methods (bunker, fuel no. 6).

- **Moderate to serious incident:** **TIER 2 (-50 m^3 < < 500 m^3)**

• Fully mobilize Contractor own resources and request assistance from other Companies, if situation requires.

• Apply a combination of dispersant spraying in case of drift in the Arabian Gulf and of dispersible product. Otherwise, use mechanical methods (where possible and effective), and any other appropriate means.

• Keep the major part of the containment equipment for the protection of possible endangered sensitive resources.

- **Major incident:** **TIER 3 (> 500 m^3)**

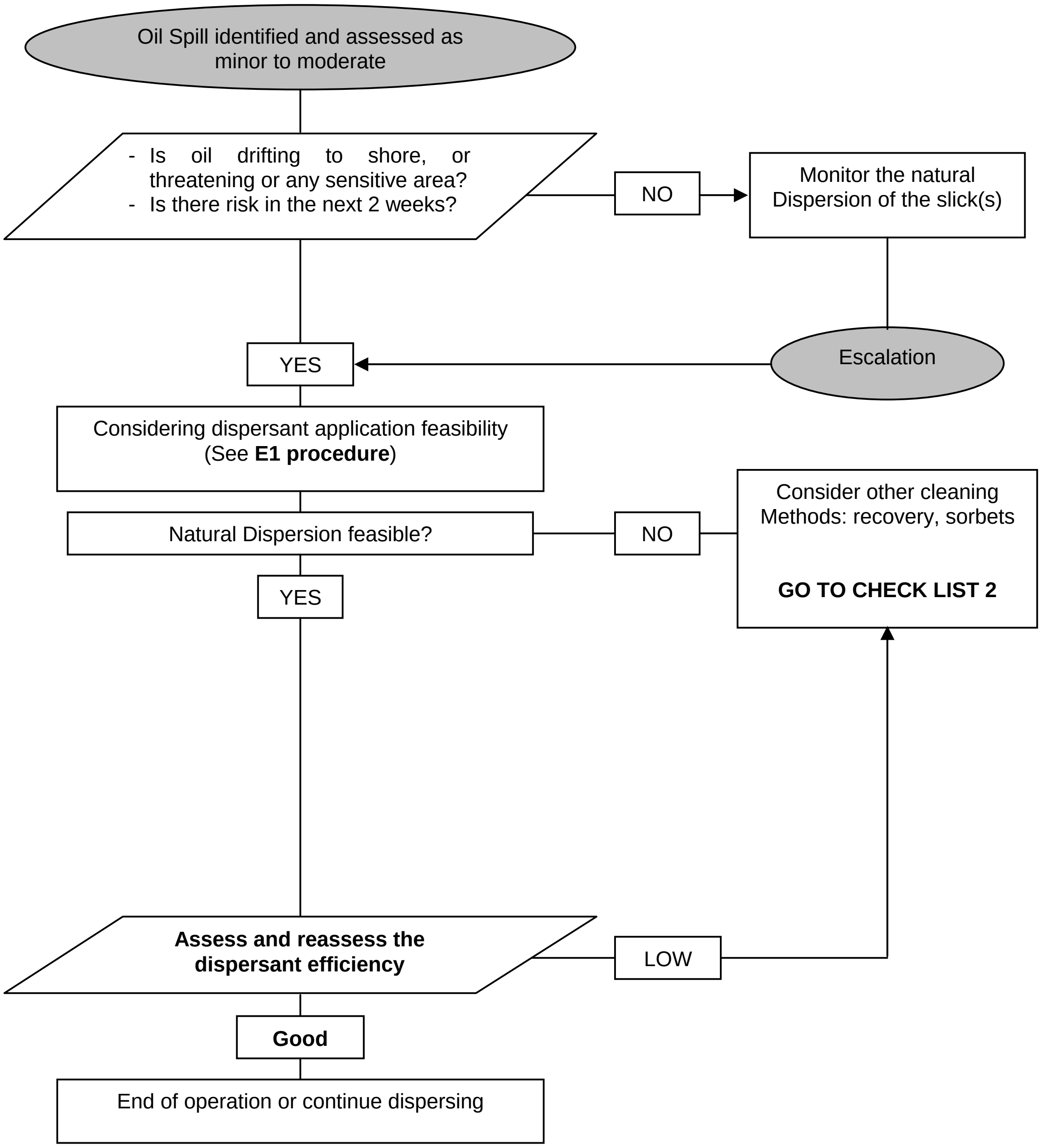
• Same as above plus large mobilization of extra resources at local, national and international level.

• Set up an extensive dispersant application campaign if technically possible and ecologically advisable and implement mechanical containment and recovery near the source, if possible.

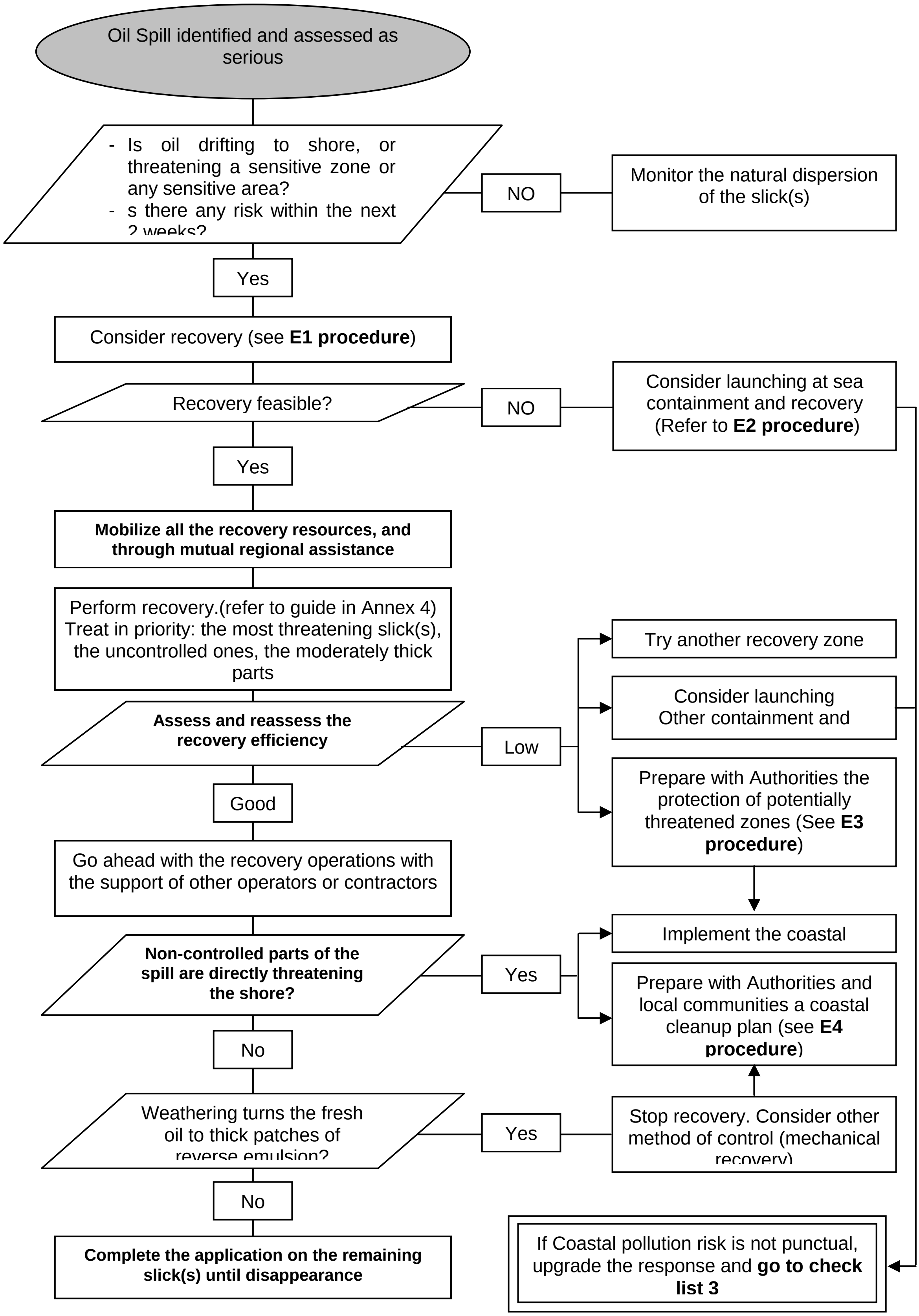
• Initiate a large campaign of coastal protection of the endangered sensitive areas by relying on massive mobilization of containment equipment and local hand-made Systems.

5.2 Typical decision making flowcharts for setting up action plans

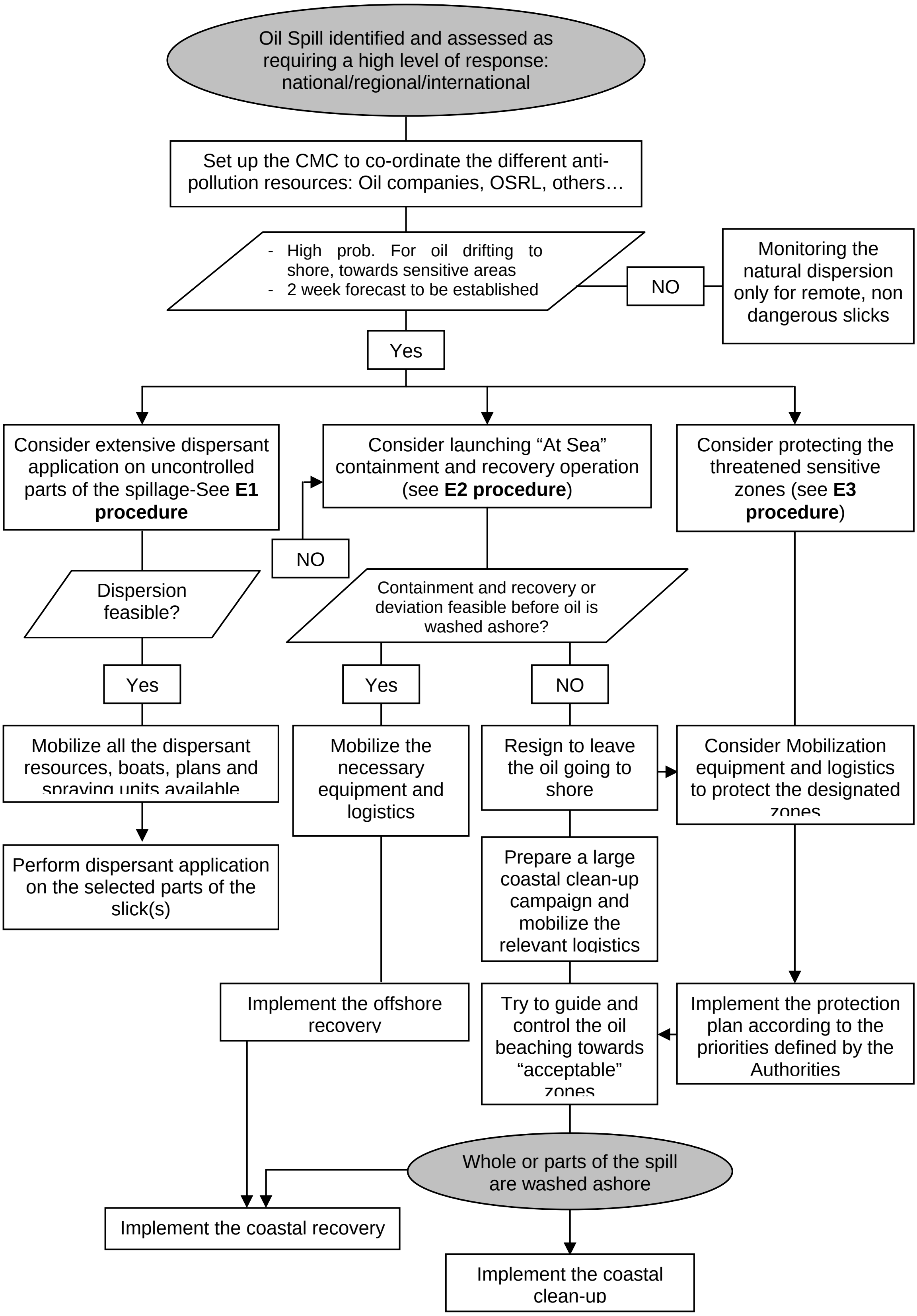
CHECK LIST 1: MINOR SPILLAGE – (TIER 1)



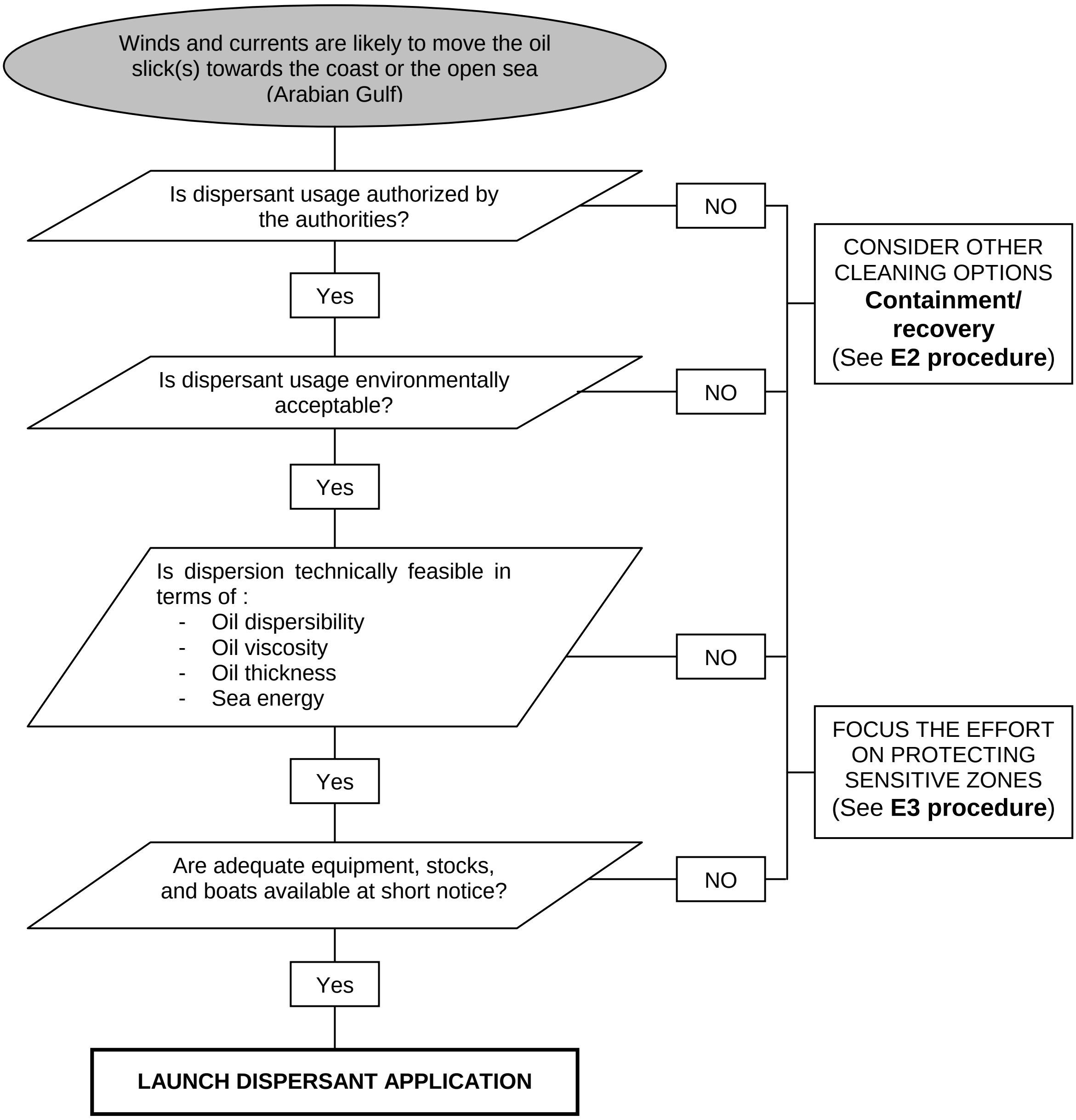
CHECK LIST 2: SERIOUS SPILLAGE – (TIER 2)



CHECK LIST 3: MAJOR SPILLAGE – (TIER 3)



E1 Procedure DISPERSANT APPLICATION



Points to be remembered:

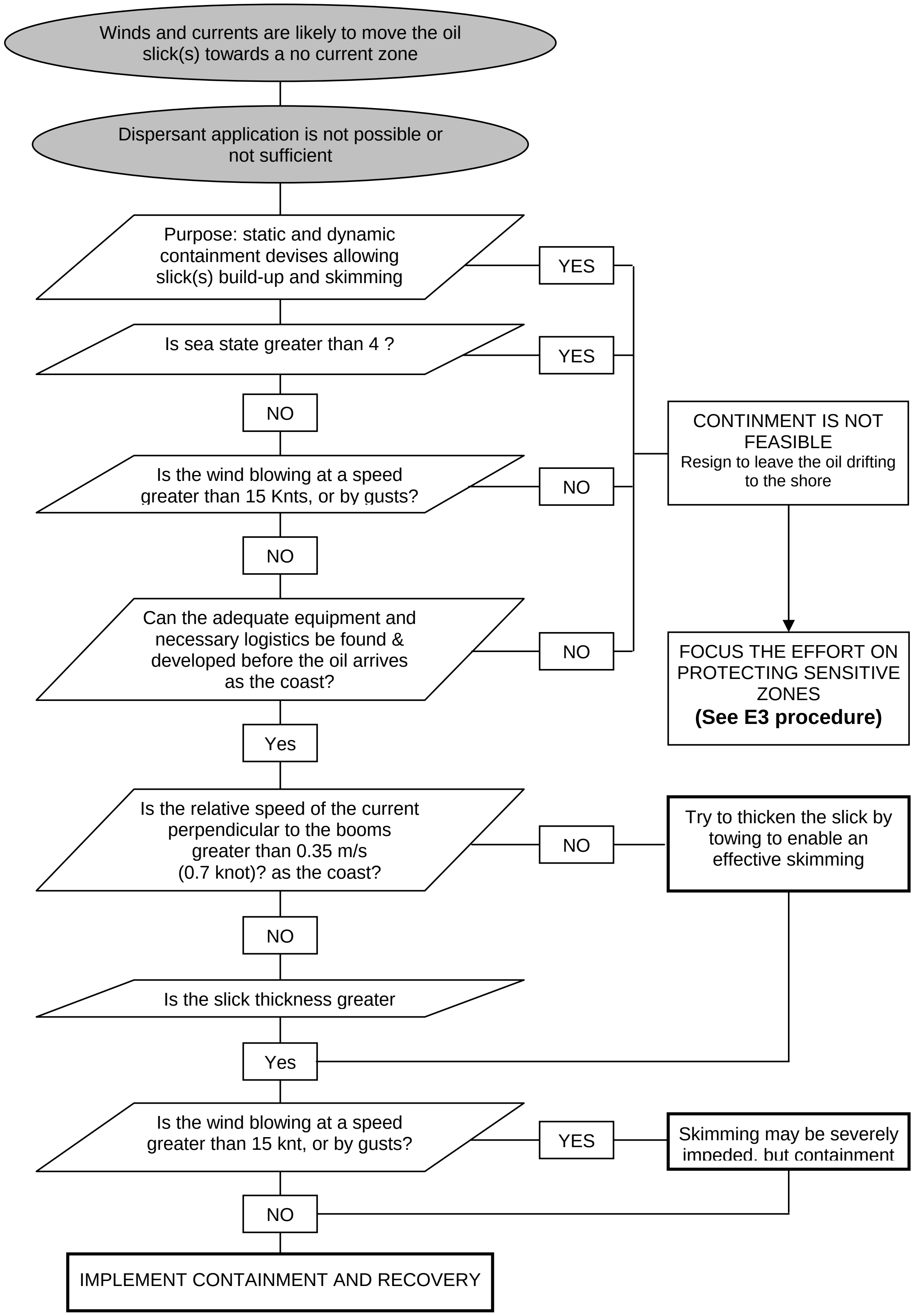
- The use of dispersant shall be avoided in fishing areas and coastal areas (less than 20 m depth and 2 nautical miles from the coast)

- Lists of dispersant approved by ROPME.

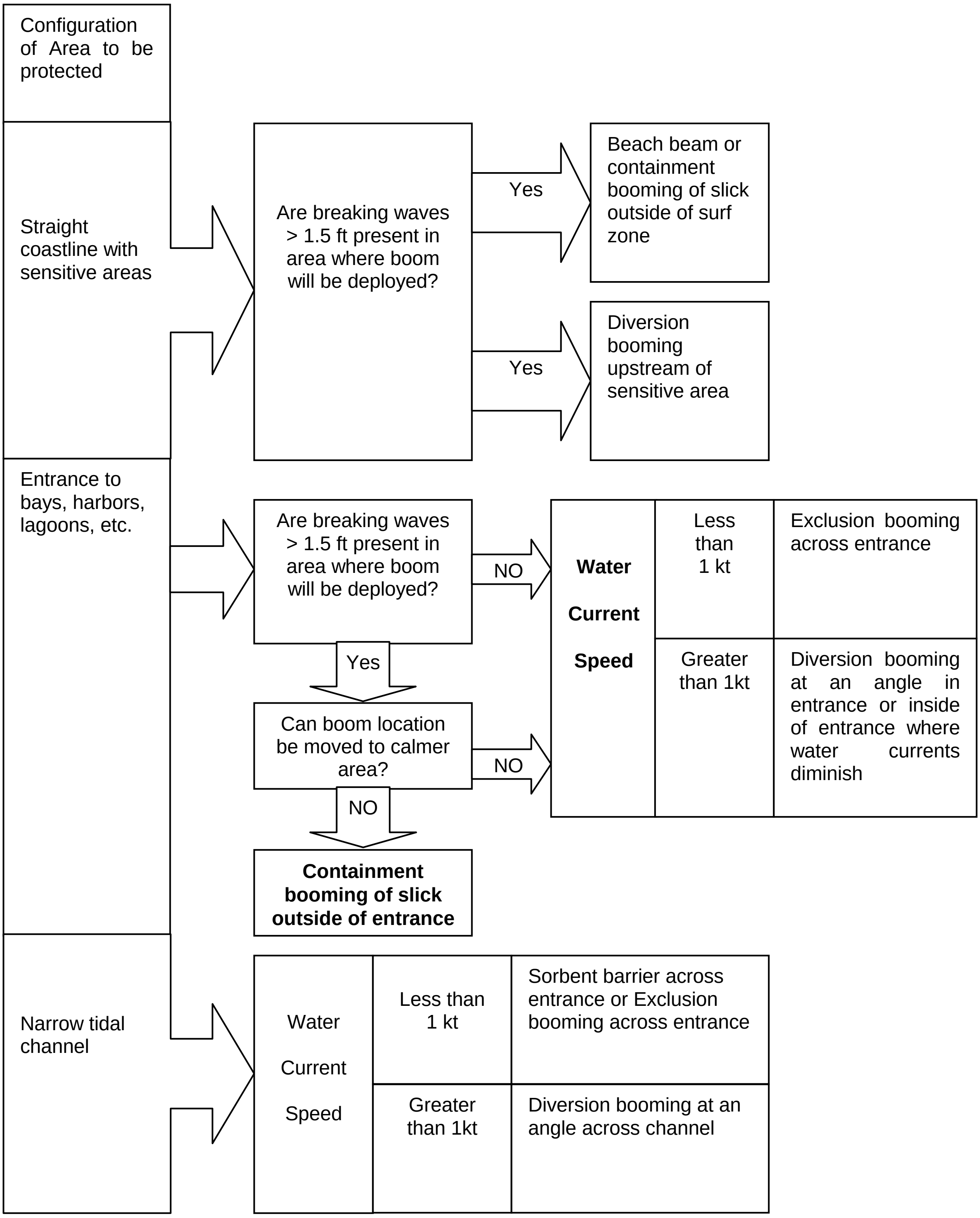
- Dispersant effectiveness generally strongly lowered by the salinity water and the weathering of the Pollutant (increasing viscosity, emulsion forming). Therefore, application should be decided and Performed promptly, within the few hours following the spill. This option will be only considered in the month of KHAWR ABD ALLAH

- After an unsuccessful treatment with dispersant, an oil spill is almost impossible to recover by Mechanical means, through its containment remains feasible.

E2 Procedure   DISPERSANT APPLICATION



E3 Procedure PROTECTION OF COASTAL SENSITIVE ZONES



E4 Procedure   COASTAL CLEAN-UP

In matters of coastal clean-up, it is not possible to summarize in a single decision flow-chart the multiple options available, as they depend on several different parameters concerning the coast.

In case of coastal areas liable to be infested by mines or ammunitions, or in case of any danger for crews, the cleaning operations will be performed from the water if technically possible.

Issues to be considered prior to fixing an action plan are:

- Nature of the oiled substrate (*sand, shingles, boulders, rock cliffs, mud flats, mangrove…*)

- Accessibility to and the trafficability of the contaminated zones.

- Pollutant amount, characteristics and depth of penetration into the substrate.

- Sea conditions along with shoreline
  (waves, tides, currents…)

- Ecological sensitivity of the shore to heavy clean-up methods
  (*mechanical scraping of Contaminated sediments, steam cleaning…*)

- Economic, political and media pressure
  (*amenity beaches, fishing or aquaculture zones, vital industry, Sanctuaries*)

DECISIONS SHALL BE TAKEN CASE BY CASE, IN CONJUNCTION WITH THE AUTHORITIES

REMINDER:

- Coastal clean up is always a very heavy and costly job.

- As far as practicable, the clean-up options with adverse ecological impacts shall be avoided

- A right balance has to be found between the economic/political requirements and the ecological factors.

5.3 Logistics support

Oil spill response requires the mobilization huge logisitics means (vessels, barges, aircrafts, tools, Spares, extra personnel, special outfits, etc…). Most of these means are to be rented at the time of Incident. Suppliers are identified and listed by the Contractor.

With respect to the Tier 1 and 2 responses, the contractor will ensure logistics. Other
Similar vessels may be mobilized for back up.

Logistics requirements for the deployment of typical clean-up techniques and equipment are Presented in Section 4-8 (mobilization of external assistance) and Annex 4 (Methodological guide).

5.4 Storage and disposal of oily waste

During offshore cleanup operations, the oil waste recovered will be stored on board the ships or barges involved in the clean-up response before being transported to temporary storage sites On-shore at regular intervals.

During coastal clean up, the collected waste will be stored in portable tanks, drums, bags or pits. In case of large spill, pits are generally the most practical medium for collection of recovered oil, oily waters, sludges and contaminated solids. The pits (location, size, characteristics) are subject to approval by the Authorities. They will be installed according to the regulatory requirements: Labeling and waste register, exclusion fence for human safety and pit security).

Later, the oily wastes from these temporary dumpsites will be processed depending on their final destination. Contractor will implement the following scheme where applicable:

- Recycling of oil and oil waters in existing facilities
- Thermal treatment (incineration, thermal d-absorption) of heavily contaminated sludges and solids, if possible (Mobile treatment unit to be fund) otherwise, inerting and solidification (quick lime, cement, silica encapsulation) of the above prior to re-use (road filling) or disposal in suitable landfills (approved landfill to be identified),
- In-situ or ex-situ bio-remediation methods on sediments and soils with low to moderate contamination (landfarming….).

6. HEALTH AND SAFETY POLICY DURING CLEAN-UP OPERATIONS

Safety:

In any event where oil is spilled, Safety must always be the prime consideration and all appropriate Safety measures should be taken;

- Liaison with the Authorities at the spill site must be maintained
- Where there is any possibility of the presence of a flammable mixture, the atmosphere should be Checked with an explosimeter (fresh oil slick, helifuel, diesel oil). until it is certain there is no risk of an explosion or fire, sources of ignition or intrinsically safe equipment must be used in the danger area (remember that cameras, flashlight, mobile telephones, radios and tape recorder may be not intrinsically safe).
- traffic should be diverted or stopped, especially fishing boats and public access strictly limited.

Remember that flammable mixtures can be obtained from spills of the following products under Normal atmospheric conditions: natural gas, condensates, jet fuel, diesel oil, crude oil, some chemicals,

HEALTH RISKS:

The main health risk is presented by asphyxiation, fire/explosion and eventually by chemicals. This problem will arise only with very volatile substance and great care must be taken where such liquids are split. As a guideline, the hydrocarbon concentration should not exceed 250 ppm in the working environment and the oxygen level should not drop below 19%. If either of these cases apply; the operators must wear breathing apparatus. Where high hydrocarbon level occurrences are possible; a minimum of 02 experienced personnel should work together and have suitable safety equipment, including breathing apparatus.

Skin / eye contact with the pollutant can pose a threat as well. But wearing can easily solve this suitable protection such as coverall, gloves and safety goggles. Moreover, personnel cleaning stations should be installed on every clean-up site. Contractor should provide detection and protection devices for the response crews. A special effort will be made in case of chemical warfare spill.

H2S (Hydrogen disulfide) might be present in sediments, or trapped in some tanker wrecks. Detector and protection devices (masks, air bottles) should be ready for us for the crews.

7. WRECK SPECIFIC ANTI POLLUTION MEASURES

Phase	Wreck Name	Location	Weight (Tonnage)	Proposed Speicific Anti Pollution Measures
1	Al Waleed	No 9 Berth UQP	650	Lift and Clean It is hoped to lift the vessel in one piece to minimize the chance of pollution. After lifting, remove and capture the sediments around the engine room and the contents of the fuel tank. Equipment Deployment Current in excess of 4 knots will make it difficult to deploy booms. A quay also protrudes into the work area. This has sharp marine growth that could damage a boom. Proposed Containment Containment of pollutants could be achieved by deploying a shore-side boom to direct the pollutants towards a current buster system, which would be held in place by one or two boats during wreck removal. A second line of defence would be provided by a small boat side fitted with a sweep surface recovery unit. An alternative solution is to use an EGMOPOL barge localized along the quay. This is a self propelled floating barge, fitted with the embolic belt skimmer usable either in static or in slow dynamic way (high efficiency unit even in the case of very viscous oil).
1	Barge 03	No 9 Berth UQP	500	Lift and Clean Before the lifting, tanks will be off-loaded using hot-tapping techniques. The oil would be removed by an off loading pump and storage in a flat barge. Equipment Deployment As for Al Waleed Proposed Containment As for Al Waleed
1	Barge 04	No 9 Berth UQP	500	
1	Barge 05	No 9 Berth UQP	500	
1	Navy Tug 01	No 9 Berth UQP	110	Lift and Clean It is hoped to lift the vessel in one piece to minimize the chance of pollution. After lifting, remove and capture the sediments around the engine room and the contents of the fuel tank. Equipment Deployment As for Al Waleed Proposed Containment As for Al Waleed
1	Al Ramady	Buoy 11 at Mouth of Gulf	450	Lift and Clean Sediments covering the wreck are to be would be removed by an airlift and stored for treatment in a flat barge. Proposed Containment Principal protection will be a current busting system with two tugs in place throughout the salvage operation. An antipollution boat will be located behind the boom to recover slick oils with skimmers. Further protection would be provided by a small boat fitted with a sweep surface recovery unit.
1	Dokan	Buoy 11 at Mouth of Gulf	450	
1	Dhow	Buoy 7 Khawr Abdallah	Unknown – wooden vessel in multiple parts	None
1	Unknown Contact	Buoy 10/11	To be determined. Side scan available	Unknown requirements. - No data available

Phase	Wreck Name	Location	Weight (Tonnage)	Proposed Speicific Anti Pollution Measures
2	Tadmur	KZ channel north of River 1	1594	Lift and Clean Mud covering wreck and engine room would be pumped out using an airlift pump/salvage pump. Before the lifting, tanks will be off-loaded using hot-tapping techniques. The oil would be removed by an off loading pump for storage on flat barges. Equipment Deployment Marine conditions do not permit deployment of booms all round wreck. Proposed Containment Antipollution boat is on station in quiet waters ready to deploy booms to create a catchment area in quiet waters. Oil recovery undertaken using different surface recovery systems.
2	Al Bahith	KZP Berth 4	200	None
2	Torpedo Boat	KZP Berth 3 / 4	210	None
2	Gaza	KZ channel north of River 1	1820	Lift and Clean Mud covering wreck and engine room would be pumped out using an airlift pump/salvage pump. Before the lifting, tanks will be off-loaded using hot-tapping techniques. The oil would be removed by an off loading pump for storage on a flat barge. Equipment Deployment Marine conditions do not permit deployment of booms all round wreck. Proposed Containment Antipollution boat is on station in quiet waters ready to deploy booms to create a catchment area in quiet waters. Oil recovery undertaken using different surface recovery systems.
2	Palestine	KZ channel north of River 1	2737	

Annex 7

Draft Proposal for the Establishment of An Environmental Unit

7.1. BACKGROUND AND ENVIRONMENTAL SCOPE OF WORK

The Government of the Republic of Iraq has received an ODA Loan from Japan Bank for International Cooperation toward the cost of the Port Sector Rehabilitation Project - Phase1. The project aims at recovering the function of the two major ports in Iraq, namely Umm Qasr Port and Khor Az Zubayr Port, to the operational level originally designed. The project involves rehabilitation, reconstruction, and replacement of the existing port facilities such as access channels, port basin, onshore facilities, cargo handling equipment, floating equipment and onshore utilities, by which a phased implementation program is required.
The then JBIC's Special Assistance for the Project Formation (SAPROF) that was carried out in 2005 to address essential rehabilitation of the Iraq Ports Sector, especially urgent works needed at the Umm Qasr Port (UQP) and Khor Az Zubayr Port (KZP) recommended the formulation of Phase-1 and Phase-2 projects to recover the functions of both ports. The overall scopes of each phase are summarized as follows:

Phase-1 Project concentrates mainly on the recovery of UQP, where most of general cargo is being handled, and involves the following work components;

- River 1 Dredging to -12.50m CD (approximately 7.0 million m3)
- Seven (7) shipwrecks salvage from Main Access Channel and UQP area
- Procurement of marine equipment (total 18 equipment) mainly for cargo handling
- On-land Port Facilities Repairs and Rehabilitation containing civil and utilities works and navigation aids restoration.

Phase-2 Project is planned to involve the following work components;

- Dredging of Channel & Berth at KZP
- Navigation Aids along Khor Az Zubayr channel
- On-shore civil and utilities works at KZP
- Marine and on-land equipment necessary for the effective operation at KZP

As such, the scopes of work have been divided into a number of lots. In addition, the consulting team will design training and capacity building programs to assist the GCPI in the implementation of the environmental management plan to be implemented throughout the different phases for the three lots under consideration. In the area related to the environment, the anticipated capacity building and institutional support will be concentrated in assisting the GCPI to establish the EU (Environmental Unit) within GCPI's organization by training program, and to assist GCPI to establish Maintenance Dredging Strategy by training program. This is to be supplemented with the procurement of monitoring equipment, in addition to training/capacity building on the use of such equipment as described later in this report.

7.2. ENVIRONMENTAL MONITORING IN THE PORT SECTOR

Ports and harbors are the most important gateway for trade in maritime countries and, thus, make a vital contribution to national economies, and directly or indirectly to employment at all levels. Public ports develop and maintain the shore side facilities for the intermodal transfer of cargo between ships, barges, trucks, and railroads. Despite their vital contribution to national economies, port development and operations such as vessels and vehicular traffic, handling and storage of materials, and shore based facilities, generate important water and air pollution as well as waste streams. In turn, excessive pollution leads to adverse effects on human health and both the natural and built environment, including cultural heritage. Compared with many land industries, ships release much less pollution to the environment, but their occasional spills and routine discharges can make profound impacts on the marine and coastal environment. Ship source pollution involves oil, chemicals, sewage and other harmful substances, as well as ballast water containing alien aquatic organisms, and gas and other emissions into the atmosphere from fuel and cargo sources.

To match environment and economics in a context of obvious pollution, Environmental Care Systems have been developed and are now considered by the European Union to be an essential, though voluntary, instrument for environmental management. The EU has even developed its own EMAS system which allows for certification and which exists next to the international ISO 14001system.

Environmental management of shipping and port operations has become a critical component of the business plan of most responsible operators. As public ports today are challenged to provide a healthy environment for their citizens and to be good stewards of public funds in meeting public needs for economic development, an Environmental Management System (EMS) has become a tool that can help ports to meet both of these goals. As an integrated process management system, an EMS enables port authorities to identify today's realities and risks and to implement realistic solutions in an effective manner. The EMS framework can also support continual improvement in other port-identified focus areas such as health and safety, security, operational efficiency and community relations.

7.3. PORT ENVIRONMENTAL MANAGEMENT

An EMS is a systematic approach to evaluate, manage, and improve the environmental impacts of an organization. While each EMS is unique, the most commonly used framework is the International Standards Organization (ISO) 14001 Standard. The system examines the environmental aspects of the organization, then develops, implements, monitors, reviews, and revises environmental programs and procedures to continually promote improvement.

The EMS approach works particularly well with establish organizations undertaking routine operations in contrast to new developments where environmental impact assessment (EIA) is the standard approach. The management system approach seeks to achieve continuous improvement in performance by iterative procedures which are often represented as a cycle that is repeated in time.

The typical EMS approach requires:

The functional organization of a port's activities necessary to comply with environmental legislation needs a framework within which the procedures and techniques can be applied if the overall response to the authority's liabilities and responsibilities is to be cost-effective and practicable. Although there is currently no legal requirement for a port to implement a formal EMS, port sector organizations and trade associations strongly recommend that their members actively consider implementing an appropriate system.

7.3.1 ENVIRONMENTAL MANAGEMENT SYSTEM FOR PORT AND MARITIME TRANSPORT

A model of EMS should be flexible and be adapted to suit the needs of a particular industry. An EMS developed for ports and maritime transport should focus on issues such as water quality, air quality, waste management, habitat conservation, noise, dredging, contaminated soils, anti-fouling paints and energy consumption. For all these issues, compliances with legislation affecting shipping and port operations should be considered. An EMS implies interdependence and information flows in which it recognize the complementarities and dynamic feedback of the various dimensions composing the model. A key feature of environmental management consists in maintaining a balance between the environmental, legislative and commercial dimensions.

Key Environmental Opportunities include the following:

- Reducing Air Emissions: Marine vessels, land-based cargo-handling equipment, trucks, and trains all contribute to air emissions at ports. Common air pollutants include particulate matter (PM), nitrogen oxides (NOx), and sulfur oxides (SOx).
- Improving Water Quality: Most large ports have large paved waterfront property for cargo handling, where stormwater runoff may pick up various pollutants before entering waterways. Also, ballast water onboard calling vessels is typically released in a different geographic area than where it was taken in, resulting in the introduction of non-native or invasive species.
- Minimizing Impacts of Growth: Surrounding communities are increasingly interested in the impacts of port expansion, such as wetland or habitat loss, handling of sediment from dredging operations, congestion, safety, and other impacts of port growth.

7.3.2 ENVIRONMENTAL MONITORING AND EVALUATION

Environmental monitoring describes the processes and activities that need to take place to characterize and monitor the quality of the environment. Environmental monitoring is first of all meant as a means of gaining insight into the dynamics of the project context, including possible project impacts, for purposes of adjusting activities and expected results of projects as part of a process approach. It is thus one way of integrating environmental care into development planning and the project cycle.

Monitoring of environmental changes is part of an environmental management system. Environmental or development policy for a region or land use system is the starting point of the environmental monitoring to describe the state of the environment in such a way that it can be a useful tool in environmental work and thus to show how well the environmental objectives are being met, and to warn of new environmental issues.

All monitoring strategies and programs have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and published. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts.

Every policy or project should include a minimum of environmental monitoring:

- To take notice of relevant trends (trend watching) and threats (early warning system)
- To anticipate on environmental changes, threats and emerging opportunities
- To draw conclusions as regards the effectiveness of policies and/or projects
- On the basis of the above elements, to adjust policies, plans, strategies and projects

Environmental indicators take as their starting point a certain environmental phenomenon, system or process, and are meant to measure the current quality and to assess changes by comparing qualities at different moments.

Different types of environmental indicators can be categorized as follows:

- State, pressure, and response indicators
- Simple, complex and index indicators
- Direct and indirect indicators
- Quantitative and qualitative indicators
- Descriptive and normative indicators.

In terms of state or quality indicators, they reflect the condition of the environment; have direct linkages with environmental qualities to be monitored.

With regard to pressure indicators, they reflect the pressures by human activities; have indirect linkages with environmental qualities to be monitored. Pressure indicators are:

- Direct environmental pressure indicators
- Indirect environmental pressure indicators

- Indirect indicators in the field of politics, economics, social change

As for response indicators, they reflect the human response measures to environmental problems.
All scientifically reliable environmental monitoring is performed in line with a published program. The program may include the overall objectives of the organization, references to the specific strategies that helps deliver the objective and details of specific projects or tasks within those strategies. However the key feature of any program is the listing of what is being monitored and how that monitoring is to take place and the time-scale over which it should all happen. Typically, and often as an Annex, a monitoring program which provide a table of locations, dates and sampling methods that are proposed and which, if undertaken in full, will deliver the published monitoring program.

In order to achieve its goals and objectives, environmental monitoring programs need to be properly coordinated to ensure that all aspects of the environment are covered. Effectively coordinated environmental monitoring is essential to gain a comprehensive picture of the environmental situation and thus provides results that are comparable across different measurement programs in which can be accessed and used by all workers concerned with monitoring the state of the environment.

For proper implementation of a suggested Environmental Management Plan (EMP), an effective monitoring program should be in place which should be carried out by the Environment Monitoring Cell (EMC) to be set up after commissioning of the port. The objectives of the monitoring program are to evaluate the efficacy of the mitigation measures proposed in the EMP, to evaluate the adequacy of the EIA, to suggest improvements in the EMP, if required, to enhance the overall environmental quality, and to comply with the legal, social and community obligations.

One of the methodologies used to help ports asses its environmental management is the Port Environmental Review System (PERS). PERS is a tool developed by the European Sea Ports Organization (ESPO) to assist ports to implement the recommendations set in the ESPO Environmental Review of 2001 and reinforced in the new ESPO Environmental Code of Practice (2003). PERS is based on internationally recognized professional best practice, and yet, remains a port-specific system developed by ports – for ports. It is formulated to be flexible and capable of evolution so that it can be adapted to future changes in legislation and priorities for action. The System defines a basic standard of good practice for the port sector. Ports wishing to progress to successively more comprehensive systems such as ISO 14001 or EMAS can do so by building on the PERS experience.

7.3.3 BENEFITS OF PERS ADOPTION

The benefits of adopting a management approach are widely reported and well accepted by many leading industrial companies and organizations. PERS supplies the basis for developing an environmental management system by identifying significant aspects, policy and performance criteria. A review, as part of PERS, will assist ports in setting objectives to improve performance on environmental issues as well as environmental management. The major benefits of PERS system are:

Cost saving and improved management control	Improved environmental performance
Compliance with legislation and relation with stakeholders	Motivating the port authority towards environmental management
Meeting customer expectations	Integrated environmental management
Demonstration of commitment	Monitoring

With regard to the environmental benefits, the system will lead to a continual minimization of environmental impacts by improving the control of the environmental aspects through a better management of environmental issues and by increasing staff awareness as well as better integration of environmental policy into all the authority's functions. In terms of monitoring, the system also will promote application of performance indicators to track efficiency of the management system and the actual quality of the physical environment.

As stated earlier, a well structured EMS developed for ports and maritime transport should cover all the issues that may affect the environment.
Dredging, for example, is considered as one of the major issues that must be handled properly to avoid negative impacts to the environment. Dredging is the underwater excavation of sediment for navigable purposes, port expansions, environmental remediation, flood protection, drainage improvements or winning minerals from underwater deposits. Dredging is a general term for a wide variety of different activities, which traditionally have been divided into three groups:

- Capital dredging works (e.g. major coastal schemes for a new or expanding port)
- Maintenance dredging works (to maintain the design navigation depth of a waterway)
- Remedial dredging works (also known as clean up dredging works to improve the environmental quality of a waterway)

Despite the fact that dredging is essential to maintain navigation in ports, harbors, and navigation channels as well as for the development of such facilities, the removal of sediments may have adverse impacts on marine species and habitats. Impacts may be due to physical or chemical changes in the environment at the dredging site. The extent of such impacts depends on many factors such as the characteristics and the sensitivity of the area dredged, the dredging technique applied, and magnitude and frequency of dredging activity.

The potential environmental effects of dredging are generally two-fold, firstly as a result of the dredging process itself and secondly as a result of the disposal of the dredged material. During the dredging process effects may arise due to the excavation of sediments at the bed, loss material during transport to the surface, overflow from the dredger whilst loading and loss of material from the dredger and/or pipelines during transport. Depending on where these activities take place, the port may be affected by either dredging or disposal alone, by both of these activities, or by neither.

Dredging can create disturbance to aquatic ecosystems, often with adverse impacts. In addition, dredge spoils may contain toxic chemicals that may have an adverse effect on the disposal area; furthermore, the process of dredging often dislodges chemicals residing in benthic substrates and injects them into the water column.

On the other hand, when contaminated (toxic) sediments are to be removed or large volume inland disposal sites are unavailable, dredge slurries are reduced to dry solids via a process known as dewatering. Such dewatered sediments, if a combined with proper environmental management, may be utilized for the production of concrete and construction blocks, although the high organic content (in many cases) of this material is a hindrance toward such ends.
The figure below represents the potential effects associated with dredging and dredged material placement.

Table 1 Time–space matrix of potential effects associated with dredging and dredged material placement

	Near-field Environmental Effects (<1km)	**Far-field Environmental Effects (>1km)**
Short-term Environmental Effects (<1 week)	**Dredging** Turbidity Smothering/removal of organisms Reduced water quality	**Dredging** None generally expected
	Disposal Smothering of organisms Turbidity Reduced water quality Acute chemical toxicity	**Disposal** Offsite movements of chemicals by physical transport
Long-term Environmental Effects (>1 week)	**Dredging** Disturbance by shipping traffic Removal of contaminated sediment	**Dredging** None generally expected
	Disposal Altered substrate type Altered community structure Chronic chemical toxicity Bioaccumulation	**Disposal** Offsite movements of chemicals by physical transport and/or biota migration

Disturbance of sediments during dredging disposal and placement of dredged material is unavoidable. Some of the environmental impacts are positive, some are negative, and thus it is imperative to allow for understanding and predicting such changes in the early planning stages of a project. Addressing these impacts requires an integrated team approach to understanding the chemical, biological, coastal processes, hydrodynamic, hydro geological, and social environmental consequences.

Among other issues of ports management in terms of environment is the shipwreck removal. Salvage and wreck removal activities can result in unexpected and sometimes considerable collateral damage. In some cases, a shipwreck may pose an obvious threat (e.g., fuel oil) and actions are taken to reduce its effects. Such actions taken to reduce that threat should consider the broader impacts of the salvage to mitigate potential collateral impacts and maximize the environmental benefit of the overall operation.

The cargo, fuel, and other hazardous materials remaining on wrecks often are the primary environmental concern during marine salvage operations. Operational and catastrophic releases of oil and hazardous materials threaten water-column resources and water-surface resources. Spilled oil can release dissolved fractions into the water column during releases from submerged vessels, as well as form surface slicks that threaten both water-surface and shoreline resources. Aqueous liquids, such as acids and bases, can have acute, toxic impacts to water-column resources.

One of the keys to a successful wreck removal is addressing environmental considerations in all aspects of the salvage operation. Many of the following considerations are integral components of best management practices. Environmental considerations do not have to become impediments to a quick and successful operation; rather, they can become part of the overall success of the operation. Good environmental practices during wreck removal begin with involving environmental specialists early in the process.

7.4. INTERNATIONAL MODELS FOR ENVIRONMENTAL MANAGEMENT SYSTEMS IN PORTS

In terms of environmental management and monitoring, over the last decade, the port sector has raised its profile substantially and demonstrated competence to deliver both environmental protection and sustainable development in many areas of its operations. A wide ranging series of port-led initiatives related to environmental policy issues, practical implementation of best practice, the raising of awareness, and demonstrable quality assurance have delivered effective management options and a change of course on environmental issues from reactive to proactive. This section provides some cases of successful environmental monitoring units in port throughout the world.

7.4.1 PORT OF TYNE- UK

The Port of Tyne is a principal gateway and key player in the North East region of the Kingdom; a dynamic trading hub with five business areas; conventional and bulk cargoes, logistics, car terminals, cruise and ferries and estates.

The Port has developed a formal Environmental Management System (EMS), which has followed a similar approach to the International Standards Organization's ISO 14001 in Environmental Management. A major part of the EMS is the Port's environmental policy and is used as a framework for planning and action. In addition, the Port has set eight key environmental objectives, which will be used to assess its environmental performance in the future. The objectives are:

Minimize pollution from authority activities, to air, land and waterways.

Continue to maintain safe and navigable depths, in compliance with DEFRA dredging licensing.

Monitor resource consumption and improve efficient usage.

To continue to comply with all existing and future relevant environmental legislation and other regulations.

Raise environmental awareness throughout the authority and wider port community.

Investigate and pursue waste minimization and recycling opportunities.

Encourage users of the site, tenants/lessees, contractors and suppliers to adopt good environmental practice.

Achieve certification of the PERS (Ports Environmental Review System) environmental standard for European Ports, as produced by EcoPorts

The Port’s environmental officer is responsible for the day to day management of environmental issues at the Port. The officer develops, implements, and maintains the Port’s EMS (Environmental Management System), as well as chairing the environment group. The environmental officer is responsible for raising environmental awareness and representing the Port in projects that could affect the Port environmentally. However, all relevant employees are aware of their environmental impacts and responsibilities. The EMS is supported by the environment group, which is an interdepartmental working group made up of representatives from each of the Port's departments. The Environmental Officer offers assistance and acts a resource for all environmental matters throughout the Port.

Tasks of the environmental officer and monitoring unit includes the following:

(1) Recycling

The Port adopts the 3Rs (Reduce, Reuse and Recycle) philosophy and works with Sunderland Community Furniture Services, a charity that supports and employs the long term unemployed and adults with learning difficulties. The waste paper recycling initiative has proved so successful that the Port's tenants have been invited to join the Tyne Dock Recycling Scheme.

Environmental Reporting

The Port aims to undertake its activities in an environmentally sensitive manner. An important part of achieving this is raising environmental awareness throughout the Port and community, so that environmental matters are incorporated in the decision-making processes. Environmental issues, activities, and progress are reported both to the employees and to the surrounding community. Environmental articles regularly appear in the Port's tri-annual newsletter, The Current, and the Port's Annual Review. Port employees are kept up to date on environmental issues through the Port's internal newsletter as well as environmental notice boards and the Environment section of the Intranet.

(2) Intranet - Environment Section

The Intranet contains an environmental section to provide information on environmental issues affecting employees at work and at home, as well as keeping everyone up to date on environmental activities being undertaken around the Port. The Environment section features information on recycling, water efficiency, vehicles and transport, as well as the Environment Policy and Objectives. There are also links to websites covering environmental topics such as waste, energy, water, fuel efficiency and alternative fuels.

(3) Port Waste Management Plan

The Port's Waste Management Plan is a further step forward in the control and management of waste from ships in order to ensure a cleaner environment at sea and in the port. The Port provides reception facilities to comply with the Merchant Shipping (Port Waste Reception Facilities) Regulations 1997. The port’s Waste Management Plan aims to reduce illegal discharge and minimize production of waste from ships; to fulfill The Port of Tyne Authority’s legal duties with regard to waste management; to consult with users, agents, operators, contractors and regulators in the development and implementation of waste management strategies; to reuse or recycle waste wherever possible and to dispose the wastes so as to minimize negative environmental effects, and to promote education and awareness of wise waste management.

(4) Dredging

The Port dredges huge amounts of silt and sand annually using its grab hopper dredger, the Hedwin, in accordance with DEFRA licensing. Hydrographic surveying is used to coordinate maintenance dredging that is performed at appropriate times of the year. The Port continues to maintain safe and navigable depths in compliance with DEFRA dredging licensing.

7.4.2 PORT OF SALALAH- OMAN

Port of Salalah is a world class transshipment hub in the West Central Asia Region. Situated right at the major East-West shipping lanes, Salalah enjoys an attractive strategic location in the heart of the Indian Ocean Rim and caters to some of the world’s largest ocean going vessels.

The Government of Oman and the Port of Salalah puts environmental issues in focus. There are very strict policies when vessels are in the port and strict measures are taken against any offenders.

Should an incident occur, The Port of Salalah has the capability of dealing with a major oil spill whether it is in the port or adjacent area. The port have oil spill inflatable booms, oil skimmers and absorbent material to contain any spill until the assistance (if required) of any outside agency.

The Port of Salalah cares about the environment and helps ensure it remains in that condition through the department of Health, Safety, Security, and Environment (HSSE) at the port. The department concerned with activities such as:

- Oil spill equipment
- Fuel control
- Pollution control in the port
- Waste Management

In terms of prevention of pollution, the port has strict rules and regulations cover various environmental issues so that negative impacts could be decreased. The environmental regulations are:

(1) The National Oil Spill Contingency Plan

All companies, agencies and vessels who are involved in the under mentioned activities must obtain and be aware of the "National Oil Spill Contingency Plan". The copy of this plan may be obtained from the Ministry of Regional Municipalities, Environment and Water Resources. The plan covers:

- Import and export of fuels and Lubricants.
- Supply of Fuels or Lubricants to vessels.
- Collection of waste oil and bilges from vessels.
- Any other activities related to any materials that may be harmful to the environment.

(2) Disposal of Wastage

It is prohibited for any vessel to dispose or throw any refuse or waste into the port. Refuse and waste shall include:

- Substances which float or are capable of floating on the surface of the water;
- Sedimentary or substances liable to form sediment in the bottom of the waterways or to cause the decomposition of marine life in the waters of the port.
- Substances which are toxic to marine life.
- Substances capable of producing odorous and gases of putrefaction.

(3) Usage of vessel's engines

It shall be kept to a very minimum whilst at berth in the port in order to avoid polluting the atmosphere with gases, fumes, and smoke. All these and other pollutants emanating from any work either ashore or afloat shall be subjected to the standards and laws prevailing in the Sultanate.

(4) The master and Owner shall be liable for cost of treatment any pollution originating from the vessel.

The Port of Salalah HSSE department plays a big role in ensuring the Port compliance to international standards. The department provides the following services:

(5) Training

The Port of Salalah Training Department ensures that the port staff meets the challenges of a dynamic and vibrant environment and continuously enhances employee skills, to the benefit of colleagues, company and customers. The Training Centre reflects the port's aim to be a responsible corporate citizen, merging the company's need with the community's expectations.

The Port of Salalah Service Training Department's range of services includes: Surveys of Training needs; Development of course outlines, objectives and course material; Review and Quality Control Courses; Development of In-house Trainers and Instructors; Assessment and Monitoring of external Training Providers to ensure a return on investment; Development of Training Processes and Procedures; and Production of suitable Training management Documentation.

7.4.3 DUBAI PORT WORLD (DP WORLD)

DP World is one of the largest marine terminal operators in the world. DP World is engaged in activities to limit the environmental impact of its business operations, particularly by employing industry-leading techniques to reduce the consumption of resources such as electricity and diesel oil, and reusing and recycling where possible.

(1) DP World Health Safety and Environment Policy

a. Purpose

DP World, a leader in international port and logistic operations, is committed to a policy of zero harm to people and the environment, ensuring that the business activities are conducted in a manner that minimizes any adverse health, safety and environmental impacts.

b. Principles

This Policy has been established on the basis that concern for the safety of the employees and guardianship of the environment. DP World also considers that environmental protection and management (e.g., pollution prevention) is an important consideration in the activities and commitment to this is reflected in corporate policies, procedures, programs and practices.

c. Policy Statement

To achieve the purposes and principles above, DP World and its business units will:

- Comply with all local (i.e., national) health, safety and environmental legislation as a minimum. Where a DP World Standard exists which is more stringent than the local legislative requirement, then the DP World Standard will prevail.
- Identify and evaluate all health, safety and environmental hazards and establish controls and techniques to manage risk to acceptable levels. Risk assessments should be updated whenever significant change in the working environment has occurred. Additional and special emphasis will be given to controlling those hazards that represent the greatest potential for fatal injury, known as the “Fatal Risks”.
- Establish and update, as appropriate, global health, safety and environmental objectives and measurable targets relevant to the impacts of DP World’s activities in order to drive and demonstrate continual improvement.
- Continue to initiate, develop, record, measure and communicate progress on health, safety and environmental performance throughout the organization.
- Work towards implementing health, safety and environmental management systems and complying with all aspects of the internationally-recognized certification systems OHSAS 18001 (on Safety Management Systems) and ISO 14001 (on Environmental Management Systems) to the level of “accreditation ready” as a minimum.
- Reduce emissions and wastes to water, air and land, and conserve resources on a like-for-like basis.
- Submit an annual report on matters relating to this Policy to senior management.
- Review this Policy at intervals not exceeding two years.

d. Responsibility

In line with the Policy above, the following commitments are made:

- All management will visibly and consistently uphold the principles and requirements of this Policy and integrate them throughout the company. The executive management team will regularly review health, safety and environmental performance.
- The management and supervisory staff in each business unit will be responsible and held accountable for resourcing, implementing, and maintaining the health, safety and environmental management system necessary to comply with this policy, and will be held fully accountable for compliance and performance.
- \- Every employee whose work may create a significant health, safety and environmental impact will be trained and held accountable for complying with the principles of the policy and related standards, procedures, practices, instructions and rules.

The above dredging strategy should be determined based on budget availability and the GCPI policy. It is proposed to carry out the hydrographic survey in the related area to trace the location of sedimentation and to work out the maintenance dredging strategy for the long-term as a part of the consulting services.

7.4.4 PORT OF MOURILYAN- AUSTRALIA

The Far North Queensland Ports Corporation Ltd manages six trading ports and four community ports throughout northern Queensland. The Port of Mourilyan is one of the trading ports managed by the Corporation. The port is located around 100 km south of Cairns. The port activities are concentrated in Mourilyan Harbor, with no intensive port activity occurring outside this area.

(1) Port Environmental Management Policy

The port's environmental policy aims to manage its activities in a pro-active manner to minimize any impacts from port operations or new developments. The port has a structured environmental program that involves environmental assessment, monitoring, protection and rehabilitation. The program undertakes continual improvements in the control of port and port user activities to maintain a healthy port environment. The detailed environmental policy, procedures and practices of the Corporation are documented in its Environmental Management System, which is based on the international standard ISO 14001.

The port's Environmental Management Plan is complementary to, and consistent with, the Corporation's Environment Policy that is documented in its Environmental Management System and on its web site.

Under the Environmental Management System, new projects undertaken on strategic port land will require a project-specific Environment Management Plan to be developed by the proponent and then approved prior to commencement of the project. This plan must address the potential environmental issues from the project and the actions needed to minimize its impacts. The port environment staff is responsible to supply a standard checklist of potential issues and work with a project proponent to determine the environmental issues that need to be addressed.

(2) Responsibility

The Department of Environment and Resource Management (DERM) oversees environmental regulation of port users and their activities. This regulation includes licensing activities in the port and any monitoring of compliance with license conditions. However, the port environment staff is responsible to supply a standard checklist of potential issues and work with a project proponent to determine the environmental issues that need to be addressed.

In order to have ecologically sustainable operations and development of the port, a setting of higher environmental standards on operations or new developments is required by environmental legislation or licenses. This can be achieved through a detailed environmental assessment of all proposed projects on port land or in waters within port limits and auditing of both Corporation and port user activities.

(3) Port Environmental Measures

Dredging

The Corporation is responsible for maintaining navigable depth in the Port of Mourilyan shipping channel and harbor, undertaking maintenance dredging when required. Dredging of the berth pocket and swing basin has been required roughly every four years in the past due to natural siltation of the port areas.
Historically, the bulk of the material removed from the harbor has been used for reclamation of port land, although two potential sea disposal sites outside the harbor have also been identified for use when land disposal is not possible. More recently, bed leveling has been used in the port to reduce the frequency of dredging. Bed leveling moves the deposited material to a natural deep hole in the centre of the harbor. Evidence to-date indicates that this practice has been successful, both in being cost-effective and in having minimal environmental impacts, although the frequency of bed-leveling may be greater than normal dredging.

The Corporation carries out extensive monitoring of dredging operations, which includes analyses of sediment prior to commencement of the dredging and monitoring of dredging plumes and sediment transport during dredging. This is complemented by the long term monitoring of the health of the sea grass meadows and modeling of currents to help predict any potential impacts.
Management of Oil Spills
Oil spills in port waters could result from a variety of sources including groundings, collisions and sinking of vessels; illegal discharges from vessels; accidents when transferring waste oil to storage facilities on shore and accidents when refueling vessels.

To reduce the risk of oil spills occurring, Queensland Transport ensures the safety of navigation, including the provision of navigation aids. The Corporation provides pilotage services for the arrival and departure of ships from the port to reduce the risk of human error.
Mourilyan is equipped for smaller spills of oil. The Port Area Officer-in -Charge is responsible for provision of the "first strike" response to an oil spill within the Port. Queensland Transport provides resources out of Cairns, or other centers, for larger spills.

7.4.5 CURRENT RESPONSIBILITIES OF ENVIRONMENTAL MANAGEMENT AT UM QASR PORT

The General Corporation for the Ports of Iraq currently houses the Iraqi Marine Anti-pollution Department (IMAD). It is reported to have a staff of 50 persons and was set up specifically to ensure Iraq meets its obligations under Marine Pollution conventions MARPOL.

Due to the lack of equipment and technical capacity, this unit has little or no capacity to respond to environmental spills/ emergencies and no capacity to monitor environmental conditions in port areas or monitor the activities of those working in the Port or using its facilities.
The Marine Anti- Pollution Unit was originally established in 1989 as a separate unit, whereas before 1989, it was part of Salvage Department. At the current institutional level, the IMAD falls under the Inspection Department in GCPI, which is directly connected with the DG office.

It is currently housed in a temporary office belonging to Al- Ma'aqel Port. Prior to 2003, the Marine Anti- Pollution Unit was well equipped, however, all equipment and accessories were looted after the invasion and it currently possesses little or basic equipment. It has no laboratory facilities; neither central nor mobile.

The current responsibilities of the IMAD is limited to responding to accidents only. It does not conduct any routine monitoring activities or measurements (mainly due to the lack of equipment and technical capacity). In case of incidents, sole responsibilities currently only include:

- Documenting incidents by taking photos of the pollution location, and
- Writing incident reports to the GCPI head office to take possible actions such as imposing fines, but without rectify the pollution problem.

There is no Lab in the Marine Anti- Pollution Unit but there is a vacant room inside the temporary office which can be used as a lab. The Marine Anti- Pollution Unit would like to use the mobile lab instead to enhance their works.
1. The main and by far the most important, problem facing the Marine Anti- Pollution Unit is "Radiation pollution ".the hope to get any support from the international parties to handle the problem.
2. the Marine Anti- Pollution Unit urgently need the following minimum requirement,
- Missing the equipment's like the (radiation level management, flouting cordoning band and oil vacuum system).
- Training courses.
- Communication system to enable fast responses to emergencies.
- High-speed boat.

- Vehicle owned by the Marine Anti- Pollution Unit.

(1) Implementation Plan

The proposed Implementation Structure for the Project EMP is summarized in Figure 1.

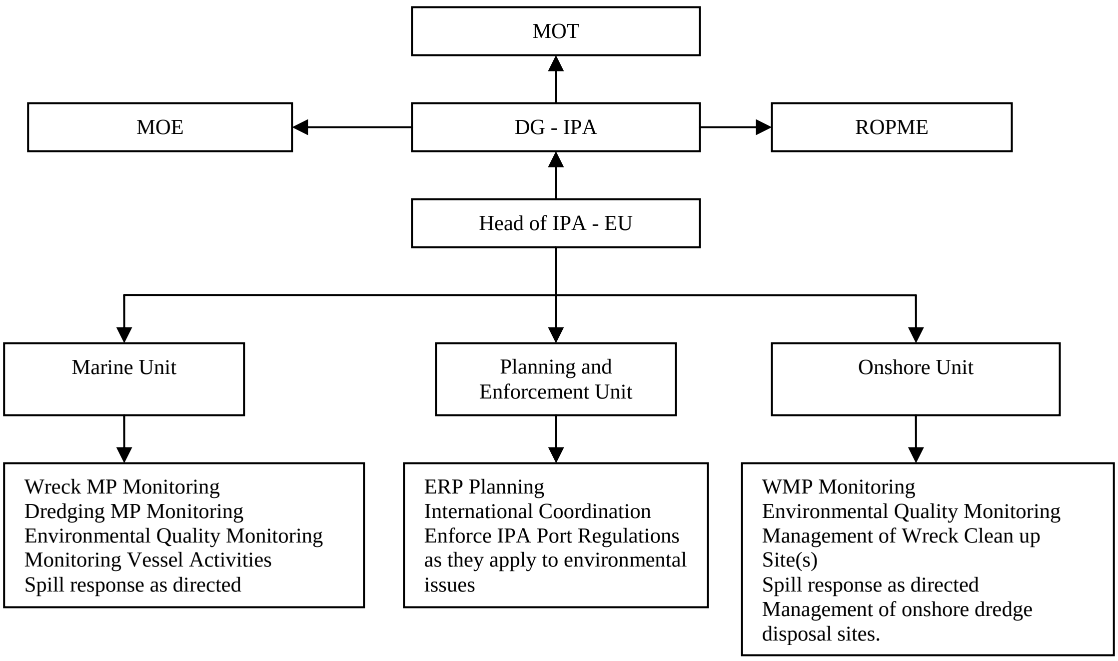


Figure 1 Proposed Implementation Structure for Project EMP

It is proposed that the existing Iraqi Marine Anti-pollution Department is re-organized into an Environmental Unit (EU). This should have responsibility for environmental management within ports (onshore and offshore) and Iraqi waters.

The IPA–EU will be required to monitor project environmental performance.
The establishment of a functional EU is fundamental to the successful implementation of the EMP. It is proposed the unit should be equipped with the items listed in Table 1 and be provided with extensive training support.

Table 1 Equipment Listing for IPA-EU

Item	No	Purpose	Comment
Zodiac Inflatable Craft*	2	Marine monitoring and ER	1 at each facility. If EU is dependent on others for access to marine areas it will not be able to function effectively.
Oil Spill Clean Up	2	Spill containment and clean up.	1 at each facility. Provided under Wreck Contracts
EQM materials, sampling equipment, sample stores, etc	3 x annual requirement	Sampling	to be defined
Secure appropriate equipment stores	As required at each facility	Ensuring equipment remains in good condition	
Secure Offices	2		1 at each facility. Existing IMAD offices may be used as main office if suitable.
Vehicle	2	Land based transport	1 at each facility
Computing	8 processors	Operations	4 at each facility

equipment	4 printers	management and reporting	2 at each facility
Communications equipment	Mobile telephones Fax Intra port communications	Communications	to be assessed 2 to be assessed

(2) Preparatory Works

An extensive program of preparatory works (i.e. works necessary to be completed prior to the implementation of Phase works) will be required. This will include:

· Develop and Implement Communication Strategy – necessary to ensure effective coordination between Iraq and its neighbors;

· Preparation of inputs into Contract Tender Documentation including; Draft DMP and Draft WRMP;

· Establishment of Environmental Unit.;

· Capacity Building for EU;

· Preparation of onshore dredge disposal site.

· Preparation of wreck cleaning site.

Technical Assistance will be necessary in each of these key areas of preparatory work.

(3) 2.1.3 Training Associated with the Environmental Monitoring System

Good training programs play a vital role in improving the adoption of the environmental monitoring system in ports. The training may be consisted of a series of workshops with the aim of ensuring that the employees are meeting the challenges of a dynamic and vibrant environment so that it will enable them to lead their port-based EMS Implementation. Based on the review of some international best practices, following are some suggested activities that could be included in the training workshops:

- An overview of the EMS requirements that are to be accomplished in the preliminary phase.
- Review of how these requirements are linked to other phases and EMS elements.
- Preparation of the participants to educate their port-based Implementation teams on upcoming requirements.
- Role-playing exercises where participants will form EMS “core teams” at hypothetical facilities to confront all of the tasks required in the next phase.
- Provide EMS practitioners with a practical experiences and insight via panel discussions.
- Review progress made during previous phase.
- Guidance, usually in the form of sample EMS documents and an Action Item List for completing tasks in each phase.

(4) EMP Reporting

A structured program of Reporting will be required to support the EMP. This will include:

- Inspection reports
- Quarterly Progress Reports
- Annual Reports.