

**The Republic of Iraq
General Company for Ports of Iraq (GCPI)**

**MASTER PLAN STUDY FOR
PORT SECTOR
IN
THE REPUBLIC OF IRAQ**

**FINAL REPORT
SUMMARY**

DECEMBER 2015

Japan International Cooperation Agency

**Ides Inc.
Nippon Koei Co., Ltd. (NK)
Oriental Consultants Global Co., Ltd. (OCG)**

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1. Introduction

1.1. Objectives of the Study

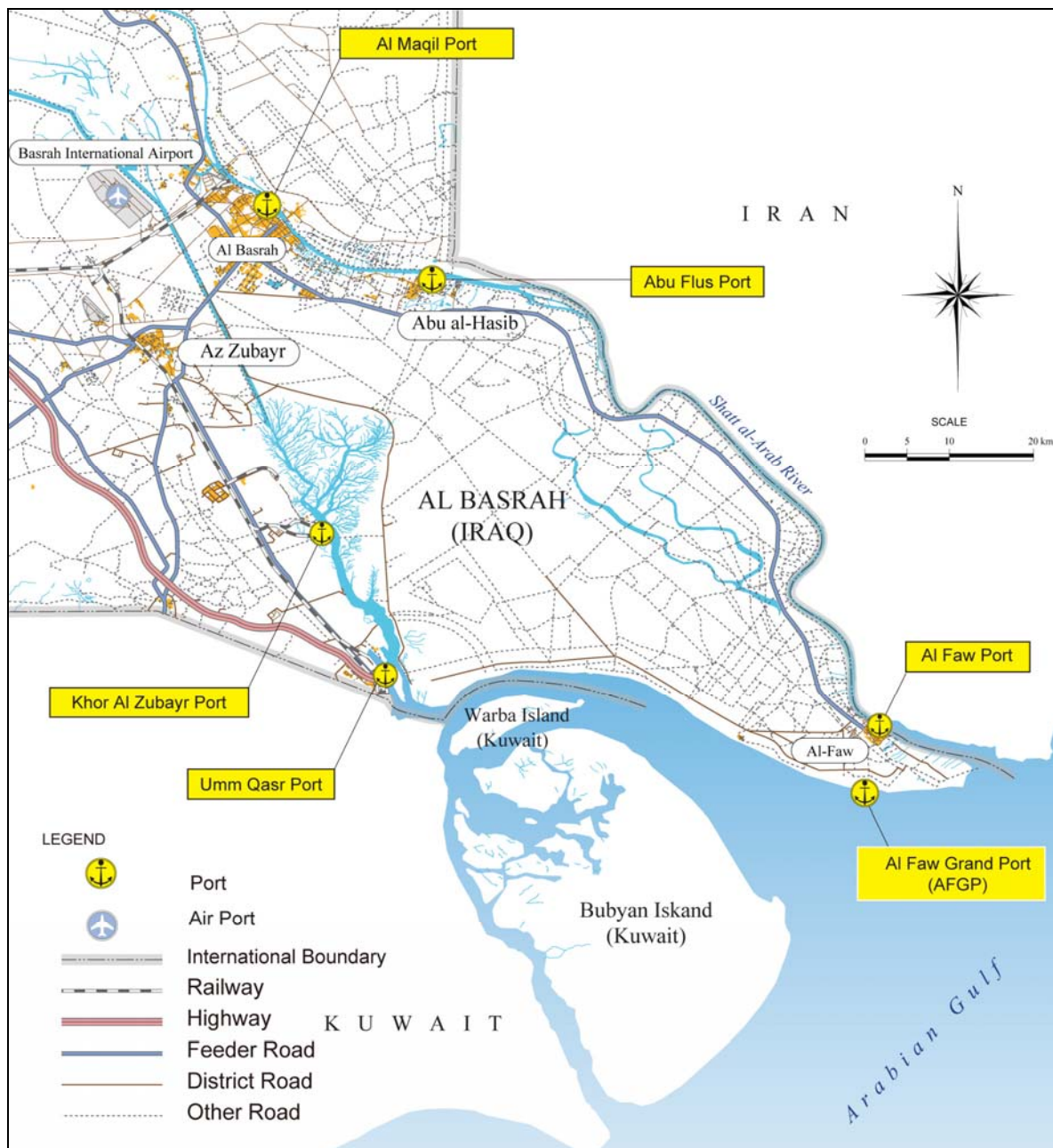
This report summarizes the Master Plan Study for Port Sector in the Republic of Iraq, implemented based on the agreement between GCPI and JICA on 17 May 2013, aimed at obtaining the following outputs:

- 1) Port Sector Development/Administration Strategy (target year 2035)
- 2) Port Master Development/Administration Plan for Main Ports and Waterways (target year 2035)
- 3) Short Term Development Plan for UQP and KZP (target year 2025)
- 4) Short Term Action Plan for Port Administration/Management/Operation (target year 2025)

In the course of the Study, it was recognized that pre-feasibility study for service berth and additional study on port security management and port reception facilities are important for the Master Plan. GCPI and JICA agreed to include these items in the Study and signed the "Amendment to the Record of Discussions on Master Plan Study for Port Sector" on 10 February 2015.

1.2. Study Area

The Study covers the channels and ports which are related to the maritime cargo transportation through Basrah Province in the southern region of Iraq: The study area comprises ports of Umm Qasr, Khor Al Zubayr, Al Maqil, Abu Flus and Al Faw Grand Port. The access channels to these ports and the adjacent areas are also included in the study area.



Source: JICA Study Team

Figure-1 Project Area

2. Analysis for the Current Condition of the Port Sector

2.1. Transportation Routes to Iraq

(1) Main Routes of the Imported Cargoes

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

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

Route 1: Mediterranean Route (Syrian and Turkish Corridors)

Syrian and Turkish corridors were one of the main import routes to the central/northern regions. Since the Syrian civil war emerged, the Turkish corridor has been used for imports through the Mediterranean Route via Mersin Port.

Route 2: Red Sea Route (Aqaba Port in Jordan)

The Red Sea route is used for cargo import to the northern part of Baghdad city and the central region of Iraq. The Syrian corridor (Tartus or Latakia Port) was used for import to the region but has not been in use since the civil war emerged. Aqaba Port in Jordan is the gateway port of this route.

Route 3: Iraqi Ports Route (Umm Qasr and Kohr Al Zubayr Port)

UQP and KZP were used for cargo import to the southern and central regions of Iraq. However, port facilities were severely damaged during the war, and import cargoes were transported by trucks through ports in Kuwait and Jordan. Then, as port facilities have been being restored in UQP and KZP in recent years, the Iraqi ports' route increases its share in total cargo import.

(2) Imported Cargo Volumes by Route

The transported cargo volumes from Jordan/Syria and Turkey were 10,000~12,000 tons/day and 6,000 tons/day respectively, while imported cargoes through the Iraqi ports were 14,000 tons/day in 2004.

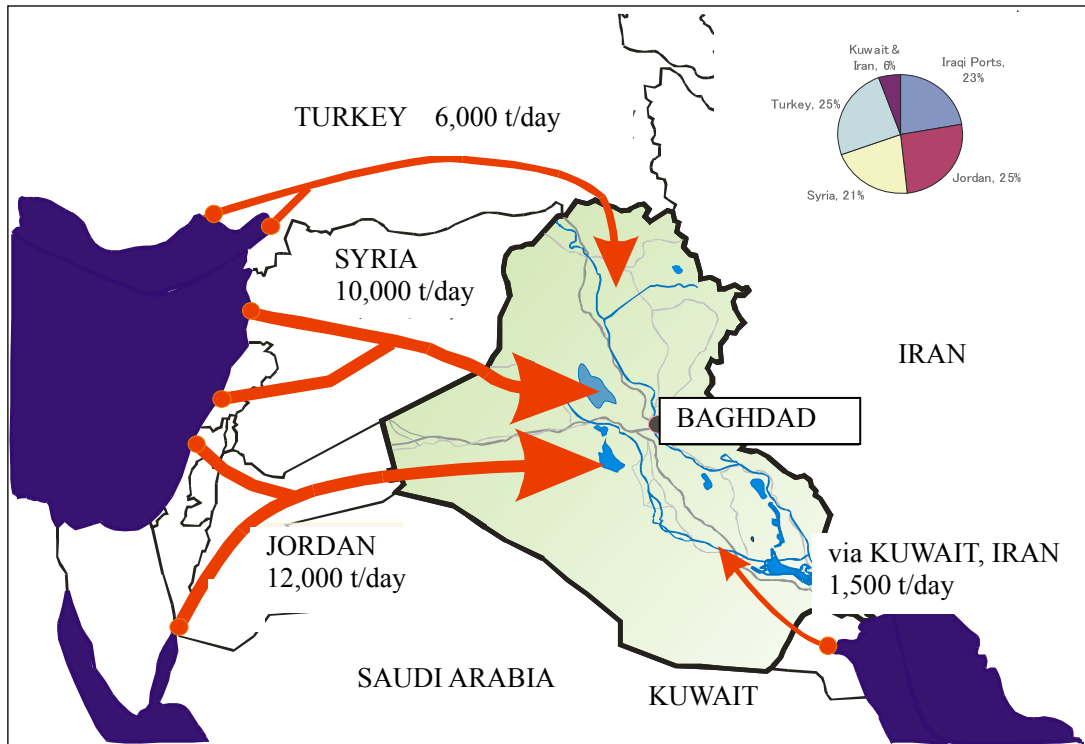
The intensification of battles in Syria and near collapse of the country's regime has had a negative effect on the cargo volumes transported through the Syrian route. Cargo transport from ports in Syria has been suspended and the majority of cargoes from Europe/South America to Iraq were unloaded at Mersin Port in Turkey and some cargoes at Aqaba Port in Jordan. Further it has been recorded that some cargoes which are equal to about US\$ 10 million per month were unloaded at Haifa Port in Israel.

The interview results with shipping companies, forwarders and consultants in Jordan and Dubai are shown below:

- There are many cases where imported cargoes from Europe are unloaded at Mersin Port in Turkey instead of ports in Syria and cargoes from Asia at Umm Qasr Port in Iraq. The road conditions from Mersin Port to Iraq are quite good and the double container truck can travel without the trouble.
- Heavy cargoes for the power station from Japan/Korea are unloaded at the port in Kuwait and transported to Iraq by the Multi-wheel Trailer because there is no such equipment in Iraq.
- Presently there is no chance for cargoes to be transported from ports in Lebanon because of the political situation.
- Recently truck numbers from Aqaba Port to Iraq have decreased, for example 6,000/month in 2011, 5,000/month in 2012 and 4,000~4,500/month in 2013. Truck numbers from Kuwait have also decreased because the Iraq government lays a much higher toll than before so that the use of ports in Iraq is promoted.
- There are some cargoes from the Saudi Arabian/Egyptian port in the Red Sea to Iraq.
- There are 3,000 trucks/month from Iraq to Aqaba Port, and 60 % of the trucks transport

container cargoes to Iraq. According to ACT (Aqaba Container Terminal), 20~30 % of container cargoes unloaded at Aqaba Port are for Iraq and recent handling volumes for Iraq have increased due to civil war in Syria.

- 15~20% of imported cargoes for Iraq were transported through ports in Syria before the civil war. The cargoes through Syria will recover after the end of the war because the relations between the Syrian and Iraqi government are quite good.



Source: Study for Development of Southern Ports in Iraq Post-Phase 1 Rehabilitation Project by GCPI

Figure-2 Transport Routes of Imported Cargoes for Iraq (2004)

Table-1 Traffic Volume of Import Routes for Iraq (2013)

(Unit: number of trucks)

	Jordan	Turkey	Iran	Kuwait	Iraqi Ports
Interview A	1,200/day	1,000~2,000/day	4,000~5,000/day	250~300/day	N.A.
Interview B	10~15 %	30~35 %	5~20 %		40~45 %
Assessment	15~20 %	30~35 %	N.A.	5 %	40~50 %

Source: Prepared by Study Team based on the interview result with shipping companies and forwarders

2.2. Present Situation of Iraqi Ports

The total cargo volume 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 12.63 million tons in 2006. The latest cargo handling volume was 15.87 million tons in 2014.

Table-2 Trend of Cargo Volumes and Ship Calls in Iraqi Ports

Year	Umm Qasr Port		Khor Al Zubayr Port		Abu Flus Port		Al Maqil Port		Total		
	Cargo Volume (1,000t)	Ship Calls	Cargo Volume (1,000t)	Ship Calls	Cargo Volume (1,000t)	Ship Calls	Cargo Volume (1,000t)	Ship Calls	Cargo Volume (1,000t)	Container Volume (TEU)	Ship Calls
2001	7,001	533	3,114	4,319	-	-	-	-	10,115	-	4,852
2002	6,083	512	1,804	4,258	-	-	-	-	7,887	-	4,770
2003	1,682	512	129	44	-	-	-	-	1,811	-	556
2004	2,105	894	1,737	780	-	-	-	-	3,842	-	1,674
2005	4,362	763	1,200	1,262	480	2,025	44	108	6,087	-	4,158
2006	7,659	883	4,301	1,307	565	1,552	103	124	12,627	137,081	3,866
2007	5,984	1,028	4,416	1,069	693	3,020	42	47	11,135	146,262	5,164
2008	7,219	898	4,049	1,006	550	2,345	10	13	11,828	293,114	4,262
2009	7,445	1,146	3,297	900	551	2,469	47	66	11,340	329,184	4,581
2010	7,413	1,106	2,817	735	571	364	242	263	11,044	465,945	2,468
2011	8,622	992	3,513	516	497	194	644	618	13,276	455,240	2,320
2012	9,335	922	4,265	531	467	150	877	743	14,944	589,295	2,346
2013	10,058	945	4,273	632	530	198	908	795	15,769	753,341	2,570
2014	9,367	948	5,060	670	460	180	983	808	15,869	778,563	2,606

Source: Prepared by Study Team based on GCPI's statistics data

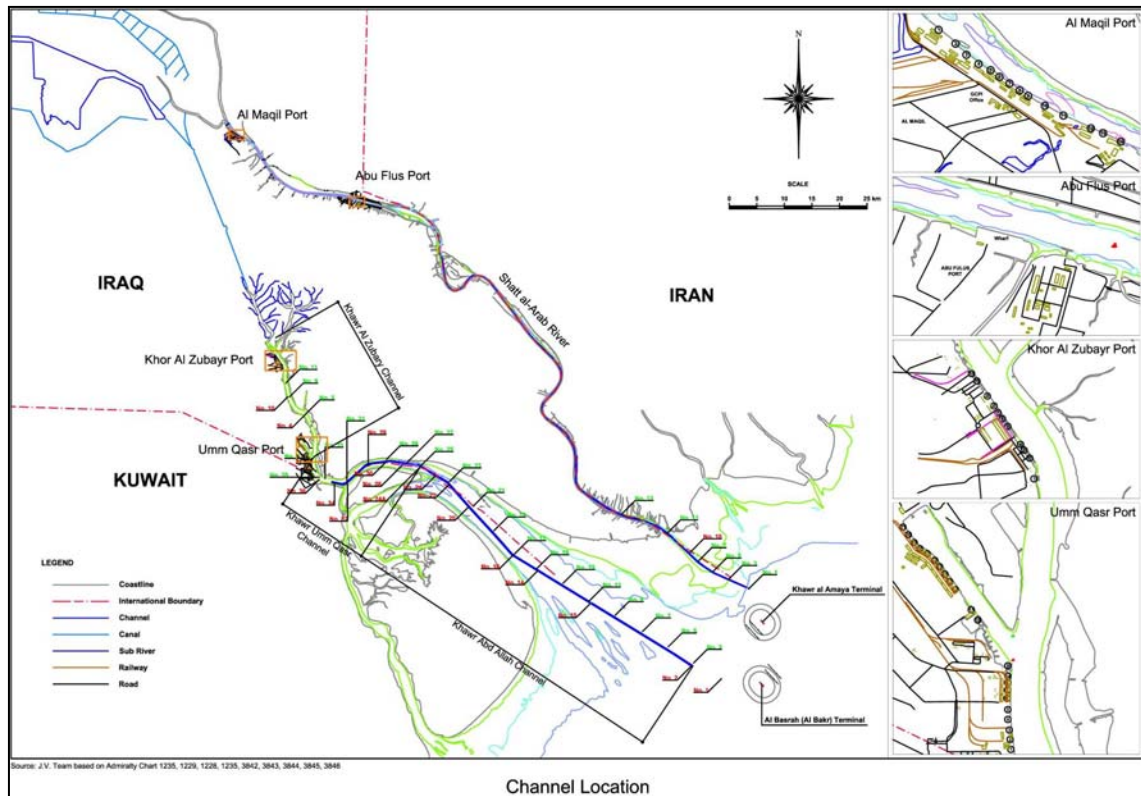
2.3. Present Situation of Approach Channels

(1) Outline of Approach of Channel

The existing channel system is composed of 2 routes. One route is Shatt al Arab Channel being established along Shatt al Arab River that leads to Abu Flus Port and Al Maqil Port. The other route is an approach to Umm Qasr Port and Khor Al Zubayr Port, and called as Khawr Abdallah Channel.

In spite of the previous cooperative efforts, the following issues are still to be resolved in order for the Approach Channel to be fully operational and attain its intended design capacity:

- Restoration of the necessary sections in depth and width throughout the respective channels. (Except for the route to the Umm Qasr Port in the Khawr Abdallah Channel, the restoration work has not yet progressed enough leaving restricted ship draft in many places. It is therefore far from adequate for the maximum design of ships expected to call at the existing ports.)
- Removal of shipwrecks obstructing safe ship navigation along the channels
- Restoration and installation of necessary Navigation Aids throughout both channels
- Settlement of border issues with neighboring countries where the channels are passing or of shared use.
(Most parts of Shatt al Arab Channel route are shared with and form a border with Iran, whilst a part of Khawr Abdallah Channel passes through the territory of Kuwait.)
- Continued maintenance dredging work in order to maintain sufficient water depths.



Source: JICA Study Team

Figure-3 Location of Channels

The present conditions of Channel depth and width are indicated in the following tables.

Shatt al-Arab Channel

Table-3 Summary of Water Depth and Width of Each Channel Section

Channel Section	Length (km)	Water Depth (CDm)	Width (m)	Remarks
River Mouth	12.0	-2.5~-4.0	150	Buoy No.1~No.7
Shared use with Iran	94.5	-4.5~-16.0	100~200	Buoy No.10~Border Post
Border Post near Abu Flus Port ~ Al Maqil Port	37.4	-5.0~-16.0	Unknown	Water depth survey done under the Study

Source: JICA Study Team

Khawr Abd Allah Channel

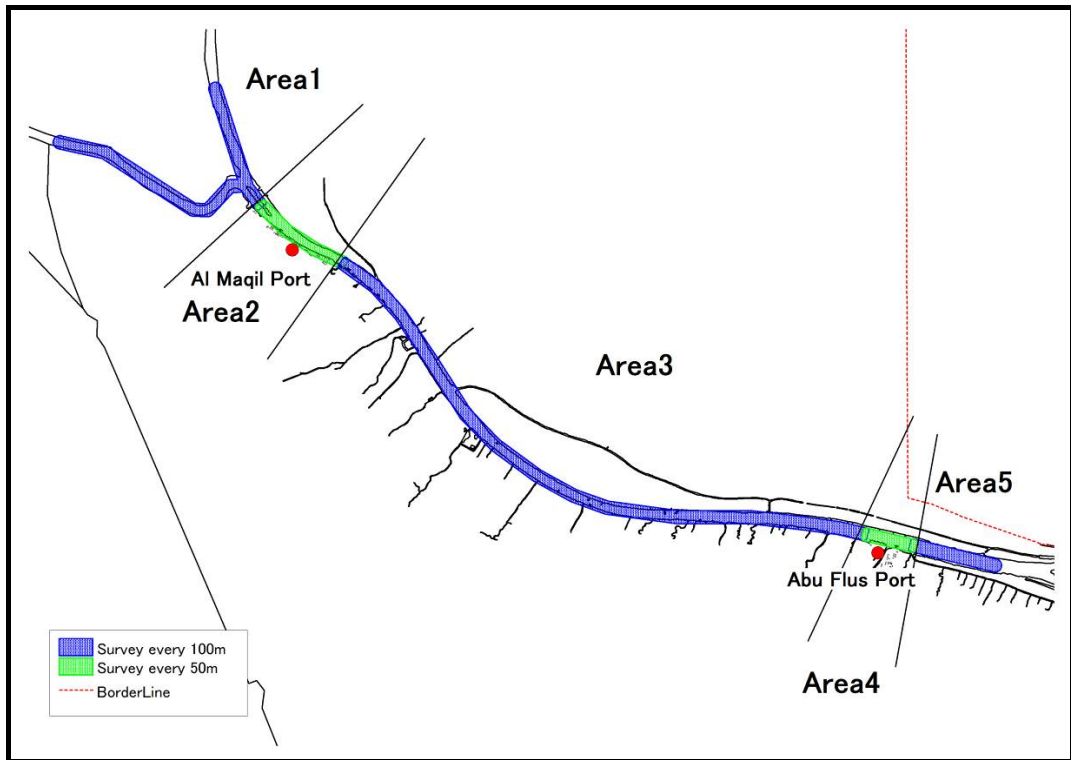
Table-4 Summary of Channel Depth and Width

Channel Segment	Length (km)	Depth (CD m)	Width (m)	Remarks
Khawr Abdallah	60.7	11.0~12.5	200	Buoy No.3~No.25
Khawr Umm Qasr	25.1	12.0~13.2	125~250	Buoy No.25~UQP
Khor Al Zubayr	17.6	9.0~15.0	150~400	UQP~KZP

Source: JICA Study Team

(2) Result of Bathymetric Survey (Shatt al Arab)

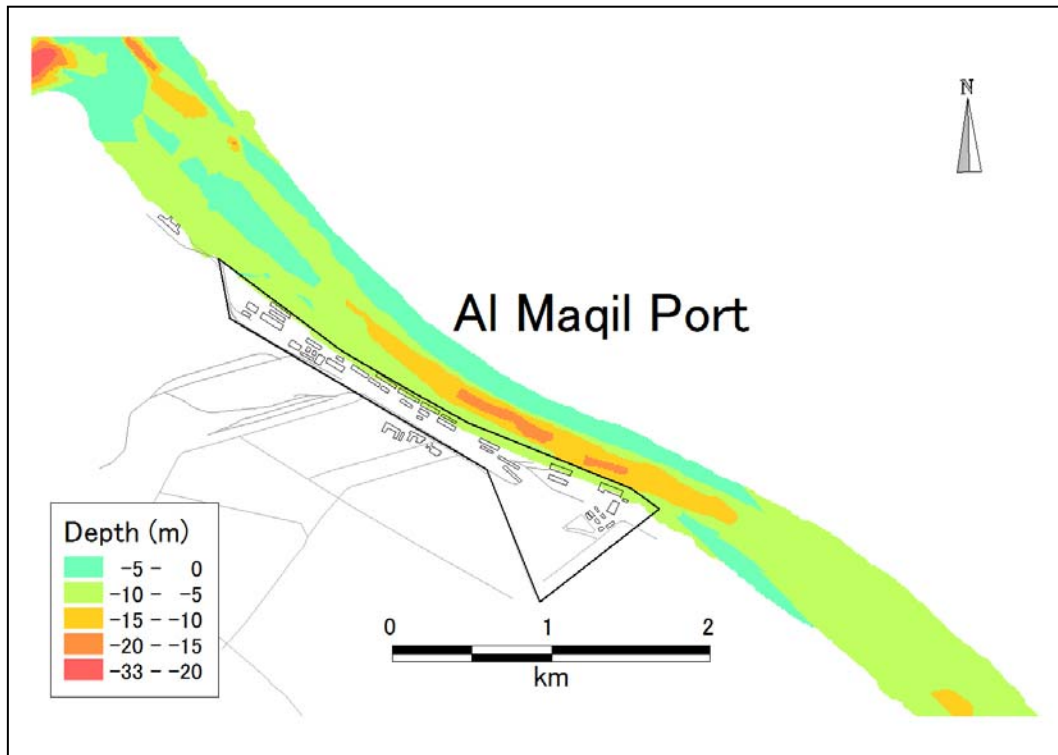
JICA Study Team conducted a bathymetric survey along the Shatt al-Arab Channel to better understand the current topographic condition of the river bed from the 8th to 19th day of February 2014.



Source: JICA Study Team

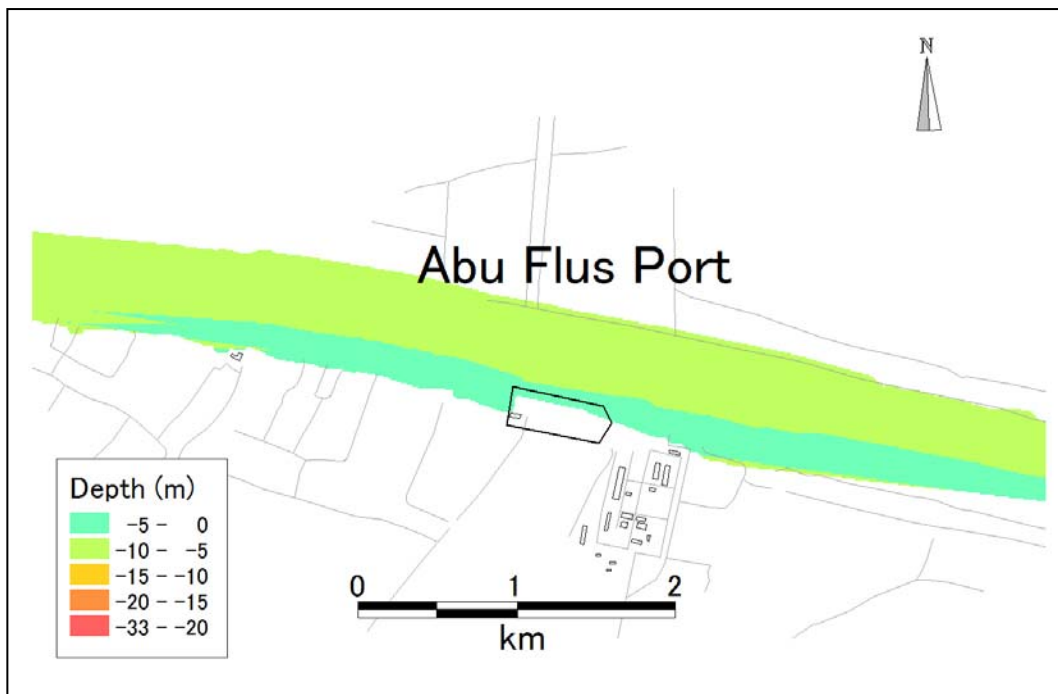
Figure-4 Location Map of Bathymetric Survey

Bathymetric charts created based on the survey data are shown in the following figure.



Source: JICA Study Team

Figure-5 (1) Bathymetric Chart (Al Maqil)



Source: JICA Study Team

Figure-5 (2) Bathymetric Chart (Abu Flus)

3. Port Development, Administration and Operations

3.1. Goals of Port Development in National Development Plan 2013-2017

Goals that indicate the quantity of the berths and the capacity to be fulfilled within the five-year period by the four major existing ports are published in NDP 2013-2017 as shown in Table 5. The development goals, i.e., those figures which appear under the column of 2017 in the Table are the same as those published in NDP 2010-2013. Except for Al Maqil Port, figures that appear under the column of 2013 which indicate the status of existing ports as of the start of the Plan, are the same as those published in NDP 2010-2013. The number of berths and the capacity of Maqil Port, printed in Bold in the Table, are larger than those shown in NDP 2010-2014: The number of berths at Maqil Port in 2013 was three (3) berths more than that the port had in 2010. Maqil Port has a 3,000 m long quay, which is divided into 15 berths. It is thus, supposed that the number of usable berths at the port has been increased by the removal of sunken ships at three berths during the period of 2010-2012 and, accordingly, the capacity of the port has increased to 2.25 million tons/year from 1.5 million tons/year in 2010.

Table-5 Goals of Development of Existing Ports shown in NDP 2013-2017

Name of Port	2013		Berth Required 2013-17	2017	
	Number of Berths	Capacity 1,000 t/yr		Number of Berths	Capacity 1,000 t/yr
Umm Qasr	22	7,500	19	41	14,000
Khor Al Zubayr	12	6,400	13	25	10,650
Al Maqil	9	2,250	5	14	3,600
Abu Flus	3	500	-	3	750
Total	46	16,650	37	83	29,000

Source: NDP 2013-2017

(1) UQP

GCPI has been developing UQP; the dredging and the removal of sunken ships along waterways between the Arabian Gulf and UQP under 'Port Sector Rehabilitation Project in the Republic of Iraqi Phase I'. The Gulfainer Company Limited, a private container terminal operator at UQP, has been developing its own terminal at Berth No. 11a under a concession contract with GCPI. GCPI is further taking steps to expand container terminals in the South Harbor with investment by private operators under joint venture contract. As of the end of 2013, GCPI is in the process of evaluating the proposals.

The current attempt at the re-development of UQP focuses on the existing port area. The vast land and water area at the northeast side of the basin still remains undeveloped, except for a plan to develop a new container terminal by private operator at the north coast of the basin across from Berth Nos. 19-21.

To cope with the growth of traffic demand, GCPI has intentions to keep developing the un-exploited spaces by attracting private investment. The northeast side has only 3,300 m long water shore line, which is not long enough to develop 19 additional berths within the basin. Thus, to fulfill the goal, it is indispensable to find other space outside the current port area of UQP. Possible sites are the incomplete basin located upstream of UQP or along the waterways.

(2) KZP

The Port Sector Rehabilitation Project Phase II is about to start. The project includes the construction of a new 300 m long additional wharf, rehabilitation of the existing wharves, dredging of basin, cargo handling equipment, and dredging of waterways between UQP and KZP. KZP has 3,600 m long water shoreline, which includes 13 berths. Of the 13 berths, currently 12 berths are operational. Including the new berth planned in the above mentioned Project Phase II, the existing

KZP has only space to develop just three or four more berths. It is impossible to develop 13 additional berths within the current port area. A new project site should be found elsewhere.

(3) Al Maqil Port

Al Maqil Port has a total of 15 berths. By rehabilitating the existing wharves and removing sunken ships in the basin as well as the renovation of the backup area, it is possible to ensure the operation of 14 berths by 2017. Taking into consideration the fact that the main commodity handled at the port is cement, the improvement of the cargo handling capacity of the port can be achieved by specializing in berths for specific major commodities such as cement. It is also expected that, by the start of the operation of a container terminal by NAWAH Port Management at Berth No. 13 and 14, general cargo will be brought to the port in the form of containers in the coming years, and this trend will increase the capacity of the port.

The goal of Al Maqil Port is to achieve 3.6 million tons per year by 2017. This target might have been calculated with the assumption that the cargo handling capacity for general cargo should be 1,000 ton per year for every meter of berths. However, taking into consideration the following situations that allow only small ships to call on the port, it is assessed to be difficult for the port to achieve the target 3.6 million tons per year with 14 berths:

- a shallow water area near the mouth of Shatt al Arab River restricts sizes of calling vessels, and
- the two bridges located downstream of access waterways to the port restrict the passage of the calling ships, .

(4) Abu Flus Port

Abu Flus Port has three berths, though some parts of them need repair, and no expansion is planned in NDP 2013-2017. The major cargo of the port is containers. It is possible to increase the capacity of the port by renovating No. 3 Berth, which is severely damaged, to a specialized container terminal equipped with suitable equipment.

(5) Al Faw Grand Port Development

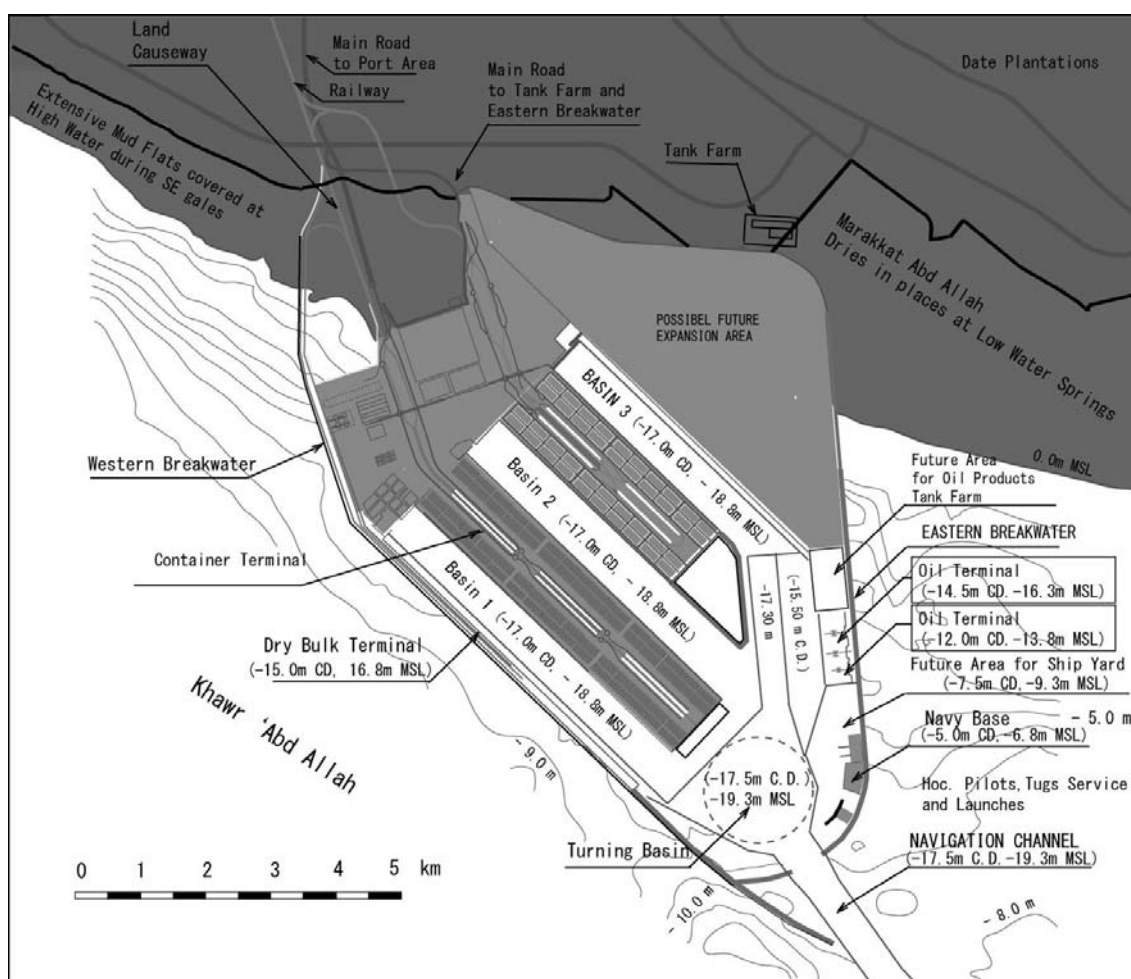
Several study reports have been published for the development of the Al Faw Grand Port. Since the proposal of the concept of developing a new port on the coast of the Arabian Gulf in the Transport Master Plan 2005, the plan of the port has been modified and elaborated. The plan shown in Figure 6 is the most updated plan that was presented at a seminar "Iraq Infrastructure 2013 in Dubai".

The Al Faw Grand Port Development Plan aims at completion in 2038 and a three-step development is proposed: the first step is up to 2018, the second step is up to 2028 and the final step is up to 2038. Facilities to be developed are listed in Table-6.

Table-6 Facilities Planned in Respective Development Stages of Al Faw Grand Port

Item	Unit	Stage 1	Stage 2	Final
Quay for Container terminal	m	3,900	3,100	7,000
Quay for Bulk terminal	m	2,000	1,500	3,500
Container yard	ha	120	80	200
Yard for bulk	ha	40	20	60
Paved area Road, Railway, building	ha	60	40	100
Silo for wheat	1,000 m ³	150	50	200

Source: Feasibility Study of the New Basrah Grand Port Vol. 0. 2008



Source: New Al Faw Port Development (Drawing), GCPI and the presentation material of GCPI at “Iraq Infrastructure 2013, Edited by the Study Team

Figure-6 Al Faw Grand Port Development Layout Plan (As of August 2013)

3.2. Financial Situation of GCPI

The following tables show the main financial figures of revenues and expenditures for four years through 2009 to 2012 of GCPI. The financial situation of GCPI for the period can be generally said as positive and stable.

Table-7 Revenues of GCPI

Unit: Mill IQD

	2012	2011	2010	2009
Commodity Activity	334	257	82	13
Service Activity	317,339	232,007	186,022	152,032
Manufacturing	380	83	275	71
Others	1,114	787	1,003	1,137
Total Revenues	319,166	233,134	187,382	153,253
Growth Rate	36.90%	24.42%	22.27%	

Source: GCPI Financial Statements/prepared by the Study Team

The revenue of service activity had the largest share in GCPI revenues which accounted for around 99% from 2009 to 2012. And the growth rate of revenue from service activity was the same percentage as that of the total. Thus, the Study Team supposes that the revenue of service activity comes from collecting port dues, cargo handling charges and concession/lease fees of each

port, although contents of the revenue of service activity are not stated at all in the financial statement of GCPI. Contrastingly, the growth rate of total cargo volume was only 15% in 2012/2011 and ship calls were almost the same both years.

The revenues of commodity activity, manufacturing and others had a small share, only 1% in total but the revenue of commodity activity in 2012 grew at 25 times the rate of that in 2009.

Table-8 Expenditures of GCPI

Unit: Mill IQD

	2012	2011	2010	2009
Wage and Salaries	139,364	110,822	111,613	106,966
Commodity Supply	14,587	12,496	10,623	12,576
Service Supply	4,463	4,234	3,703	3,487
Construction and service	9,072	14,705	10,279	6,723
Depreciation	6,759	5,911	5,485	4,757
Taxes and Fees	8	0	0	0
Manufacturing	4,008	2,398	316	562
Others	14,612	12,583	2,220	1,680
Total Expenditures	192,871	163,149	144,239	136,751
Growth Rate	18.22%	13.11%	5.48%	

Source: GCPI Financial Statements/prepared by the Study Team

As shown in the table above the GCPI expenditures of running Iraqi ports constantly increased during the past 4 years. The development of expenditures did not uniformly follow the development of the revenues/volume of cargo handled in the ports. The largest share of expenditure was wages and salaries which accounted for 77% in 2009 and 2010, then sharply decreased to 67% in 2011 but increased a little to 72% in 2012. The second share was commodity supply such as gas, fuel, water and other utilities cost which was around 7%.

4. Long-term Strategy for Port Development and Administration

4.1. Prospects of Cargo Traffic Demand

(1) Demand Forecast by Macro Analysis

The average annual growth rate in Iraq was 2.12 % and for the last decade and 7.05 % for the last five years. According to IMF Data and Statistics, the average annual growth rate is forecast to be 7.23 % from 2012 to 2018. It is expected that the GDP growth rate for Gulf countries except Iraq will be about 5 %. Further the GDP growth rate will be an annual average of 13.31 % at fixed 2012 prices over the duration of the plan, according to the “National Development Plan 2013-2017” by Ministry of Planning in Iraq.

Based on the abovementioned information, the following GDP growth rate for Iraq in the future is assumed:

- The average annual middle growth rate will be 7.5% from 2012 to 2018, based on IMF Data and Statistics and the average annual high growth rate will be 9.5%, reflecting the active target of “National Development Plan 2013-2017”, and referring to 9.64%/year in 2018 forecasted by the IMF Data & Statistics. The average annual low growth rate will change like the rate in the other Gulf countries.
- The average growth rate from 2012 to 2025 will be the same as the rate from 2012 to 2018.
- The average annual middle growth rate from 2012 to 2035 will be 6.0 %, referring to the future growth rate of the Non-OECD countries, based on the OECD Economic Policy Papers No.03, Looking to 2060: Long-term global growth prospects, Nov. 2012”. Further it is assumed that the growth rate in Iraq will be restored to the state at which the other Gulf countries retraced, considering that the growth rate in Iraq is higher compared to their rate in the same period. The high and low growth rates are assumed to be 7.5 % and 4.4 % respectively.

The future GDP growth rates in Iraq by the growth scenario are shown in Table-9.

Table-9 Future GDP Growth Rate in Iraq

Scenario/Year	2012~2018	2012~2025	2012~2035
Low Growth	5.5 %	5.5 %	4.4 %
Middle Growth	7.5 %	7.5 %	6.0 %
High Growth	9.5 %	9.5 %	7.5 %

Source: Prepared by JICA Study Team based on view of forecasts of IMF, OECD and Iraq NDP 2013-2017

(2) Result of Micro Analysis

Results by micro analysis are shown in Table-10. The projected container cargo volume is estimated based on the correlation between GDP in Iraq and cargo volumes in ports of Iraq.

The projected cargo volume of wheat, rice, sugar and dates, is referred to a long-range program for increasing output in the “National Development Plan 2013-2017”. Future volume of cement and steel is estimated in relation with cement/steel consumption rates and GDP levels in several countries (Russia, Iran and Turkey, etc.). Number of vehicles imported is also estimated in relation with vehicle holding rates and GDP levels in the world.

Table-10 Demand Forecast for Iraqi Ports

Cargo/Year	Unit	2012	2015			2025			2035		
			Low	Middle	High	Low	Middle	High	Low	Middle	High
(Import Cargo)											
1. Container Cargo	TEU	294,649	433,000	483,000	535,000	1,045,000	1,454,000	1,964,000	1,553,000	2,359,000	3,471,000
2. Conventional Cargo											
(1) Grain (wheat)	ton	2,644,783	1,372,000	2,244,000	2,520,000	1,152,000	1,152,000	2,149,000	1,707,000	1,707,000	2,703,000
(2) Rice	ton	1,092,684	1,211,000	1,211,000	1,211,000	1,416,000	1,416,000	1,416,000	1,531,000	1,531,000	1,531,000
(3) Sugar	ton	742,239	773,000	773,000	773,000	1,129,000	1,129,000	1,129,000	1,549,000	1,549,000	1,549,000
(4) Cement	ton	1,587,269	0	1,100,000	3,000,000	0	1,800,000	5,400,000	0	2,600,000	6,600,000
(5) Steel & Pipes	ton	734,129	330,000	550,000	770,000	290,000	840,000	950,000	320,000	1,080,000	1,140,000
(6) Vehicle	no.	69,694	93,000	93,000	93,000	570,000	570,000	570,000	686,000	686,000	686,000
(7) Others	ton	922,477	551,000	878,000	1,236,000	596,000	947,000	1,650,000	763,000	1,265,000	2,021,000
Sub-total (except Vehicle)	ton	7,723,581	4,237,000	6,756,000	9,510,000	4,583,000	7,284,000	12,694,000	5,870,000	9,732,000	15,544,000
3. Liquid Bulk (Oil Product)	ton	2,731,572	0	4,510,000	4,750,000	0	0	480,000	0	0	4,520,000
Import Total	ton	10,455,153	4,237,000	11,266,000	14,260,000	4,583,000	7,284,000	13,174,000	5,870,000	9,732,000	20,064,000
(Export Cargo)											
1. Container Cargo (Empty)	TEU	294,644	433,000	483,000	535,000	1,045,000	1,454,000	1,964,000	1,553,000	2,359,000	3,471,000
2. Conventional Cargo											
(1) Dates	ton	82,510	106,000	106,000	106,000	0	0	0	0	0	0
(2) Others	ton	0	0	0	0	0	0	0	0	0	0
Sub-total	ton	82,510	106,000	106,000	106,000	0	0	0	0	0	0
3. Liquid Bulk											
(1) Oil Product (Heavy fuel oil)	ton	365,772	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000
(2) Oil Product (Gasoline, Gasoil)	ton	0	0	0	710,000	3,480,000	5,220,000	9,320,000	2,390,000	2,450,000	6,610,000
(3) LNG/LPG	ton	0	0	0	0	2,000,000	2,000,000	2,000,000	4,000,000	4,000,000	4,000,000
Sub-total	ton	365,772	600,000	600,000	1,310,000	6,080,000	7,820,000	11,920,000	6,990,000	7,050,000	11,210,000
Export Total	ton	448,282	706,000	706,000	1,416,000	6,080,000	7,820,000	11,920,000	6,990,000	7,050,000	11,210,000
Grand Total											
Container Cargo	TEU	589,293	866,000	966,000	1,070,000	2,090,000	2,908,000	3,928,000	3,106,000	4,718,000	6,942,000
Conventional Cargo	ton	7,806,091	4,343,000	6,862,000	9,616,000	4,583,000	7,284,000	12,694,000	5,870,000	9,732,000	15,544,000
Liquid Bulk Cargo	ton	3,097,344	600,000	5,110,000	6,060,000	6,080,000	7,820,000	12,400,000	6,990,000	7,050,000	15,730,000

Source: Prepared by JICA Study Team

4.2. Issues on Port Development, Management and Operations

Ports of Iraq are important national assets for promoting international trade through smooth import and export by accommodating ocean going vessels and realizing competitive maritime transport. However, shipping companies, shippers and consignees indicate difficulties in using Iraqi ports; poor port service, low port productivity, high cost, shallow channel, long cargo dwelling in port, ship waiting for tide, and many other problems. Iraqi ports are still on the way to restoration after a long war and face the following problems in port development, management and operations.

(1) Issues on Port Infrastructure

Total cargo throughput of Iraqi ports reached 14.9 million tons in 2012, of which container cargo accounted for half of the total in tons, i.e. 589,000 TEUs in number of boxes. Accounting for GDP growth of Iraq, cargo throughput will see rapid growth for the next 10-20 years. Consequently, Iraqi ports will face a shortage of port facilities and queues of waiting ships in the near future. It is imperative to develop modern container terminals in UQP and/or AFGP in the coming three or four years.

(2) Issues on Port Management and Operations

All ports of Iraq are administered and managed by GCPI, and some terminals are operated by private companies under lease agreement with GCPI. Iraqi ports are therefore categorized as “Service Port” where the port authority manages a port, regulates activities in a port, provides all kinds of port services including pilotage, cargo handling and storage.

“Service Port” is usually a state owned port and their employees are public service employees, who have less motivation to provide good services and have an attitude of giving permission to use the port rather than an attitude of promoting the use of their port. In order to improve cargo handling productivity and quality of port services, it is imperative to change the ports of Iraq from “Service Port” to “Landlord Port”. The landlord manages a port and regulates port activities but does not render cargo handling services, and instead commissions private companies to provide such port services. Separation of regulators and operators is necessary for the change from a Service Port to a Landlord Port.

1) Improvement of productivity and efficiency of container terminals

- Low berth occupancy ratio (Container berths are not used as designed, number of calling vessels remain at low levels),
- Shortage of container yard due to long dwelling time of imported containers,
- Lack of RTG and shortage of container yard (Reach stacker operated yard needs wider area than RTG operated one. Private operators are reluctant to introduce RTGs.),
- Long waiting queue of trucks for entering port, loading cargo, and clearing the departure gate. (Trucks cause chaos in port.)
- Lack of electronic data processing for port operations.

2) Issues on oil terminals and liquid cargo handling

- Lack of capacity for the export of oil products and import of oil related materials is anticipated in Khor Al Zubayr Port.
- Increase of tanker calls are expected at the oil tanker jetty located on Khor Al Zubayr Channel between UQP and KZP, and tankers pay special attention to their safe navigation, mooring and cargo handling as dangerous cargo carriers.

3) Issues on productivity of general cargo terminal

- Low productivity of break bulk cargo operations, i.e. discharging of sugar, wheat, rice and the like, is brought about by direct loading onto trucks on a wharf. (Break bulk cargo shall be stored in a shed and delivered to trucks later.)
- Lack of bulk loading and unloading facilities (Cement/Grain Silo, Pneumatic unloader, Belt conveyor, and other bulk cargo handling facilities)

4) Issues on competitive port operations

- Charges on “General Services” are considerably high in port fees and charges. Charges for entry include tug boat service, pilotage, berthing and unberthing and are not consistent with the quantity of services provided. Total cost for ship entry and cargo handling is at a high level.
- Tariff of GCPI is applied to a terminal operated by private company. Private operators cannot offer lower charges or volume discount to a specific user. Profit share scheme between GCPI and private company gives less incentive to private investment.

- Dwelling time of cargo is longer than free of charge period in many cases due to slow procedures related to cargo delivery.
- Lengthy procedures of customs documentation, inspection, and clearance. Electronic customs clearance system has not been introduced.
- Necessary days for transportation from UQP to Bagdad after cargo arrival at the port is much longer than that from Aqaba Port to Bagdad.
- Competition between private terminals is not encouraged due to pricing policy of GCPI.

5) Issues on port management body

- Stevedoring services provided by GCPI and private operators are not competitive due to the fact that the same tariff is applied to services. Advantages of private operations are not well realized.
- Ports of Iraq are categorized as “Service Port” and GCPI controls everything related to port management and operations. It is indispensable that GCPI becomes a regulatory body and does not provide stevedoring services, so that Iraqi ports will become “Landlord Port”. (Revision of Law of Ports and Harbors will be necessary for this transformation)
- Capital raising for new channel dredging, maintenance dredging, construction of breakwaters, land reclamation and development of other port facilities.
- Granting long-term concessions on port development and operations, and incentives for private investors.
- Strengthening earning capacity by reducing redundant employees, encouraging transfer of port workers to private operators, and promoting capacity development of port employees by job training and re-education.

4.3. Basic Concepts for Port Development

Roles and functions of GCPI are to develop, maintain, and operate the infrastructure for maritime transport, and to contribute to the economic development of Iraq through ensuring smooth maritime transportation for import and export. For this purpose, it is imperative to 1) develop international trade ports to satisfy the demand for import and export, and 2) provide competitive and satisfactory customer services. Strategic goals of port development are examined and basic concepts for the port development are summarized as the following 7 items.

- 1) To promote maritime transportation through Iraqi ports
 - To strengthen the competitiveness of transportation through the Iraqi ports route compared with the Aqaba port route and Mersin port route. (Reducing the cost at Iraqi ports, shortening transportation time through the Iraqi ports route, modernizing port facilities, and improving port services)
- 2) To develop and maintain approach channels to cope with the increasing number and size of calling vessels
 - Abdullah, Umm Qasr and Khor Al Zubayr channels maintain a depth of 12.5 meters,
 - Aiming at an early opening of the port; channel to Al Faw Grand Port be dredged to a depth of 13-14 m at the initial stage, deepened further at the later stage,
 - Channel to Al Maqil Port and Abu Flus Port maintains its status quo and will be dredged when Iran and Iraq agree to it.

- 3) To develop port facilities and terminals to cope with increasing cargoes
 - Container cargo is estimated to increase to 2.9 million TEUs (2.1-3.9 million TEUs) in 2025 and to 4.7 million TEUs (3.1-6.9 million TEUs) in 2035. UQP is required to develop container facilities to handle up to 1.7-2.7 million TEUs.
 - Al Faw Grand Port is expected to start operations in 2018-2026.
 - General cargo volumes, containerized or handled in bulk, will soon increase, therefore, bulk terminals for grain, cement, fertilizer and others are needed.
 - Al Maqil Port and Abu Flus Port be restored and serve Basrah and neighboring provinces.
- 4) To encourage private participation in port development and operation
 - To grant concession to capable private companies for the restoration, development and operation of port facilities.
 - To encourage private investment; enough period of concession contract, lease contract or other form of contract is ensured to recover their investment. Incentives for their investment are given to overcome risks of investment.
- 5) To provide user friendly and competitive services
 - To modernize port facilities and equipment, improve productivity of cargo handling, and enhance performance of ports.
 - To reduce cargo dwelling time in the port, realize prompt customs clearance, introduce systematic gate and truck operations, and rationalize port procedures.
 - To transfer port service works, which can be provided by a private sector, to a private sector so GCPI is separated from competition with private services.
- 6) To promote the development of highways, port access roads and railways
 - To develop an express highway from UQP to Bagdad, and restore railways from the port to major cities.
 - To develop a port access road to Al Faw Grand Port.
 - To develop dry ports in the suburbs of Bagdad with a bonded area, and reduce cargo dwelling time in the port.
- 7) To establish laws and regulations to ensure proper port development, management and operations
 - To clarify rights, duties and responsibilities of private investors in port development and operations.
 - To clarify powers, functions, duties and responsibilities of GCPI.
 - To transform Iraqi ports from Service Port to Landlord Port.

Table-11 SWOT Analysis Matrix

		External Environment	
		Opportunities	Threats
Internal Environment	Strengths	<ul style="list-style-type: none"> To promote maritime transportation through Iraqi ports 	<ul style="list-style-type: none"> To maintain security of Iraqi ports and ensure safety of transportation
		<ul style="list-style-type: none"> To develop and maintain approach channels coping with the increasing number and size of calling vessels 	<ul style="list-style-type: none"> To maintain channels by public work of GCPI
		<ul style="list-style-type: none"> To develop port facilities and terminals coping with the increasing cargoes 	<ul style="list-style-type: none"> To establish laws and regulation to ensure proper port development, management and operation
	Weaknesses	<ul style="list-style-type: none"> To encourage private participation in port development and operation 	<ul style="list-style-type: none"> To promote the development of highways, port access roads and railways
<ul style="list-style-type: none"> To provide user friendly and competitive services 		<ul style="list-style-type: none"> To reduce cost of Iraqi ports and improve services 	

Source: JICA Study Team

4.4. Strategic Long-term Plan for Port Development and Management

Functional allotment among ports is examined, and roles and functions of each port are summarized as shown in Table-12.

UQP

The port shall handle all kinds of commodities except liquid bulk. The capacity of the port can be enhanced by having specialized terminals for container, dry bulk cargoes (wheat, rice, sugar and cement) and vehicles. The port's capacity to handle general cargoes can be enhanced by utilizing existing warehouses more productively. The port shall also handle large and heavy cargoes that cannot be handled at other ports.

KZP

Taking into consideration the current situation that the port handles the commodities related to local industries, including liquid bulk, it is expected that the port keep supporting and promoting the business activities of local industries. To this end, the development of the port should keep pace with the business plan of the local industries.

Attention should be also paid to Dhow ships and barges currently calling on the port. Though it is foreseen that those commodities transported by these small ships, such as sugar and beans for import and dates for export, will be containerized in the future, the port should reserve facilities for these small ships for the time being.

Al Maqil Port

The port has been handling cement and general cargoes. However, the port is expected to start container services due to the opening of a private container terminal in 2013. It is the intention of the container terminal to serve the local markets within Basrah City and its neighborhood. As the volume of container cargoes will increase at the port, the port should be not only a terminal between ship and quay, but also a local and regional logistics center.

Abu Flus Port

Abu Flus and Al Maqil Ports are complementing each other. The two ports are alternative ports to serve the market in the Basrah area and vicinity. Therefore, once the road system between Basrah and Abu Flus Port is improved, Abu Flus Port will be the alternative outer port. Since there are large underused land areas around the Abu Flus Port, the port has potential to attract industries into its hinterland.

Table-12 Roles and Functions of Each Port

Port Category	Role	Services and Ships	Present	Future
Principal Port (Gateway Port)	Container Cargo Import and Export	Liner services to Asia and Europe; Calls of mother vessels of these services	None	Al Faw Grand Port (Post Panamax Class Ships) UQP (Panamax Class)
		Feeder services from the Arabian Gulf; Calls of feeder vessels	UQP	Al Faw Grand Port UQP KZP if necessary
	General Cargo Import and Export	Tramper services by large cargo ships	UQP	Al Faw Grand Port UQP KZP
Important Industrial Port	Industrial Cargo, Bulk Cargo Import and Export	Bulk carriers, Tankers of and General cargo ships	KZP	Al Faw Grand Port (Large bulk carriers) KZP (Panamax Class)
Local Port	Trade with Countries in the Arabian Gulf	Liner services by small ships	Abu Flus Port	Abu Flus Port,
		Tramper services by small general cargo ships	Abu Flus Port, Al Maqil Port	Abu Flus Port, Al Maqil Port

Source: JICA Study Team

5. Long-term Development/Administration Plan for Main Ports and Waterways

5.1. Development Outline of Main Ports and Waterways

(1) Development of Container Terminals

Three alternative concepts for port development were raised in consideration of port policy of Iraq. Taking into account the future Iraqi port system, it is concluded that the Master Plan shall be prepared based on Concept B, which is moderate development of UQP and KZP until AFGP enters into full operation.

Concept A: The least investment in port development

UQP and KZP will be developed less and efforts be made to build the AFGP. In case that seaborne cargo overflows the capacity of Iraqi ports, Mubarak Port in Kuwait, Aqaba Port in Jordan, and/or Mersin Port in Turkey will be used for the import of Iraqi cargo.

Concept B: Moderate development of UQP and KZP

Assuming that all seaborne cargo from the Arabian Gulf shall be handled at Iraqi ports, UQP and KZP will be developed to cope with the cargo demand until AFGP enters into operation.

Concept C: Full development of UQP and KZP, Least development of AFGP

Coping with all seaborne cargo destined for Iraqi ports, UQP and KZP will be expanded to the maximum capacity. All the unused water front within the basin of UQP is developed into wharves and the capacity maximized by installing full scale cargo handling equipment. This concept will ease the tight schedule of the AFGP development project.

These three concepts can be figuratively illustrated as shown in Figure-7. Attempt of Concept A is to open AFGP as soon as possible, and Concept C is intended to delay the opening of AFGP as much as possible, while Concept B is the intermediate of Concept A and C.

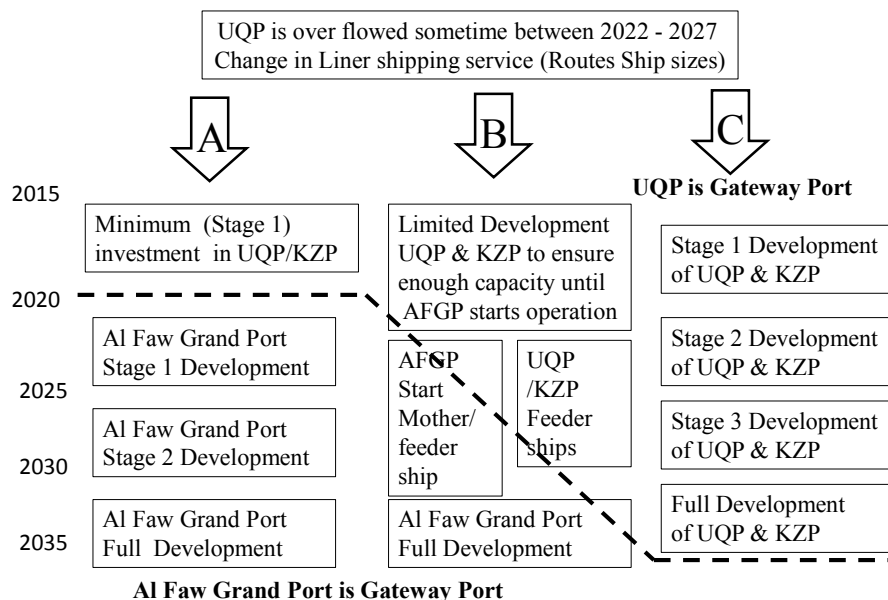


Figure-7 Alternative Concepts of Long-term Development of Iraqi Ports

In order to make a master plan based on Concept B, two options for the opening of AFGP are taken into consideration. One option is that the first berth of AFGP may be completed by the end of 2018 and enter into operation soonest. The other option is that the opening of AFGP may be delayed for several years.

[Long-term Development Plan]

AFGP may enter into operation in 2026 or later. UQP South berths will be redeveloped and expanded to the seaside. Quay gantry cranes will be installed in the UQP South berths. UQP North Berths No.25, 26 and 27 are also developed as a large scale modern container terminal.

[Alternative Plan]

AFGP may enter into operation in 2018 or soon after. Before the opening of AFGP, UQP South will be rehabilitated and reinforced by private sector and used for container handling with mobile cranes. UQP North No.25, 26 and 27 will not be developed due to limited demand for container handling at UQP.

The stage plan of port development under the Long-term Development Plan and the Alternative Plan is illustrated in Figures-8 and 9, respectively. Container throughput of a container terminal in UQP is limited by the capacity of its yard due to the fact that containers remain in the container yards for about 15 days on average. For the purpose of planning, it is assumed that average dwelling time at UQP should be shortened to 10 days and the yard space at AFGP is large enough. The required number of berths is estimated as shown in Table-13.

Table-13 Required Number of Container Berths at AFGP and UQP

Port	2025						2035					
	Low		Middle		High		Low		Middle		High	
	L.D.P	Altern.	L.D.P	Altern.	L.D.P	Altern.	L.D.P	Altern.	L.D.P	Altern.	L.D.P	Altern.
Al Faw 350 m Berth	0	0	0	2	3	4	0	5	4	9	10	14
UQP Container Berths	10	9	10	8	10	8	10	3	10	3	10	2

Source: JICA Study Team

(2) Development of Conventional Berths

The required numbers of conventional berths are summed up by cargo type and by port, and compared with the number of available berths in 2025 and 2035 at each port for the respective cargo types. It is observed that the number of berths available for dry bulk and general cargoes in the existing ports is larger than the required number of berths for both dry bulk and general cargoes in the middle growth case.

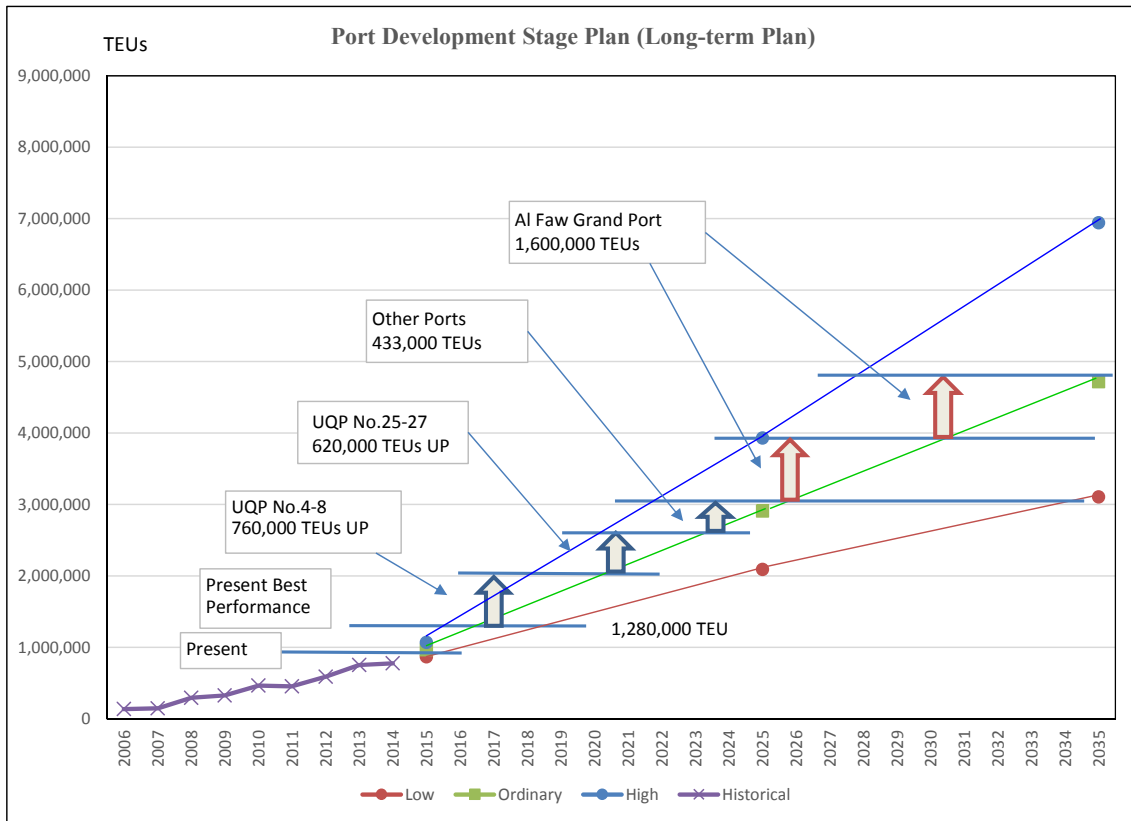
In the high growth case, additional berths are required as shown in Table-14 with Bold letters. KZP will face shortages of berths for liquid bulk berths in 2025 and 2035, and general cargo berths in 2025. Al Maqil Port will face shortages of general cargo berths in 2015, since Berth No. 8-12 will be available for general cargo handling because the master plan allocates Berth No. 1-7 for water front redevelopment and Berth No. 13 and 14 for a container terminal.

Table-14 Comparison between Required and Available Numbers of Berths for Handling Dry Bulk and General Cargoes

Port	Type of Cargo	2025				Available	2035			
		Required			Available		Required			Available
		Low	Middle	High			Low	Middle	High	
UQP	Dry Bulk	1.4	1.4	1.9	4	2.0	2.0	2.5	4	
	General Cargo/Ro.Ro	3.6	4.0	6.6	9	3.9	4.3	5.7	9	
KZP	Dry Bulk	2.0	2.0	2.0	2*	2.0	2.0	2.0	2*	
	General Cargo	1.3	2.9	5.0	5	1.0	2.6	4.9	4	
	Liquid bulk	1.3	4.1	12.8	4	1.3	3.7	12.8	5	
Abu Flus	Dry Bulk	0	0	0	0	0	0	0	0	
	General Cargo	0.6	1.0	1.4	2	0.4	0.6	2.0	2	
Al Maqil	Dry Bulk	0	0	0	0	0	0	0	0	
	General Cargo	0.3	5.0	12.0	5**	0.4	4.4	9.5	5**	

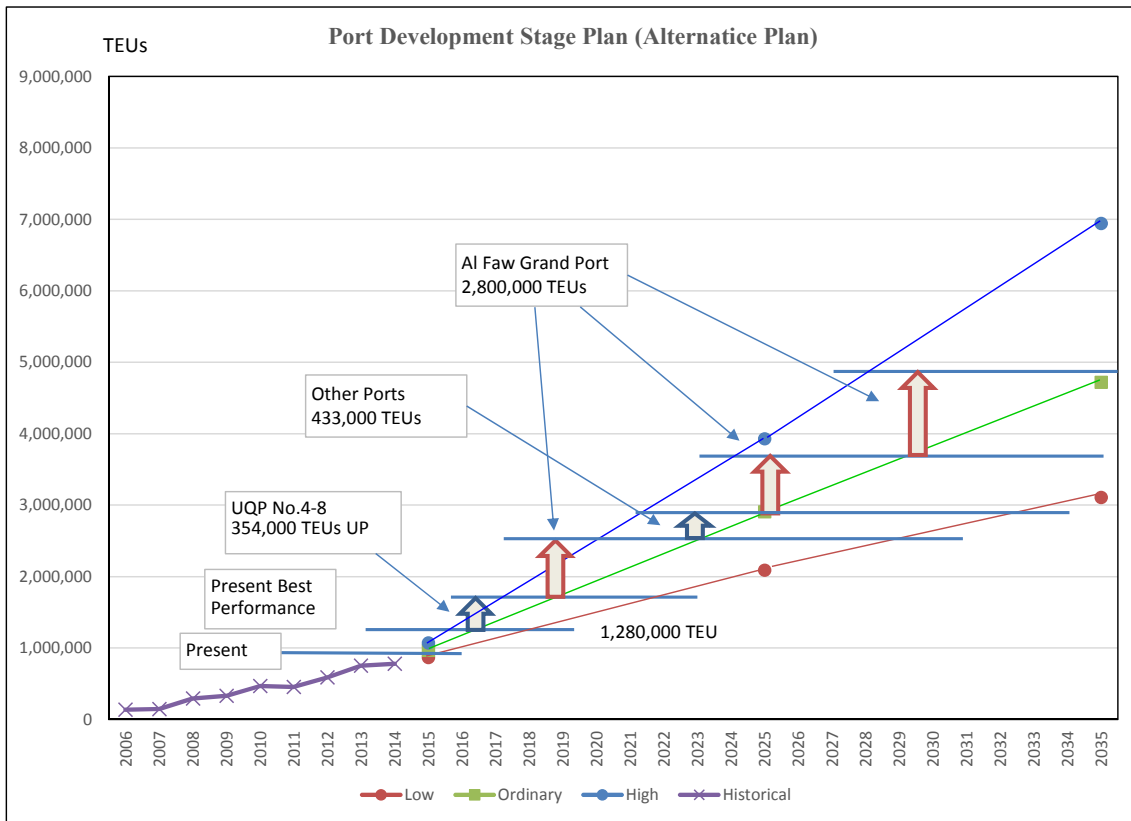
Note: * Berth for sponge iron, ** Berth No.8-12 at Al Maqil Port

Source: JICA Study Team



Source: JICA Study Team

Figure-8 Port Development Stage Plan



Source: JICA Study Team

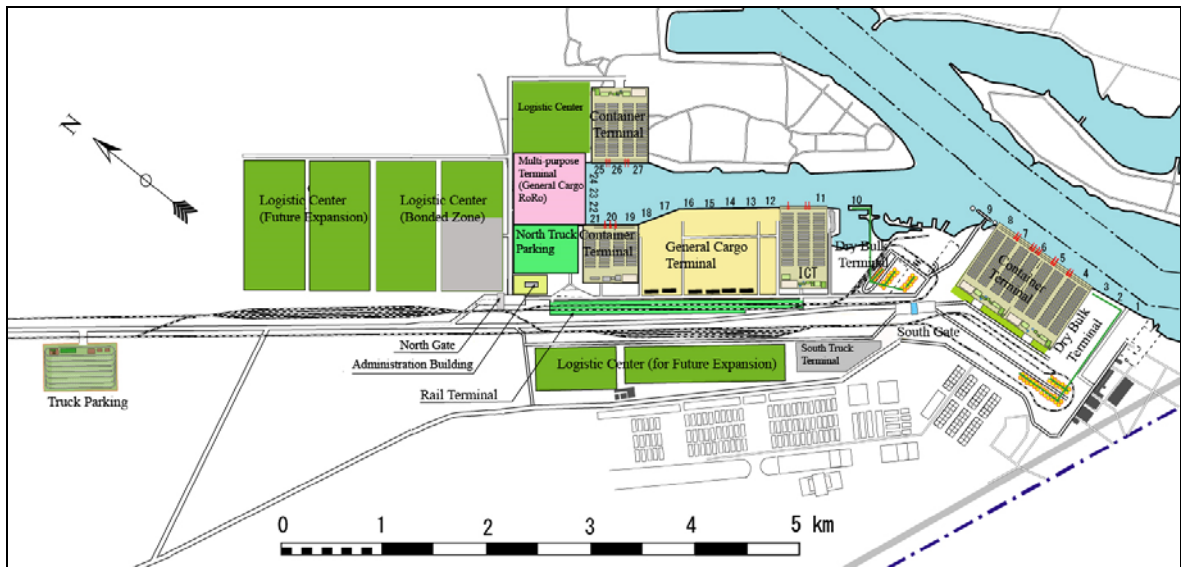
Figure-9 Port Development Stage Plan (Alternative)

5.2. Possible Long-term Port Development Projects

Calculating the demand for seaborne cargo handling in 2035, necessary projects are examined and the following projects are selected for Long-term Development project. Contents of each project for long-term development and estimated cost are as shown in following sections.

(1) UQP North Berths No.25-27

Development facilities New Berths No.25-27 Container Yard Reclamation Container Yard Soil Improvement Container Yard Pavement Container Yard Utilities Cargo Handling Equipment (QGC) Equipment (RTG, Mobile Crane, Reach Stacker, Top/Side Lifter, Tractor & Chassis)	Estimated Cost:	USD 522 mil.
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Source: JICA Study Team

Figure-10 UQP North/South Long-term Development Plan

(2) UQP North Berths No. 22, 23 & 24

Development facilities New General/RoRo/Container Terminal, Berths No.22, 23 & 24 Yard Reclamation Yard Soil Improvement Yard Pavement Yard Utilities Removal of Existing Berths	Estimated Cost:	USD 447 mil.
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(3) UQP North Berths No.20

Development facilities Container Yard Pavement Container Yard Utilities	Estimated Cost:	USD 142 mil.
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(4) UQP South Berths No.4 - No.8

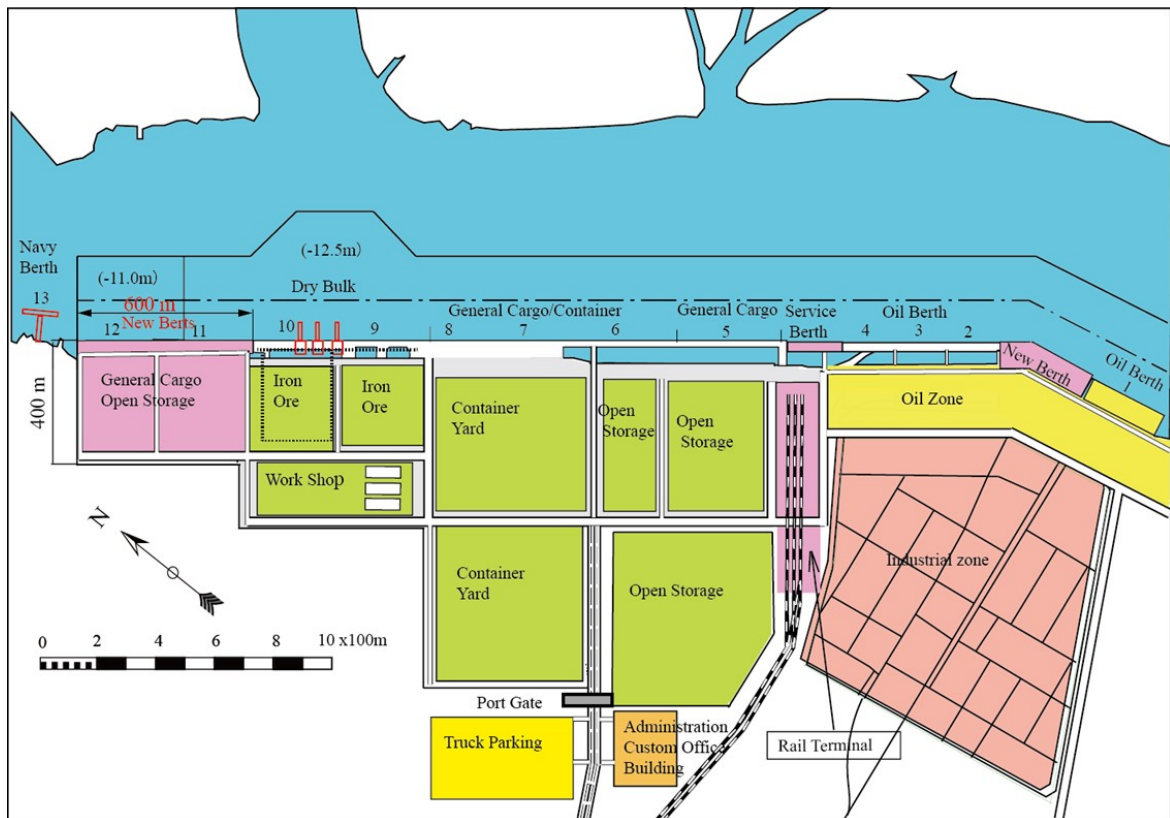
Development facilities	Estimated Cost:	Long-term Plan:
Reinforcement & Expansion of Berth No.4-8		USD 1,035 mil.
Removal of Existing Sheds		Alternative Plan:
Container Yard Pavement		USD 275 mil.
Container Yard Utilities		
Cargo Handling Equipment (QGC)		
Equipment (RTG, Mobile Cranes, Reach Stacker)		

(5) UQP Ground Area Redevelopment

Development facilities	Estimated Cost:	USD 561 mil.
Truck Parking		
South Port Truck Terminal		
Administration Building		
Main Gates for North Port and South Port		
Logistic Center (Bonded Zone) EPZ		
Logistic Center		
General Cargo Terminal/Yard		
Container Terminal/Stacking Yard behind of No.12 & 13		
International Container Terminal (ICT)		
Removal of Existing Sheds Behind No.12 & 13		
Removal of Existing Jib Cranes		
Removal of Existing Rail, Construction of New Rail		
New Road inside Port Area		

(6) KZP Berths No.11 & 12

Development facilities	Estimated Cost:	USD 391 mil.
New General Cargo Berths No.11 & No.12		
Dredging in front of Berths No.11 & No.12		
Yard Reclamation		
Yard Soil Improvement		
Yard Pavement		
Yard Utilities		
Removal of Existing Berths No.11, 12, 13		
New Jetty No. 13		



Source: JICA Study Team

Figure-11 KZP Long-term Development Plan

(7) KZP Ground Area Redevelopment

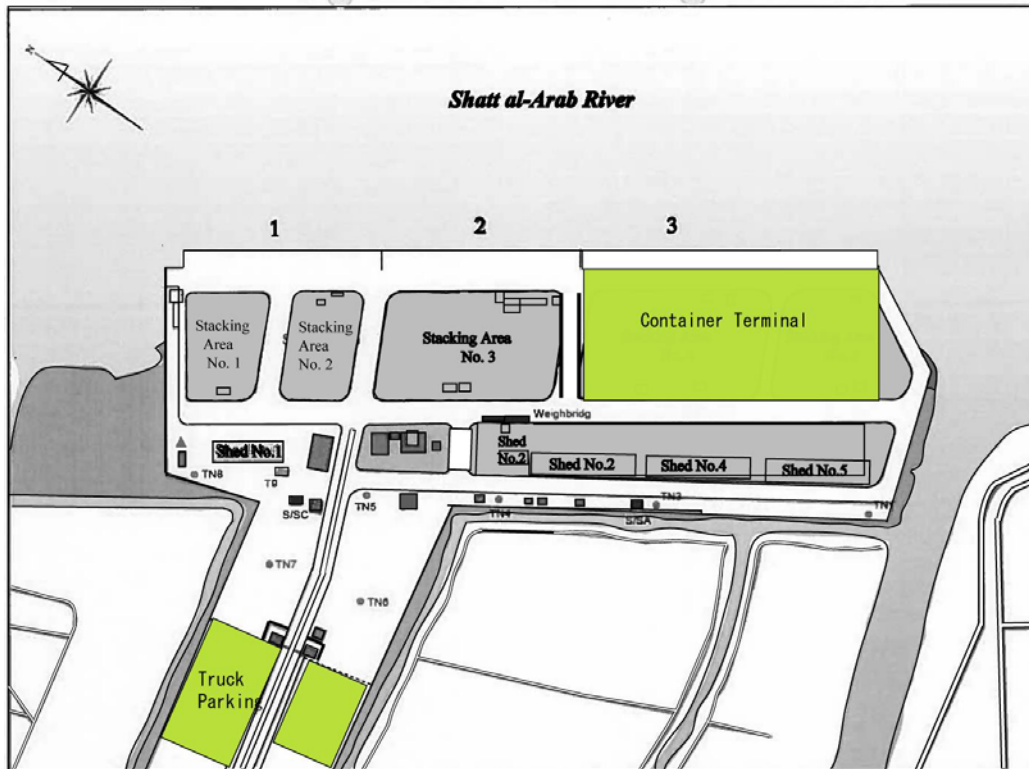
Development facilities	Estimated Cost:	USD 425 mil.
New Open Storage Yard 1, Yard 2, Yard 3 New Iron Ore Yard at Berths No. 9 & 10 New Work Shop Behind of No. 9 & 10 New Sheds at Work Shop behind No. 9 & 10 Removal of Existing Sheds Behind No.7 & 8 Removal of Existing Belt Conveyors Behind of No.5 & 6 Yard Utilities Truck Parking Area Administration Custom Office Building Rail Terminal		

(8) Abu Flus Port Redevelopment

Development facilities	Estimated Cost:	USD 19 mil.
Rehabilitation of Berth No.3 for Container Terminal Container Staking Yards Equipment (Mobile Crane)		

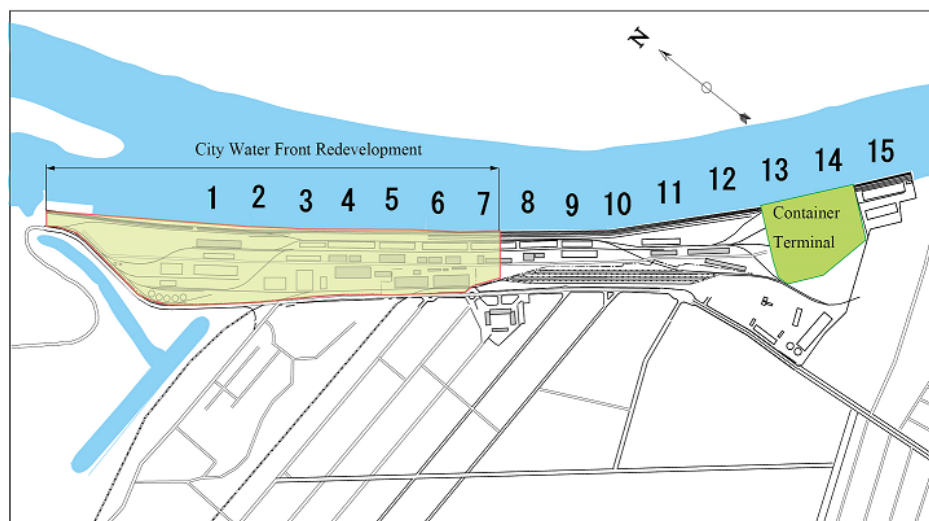
(9) Al Maqil Port Redevelopment

Development facilities	Estimated Cost:	USD 48 mil.
Yard Rehabilitation		



Source: JICA Study Team

Figure-12 Abu Flus Port Long-term Development Plan



Source: JICA Study Team

Figure-13 Al Maqil Port Long-term Development Plan

(10) Al Faw Grand Port Development

<p>Development facilities</p> <ul style="list-style-type: none"> New Container Terminals (Long-term Plan:No.1-4, Alt. Plan:No.1- 9) Access Channel Dredging Access Road (Type-1, Type 2) Access Road (Revetment) Highway, Part-1 connecting to Al Faw Port Highway, Part-2 Highway, Part-3, incl tunnel approach Highway, Part-4 from Safwan city, incl tunnel approach 	<p>Estimated Cost:</p>	<p>Long-term Plan: USD 5,042 mil.</p> <p>Alternative Plan: USD 6,436 mil.</p>
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Highway, Tunnel Between Part 3 and Part 4 Container Handling Equipment (QGC) Equipment (RTG, Top/Side Lifter, Tractor & Chassis) East and West Breakwaters	
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(Up) AFGP First Phase Plan

(Right) AFGP Alternative First Phase Plan



Figure-14 AFGP First Phase Development Plans

(11) Development of Khawr Abdallah Channel System

Development of Channel/Removal of Wrecks	Estimated Cost
Abdallah Channel () in case of Rerouting	USD 360 (1,359) mil.
Removal of Sunken Vessel (One)	USD 7 mil.
Umm Qasr Channel	USD 60 mil.
Removal of Sunken Vessels (6 along Channel, 3 at Berth)	USD 60 mil.
Khor Alzubayr Channel	-
Removal of Wrecks (4 along Channel)	-

(12) Development of Shatt Al Arab Channel

Development of Channel/Removal of Wrecks	Estimated Cost
River Mouth Area	USD 170 mil.
River Mouth - Abu Flus Port	USD 140 mil.
Abu Flus to Al Maqil Port	USD 10 mil.
Removal of Wrecks (Approximately 33)	USD 220 mil.

Source: JICA Study Team

5.3. Strategic Environmental Assessment**(1) Water and sediment quality survey**

As part of the strategic environmental assessment, water and sediment quality surveys were conducted on 11 December 2013 (low tide, water quality) and 17 January 2014 (high tide, water quality and sediments). The locations for sampling water quality and sediments were in the Shatt al-Arab river between Al Maqil Port and Abu Flus Port.

1) Water Quality

The results of the water quality surveys are compared with environmental standards in Iraq for fresh water, and EU standards for bathing water quality for with respect to coliform bacteria.

- Electrical Conductivity (EC) ranged between 2,066 - >3,999 $\mu\text{S}/\text{cm}$ (equivalent to Salinity of ca. 1-2 ‰) during low tide and 2,380 – 4,360 $\mu\text{S}/\text{cm}$ (equivalent to Salinity of ca. 2-3 ‰) at high tide. The effect of the Arabian Gulf is noticeable at high tide. No stratification was evident with the EC measurements.
- Dissolved Oxygen (DO) was generally high value above 5 mg/L apart from some locations where DO is below Iraqi standard.
- BOD, indicator of organic pollution, was below 1.2 mg/L at all stations.
- Total Petroleum Hydrocarbons (TPH), indicator of oil and grease, were not detected at any stations.
- Coliform count ranged between 70,000 and 510,000 cfu/100mL not meeting EU standard for bathing water quality.
- Cyanide (CN), Arsenic (As), Cadmium (Cd), Lead (Pb) and Mercury (Hg) were below Iraqi environmental standard.

There is little evidence of significant pollution of the water quality in Shatt al Arab River except for coliform. It is suggested that poor sewage or waste water treatment causes high coliform counts in the Shatt al Arab River.

2) Sediment Quality

The results of the sediment quality survey are compared with the Canadian Sediment Quality Guideline Values for the Protection of Aquatic Life (fresh water) because there are no

environmental standards in Iraq and neighboring countries. In the Canadian Guideline, ISQG corresponds to the threshold level below which adverse biological effects are not expected while PEL defines the level above which adverse effects are expected to occur frequently.

- Total Organic Carbon (TOC) was below 1% hence it is assumed that organic pollution does not progress.
- Total Petroleum Hydrocarbons (TPH), indicator of oil and grease, were not detected at any stations.
- Cadmium (Cd), Lead (Pb), Mercury (Hg), PCB and DDT were not detected or below ISQG.
- Arsenic (As) and Copper (Cu) were above ISQG at some stations but below PEL.
- Dioxins, High Values (concentration of non-detected congeners at detection limit) were above ISQG but below PEL while Low Values were above ISQG (concentration of non-detected congeners at zero) at only four stations.

There is little evidence of significant pollution of the sediment quality in Shatt al Arab River even though some parameters are above ISQG at some stations. Generally sediment pollution occurs subsequent to water pollution. It is suggested that high river discharge volume and strong currents are preventing degradation in water quality hence sediment pollution does not progress.

(2) Preliminary environmental impact assessment

A preliminary environmental impact assessment was conducted for the proposed long-term development projects (4 ports and shipping channels). The degree of impacts were rated from A-D in accordance to the following criteria:

- A+/-: Significant positive/negative impact is expected.
- B+/-: Positive/negative impact is expected to some extent.
- C+/-: Extent of positive/negative impact is unknown.
- D: No impact is expected.

According to the preliminary environmental impact assessment, there were no items that were expected to have significant negative impact (rating: A-). However there were some items that were rated as B- or C-. Items rated as B- were air pollution (operation phase), water pollution (construction and operation phases), waste (construction and operation phases), sediment pollution (operation phases), ecosystem (construction and operation phases) and resettlement (operation phase). Items rated as C- were air pollution (construction phase) and noise/vibration (construction and operation phases). Please refer to Section 5.3 of the main report for the rationale behind the ratings. A detailed environmental impact assessment should be conducted in the ensuing development stages (e.g. feasibility study phase) taking into account the potential impacts identified through the preliminary environmental impact assessment.

5.4. Economic Evaluation of Long-term Development Projects

National benefits of long-term port development projects are assessed in accordance with the following effects to be realized by the implementation of projects.

- Expansion of container handling capacity by the development of UQP;
- Reduction of ship berthing hours resulting from productivity improvement which may be brought by the introduction of new modern cargo handling equipment;
- Reduction of traffic congestion in port area by the redevelopment of road and utilities inside the port;
- Expansion of bulk/general cargo handling capacity from the development of KZP;
- Maintenance of container handling capacity through the rehabilitation of Abu Flus Port;
- Expansion of container handling capacity from the development of AFGP;
- Avoidance of interruption of ship traffic along Khawr Abdallah Channel which may be

- caused by ships calling at Mubarak Port;
- Navigation of larger ships along the Shatt al Arab River by the dredging and removal of sunken ships;
- Reduction of ocean freight rates and land transportation cost in comparison with a case of no port development

Economic benefits of the long-term projects are calculated based on the abovementioned items and project value is analyzed by three indicators, i.e. Net Present Value (NPV), Benefit Cost Ratio (B/C) and Economic Internal Rate of Return (EIRR). These indicators of the development of Long-term Development Plan and its Alternative Plan are simulated as shown in Table-15. B/C of the Long-term Development Plan is slightly higher than the Alternative Plan. As both cases of long-term development need the development of AFGP, economic indicators show similar rates.

Table-15 Economic Analysis of Long-term Projects

Long-term Plan	NPV (million USD)	B/C ratio	EIRR
Base Case	2,102	1.26	8.4 %
Case 1	1,309	1.15	7.4 %
Case 2	1,099	1.14	7.3 %
Case 3	305	1.03	6.3 %
Alternative Plan	NPV (million USD)	B/C ratio	EIRR
Base Case	1,151	1.13	7.0 %
Case 1	240	1.02	6.2 %
Case 2	125	1.01	6.2 %
Case 3	- 786	0.92	5.4 %

Source: JICA Study Team

Note: Case 1: Cost up by 10%; Case 2: Benefit down by 10%, Case 3: Both cases happen simultaneously

6. Short/Mid-term Development Plan

6.1. Possible Short/Mid-term Development Projects

Coping with estimated demand in 2025, possible port development projects are selected in UQP, KZP. Other supplementary projects are also selected as Short/Mid-term development projects. The summary below shows each project of the Short/Mid-term Development Plan.

(1) UQP-North Berths No.25, 26 & 27

Facilities	Details	USD 522 mil
New Berth No. 25, 26 and 27	600 m x 50 m (-12.5m)	
Container Yard: Reclamation	1,340,000 m3	
Container Yard: Soil Improvement	335,000m2	
Container Yard: Pavement	335,000m2	
Container Yard: Infrastructure	L.S.	
Equipment: Gantry Crane	4 sets for 3 berths	
Equipment: RTG	8 sets	
Equipment: Mobile Crane	3 sets	
Equipment: Reach Stacker	10 sets	
Equipment: Top/Side Lifter	6 sets	
Equipment: Tractor & Chassis	13 sets	

(2) UQP-North Berths No. 22, 23 & 24

Facilities	Details	USD 447 mil
New Berth No.22, 23 & 24	400m	
Yard: Reclamation	1,200,000m3 (1,200m x 500m x 2m)	
Yard: Soil Improvement	600,000m2 (1,200m x 500m)	
Yard: Pavement	585,000m2	
Yard: Infrastructure	L.S.	
Removal of existing berths	400m	

(3) UQP-North Yard behind of Berth No.20

Facilities	Details	USD 142 mil
Container Yard: Pavement	560,000m2 (800m x 700m)	
Container Yard: Infrastructure	L.S.	

(4) UQP-South Berths No.4 - No.8

Facilities	Details	USD	275mil	1,035mil
Expansion of Berth No.4-8 (**)	1,090m x 15m (-13m)		-	379
Removal of existing sheds	6 Sheds, 36,000m2		33	33
Container Yard: Pavement	730,300m2, (1,090m x 670 m)		195	195
Container Yard: Infrastructure	L.S.		20	20
Equipment: Gantry Crane (**)	14 sets, 7 sets per 545.0 m x2		-	279
Equipment: RTG (**)	42 sets, 21 sets per 545.0 m x2		-	129
Equipment: Mobile Crane (*)	10 sets, 2 x 5berths		27	-

Note: ** Long-term Development Plan only,
* Alternative Plan only

(5) UQP Ground Area Redevelopment

Facilities	Details	USD 561 mil
Truck Parking	1,500,000m2 (1.5km x 1.0km)	
South Port Truck Terminal	L.S.	
Administration Building	200,000m2 (200m x 200m x 5 floors)	
Main Gates for North Port and South Port	2 Gates	
Logistic Center (Bonded Zone) EPZ	1,500,000m2 (500m x 1,500m x 2 area)	
Logistic Center	600,000m2 (300m x 2,000m)	
General Cargo Terminal/Yard	600,000m2 (1,200m x 500m)	
Yard behind of No.12 & 13	400,000m2 (400m x 1,000m)	
International Container Terminal (ICT)	L.S.	
Removal of Sheds behind No.12 & 13	4 Sheds, 24,000m2 (150m x 40m x 6 shed)	
Removal of Existing Jib Cranes	24 nos	
Removal of Existing Rails	L.S.	
Construction of New Rails	L.S.	
New Roads in Port Area	80,000m2 (8m x 10,000m)	

(6) KZP Ground Area Redevelopment

Facilities	Details	USD 425 mil
New Open Storage Yard 1, 2 & 3	250,000 m2, (500m x 500m) x3	
New Iron Ore Yards at Berth No.9 & 10	224,000 m2, (560m x 400m)	
New Work Shop behind of No.9 & 10	112,000 m2, (560m x 200m)	
Work Shop No.9 & 10	3 Sheds, 20,000m2 (100m x 20m x 3 shed)	
Removal of Sheds behind of No.7 & 8	4 Sheds, 28,800m2 (180m x 40m x 4 shed)	
Removal of Belt Conveyors No.5 & 6	L.S.	
Infrastructure	L.S.	
Truck Parking Area	150,000m2, (500m x 300m)	
Administration Customs Office Building	150,000m2, (250m x 300m x 2floors)	
Rail Terminal	L.S.	

(7) Abu Flus Port Redevelopment

Facilities	Details	USD 19 mil
Rehabilitation No.3 for Container Terminal	250m	
Container Staking Yards	250,000m2 (250m x 100m)	
Equipment: Mobile Crane	2 sets	

(8) Al Maqil Port Redevelopment

Facilities	Details	USD 48 mil
Yard Rehabilitation	180,000 m2	

(9) Al Faw Grand Port (Alternative only)

Facilities	Details	USD 4,905 mil
New Container berth No.1 - 2	350m x 2 x 500m (-16.0m)	325
Access Channel Dredging	17,730,000m3, inner: -14m, 27,000,000 outer:-14m	354 (540)
Access Road TYPE-1	5,700m	185
Access Road TYPE-2	700m	20
Revetment	900 m	22
Highway: Part-1 to Al Faw Port	16.0 km + 5 km to AFGP	232
Highway: Part-2	33.5 km	371
Highway: Part-3, incl. tunnel approach	10.3 km	114

Highway: Part-4 from Safwan city	12.4 km	137
Highway: UQP Tunnel	5,000 m (main tunnel 2,000m)	1,149
Equipment: Gantry Crane, RTG	6 sets, 18 sets	175
West Breakwater	16.0 km	933
East Breakwater	8.0 km	346

(10) Khawar Abdallah Channel System

Capital Dredging/Removal of Wrecks	million USD
Abdallah Channel	360
Wreck Removal (1 at buoy No.3 to No.25)	7
Umm Qasr Channel	60
Wreck Removal (6 along channel, 3 at berth No.9)	60
Khor Al-Zubayr Channel	-
Wreck Removal (4 along channel)	-

(11) Shatt Al Arab Channel

Capital Dredging/Removal of Wrecks	million USD
Mouth area dredging	90
Wreck Removal (approximately 23)	153

6.2. Priority Projects

Among the Short/Mid-term development projects listed in the previous section, some projects need early implementation, and some projects need public and private partnership for effective implementation. Priority ranking of the projects are assessed from the viewpoints of expansion of cargo handling capacity, urgency, necessity for public initiative, effectiveness on port safety, and obstacles in project implementation. Short/Mid-term projects for port development are listed in Table-16 in order of priority ranking.

Table-16 Priority Ranking of Short/Mid-term Development Projects

Project	Factors	Capacity Expansion	Urgency	Necessity Public Initiative	Effective on Safety	Obstacles in Implementation	Priority Ranking
UQP-South Berths No.4 to No.8		A	A	A	-	-	1
UQP Land Area Redevelopment		B	B	A	B	-B	2
Khawr Abdallah Channel		B	B	A	B	-B	2
UQP-North Berths No.24&25		A	B	C	-	-	3
UQP-North Berths No. 22 & 23		B	A	C	-	-	3
UQP-North Yard behind No.20		B	A	C			3
KZP Land Area Redevelopment		B	B	A	-	-B	3
Abu Flus Port Redevelopment		C	B	B	-	-	4
Al Maqil Port Redevelopment		C	B	B	-	-	4
Shatt Al Arab Channel		B	C	A	B	-A	4

Note: A: Very Important, B: Necessary, C: Less Impact, -A: Very Difficult, -B: Fairly Difficult

Source: JICA Study Team

6.3. Economic Evaluation of Short/Mid-term Development Projects

Economic analysis of the Short/Mid-term project shows larger B/C ratio and EIRR than the case of long-term projects as shown in Table-17. NPV, B/C ratio and EIRR of the Short/Mid-term Development Plan are larger than those of the Alternative Plan, which indicates that the Short/Mid-term Development Plan may be suitable from the view point of national economy.

Table-17 Economic Analysis of Short/Mid-term Projects

Short/Mid-term Plan	NPV (million USD)	B/C ratio	EIRR
Base Case	4,865	2.48	16.8 %
Case 1	4,536	2.25	15.4 %
Case 2	4,049	2.23	15.3 %
Case 3	3,179	2.03	14.0 %

Alternative Plan	NPV (million USD)	B/C ratio	EIRR
Base Case	224	1.04	6.4 %
Case 1	- 353	0.94	5.6 %
Case 2	- 375	0.93	5.5 %
Case 3	-952	0.85	4.6 %

Source: The Study Team

Note: Case 1: Cost up by 10%; Case 2: Benefit down by 10%, Case 3: Both cases happen simultaneously

7. Short/Mid-term Action Plan to Improve Port Management and Operations

7.1. Improvement of Terminal Operations

The most critical issues for GCPI regarding container terminal operations and management are; to not operate them by GCPI itself, but to utilize the existing facilities to the maximum extent by letting competent private operators manage and operate container terminals, and also, to develop necessary facilities in the right locations, and rehabilitation of the existing facilities.

Another critical issue for container terminal operation at Iraq ports is the long dwelling time of stored containers. The lengthy dwelling time of import containers forces terminal operators to prepare huge Off-dock container yards when they handle containers up to their berth capacities.

Extra expenditures and operations of the operators in UQP for developing and operating the Off-dock yards should become a big burden for them by reducing competitiveness and user-friendliness of the port. Therefore, GCPI is required to work hard together with MOT to reduce the dwell-time drastically, in cooperation with Iraqi Customs/MOF by modernizing and or simplifying their procedures/systems.

- Average container yard dwelling time of containers at ports in developed countries, except transshipment ports, is around 5~6 days, though it is more than 10 days at developing countries because consignees at these countries use the container yards as storage places for their cargoes in many cases.
- Hence, GCPI/MOT shall try to reduce the average dwelling time at Iraqi container terminals to 10 days initially.
- To achieve an average dwelling time of 10 days, it should become 16 days on average for the import containers, assuming 4 days on average for export ones, including empties.
- However, a 10 day dwelling period should be a tentative goal for the port; GCPI/MOT, hence, has to aim to reduce the average dwelling time to 5~6 days as a whole in the near future.

7.2. Necessary Actions for Improving Port Management and Operations

Regarding the improvement of terminal management and operations, important directions are separation of private and public services, improvement of cargo handling productivity and reduction of cargo dwelling time in port. GCPI's change from service port to landlord port is another important issue.

Port development needs the encouragement of private investment by means of granting attractive conditions on port development and operation concession. Longer concession period and bigger revenue share will encourage private companies to make larger investment. It is also important to make the port development master plan and authorize it for the implementation of public agencies and private investors. Human resources development is one important action to be taken in due course, in particular capacity development of port administration and improvement of training the institute are important actions for better port management and operation.

Forty nine items are listed in the necessary action plan for improving port management and operations as shown in Table-18.

Table-18 Necessary Actions for Improving Port Management and Operation

Items		Directions		Necessary Actions
Terminal management and operation	1	Separation of Private and Public Services	1	Facilitation of granting operation concession to private terminal operators
			2	Encouragement of stevedoring work by private companies
	2	Improvement of productivity of cargo handling	3	Reduction of cargo dwelling time in port, and increase of annual yard capacity of cargo handling.
			4	Utilization of berths by increasing berth occupancy ratio
			5	Reduction of customs clearance hours
			6	Reduction of gate processing time and shortening queues in front of the gates
	3	Introduction of Port EDI system and IT	7	Introduction of single window system for port management and operations through the establishment of Port EDI system
	4	Installation of modern cargo handling equipment	8	Installation of RTG system in container yard operations, and increase in yard capacity
			9	Installation of quay gantry cranes
			10	Good maintenance of cargo handling equipment
Organizational reform	5	Change from the service port to the landlord port	11	Establishment of an operating company which succeeds operational function of GCPI
			12	Establishment of authority/department in charge of port administration
			13	Revision of the present "Port Law" and clarification of roles, duties, functions and powers of port management body and operators
			14	Establishment of marine agency responsible for the maintenance of navigation channels, pilotage service.
			15	Administration on port safety, port and ship security, and environment protection
	6	Improvement of financial management	16	Reduction of personnel cost and excess labor force for cargo operations
			17	Increase in cargo handling activities by modern equipment and productive work force
			18	Increases in cargo throughput and ship calls in line with the national economic growth
Port development	7	Expansion of port capacity ahead of demand	19	Authorization of port development master plan and approval on each port development plan in due course
			20	Implementation of Public Private Partnership projects
				21

Items		Directions		Necessary Actions
			22	Encouragement of private investment by means of granting longer concession period
			23	Appropriate profit margin for private investors to introduce modern efficient equipment
			24	Development of access road, port zone, and utility facilities to encourage port investment
			25	Development of wharves and infra structures by public fund and super structures by private operators
			8	Rehabilitation and reinforcement of existing facilities
27	Promotion of the establishment of port related business through preparing logistics area, roads, water supply and drainage, utilities in port area.			
Improvement of navigation channel	9	Navigation channel improvement in depth and width	28	Deepening and widening crucial part of navigation channel and removal of obstacles to enable larger ships' entry without tidal restriction
	10	Introduction of Vessel traffic control	29	Introduction of AIS-VTS to secure safety of navigation and increase capacity of channel traffic
	11	Maintenance of navigation channels	30	Implementation of maintenance dredging by own fleet
31			Joint management of Khor Abdallah channel with Kuwait authority	
Promotion of Iraqi ports	12	Revision of port tariff for port promotion	32	Introduction of rational tariff at container port, review of wharfage and increasing rates on tonnage fee, and others
	13	Better services for shippers and consignees	33	Reduction of necessary time for clearing port documentation, customs procedure, and dwelling time of imported cargoes
			34	Review of tariff system and enabling private operators set own charges on cargo handling and other own services
	14	Better services for shipping lines	35	Reduction of berthing time of a ship by offering speedy cargo handling
			36	Less tidal restrictions on ships entering into approach channel or departing from port
			37	Improvement of productivity of cargo handling and shortening ships' turnaround time
			38	Reduction of total port cost including storage fee and unofficial charges

Items		Directions		Necessary Actions
Assurance of Port Security	15	Security management of international port facilities	39	Implementation of port security evaluation in accordance with ISPS Code, Assessment of port security management of each terminal
			40	Preparation of port security plans, Installation of port security facilities, Port security drills and exercises
Preservation of Port Environment	16	Conformity with regulations of MARPOL convention	41	Reception of oil, oily water, sewage, garbage and other waste from ships. Installation of reception facilities.
			17	Management of waste from port activities and floating waste
	43	Recovery and treatment of floating waste on port waters and navigational channels.		
Human resources development	18	Capacity development of port administration staff	44	Capacity development of managers and officers in planning port policy, making development strategy and implementing development projects
			45	Capacity development of officers in evaluating port development projects and coordinating related projects
			46	Capacity development of officers in monitoring and supervising private terminal operations
	19	Improvement of training institute	47	Modernization of seafarers training institute, and introduction of port labor training program
			48	Training of personnel for vessel traffic control, pilotage service, operation of dredgers and other services
			49	Training of staff members of private port operators

Source: JICA Study Team

7.3. Port Security Management

Based on the results of the current situation review conducted, the JICA Study Team discussed the rectification and improvement strategy of the security measures with the ISPS Section of GCPI, and recommend possible and sustainable measures to GCPI for further effective implementation of security measures at port facilities applicable to ISPS Code.

(1) Domestic Law

The Iraqi domestic law in compliance with the requirements of SOLAS XI-2 and Part A of ISPS Code should be enacted as soon as possible in order to justify the implementation of the security measures required by SOLAS XI-2 and ISPS Code by this domestic law.

(2) Communication to IMO

The major noncompliance with the requirements of SOLAS XI-2 is that the Contracting Government has not communicated to IMO the details of the port facilities of which PFSPs have been approved by the Contracting Government. This means that the port facilities in Iraq are not considered by ships, as well as port facilities of other countries, as port facilities complying with ISPS Code. Consequently, it is feared that port facilities not complying with the global standard will exert huge influence on their international trade and prejudice the national economy.

(3) Security Measures

The following security measures should be implemented effectively:

1) Controlling access to the port facility

Port Security Card system (PS Cards will be issued as the entry pass by GCPI to persons required to enter port facilities) is recommended to implement tighter access control at the gate of the port facilities, however, it will be expensive and need time for preparation. Therefore, the following method is recommended until the time GCPI will arrange a PS Card system to identify 3 important items:

- a) Identification of uniqueness of the personnel; Checking ID with photo and the face of the personnel
- b) Identification of professional affiliation: The said personnel should fill his/her name and professional affiliation into the registration book, and temporary entry pass should be issued.
- c) Identification of purpose of entry: The purpose of entry and target object should be recorded into the registration book and the cargo carrying in/out slip should be verified.

2) Monitoring port facility

In order to ensure the monitoring requirements be properly conducted, improvement of the following important measures are necessary:

- a) Fencing
- b) Surveillance cameras
- c) Lighting
- d) Security communication

3) Testing the effectiveness of the Port Facility Security Plan should be conducted periodically.

4) Training, drills and especially exercises, on port facility security, should be conducted together with related organizations to ensure reliable communication on the assumption that a security incident could occur.

7.4. Port Reception Facility

In the Gulf region, all countries except Iraq have ratified MARPOL convention. Iraq regulates ship discharges under provisions of the Law and Instruction of Ports 1995 and the Law for Protection and Improvement of the Environment 2009. Ship waste reception needs at UQP and KZP are assessed as shown in Table-19. Waste reception method is examined and summarized as shown in Table-20.

Table-19 Assessment of Ship Waste Reception Needs

Waste reception needs		Reason	
Annex I	Oily bilge water	Yes	While most ships generate oily bilge water, ships without oil filtering equipment cannot discharge during voyage under MARPOL.
	Oily residues	Yes	All ships generate oily residue, which cannot be discharged during voyage under MARPOL.
	Oily tank washings	No	Tank washing is not conducted at KZP as calling tankers carry only single products. There are no oil tankers calling at UQP.
	Oily ballast water	Yes	Although modern tankers are likely to be equipped with segregated ballast tanks in accordance to MARPOL,

Waste reception needs		Reason	
			some old or small tankers not regulated under MARPOL may carry oily ballast water.
	Scale/sludge from tanker cleaning	No	Tank cleaning is not conducted at KZP. There are no oil tankers calling at UQP.
Annex II	NLS	No	Tank washing is not conducted at KZP as calling tankers carry only single products. There are no chemical tankers calling at UQP.
Annex IV	Sewage	No	Most ships can discharge their sewage legally during voyage under MARPOL.
Annex V	Cargo residue	No	There are no ships that carry harmful bulk commodities. Non-harmful cargo residue can be discharged legally during voyage under MARPOL.
	Animal carcass	No	Can be discharged legally during voyage under MARPOL.
	Domestic waste	Yes	All ships generate domestic waste and cannot be discharged during voyage under MARPOL.
	Cooking oil	Yes	Most ships use cooking oil and cannot be discharged during voyage under MARPOL.
	Food waste	No	Can be discharged legally during voyage under MARPOL.
	Operational waste	Yes	All ships generate operational waste (e.g. dunnage/linings, incinerator ash) and cannot be discharged during voyage under MARPOL, except non-harmful cleaning agents or additives.
	Plastics	Yes	All ships generate plastic waste and cannot be discharged during voyage under MARPOL.

Source: JICA Study Team

Table-20 Proposed Waste Reception Method and Required Facilities

MARPOL	Waste type	Reception method	Required facility
Annex I	Oily bilge water	Collection by tank truck/oil collection vessel, then transport to local treatment facility (e.g. SOC facility) for treatment/disposal.	• Tank truck
	Oily residues		• Vacuum truck (for collecting sludge)
	Oily ballast water		• Oil collection vessel • Holding tank (in case of excessive waste oil)
Annex V	Garbage	• Receive only non-hazardous garbage • Collection by garbage truck, then transport to local landfill. • Segregation of recyclable waste	• Receptacles (garbage bins) • Garbage truck • Temporary storage area for recyclable waste

Source: JICA Study Team

7.5. Environmental Management Requirements for Private Terminal Operators

Aiming at environmental protection in port land areas and waters, private terminal operators or other agencies located in the port shall take necessary action to prevent pollution in

port. The party responsible for implementing the environmental management measures should be clearly stated in the EIA and incorporated into the contract between GCPI and private operator. Other recommended measures to be taken by private operators and GCPI are as follows.

- Private terminal operators or any agency who will develop and operate a terminal shall prepare the EIA report, which covers operational aspects of port activities and shall include an Environmental Management Plan and Waste Management Plan;
- Private terminal buildings, workshops and other houses shall install combined waste water treatment tanks for toilet and domestic water, and discharge treated effluent under Iraqi discharge standard (e.g. BOD concentrations of 40 mg/litter or less);
- Workshops, power generators and other machinery maintenance service shops shall be equipped with oil spill containments and prevent runoff into port waters; and
- GCPI should periodically monitor water quality of channel and basin in UQP and KZP, e.g. chemical oxygen demand, dissolved oxygen, suspended solids, coliform bacteria, normal hexane extracts (oily substances), and other necessary items.

7.6. Capacity Development

(1) Training Center and Ports Institute

GCPI's ports training center holds regular in-house training courses throughout the year. In 2014, the number of training courses increased by 50% to 54, and total number of participants increased by 100% to 921 compared with the previous year. Training courses cover a wide range of Marine Affairs, Electric Engineering, Mechanical Engineering, English Language, Port Management, Cargo Handling Operations, Safety Measures, Environmental Protection, Fire Prevention and General Administration.

A feasibility study for a Ports' Institute project was implemented by the committee organized by GCPI in April 2013. The committee, consisting of nine members from GCPI, recommended to establish the Ports' Institute for training GCPI staff in order to implement port development projects effectively and to manage port operations properly, in particular the development and management of Al Faw Grand Port.

Total investment necessary for the establishment of the Ports' Institute is estimated at about USD 36 million, in which cost for a ship handling simulator and laboratory test equipment is assessed at about USD 28 million, and workshop equipment is USD 2.4 million. The necessary number of lecturers and staff members of the Ports Institute is estimated at 158, and annual operation cost is in a range of USD 4.5 to 4.9 million, including wages.

(2) Needs for Capacity Development

Capacity assessment implied that necessary expertise for GCPI is extensive, as shown in Table-21. One target group for capacity development is middle class management, in terms of port administration and management, terminal management and operations, business management of GCPI, port sales and marketing, and port/channel planning. The other target group is marine staff, engineers and supervisors in the area of marine services, port channel construction work, maintenance and repair of port facilities and other practical work.

Both groups are targeted in terms of port security management, port environment protection and safety measures in ports.

Table-21 Necessary Areas for Capacity Development

Themes of CD	Area for Capacity Development	
Improvement of capacity for port administration	<ul style="list-style-type: none"> ➤ Establishment of Port Policy ➤ Port Development Planning ➤ Port Operation ➤ Port Administration 	<ul style="list-style-type: none"> ➤ Port Legislation ➤ Maritime Transportation Analysis ➤ Port Privatization
Improvement of capacity for terminal management and operations	<ul style="list-style-type: none"> ➤ General Cargo Handling ➤ Container Cargo Handling ➤ Port EDI System, Port Management IT System ➤ Cargo Handling Equipment ➤ Stevedoring Work ➤ QGC/RTG Operation 	<ul style="list-style-type: none"> ➤ Port Logistics ➤ Container Yard Operation ➤ Port Entry and Departure Control
Enhancement of capacity for business management of GCPI	<ul style="list-style-type: none"> ➤ Port Business Management ➤ Human Resources Management ➤ Budget Management ➤ PPP Project Planning and Management ➤ Port Development and Operation Concession 	<ul style="list-style-type: none"> ➤ Contract Management ➤ Financial Management of Port ➤ Coordination of Port Services
Enhancement of capacity for marketing and port promotion	<ul style="list-style-type: none"> ➤ Port Transport and Stevedoring Services ➤ Maritime Network Analysis ➤ One Stop Service 	<ul style="list-style-type: none"> ➤ Attraction of Enterprises ➤ Port Sales and Marketing
Enhancement of capacity for port/channel planning and implementation of development project	<ul style="list-style-type: none"> ➤ Port Layout Design ➤ Financial Arrangements ➤ Road Planning, City Planning ➤ Port Facility Design ➤ Navigation Channel Development 	<ul style="list-style-type: none"> ➤ Project Cost Estimation ➤ Construction Contract Management ➤ Construction Work Implementation
Improvement of capacity of staff members in marine services	<ul style="list-style-type: none"> ➤ Laws on Maritime Safety and Navigation ➤ Laws and Regulations on Ship Safety ➤ Meteorology and Oceanography ➤ Navigation Aids ➤ Dredging Techniques 	<ul style="list-style-type: none"> ➤ Seafarers Training ➤ Ship Manoeuvring ➤ Dredger Manoeuvring ➤ Tugboat Manoeuvring
Improvement of capacity for maintenance of port facilities and channels	<ul style="list-style-type: none"> ➤ Civil Engineering and Architecture Design ➤ Construction Work Management ➤ Bathymetric Survey ➤ Dredging Work Management 	<ul style="list-style-type: none"> ➤ Mechanical Design ➤ Mechanical Facility Maintenance ➤ Electric Facility Maintenance ➤ Salvage of Wrecks

Themes of CD	Area for Capacity Development
	➤ Maintenance Shop Management
Capacity for port security management, port environment protection	<ul style="list-style-type: none"> ➤ VTS Operation and Maintenance ➤ Port Facility Security Plan ➤ Port Security Management ➤ Reception of Ship Waste ➤ Vessel Traffic Controller ➤ Safety and Prevention of Accident in Port ➤ Port Environment Protection ➤ Sanitation in Port

Source: JICA Study Team

8. Conclusions and Recommendations

8.1. Conclusions

(1) Cargo Demand Forecast

Future container cargo throughput of Iraqi ports is estimated in connection with GDP growth, and those of conventional and liquid cargo are examined by analyzing demand for consumption of major commodities. Container cargo is projected to increase to 2.09 - 3.93 million TEUs in 2025 and to increase to 3.11 - 6.94 million TEUs in 2035.

Import of conventional cargo, except vehicles, is projected to increase slightly from 6.5 million tons in 2014 to 7.3 million tons in 2025, and 9.7 million in 2035. In the low growth case, conventional cargo is projected to decrease slightly. Export of liquid bulk cargo is projected to increase from 1.2 million tons in 2014 to 7.8 million in 2025, and decrease to 7.1 million tons in 2035 due to domestic demand for consumption.

(2) Long-term Strategy for Port Development and Administration

Based on the SWOT analysis¹, strategic goals of port development in Iraq are summarized as the following 7 items.

1) To promote maritime transportation through Iraqi ports

Iraqi ports are required to strengthen the competitiveness of transportation through the Arabian Gulf coast route compared with the Aqaba port route and Mersin port route, by reducing the cost at Iraqi ports, shortening transportation time, and improving port services)

2) To develop and maintain approach channels that cope with the increasing number and size of calling vessels

Khawr Abdullah, Umm Qasr and Khor Al Zubayr channels maintain a depth of 12 meters. Al Faw Grand Port shall be dredged to a depth of 12 m at the initial stage, deepened further at the later stage. Shatt-al-Arab channel mouth maintains a status quo and will be dredged to a depth of 8 meters.

3) To develop port facilities and terminals to cope with the increase in cargo

UQP is required to develop container facilities to handle up to 250 - 300 million TEUs. Al Faw Grand Port is expected to start operations in 2020 - 2025. Bulk terminals for grain, cement, fertilizer and others shall be developed.

4) To encourage private participation in port development and operation

Private investment plays key role in successful port development, it is therefore important to ensure investors enough period to recover their investment in the concession contract, and give incentives for their investment to overcome risks of investment.

5) To provide friendly and competitive services for users

Port management shall aim at providing competitive services by modernizing port facilities and equipment, improving productivity of cargo handling, enhancing performance of ports, reducing cargo dwelling time in port, realizing prompt customs clearance, introducing systematic gate and truck operations, and rationalizing port procedures.

6) To promote the development of highways, port access roads and railways

Transportation from a port to hinterland is a critical factor for shippers and consignees. Efforts shall be made to develop an express highway from UQP to Bagdad, restore railways from port to major cities, develop a port access road to Al Faw Grand Port, to develop dry ports in the suburbs of Bagdad.

¹ SWOT analysis is a structured planning method used to evaluate the strengths, weaknesses, opportunities and threats involved in internal and external environment of Iraqi port.

7) To establish laws and regulations for port development, management and operations

Iraqi ports shall be administered under national law and regulations, which clarify rights, duties and responsibilities of private investors in port development and operations, clarify powers, functions, duties and responsibilities of GCPI, and transform Iraqi ports from Service Ports to Landlord Ports.

(3) Long-term Stage Plan for Port Development

In order to make a master plan based on Concept B, two options for the opening of AFGP are taken into consideration. One option is that the opening of AFGP may be delayed for several years. The other option is that the first berth of AFGP may be completed by the end of 2018 and enter into operation soon.

[Option 1] AFGP may enter into operation in 2026 or later. UQP South berths will be redeveloped and expanded along the water front. Quay gantry cranes will be installed in the UQP South berths. UQP North Berths No.25, 26 and 27 are also developed as a large scale modern container terminal.

[Option 2] AFGP may enter into operation in 2018. Before the opening, UQP South will be rehabilitated and reinforced by private sector and used for container handling with mobile cranes. UQP North No.25 to 27 will not be developed due to limited demand for container handling at UQP.

Long-term Port Development Plan is proposed in line with the Option 1, and the Option 2 is listed as the Alternative Plan.

(4) Long-term Port Development Projects

Coping with the demand for seaborne cargo handling in 2035, necessary projects are examined and the following projects are selected for long-term port development. Contents of each project and estimated cost are as shown in Table 22.

Table 22 Possible Long-term Development Projects

Terminals/Facilities	Estimated Investment
UQP North Berths No.25, 26 & 27	USD 522 mil.
UQP North Berths No.22, 23 & 24	USD 447 mil.
UQP North Berth No.20	USD 142 mil.
UQP South Berths No.4 - No.8	Long-term Development Plan: USD 1,035 mil. Alternative Plan: USD 275 mil.
UQP Port Area Redevelopment	USD 561 mil.
KZP Berth No.11 & 12	USD 391 mil.
KZP Port Area Redevelopment	USD 425 mil.
Abu Flus Port Redevelopment	USD 19 mil.
Al Maqil Port Redevelopment	USD 48 mil.
Al Faw Ground Port Development	Long-term Plan (4 Berths): USD 5,042 mil. Alternative Plan (9 Berths): USD 6,436 mil.
Khawr Abdallah Channel System	
Abdallah Channel () in case of Rerouting	USD 360 (1,359) mil.
Removal of Sunken Vessel (One)	USD 7 mil.
Umm Qasr Channel	USD 60 mil.
Removal of Sunken Vessels	USD 60 mil.
Shatt al Arab Channel	
River Mouth Area	USD 170 mil.
River Mouth - Abu Flus Port	USD 140 mil.
Abu Flus to Al Maqil Port	USD 10 mil.
Removal of Wrecks (Approximately 33)	USD 220 mil.

Source: JICA Study Team

(5) Short/Mid-term Port Development Projects

To cope with estimated demand in 2025, necessary port and channel development projects are selected from Long-term Development Plan for UQP, KZP, Al Maqil Port, Abu Flus Port, Khawr Abdallah Channel and Shat Al Arab Channel. Except Al Faw Grand Port development project, KZP No.11-12 Berth development project and part of the Shatt Al Arab Channel development project, the other projects of the Long-term Development Plan are assessed as necessary projects for Short/Mid-term Plan. For early recovery of Shat Al Arab Channel, dredging of the river mouth area and removal of wrecks are proposed to be included in Short/Mid-term Plan.

(6) Economic Evaluation

Economic analysis of the Short/Mid-term Plan shows that B/C ratio is 2.5 and EIRR is 16.8% in Base Case. The Alternative Plan, which is the early development of Al Faw Grand Port and less development of UQP, shows that B/C ratio is 1.04 and EIRR is 6.4%. In the case of the Alternative Plan, two berths of Al Faw Grand Port will enter into operation in 2018 or 2019, and initial investment necessary for the opening of two berths and access channel to AFGP is estimated at about USD 4,900 million. It is therefore proposed that the Short/Mid-term development plan without Al Faw Grand Port is more beneficial and Al Faw Grand Port will be developed to meet the demand after 2025.

(7) Necessary Actions for Improving Port Management and Operations

Regarding the improvement of terminal management and operations, important directions are separation of private and public services, and GCPI's change from service port to landlord port.

Port development needs to encourage private companies to make larger investments. It is also important to make a port development master plan and authorize it for the implementation of public agencies and private investors.

Human resources development is one of the important actions to be taken in due course, in particular capacity development for port administration and improvement of the training institute are important actions. Forty nine necessary actions for improving port management and operations are proposed, and those are summarized as following 19 middle items:

- 1) Separation of Private and Public Services
- 2) Improvement of productivity of cargo handling
- 3) Introduction of Port EDI system and IT
- 4) Installation of modern cargo handling equipment
- 5) Change from service port to landlord port
- 6) Improvement of financial management
- 7) Expansion of port capacity ahead of demand
- 8) Rehabilitation and reinforcement of existing facilities
- 9) Navigation channel improvement in depth and width
- 10) Introduction of vessel traffic control
- 11) Maintenance of navigation channels
- 12) Revision of port tariff for port promotion
- 13) Better services for shippers and consignees
- 14) Better services for shipping lines
- 15) Security management of international port facilities
- 16) Conformity with regulations of MARPOL convention
- 17) Management of waste from port activities and floating waste
- 18) Capacity development of port administration staff
- 19) Improvement of training institute

(8) Port Security Management

Major requirements of SOLAS Chapter XI-2 and Part A of ISPS Code and the situation of compliance in Iraqi ports have been assessed and conclude that the requirements are mostly implemented except communications to IMO on the details of the approved port facilities. However, it is pointed out that more drills are necessary for better security measures, improvement of security equipment is important for better monitoring, and capacity development of security staff is indispensable for effective security management.

(9) Port Reception Facilities

In the Gulf region, all countries except Iraq have ratified MARPOL convention. Iraq regulates ship discharges under provisions of Law and Instruction of Ports 1995 and the Law for Protection and Improvement Environment 2009. Needs for ship waste reception at UQP and KZP have been assessed and conclude that UQP and KZP shall collect oily bilge water, oily residues, oily ballast water, garbage, cooking oil, dunnage lining and other operational waste and plastics.

Other Annex I wastes, such as oily tank washings, scale/sludge from tanker cleaning, noxious liquid substances, shall be treated by their cargo owner or ship operator. Other Annex V wastes, such as cargo residue, animal carcasses, garbage (domestic waste), cooking oil and food waste, shall be discharged in accordance with regulations of MARPOL or treated by their own onboard facilities.

Oily waste shall be collected by tank truck/oil collection vessel, then transported to a local treatment facility (e.g. SOC facility) for treatment/disposal. Garbage and other operational waste shall be collected by garbage truck, then transported to a local landfill site. Segregation of recyclable waste shall be encouraged, and stored in a temporary storage area.

8.2. Capacity Development

Capacity assessment for the implementation of the Action Plan implied that necessary expertise for GCPI staff is extended over many areas, i.e. policy planning, legislation, development planning, port management and operations, logistics, cargo handling, stevedoring, port IT system, contract procedures, financial management, maritime network, port sales and marketing, one stop service, pilotage, navigation aids, port facility construction and maintenance, vessel traffic, port security, ship waste management, environmental assessment and others.

One target group for capacity development is middle class management for port administration, terminal management and operations, business management of GCPI, port sales and marketing, and port/channel planning. Another target group is engineers, supervisors and marine staff for training of marine services, port channel construction work, maintenance and repair of port facilities and other practical work.

The training center of GCPI will establish courses for practical skills and studies. However, policy matters and/or legislative/administrative matters, such as Establishment of Port Policy, Port Legislation, Port Privatization, Port Development and Operation Concession, Financial Management of Port and the like, may need special collaboration between foreign experts and executive members of GCPI.

Qualification and certification of seafarers is regulated by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978. Though the Republic of Iraq ratified the STCW convention, Iraq is not included on the white list of IMO, which upholds that seafarers' education meets the standard of STCW, and that the certification issued by a white list country is acceptable.

The number of Iraqi flag vessels is not so many, but there are 59 vessels of Iraqi flag, of which four are tankers, six are general cargo vessels, others are dredgers, tugboats and the like, as of 2014. It may be necessary that Iraq has a Seafarers Training Institute and joins as a member of the white listed countries. Seafarers' training is the responsibility of the Ministry of Transport, and GCPI shall make efforts to train harbor pilots, crews of dredgers and tugboats, and other marine

staff members.

Seafarers' training may employ a training ship and/or a ship handling simulator. A ship simulator will be of help to seafarer's training, but is not always necessary for it. On board training can qualify seafarers to obtain certificate of officers or a seaman license.

8.3. Recommendations

(1) Stage Plan for Port Development

Recalling the development of Al Faw Grand Port, two options for the stage plan of the development of UQP are assumed, and comparison is made by economic analysis of Long-term Development Projects and Short/Mid-term Projects. The first option is the priority development of UQP in the early stage with moderate development of AFGP to meet demand after 2025. The second option is intensive investment in Al Faw Grand Port and less development of UQP.

Due to the large investment necessary for the opening of Al Faw Grand Port and its access channel, the first option "priority development of UQP" shows higher economic rate of return than the second option "intensive investment in Al Faw Grand Port and less investment in UQP".

Therefore, the following stage plan will be appropriate to improve/expand cargo handling capacity of Iraqi ports.

- 1st) Improve cargo handling capacity by increasing productivity and reducing dwell time of imported cargo;
- 2nd) Redevelop UQP-South Berths No.4-No.8 as a modern container terminal with Quay gantry cranes;
- 3rd) Develop UQP-North Berths No.25-27 as a new container terminal;
- 4th) Encourage container handling at KZP, Al Maqil Port and Abu Flus Port;
- 5th) Container handling capacity of the present four ports shall be expanded to 3 million TEUs in total; and
- 6th) Al Faw Grand Port will enter into operation after container throughput of Iraq reaches 3 million TEUs.

(2) Priority Projects for Short/Mid-term Port Development

Among the Short/Mid-term development projects listed in this report, some projects need early implementation, and some projects need public and private partnership for effective implementation. Priority ranking of the projects are assessed from the viewpoints of expansion of cargo handling capacity, urgency, necessity for public initiative, effectiveness on port safety, and obstacles in project implementation. Short/Mid-term projects for port development are listed as follows in priority order.

- 1st) UQP-South Berths No.4 to No.8
- 2nd) UQP Land Area Redevelopment
- 2nd) Khawr Abdallah Channel Improvement
- 3rd) UQP-North Berths No.25, 26 & 27
- 3rd) UQP-North Berths No. 22, 23 & 24
- 3rd) UQP-North Yard behind No.20
- 3rd) KZP Land Area Redevelopment
- 4th) Abu Flus Port Redevelopment
- 4th) Al Maqil Port Redevelopment
- 4th) Shatt Al Arab Channel Improvement

It is therefore recommended to place the first priority on the development of UQP-South Berths No.4-No.8, followed by the redevelopment of UQP land area and the improvement of Khawr Abdallah Channel. The third priority project is the development of UQP-North Berths No.25 to 27, UQP-North No.22 to 24, and UQP-North Yard behind No.20.

(3) Priority Projects for Improving Port Management and Operations

Necessary actions for improving port management and operations are analyzed as shown in Table 7.2-4, in which projects shown in Table 8.3-2 need the installation of equipment/facilities for maintenance or monitoring work. Among these projects, priority is examined from the viewpoint of urgency, necessity for GCPI's initiative and importance on port safety, security and environment. Priority ranking is assessed as follows as follows.

- 1st) Security Management of International Port Facilities
- 1st) Management of Waste from Ships & Port Activities
- 1st) Maintenance of Channels, Development of Service Berth
- 1st) Introduction of Vessel Traffic Management Systems
- 1st) Rehabilitation/Reinforcement of Existing Facilities
- 1st) Improvement of Training Institute
- 2nd) Introduction of Port EDI system and IT
- 2nd) Installation/Modernization of Cargo Handling Equipment

It is therefore recommended to place the first priority on; the improvement and implementation of security management of international port facilities, management of wastes from ships and port activities, maintenance of channel and development of service berth, introduction of vessel traffic management systems, rehabilitation/reinforcement of existing facilities, and improvement of training institute.

(4) Necessary Institutional Actions for Improving Port Management and Operations

Regarding the improvement of terminal management and operations, important directions are the separation of private and public services, improvement of cargo handling productivity and reduction of cargo dwelling time in port. GCPI's change from service port to landlord port is another important issue.

Port development needs the encouragement of private investment by means of granting attractive conditions on port development and operation concession. Longer concession period and bigger revenue share will encourage private companies to make larger investment. It is also important to make a port development master plan and authorize it for the implementation of public agencies and private investors. Human resources development is one of the important actions to be taken in due course, in particular capacity development of port administration and improvement of the training institute are important actions for better port management and operations.

(5) Recommendations on Port Security Management

1) Domestic Law

The Iraqi domestic law in compliance with the requirements of SOLAS XI-2 and Part A of ISPS Code should be enacted as soon as possible in order to justify the implementation of the security measures required by SOLAS XI-2 and ISPS Code by this domestic law.

2) Communication to IMO

The major noncompliance with the requirements of SOLAS XI-2 is that the Contracting Government has not communicated to IMO details of the port facilities of which PFSPs have been approved by the Contracting Government. This means that the port facilities in Iraq are not considered by ships, as well as port facilities of other countries, as port facilities complying with ISPS Code. Consequently, it is feared that because port facilities are not complying with the global standard, it will exert a huge influence on international trade and prejudice the national economy.

3) Controlling access to the port facility

Port Security Card system (PS Cards will be issued as the entry pass by GCPI to persons required to enter port facilities) is recommended to implement tighter access control at the gate of port facilities. Until GCPI will arrange PS Card system, it is recommended to implement a) checking ID with photo and the face of the personnel; b) requesting person to fill his/her name and professional affiliation into the registration book and issuance of temporary entry pass; and c) keep the records of the entry registration book.

4) Access monitoring to port facilities

In order to ensure the monitoring requirements be properly conducted; improvement of a) fencing; b) surveillance cameras, c) lighting; and d) security communication.

5) Training, drills and exercises on port facility security

Drills and exercises should be conducted together with related organizations for reliable communication on the assumption that a security incident could occur.

(6) Port Reception Facilities

In order to comply with the requirements of MARPOL, which Iraq intends to ratify soon, Iraqi ports need to strengthen the reception facilities of ship wastes. In particular, it is necessary to receive MARPOL Annex I (oily waste) and Annex V (garbage) wastes.

It is appropriate that GCPI only receives wastes generated commonly by all ships (e.g. oily residue, bilge water, domestic waste (garbage)). Wastes generated only from specific ships (e.g. oily ballast water, cargo residue) shall be handled by the cargo owner/shipper or ship operator. The scope of the reception facilities should be limited to the minimum investment and facilities as possible, by utilizing existing treatment and disposal facilities in the area. Specifically, the following reception facilities are expected at UQP and KZP.

- Tank truck, vacuum truck, oil collection vessel, and holding tank for receiving Annex I waste;
- Receptacles, garbage truck, and temporary storage area for recyclable garbage, for receiving Annex V waste

In order to estimate the quantity and scale of the reception facilities required, it is imperative to clarify volumes and types of wastes to be received at Iraqi ports, fees to be collected, regulations and procedures for reception. The following studies among others should be conducted to further refine the reception facility plan:

- Types of wastes that can be treated by existing local waste treatment facilities and required treatment fees
- Method of how to charge waste reception fee from ships
- Possibility to outsource waste handling (collection, treatment, disposal)
- Necessary amendments to relevant laws/regulations
- System and format for advanced notification for waste delivery from ships
- Storage and maintenance plan of facilities
- Impacts on port operation

Since there are many factors that could influence the quantity of ship waste (e.g. advance in waste treatment equipment on board, revision of regulations on discharges from ship, and the like), periodical reviews shall be conducted to assess the waste reception needs.

(7) Capacity Development

Taking into account future tasks of GCPI, capacity development of staff members becomes one of most important factors for successful port development and management. Capacity development shall place emphasis on the establishment of an effective port development,

management and operation system in the Republic of Iraq. Goals, objectives and outputs of capacity development are supposed as follows:

Overall Goal:

The port development, management and operation system in Iraq will be improved and changed to a Landlord type system.

Purpose of Capacity Development:

Knowledge and implementation skills on port development, management and operations are strengthened, and cargo handling capacity is increased.

Expected Outputs of Capacity Development:

- 1) Institutional reform plan for port development, management and operation is drafted.
- 2) Concession agreement for terminal development and operations is undertaken in accordance with public initiatives.
- 3) Maintenance of navigation channels and ship traffic control is properly carried out.
- 4) Port management is implemented in accordance with related international conventions.
- 5) Public port facilities are well maintained and the port area is orderly managed.

Necessary Expertise for Capacity Development

- Port Policy, Organization
- Project Management
- Concession Contract and Management
- Port and Channel Planning
- Dredging Management, Dredgers Operation
- Port Security Management
- Port Environment, Reception Facilities
- Port Management IT System
- Others

It is therefore recommended that part of the necessary areas for capacity development shown in Table-21 of this report shall be incorporated in several cooperation schemes, such as 1) on-the-job training during Port Sector Rehabilitation Project Phase (II), 2) JICA's technical cooperation, and 3) UNDP's capacity development project in Iraq.

